THE DEPRECIATION OF FACTORIES. By Ewing Matheson, M. Inst. C.E. No. I.

The deterioration of a factory by time and use, the appraisement of the loss and its due allotment in the accounts of the undertaking, are matters of great importance in the economy of management, and any neglect or error will, according to its extent, render calculations of cost and profit fallacious. No fixed rules or rates of depreciation can be established for general use, because not only do trades and processes of manufacture differ, but numerous secondary circumstances have to be considered in determining the proper course. It may, however, be possible to lay down some general principles which will always apply, or which, at any rate, may with advantage be held in view in deciding particular cases.

The question of depreciation cannot be separated from that of maintenance, and in theory one may be said to balance the other. In practice it is only in certain cases that this can be acted on. In any particular building, machine, or appurtenance, decay or wear of some sort must take place in the course of time, and repairs in order to compensate fully for the loss must take the form of renewal. But although this may be the case with each separate item of plant, the absolute replacement of some every year may maintain an average aggregate value. In only two classes of undertakings, however, can such an exact balancing of loss and gain be ventured on. One, where the plant wears out so quickly as to need replace-ment at short intervals, affording constant proof, by the mere continuance of working, that the earning power of the factory is maintained; and in a second class, that of permanent undertakings so large as to afford a wide average of deterioration and renewal. For instance, on a railway the deterioration of the fixed and moving plant is supposed to be fully and properly met by the expenditure for repairs and renewals, and so long as the working of the railway is kept going, no regard is had to a future valuation such as might disturb the accounts of a manufactory subject to a change of ownership or cessation of trade. When a railway has been in operation for many years and an average rate of expenditure as proportioned to the revenue has been arrived at, such a method may be sound, but there is a risk that in the earlier years of working the gross revenue may not be sufficiently charged with the depreciation due to it.

The absence of any provision for future renewals is often excused by the small earnings of the earlier years, but the wear and tear necessary to such earnings must sooner or later be paid for out of revenue or from new capital; and though in course of years the expenditure for repairs and renewals must almost of necessity balance the deterioration if the traffic is to go on, there is room for much error in the accounts of particular years, and in the case of constantly changing shareholders, of an unfair allotment of charges. The temptation to treat as profit the surplus of receipts over expenditure, without allowing for deterioration, appears to be often irresistible. Thus in the case of a tramway undertaking in its first years of working, a dividend may be possible only by writing little or nothing off the capital value of the cars, the harness, and the horses. This, of course, cannot last without the introduction of new capital, but even in undertakings long established there may be epochs of fictitious profits due to various causes. Thus there may be an absolute neglect of repairs, which, when the result becomes evident, will involve a heavy expenditure for renewals, or it may arise from actual fraud in postponing expenditure, so as to show large profits, which will raise the value of shares for stockjobbing purposes. There are railways where the dividend income and the corresponding value of the shares hare fluctuated considerably, not according to alternate neglect and attention to renewals of plant.

Water supply companies afford another example of permanent undertakings where deterioration of plant is dealt with in a special manner. It is not usual to write off in the annual accounts as presented to the shareholders any-thing for depreciation; but renewals as well as repairs are effected out of the current revenue. In very large and long established undertakings an average expenditure will have been arrived at which, as in the case of railways serves the purpose of a depreciation rate by charging the earnings of each year. But in the earlier years of work-ing, when expenditure for renewals has not commenced, it is usual to divide the earnings as profit, without setting apart a reserve for repairs. In the case of companies with a sunk capital, not exceeding $\pounds 100,000$, the expenditure for renewals occurs at irregular intervals; but instead of providing for such outlays in preceding years, it is more usual when any considerable expense is incurred-as, for instance, a new pumping engine or boilers—to open a "suspense account," and to divide the cost over a subsequent term of years. Of course, when this system has become well established and suspense accounts are always running, the effect on any particular year's income will probably not differ much from that of a regular depreciation rate, but it increases the apparent profit of the earlier years at the expense of later years. In many companies, however, even where no direct provision for repairs and renewals is made, there is an indirect reserve. Water supply companies are in this country almost always established by Act of Parliament, and the mode of keeping accounts and dividing profits is to some extent prescribed. Subject to occasional modification in the special Act authorising particular companies, the conditions generally are those of the Waterworks Companies' Clauses Consolidation Acts of 1845 and 1877, which allow in the discretion of the directors a reserve fund to be set apart out of profits to equalise dividends in any future years, when current profits do not allow the maxi-mum dividend permitted by the special Act of the company, the reserve fund being limited to one-tenth of the capital. This reserve fund can only be applied to its prescribed purpose of equalising dividend, and cannot be

used directly for repairs; but it is obvious that if the earnings of a particular year are burdened with some heavy expenditure for renewals the latter are really paid for out of the fund nominally applicable for dividend. But the establishment of such reserve funds is seldom authorised by shareholders, except out of surplus earnings, beyond 5 or 6 per cent., and therefore by struggling or unremunerative companies the renewals are all charged forward. Such outlay may be minimised by careful attention to repairs, but cannot be avoided. The permauent nature of the undertaking may disguise the unsoundness of the system; but it is one which, when adopted in private undertakings, is frequently a cause of loss and failure. In the case of prosperous companies with large net revenue, and whose monopoly assures a continuance of profits, repairs and renewals are carried out liberally, and, in cases where the rate of dividend is limited by law, there is even a tendency to exaggerate the expenditure on this account, so as to disguise the real net profit, or to postpone a reduction in the price of water which profits

beyond a certain limit might render obligatory. With gas supply companies also a reserve fund for renewals is not customary, and though in one sense they are per-manent undertakings, there is not so secure a future as in the case of water companies. The plant used in the manufacture and distribution of gas differs also from that used in water supply-more of it being of a kind to wear out rapidly. Retorts and other parts of the plant of short endurance are renewed out of current revenue, and with due care these charges bear a fixed proportion to the earnings; but when some considerable renewal takes place, and only the part which extends the earning capacity is defrayed out of new capital, the remainder of the outlay, which only makes good the wear and tear of the past, tells most unfairly on the current year's income, and a postponement of the charge to future years is equally unsatisfactory, if the deterioration which has called for it is really due to the work of preceding years. But, as in the case of water companies, if the profits are large and the dividends are restricted to a maximum, the expenditure out of revenue for repairs and renewals, and even for what really are extensions, is sometimes very lavish, and the accounts may be as fictitious in this direction as in the reverse cases above alluded to. Recent legislation, however, has been directed towards the ensuring of a fairer system, increased dividends being permitted in proportion as the price of gas is reduced. The interest in proportion as the price of gas is reduced. The interest of the consumers and the shareholders is thus rendered more identical, so far as economy in management is concerned.

In the case of a very large manufactory, where there is a considerable annual outlay for renewals of plant, as well as for repairs, such expenditure, if charged to revenue, may fairly balance the average deterioration of the whole; but unless safety is sought by allowing an ample margin—say by obviously increasing the plant every year—there will always be a risk that a gradual reduction in the total value of buildings or plant will take place, ultimately involving considerable expenditure to restore its earning capacity. The neglect of due provision for deterioration may occur without any warning sign in a new factory, where everything is in full working order, and where, as in the case of the railway just cited, the earnings may be undeveloped, and no fund available from which to provide for future repairs.

provide for future repairs. It is seldom that any sound undertaking can avoid legitimate extensions, but an increase in capital value cannot be properly assumed unless the earning power is increased in a corresponding ratio. In a manufactory it is difficult even for those engaged in its management always to distinguish between the expenditure for renewals chargeable to capital and that due to past deterioration, and to those outside the management impossible without careful and skilful investigation, rarely attempted. Of course, actual additions to the size of a factory may be duly reckoned as increasing the fixed capital, but such an increase may be wholly or partially neutralised by the depreciation of the older part. It may be said that the success of many undertakings, and their survival through the vicissitudes of dull times and during radical alterations in trade, have been due to the liberal charging to revenue of seeming extensions.

There are various methods of estimating the depreciation of a factory, and of recording alterations in value, but it may be said in regard to any of them that the object in view is to so treat the nominal capital in the books of account so that it shall always represent as nearly as possible the real value. The most effectual method of doing this would be to revalue everything at stated intervals, and to write off whatever loss such valuations might reveal, without regard to any settled rate. In this way the deterioration due to a period of arduous working, or to an average or idle year, might be properly allotted. Such a system of annual valuation is seldom maintained, because of the time, trouble, and expense it would involve; and even where stock-taking of profit and loss occurs every year, an ual valuation of the considered le imn ica The next best plan, which is that generally followed, and which it is my purpose now to investigate, is to esta-blish average rates which can, without inordinate trouble, be written off every year, and to check the result by complete or partial valuation at longer intervals.

A HYDRAULIC CURTAIN.—Messrs. Clark, Bunnett, and Co., of Rathbone-place, have fitted the new Lyceum Theatre, in Edinburgh, with a hydraulic curtain. The proscenium opening is over 30ft. high by fully 28ft wide. The curtain is constructed of two screens of wrought iron plates an eighth of an inch thick, forming a double division, with air chambers between of 9in. The top of the curtain is rivetted to double wrought iron girders secured to head of hydraulic rams, which are fitted, with their cylinders, on each side of the proscenium opening. The supply of water for working the rams is laid on from the town mains, and with an expenditure of only 84 gallons of water the curtain, which weighs about 64 tons, can be raised or lowered in fifty seconds. The means for working the curtain are in the prompter's box, and the prompter, by simply moving a lever, can drop the curtain, thus forming, with the proscenium wall, a solid fireproof division of the house, totally separating the stage from the auditorium, so that in case of fire an audience would be perfectly free from danger.

THE CHICAGO RAILWAY EXPOSITION.

No. V. THE rapid construction of railways has been such an important item in the development and colonisation of the far Western States, that it is not surprising that the Exposition contained many examples of machines specially constructed to save labour and make cuttings, embankments, and ditches in the shortest possible time. Among the various machines used for rapid railway construction were several steam excavators or shovels. That exhibited by the Industrial Works, of Bay City, Michigan, appeared to be well designed, and presented some points of novelty. The crane and body framing are constructed of wrought iron bars, and tie bolts bracing the whole structure firmly together. The boiler is 9ft. high, and 4ft. 6in. diameter, the outside shell being made of annealed steel plates gin. thick. The tubes are of wrought iron with copper ferrules outside where they enter the tube plate, and are 2in. internal diameter, and 148 in number. A horizontal engine with two cylinders 9in. diameter and 10in. stroke, gives power to either hoist the dipper or shovel, or move the entire digger. The former is accomplished by means of a chain winding round a drum which is driven by gearing from the engine shaft, while the whole digger is moved by means of a pitch chain from a countershaft to both forward axles, this countershaft being also driven from the main engine shaft. Two separate steam cylinders just under engine shaft. the roof, and connected to the main body framing, are used for slewing the crane, the piston rods being coupled directly to a wire rope which runs round a horizontal veed wheel or sheave attached to the upper part of the crane post. Steam is admitted to but one end of these cylinders, and the wire rope is always kept taut by an arrangement of check valves constantly maintaining a pressure on both pistons. Some economy is effected by making the cylinders of different diameters, and exhausting from the smaller to The dipper or shovel is forced into the bank the larger. of earth by a steam cylinder, which acts directly on it, the strain of guiding the dipper being taken by a long I-section beam sliding on the back of the cylinder. The dipper and piston rod are rigidly attached to this beam, thus relieving the piston of any side strain. The cylinder revolves in a vertical plane about a pair of trunnions through which it vertical plate about a pair of truthings through which is is supplied with steam. Stop motions are fitted for the various movements, so that steam is shut off to prevent the crane being swung too far, or the dipper being overwound. A digger of this construction has excavated and loaded into trucks 1200 cubic yards of hard clay in seven hours. By taking off the nut at the end of the dipper piston rod, the dipper or bucket and guide can be removed, the piston and rod swung out of the way, as shown in our illustration, and the machine can then be used as a travelling steam crane, and is thus shown in Fig. 26.

The same firm exhibit a very powerful steam break-down crane, which is also intended to be used in renewing bridges, the new girders being easily swung into position by a crane which is capable of lifting forty tons, or 90,000 lb. The jib is constructed with a central vertical plate and two side plates, each dished in the form of a semi-elipse, as shown on Fig. 28. The jib plates are of steel, §in. thick at the lower end and §in. thick at the outer end. The pillar of the crane is of cast steel, and the jib carries two cast iron blocks or bearings fitting the pillar. The radius when lifting is constant, 21ft., but the outer end of the jib can be lowered for travelling, the inner end being lifted by gear, which is not shown in the illustration, and secured by pins through the upper ends A A of raking links. A hemp rope 2³/₄in. diameter is used for hoisting linked of a chain which is almost universally used in England.

The crane end of the vehicle is carried on no less than eight wheels, two ordinary trucks or bogies being placed under the ends of two I-section bars B, 15in. deep. These bars are secured to the base of the crane pillar, but are allowed enough play in a horizontal plane to permit the two trucks or bogies to radiate to the curves of a railway. The vertical multitubular boiler is made of §in. steel plates, and is adapted to work at a pressure of 120 lb. per square inch. The cylinders are 10in. diameter by 12in. stroke. The weight of the whole vehicle complete is about forty tons, and the maker's price in America is 8000 dols., or about £1600. Cranes of a somewhat similar pattern are much used in the United States, where derailments and collisions, or "wrecks," as they are termed, are of somewhat frequent occurrence.

Messrs. Wilcox and Stock, of Toledo, Ohio, also exhibit a steam excavator, which is stated to be capable of excavating 5 cubic yards per minute. The machine is mounted on two four-wheel trucks or bogies of ordinary form but of unusual strength, the axles being 5in. in diameter, with bearings 4³/₄in. diameter by 8¹/₂in. long. The underframe is composed of 12in. by 3in. by ³/₄in. channel iron, 10in. by 2¹/₂in. by ³/₅in., to which tee irons are rivetted. The shovel or dipper is attached to a timber handle, on the lower side of which a cast steel rack is secured, and a steel pinion gearing into this rack is driven through gearing by a small double-cylinder engine attached to the jib. The main engines, which hoist the dipper or move the whole affair forward, are situated in the centre of the car. The dipper has a drop bottom, which is fitted with a self-closing catch, acting when the dipper, which will excavate to a depth of 5ft. beneath the rail level, and discharge at a height of 7ft. above the rail level. The jib has 22ft. 5in. radius, and the maximum radius of the extreme point of the shovel or dipper is 31ft., so that the machine can accomplish a tolerably wide range of work.

accomplish a tolerably wide range of work. The main pillar is of solid wrought iron 8in diameter, and is stayed laterally to projecting beams, which rest on screw jacks placed on blocks on the ground on either side of the machine, as shown on Fig. 29. A considerable amount of stability is thus attained, while these projecting arms can be readily swung clear of the loading gauge by the removal of a couple of bolts A.A. The bar hinging 200

up out of the wagon on the remaining bolt B. The bolts A¹ and A¹ and B passing through a block timber, which is firmly secured to the main frame of the car. The machine is self propelling, the main engines driving a pitch chain, which engages a spocket wheel keyed on the leading axle. The vertical multitubular boiler is 8ft. high, and 5ft. 2in. diameter, with 100 tubes 21 in. external diameter, and 2ft. 5in. in length. The hoisting chains are of steel and the bearings of phosphor bronze, with white metal pockets.

14ft. high and 10ft. wide, which is about the usual American loading gauge. Machines of this class are extremely useful to railways in America, and effect a large saving in enlarging station yards, doubling lines, and other work, which is often undertaken by the railway company and not let by con-tract. As such a machine can be converted into a breakdown or civil engineers' department crane, most railway companies could keep it in tolerably constant use.

Messrs. Harris and Carter, of Terre Haute, Indiana, show a very simple and ef-fective machine for levelling ballast, or sloping cuttings or embankments, and open-ing ditches. Fig. 30 shows the machine folded up and and Fig. 31 shows the ma-chine ready for work. A species of long plough share is hinged to each of the sides of an ordinary platform freight car. The ploughs can be raised or lowered to any angle, and the car being drawn olong the bellet drawn along, the ballast or other material which has been dumped by the side of the rails is effectually levelled to a width of 10ft. 6in. from the centre of the track. Different forms of shares can

operation of the scraper. A simpler form of scraper, Figs 4 and 35, has no wheels, but is simply dragged along he ground, an extra steel plate on the bottom taking the

wear, while a swivelling eyebolt attached to the whipple

tree enables the scraper to be tipped sideways. The railway track exhibited by the American Railway Construction Company, of Chicago, is also a very simple and efficient labour-saving machine. As the road is laid, and the rails are roughly spiked down, a train is pushed up to follow the spikers. The flat cars near the engine are laden with rails and sleepers, and the front car furthest from the engine is provided with a simple light derrick crane, which suspends on one side of the car and for some 40ft. in front of it an inclined roller pathway. Another similar pathway is fitted to the other pockets. The machine is said to be capable of excavating 1500 cubic yards per day, and can be used as a grab dredger or as a break-down crane. When put to the latter use, the dipper and dipper arm are disconnected by the removal of a single pin. The excavator when in working order is 50ft long over all, 16ft, wide over the jack beams, and 19ft, high to the top of the crane. These dimensions can be reduced for travelling to 14ft, high and 10ft wide

FIG.30.

FIC. 31.

are assisted by so simple and convenient a machine. The pathways are hinged to the sides of the flat cars, and can

pathways are hinged to the sides of the hat cars, and can be folded up out of the way when they are not wanted. The necessary spikes, fish plates, and bolts are carried on cars near the front of the train and distributed as required. A ballast train is then drawn to the spot by an engine, and is partly emptied or "dumped" through the dram bottom doors on the beliest travels or "dist area" the drop bottom doors on the ballast trucks, or "dirt cars, as they are termed in America, and partly by a means well known in England, a suitable plough on the rear car being attached by a steel rope to the engine, which is detached from the train and moving ahead distributes the ballast on one or both sides of the track as required.

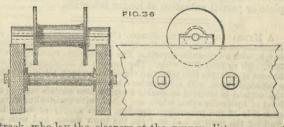
These and kindred appliances enable American railways to be extended at a small cost and with very great rapidity, and the results obtained bear testimony to the efficiency of

the apparatus employed. As an example of the general practice, the Chicago, Mil-waukee, and St. Paul Rail-road lately built a branch across the State of Iowa to Council Bluffs, a distance of 260 miles in one season, work commencing when the frost was out of the ground, and trains running before the winter fairly set in. This rate of progress is better appreciated when it is con-trasted with that obtaining in some of our colonies. In the Cape of Good Hope, for instance, the main line lead-ing to the diamond fields, though urgently wanted, has been so slowly constructed that nine years have been consumed in making 280 miles of line which present no great difficulties, a few bridges of 90ft. span, and a tunnel one-quarter of a mile in length being the only works of art upon the line.

> THE MARIEMONTAND BASCOUP COLLIERIES.

IN our last impression we published some drawings, and gave some particulars of the Mariemont and Bascoup Collieries, visited last month by the members of the Institution of Mechanical Engineers. On pages 204 and 205 will be found



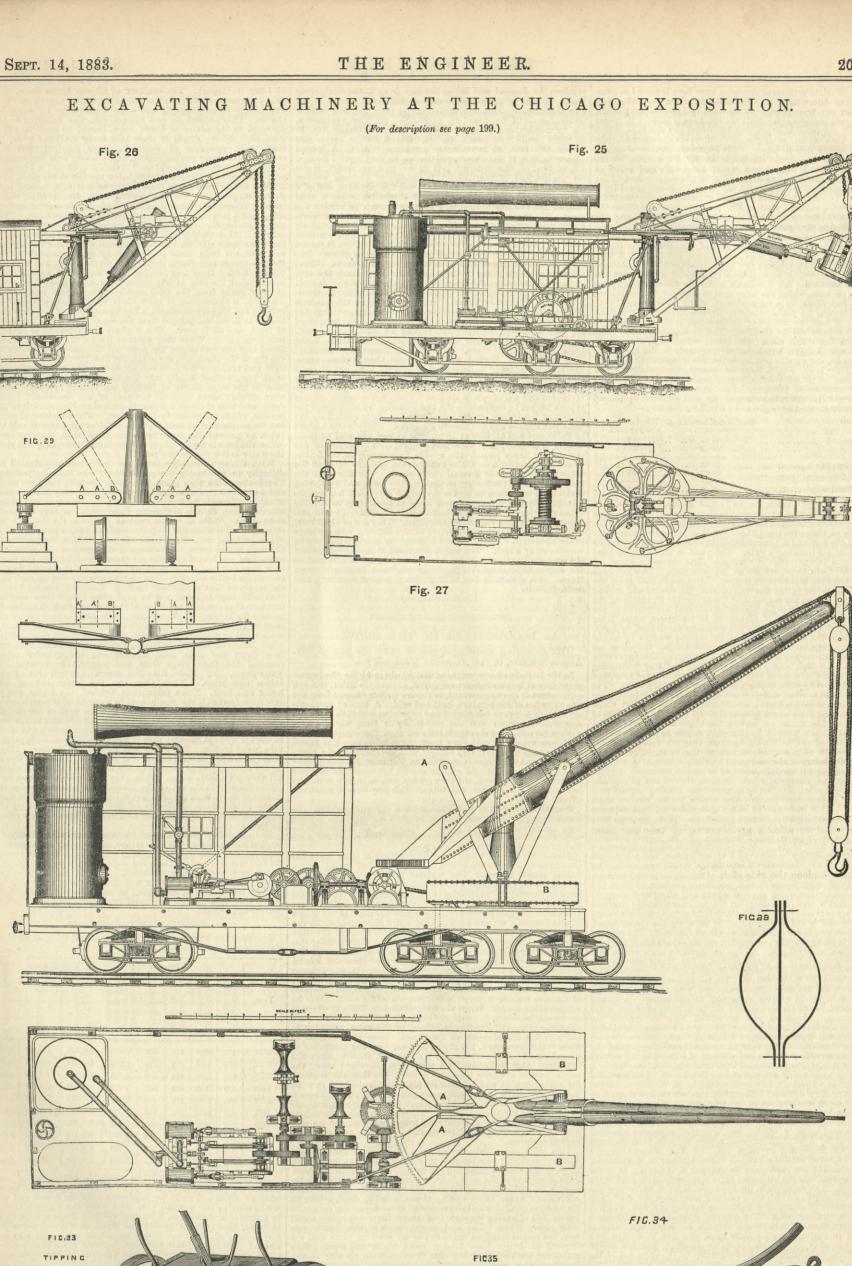


roller path, they can be laid down in advance of the rails It can readily be imagined that a gang of fifty men will easily lay one mile a day for a year at a stretch when they

204 and 205 will be found engravings showing an end view and plan of the pump-brackets made of 1½in. diameter wrought iron pipe, which neatly, and to effect a great saving in time and labour. The American Railway Ditching Company exhibits a machine which has been much used, especially on Western railroads, for excavat

but the separation requires a considerable amount of manual labour. The work is also slow, and the screens, if the output is large, must be very numerous. If the angle is high, the coal falls more rapidly, but it thus gets broken, and the proportion of large coal and rough slack is diminished. Moreover, the separation is im-

201



TOHNSW

perfect. Various systems of screening have been invented to over-come these difficulties. In England and Germany cylindrical screens are largely employed. They work well as to separation and rapidity, but if the coal is friable the breakage is large. M. Briart has adopted another principle, which prevents any breakage, whilst effecting the complete separation of the different classes and largely diminishing the manual labour. The apparatus consists of one or more gratings placed one above the other, and working in the same way. Each is formed by a row of fixed bars and a row of movable bars, which when at rest lie in the same plane. The movable bars, and at its upper extremity on two excentries keyed upon a rotating shaft. The movable bars are above the fixed bars during one semi-revolution and below it during the other. During the former they have a longitudinal motion down-hill, during the latter a similar motion uphill. Hence when a coal wagon is emptied upon the upper part of the screen, the coal is first lifted by the movable bars and carried downwards; it then rests on the fixed bars during the lower semi-revolution. At each revolution the coal is thus shaken up throughout its mass and gradually screened. All the small coal falls through the spaces between the bars, whilst the large coal is brought to the bottom without any shock, by a succession of steps. If necessary, both sets of bars can be made movable. In the screen of No. 5 shaft both sets of bars are movable. If there are to be three classes of coal, two screens will be required. The first separates the large coal from the rough slack; the latter, which falls through, is received upon a frame which carries it upwards to the top the lower screen, and on this it is separated into rough slack and fine slack. This lower screen may be placed horizontally, which enables the height of the discharging road above the rails of the delivery road to be lessened. This height has been fixed at perfect. Various systems of screening have been invented to overslack. This lower screen may be placed horizontally, which enables the height of the discharging road above the rails of the delivery road to be lessened. This height has been fixed at 6 metres—19.7ft. Experiments made on coal screened by the old and the new method have given the following results :—

		-								
			Mechanical screening. Per cent.				Per cent.			
Large coal	 				16.35				13.15	
Rough slack	 	••			32.63				31.08	
Together	 				48.98				44.23	
Fine slack	 •••	••			51.02	••.	••	••	55.77	
Total	 				100 00				100 00	

In the more recent examples, as in that at No. 5 pit, by simply turning a handle, without stopping the apparatus, it is possible to vary the distance between the bars of the screens, so as to alter the character of the screening. There are also mechanical means for cleaning the coal and for transferring the screened coal into wagons without falling from any height. The yield is thus increased and the manual labour much diminished. The screening shops, of which there are three, are all on the same plan. They are large rectangular buildings of three stories. The ground floor is on the level of the railway ; the first floor contains the screens and loading apparatus; and on the second floor the apparatus for emptying the trucks. The appliances for classifying the coal are placed at the two sides. They consist of turntables or traversers, which bring the screened coal from under the screen to be cleaned by hand. From these the coal is carried to the railway wagons by special apparatus, referred to below. The trams from the mine are brought by the endless chain to a set of sidings on the upper floor of the shop. Each siding ends in a tipping cradle or "tumbling Tom," placed above one of the screens. This consists of two rings fixed together by cross pieces and resting on four pulleys. The tram enters at one side and goes out at the other. Whilst pass-ing it is turned over sideways, and empties its load without shock upon a circular table which spreads the coal over the full width of the screen. The trams on leaving the timper are carried for more In the more recent examples, as in that at No. 5 pit, by simply of the shop. Each siding ends in a tipping eradle or "tumbling Tom," placed above one of the screens. This consists of two rings fixed together by cross pieces and resting on four pulleys. The tram enters at one side and goes out at the other. While bass-ing it is turned over sideways, and empties its load without shock upon a circular table which spreads the coal over the full with of the screen. The trams on leaving the tipper are carried forward by endless chains worked by the main engine to sidings running on each side of the building ; by these they are returned to the y and at which they artived, and so to the mine. The railway wagons which receive the coal stand on the platform of a weight is more start and the second of the screening shops is connected by means of the winding engines with a similar system underground, also worked on the endless chain principle. This underground, also worked on the endless chain principle. This underground, also worked on the endless chain been used for working the chains. The first consists of a small stream the signification this rope drives, through a second pulley of the single at the surface, worked by a steam engine, and going down the single for working the chains. The trans contain rods. In the third or automatic system, the trans run is ad the energy his descent is used for hulage on the crass of the windle and the surface, worked hy a steam engine, and going down the single for a build is risker. The trans contain rods. In the different is surface, the clarant system thas the end or work of hulage on the case of the windle rod. The work of hulage are provided down which the full trans run; and the energy his descent is used for hulage on the borizont rods. A sepoid with as the borizont is surface, the the different rods is the streng on the single station of the work of hulage is not by the windle rod run to a streng the base of the work of hulage is not by the windle rods. The work of hulage is not less than 5200-lorse power, produced by 114 boilers and thu

platform to descend and brings the cage down to the discharging level. (4) The pumping engines are not remarkable, except in the case of pit No. 5. This was illustrated on page 184, and further illustrations will be found on page 204. (5) The ventilators, ten in number, are all on the Guibal system, generally 9 m. in diameter and 2 m. wide (29.5ft. and 6.6ft.). Three pits possess two fans, to provide for possible accidents. A special apparatus, due to M. Briart, and known as the Clapet d'Aérage, allows two of the winding pits to be used as upcast shafts for the purpose of ventilation. It consists of a strong wooden partition fixed immediately below the reception platform, and of a depth somewhat more than that of the cage. The pit is thus divided into two compartments, just large enough to receive the cages. The cages form, as it were, pistons in these two compart-ments, and whilst they remain therein, the entry of external air into the shaft is almost entirely cut off. At the receiving platform there are two traps, or movable covers, which, when the cages are in the shaft, lie over the pit and prevent the entry of air. The ropes of the winding engine pass through holes in them. These traps are raised in guides by the cages when they reach the top, and are left behind on the top of the shaft when the cages descend. Below the partition is an air drift communicating with the venti-lator. By this arrangement it will be seen that the shaft is always closed either by the cages or by the traps, so that the exterior air cannot enter, and the venti-lator can only draw platform to descend and brings the cage down to the discharging Below the partition is an air drift communicating with the venti-lator. By this arrangement it will be seen that the shaft is always closed either by the cages or by the traps, so that the exterior air cannot enter, and the ventilator can only draw the air from the mine. The closing of the pit is not, of course, complete, but the air which enters through the holes left for the ropes, &c., is insignificant in quantity. This system has worked well for more than fifteen years. The timber employed underground is entirely sawn out of large logs to definite dimensions, so that exactly the quantity necessary can always be supplied. This system is found to offer great advan-tages over the use of whole timbers. There is a complete railway system worked in common by the two collieries, which conveys the output to the station at Bascoup-Chapelle. It is worked by five main line engines and five shunting engines. There is also a wharf at Bellecourt and another at Mons. To unload the coal at these wharfs, it is conveyed in sheet iron wagons, each consisting of five rectangular boxes placed side by side transversely to the frame. These boxes can turn on a hinge at one side, and are lifted at the other side by means of a small steam crane. The side next the hinge opens from the bottom on drawing the bolts, and by tipping each box in succession its load is discharged through a hopper into a barge. By this arrangement a barge of from sixty to seventy toons can be loaded in less than half-an-hour. For carrying coke and patent fuel, hopper wagons are employed. They are of sheet iron, and comprise three hoppers square at the bottom, which openings below the frame. The bottoms are closed by covers which can be withdrawn by a rack. The wagon is covered at the top to protect the contents from wet. It has a special coupling, which enables the wagons to be coupled without the workmen passing between them. This system is due to M. E. Peny, general secretary, and to M. Mabille. (To be continued.)

LOCOMOTIVES IN THE SNOW. THE following amusing sketch is from the pen of Mr. Angus Sinclair, in the American Machinist :-

Angus Sinclair, in the American Machinist:— In the latitude of our northern States, where by far the largest proportion of locomotives are employed, engines are liable, through carelessness or mismanagement, to receive serious damage from the two extremes of temperature, heat and cold. A case of overheat-ing is likely to prove destructive and expensive, but such cases are comparatively rare; and the probability is that, where severe winters prevail, more damage is inflicted upon the equipment of a road from excess of cold than from excess of heat. The moral code of enginemen deals very sharply with the engineer who burns his boiler, and the action is regarded as the most heinous profes-sional disgrace. Railroad officers second the sentiment of their engineers in this respect, and they seldom care to trust a man who has scorched his fire-box and tubes. This may have a deterrent effect. effect.

Mismanaged excess of cold is treated in a different manner. To let an engine freeze up and become helpless scarcely casts a stain upon the reputation of an engineer, although this act may be no more excusable than the case of burning, and may entail far more

The excusable that the case of burning, and may entail far more serious consequences upon the company. I remember a case where an engine pulling a stock train was overtaken by a severe snowstorm on a division that passed over a rolling prairie country. The engineer had an excellent engine, equipped with two pumps and one injector, and every way calcu-lated for successfully weathering any storm likely to be encountered. But the man was definite in natural answer and within these equipped with two pumps and one injector, and every way calcu-lated for successfully weathering any storm likely to be encountered. But the man was deficient in natural energy, and within three hours after the gale commenced, his engine was dead, in the centre of a long cutting, without a rod down or a pipe disconnected. By the time the storm abated nothing about the forward part of the train was visible, except the top of the smoke stack. Resurrecting this immersed engine caused eight hours' extra delay in clearing the track for traffic. This figured up expensively when the loss of stock was added in. The unfortunate predicament was brought about in this way:—The engineer worked the train along as best he could through the increasing snow drifts, the unusual heaviness of traction making a deep drain upon his water tank. This he did not think about. When the train stalled in the cut where it finally settled down, the engineer cut away and proceeded to work through the snow. His first indication of the water being low in the tank was the stopping of the pump. Then he attempted to make water from snow, but it was too late. He was compelled to quench the fire before he could melt enough snow to start the engine became so deeply imbedded in the drifts that the engineer did not see how he could disconnect pipes and rods—and it is no easy matter—so he succumbed to adverse circumstances. There is no condition of railroad operating where the valuable attainments possessed by a really good engineer stand out so conspicuously as during the prevalence of distressing winter weather, and no con-dition so completely annihilates all stamina in the man of scanty natural resources. Like every other trying ordeal, the hardships of severely cold weather, that may be reinforced by drifting snow, the resisted

dition so completely annihilates all stamma in the man of scanty natural resources. Like every other trying ordeal, the hardships of severely cold weather, that may be reinforced by drifting snow, can be resisted or overcome most successfully by thoughtful preparation ahead. John Steel, one of the most fortunate engineers in the frigid north-west, a man who has wrestled with the snow drifts of twenty-five winters and never burst a pump or was towed in dead, attributes his uniform good luck to the practice of never depending on a mild winter, but of having his plans laid out for the worst before a cold snap comes round. The first consideration in this regard is to have the means arranged conveniently for draining pipes that are exposed to danger from holding water which will freeze; then comes the necessity for being able to warm them up with steam. Injectors, as a rule, are more easily preserved from frost than pumps, but most injector branch pipes will freeze up unless they are supplied with frost cocks. If a pump be carefully attended to, frost plugs will go unused for a whole winter, but the engineer who looks ahead to avoid trouble takes care that his pumps have got frost plugs, and that he has the means at hand of taking them out promptly if necessary. So with other precautionary attach-ments. The man least likely to need them keeps them in the best order. order.

order. Engineer Tom Myers, of the frigid Northern Railroad, tells with graphic detail the story of how he was pulled through a remarkable snow siege during the terrible winter of '80. That was Tom's first winter on the right-hand side. One day when he happened to be out on the most northerly division, one of the numerous snow hurricanes of the season overtook him, and its rigoor plainly indi-cated a block. Presently passenger train No. 62 came along, and Tom got orders to leave his own train and double-head 62, and try

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attendor tiene that there is in thanking them out when they become a mass of ice. When an engine remains passive in the snow all the steam needed is what will keep the water and pipes from freezing. When morning came there was no improvement in the position of the snow-bound train. No change in the weather. To move was impossible, and no aid could be got from shovelling, for the snow blew in as fast as it could be thrown out. All they could do was to wait for better weather. But waiting meant using up coal, and the supply of that article was limited. Calculation assured them that both engines could not be kept alive longer than another night, so they resolved to let one of them die, so that its coal could be used for keeping the other warm. The head engine was of the most importance, since it could pull out for supplies as soon as the track could be cleared; so the train engine was cooled down. With much labour and untold suffering, they burrowed in the snow and took down the main rods, screwed out the cylinder cocks, removed the frost plugs from the pumps, disconnected the water-boxes, and blew the live steam through the pump valves and pipes. Then they run the water out of the boiler and tank. These precautions finished, the engine was as safe from frost as if she was housed in a comfortable round-house. This honest work performed did not end the work of the engine-men. They had just finished the moving of the coal to the live engine when its injector refused to work. Every effort was made to start it without success; then it was taken apart and the primer tube found broken. The pump was now the only resort. They disconnected the forward end of the side rods, jacked the weight of the drivers, poured some oil on the rails, and slipped the wheels till they got a little water. Then they hollowed a channel in a square block to fit the arc of the driving axle, placed it under the middle of the axle on top of a screw-jack, and raised up till most of the weight of the wheels was off the rails. With this rig the eng

on blocks. The exemplary persistency of these enginemen was finally re-warded with success. They held the engine alive till shovellers came and dug them out. Then they went to the nearest station for fuel and returned for the other engine, which was hauled to a water tank and there resuscitated. By this means these two engines were enabled to render material assistance in opening the road for traffic, instead of helping to encumber the blockade, as would have been the case had feeble hands permitted them both to cool off in the snow. cool off in the snow.

ACCIDENTS IN ENGLISH MINES .- The annexed table of accident

statistics in English mines is official :								
fatal its. by the			sons oyed.	from per ons d.	Total of min	mines.		
Year.	Separate fat accidents.	Lives lost by accident	Per fatal accident.	Per life lost.	Death-rate accidents 1000 perso employed	Per fatal accident.	Per life lost.	Number of m
1873	973	1069	528	481	2.079	146,867	133,677	3938
1874	895	1056	602	510	1.959	157,222	133,251	4332
1875	927	1244	578	420	2.321	159,331	118,730	4501
1876	839	933	613	551	1.813	177,580	159,688	4385
1877	864	1208	572	409	2.443	172,276	123,217	4231
1878	811	1413	586	336	2.972	179,777	103,183	3968
1879	782	973	610	490	2.040	185,890	149,400	3956
1880	815	1318	595	368	2.718	198,119	122,509	3904
1881	844	954	587	519	1 925	200,189	177,106	3847
1882	876	1126	575	447	2.234	195,586	152,161	3814

EXTREME MINUTENESS.—When vision is not aided by any magnifying process, there is a point of minuteness, as all know, when an object will make no impression upon the retina, and will not be seen by the unaided eye. But when the object is viewed by means of a microscope, it becomes visible. There is a question, not be seen by the unaided eye. But when the object is viewed by means of a microscope, it becomes visible. There is a question, however, that remains unaswered, which is, whether any object may become so attenuated that it cannot be made visible by any means? Not many years ago—less probably than twenty-five— there were lines that could not be resolved by any microscopic lenses then in existence, which can be exhibited now without any difficulty; but, at that time, makers of lenses had not attained to the skill of making them with large angles of aperture, but now they are made with the highest angle that is possible, and conse-quently the capacity of such objectives can only be increased by greater skill in their manufacture. But the limit of angle of aperture having been reached—no opportunity remaining of in-creasing capacity in that direction—is it not reasonable to suppose that, with present appliances, no greater skill in manufacture can be expected? Sir Royston Pigott, recently, at a meeting of the Royal Meteorological Society, stated that he had seen globules of mercury, made by smashing a minute particle of mercury with a watch spring, less than $r_{0,50} \circ r_{0,50} \circ f$ an inch, or less than the millionth of an inch. Another member replied that he was not aware that there is any limit of visibility in the microscope other than that imposed by the sensibility of the observer's retina, the correction of the objective, and the illumination.—*The Microscope*.

RAILWAY MATTERS

THE consumption of iron rails in France was only 6930 tons in 1882. The total of steel and iron was 290,979 tons. THE cost of stopping a train of cars is said to be from 60c. to 40c.

An American contemporary points out that when the train is stopped by another train these prices become somewhat inflated. THE line of rail connecting Rhondda with Newport is fast approaching completion. That also for connecting Cyfarthfa Works with the Great Western and Rhymney system was advancing rapidly, but a hitch has arisen in respect of some land.

An exchange says that the Cumberland Valley Railroad Company, U.S., which does a considerable business in carrying picnic parties to points on its line, has devised a new attraction in the form of a car provided with machinery for supplying electric light to such parties as may wish to remain on the picnic grounds after dark. The car is said to be in demand.

AFTER many years, track laying on the great Northern Pacific Railway is completed. The last rail was laid on August 22nd, at a point some fifty miles west of Helena, Mon. The driving of the golden spike and the formal opening took place on September 8th, when President Villard, with a large party of guests, assisted in the historic proceedings which crown the life of the road in its 19th very year.

An offer has been made to the Grecian Government by a Belgian company to make a narrow gauge railroad from Nauplis to Pyrgos for the sum of 25,000f. per kilometre. On the other hand, a group of Austrian capitalists want to make a line from Larissa to Thes-salonica, on condition that they obtain the concession of the line from Athens to Larissa, at the rate of 150,000f. per kilometre— and that the Government guarantee 5 per cent. on cost.

and that the Government guarantee 5 per cent on cost. RAILWAYS are by no means amongst the least of the employers of engineers, and there is always interest attaching to the esti-mates that are made of the requirements of rolling stock by the railways. It is satisfactory to notice that these estimates are large, not only because of the direct effect that the construction of the stock has on the trades concerned, but also because it is an indication that the traffic managers expect considerable accessions of traffic. The London and North-Western Railway estimates that in the half year now running its course it would need to expend £65,084 on new working stock, as well as a large sum on new steamboats; the North-Eastern places its expenditure at the sum of £60,000; the Great Western puts the cost of its require-ments for the half-year as £105,000; the Great Northern at £50,000 -continuous brakes being included-and the Lancashire and Yorkshire at £72,000. The Midland Railway and one or two other lines do not specifically name the amounts, but it is evident that they must be also large; but the sums that have been named show that the total requirements of the railways are still large. There are some probabilities, too, that these estimates may con-tinue to grow, because the traffic returns of all the great com-panies have, in the last few months, shown a steady increase, especially in the passenger traffic. THE Philadelphia *Record* says that "several experienced Western mechanical engineers visited Philadelphia last week to inspect the fixed on the Chicago, Burlington, and Quinoy Raihroad during the Chicago Exposition, and afterwards on the Baltimore and Ohio Raihroad. Particular interest attaches to the capability of the locomotive to use coke for fuel, as that combustible, being entirely free from smoke, will not only at once relieve the Western com-panies from the penalties for infractions of the laws for the pre-vention of the smoke nuisance, but will secure greater comfort and pleasure to the travelling RAILWAYS are by no means amongst the least of the employers

demonstrated that continuous runs of 200 miles can be made with coke fuel, without any further attention on the part of the fireman than simply feeding the furnace, and that meanwhile no clinker or other obstruction to the draft occurred during the trials, which were of the most exacting nature. The coke used was the product of the Connellsville Coke and Iron Company, and its calorific efficiency was found to be in excess of seven pounds of water evapo-rated for each pound of coke consumed. At the request of visiting experts further evaporative tests of the same kind of fuel are to be made in one of these locomotives." The *Record* either never knew, or has forgotten, that for the first twenty-five years of its existence the locomotive burned nothing but coke. The locomotive boiler was specially designed for that fuel, and the Philadelphia engi-neers are only doing now what was done in Great Britain about the time they were born. At the instance of the Simplon Railway Company a commission

neers are only doing now what was done in Great Britain about the time they were born. At the instance of the Simplon Railway Company a commission of experts, composed of Professors Heim, of Zurich; Liory, of Grenoble; Taramelli, of Pavia; and Renevier, of Lausanne, have, the Times' Geneva correspondent says, compiled and published an interesting memoir on the geological condition of the Simplon, with special reference to the probable temperature of the proposed tunnel. Their general conclusion is that in this respect they would be more favourable than those of the great St. Gothard Tunnel. The temperature of a tunnel depends chiefly on its length, the character of the strata through which it runs, and the thickness of the superincumbent mass. In the St. Gothard Tunnel the temperature often rose to 3075 deg. Centigrade—nearly 90 Fah.— in the proposed Mont Blanc Tunnel it would probably be 50 deg. Centigrade—120 Fah.—in the Simplon Tunnel if the trace projected in 1877, which passes through Monte Leone, were adopted, it might be 48 deg. Centigrade. But it is now proposed to adopt another trace, which, though it would be a curve and make the tunnel 20 kilometres longer than was contemplated in 1877, offers, as compared with the straight line, several important advantages. It would pass under the valleys of the Ganther and the Chenaska, above which rises the splendid amplitheatre of the Diveglia Alp. The normal temperature of the tunnel on this line would not, it is computed, exceed 36 deg.—95 Fah.—and as the nature of the ground would greatly facilitate, and, therefore, cheapen the work of construction, the experts are unanimous in recommending the line by the valleys of the Ganther and the Chenaska in preference to the trace through Monte Leone. ACCORDING to Mr. E. Harford, the general secretary of the Amalcamated Society of Railway Servants.

the trace through monte Leone. ACCORDING to Mr. E. Harford, the general secretary of the Amalgamated Society of Railway Servants, statistics of the signal-men's hours of duty on the North-Eastern Railway show that out of a total of 994 signal boxes, 886 are worked by persons whose sole duties are to attend to the signals. The other 108 are worked by the station staff. Out of the 886 not more than 70 are eight hours, but 100 are to hours and 716 are twelve hours' hores—that is to the station staff. Out of the 886 not more than 70 are eight hours, about 100 are ten hours, and 716 are twelve hours' boxes—that is to say, in 716 of the 886 boxes the signalmen are on duty twelve hours at a stretch. On the Monmouthshire division of the Great Western Railway—especially on the Eastern Valley side—most of the signalmen are on duty more than twelve hours daily, and in many instances men "are on fourteen, and in some cases fifteen hours." It appears the signalmen referred to have excursion trains to deal with, and in winter have "lamp duties" to attend to. It is stated that on this division of the Great Western system a signalman who is on duty in his box until eleven p.m. has then to extinguish all his signal lamps, occupying over half an hour, and be out again and light the lamps next morning before the first train is signalled. To do this the man must be on duty soon after 4 a.m. Milland Railway relief signalmen at Wigston complain that up to about twelve months ago they were paid a day for eleven hours' day duty Railway relief signalmen at Wigston complain that up to about twelve months ago they were paid a day for eleven hours' day duty and a day for thirteen hours' night duty, the same as the ordinary twelve hours signalman, but now they have to work Sunday for nothing. In various other reports instances of long hours worked by railway signalmen have been reported to the general secretary of the society; and taken together all the statements show that the percentage of eight-hour boxes—the system which would divide the twenty-four hours between three men—over the general railway system of the country is exceedingly small. system of the country is exceedingly small.

NOTES AND MEMORANDA.

MR. J. A. WANKLYN has called attention to the fact that con-siderable ammonia is lost in gasworks by the storage of the ammoniacal liquor in open or but partly closed tanks. He states that the relative rates of evaporation of the volatile ammonia and the water of gas liquor are 20°1.

THE knot, or nautical mile, is variously reckoned at from 6076ft. to 6120ft. The British Admiralty standard is the length of one minute of longitude at the equator, or 6086ft., 1'1527 statute inch or 1855 metres; the mean length of one minute of latitude, some-times reckoned as a knot, is 6076ft., 1'151 statute mile, or 1852 metres. A marine league is three of these sea miles.

DR. ELLIS in twelve samples of Toronto soda water found only three which were free from lead. No mention is made of the pre-sence of copper. The quantity of lead varied from '07 of a grain to '5 of a grain to the gallon, the average of nine samples being '32 of a grain. All of the above samples were taken from foun-tain cisterns, bottled soda water being invariably found free from metallic impurities. How about soda water in England?

metallic impurities. How about soda water in England? SCIENTIFIC authorities are not at rest with giving Philipp Reiss the merit of inventing the telephone. The latest claimant put forth is Charles Bourseul, a Frenchman, who is said to have invented the telephone in 1854. This invention is said to have been communicated in 1854 to the French Academy, and to have appeared in the *Didaskalia*, a supplementary paper to the *Frank-furter Journal*, for September 23th, 1854. M. le Comte du Moncel is advocating the claims of Bourseul.

To encourage tree planting, the last Legislature of New York State passed a law by which any inhabitant who shall transplant by the side of the public highway adjoining his premises any forest shade trees, fruit trees, ornamental trees, or any nut-bearing trees, shall be allowed, in abatement of his highway tax, 1 dol. for every four trees set out. Elms must be placed not less than 70ft. apart on the same side of such highway, and no maples or other forest trees, ornamental, or fruit trees, nearer than 40ft. apart on the same side of such highway.

same side of such highway. AMONG the various substances which have been found on the human tongue, as shown by the microscope, says the *Scientific American*, are the following :—Fibres of wool, linen, and cotton ; fibres of spiral vessels, fibres of muscle, in one case eight hours after eating; starch grains, cheese mould, portions of potato skin, scales, moths, &c., hairs from legs of bees, hairs from legs of spiders, pollen of various flowers, stamens of various flowers, hairs of cats, quite common; hairs of mouse once only, hairs from various leaves, wing of mosquito once, fragments of the leaves of tobacco, of chamomile flowers, &c. WHEN a collowpus picture is transferred to stone for lithographic

tobacco, of chamomile flowers, &c. WHEN a collotypic picture is transferred to stone for lithographic printing, or to metal for etching into a typographic block, the details are apt to clog during the first inking, owing to fatty matter round the ink becoming pressed out. A recent improve-ment by Mr. Swan, however, yields a transfer with a grain clearly and sharply defined so as to print well from a stone, or yield a transfer capable of being inked on zinc and other metal. The method consists in inking the collotypic plate before soaking it in water, and as the gelatine softens in parts, the ink is removed by sponging. During this operation the ink breaks up into a clear grain free from the halo of grease referred to above. The process is not patented. THE consumption of copper in the United States in 1872 was

THE consumption of copper in the United States in 1872 was 34,000,000 lb., and the quantity went on increasing until last year, when the consumption was 77,000,000 lb. At first it was necessary to import copper, but almost nothing has been done in that direction for several years. The great increase in consumption commenced in 1880, when it reached 62,000,000 lb., as against 34,000,000 lb. in 1872. This was due to the development of the electric lighting business—62,000,000 lb. in 1880; 63,000,000 lb. in 1881; and 77,000,000 lb. in 1882. The average price in 1872 was 35 c. per lb., and taking the following years, the average price in 1872 was as follows: $-27, 223, 22, 20, 18, 16, 183, 20, 173, and last year 18 a c. The highest price last year was <math>20\frac{1}{3}$ c., and the lowest $17\frac{1}{3}$ c. per lb. THE consumption of copper in the United States in 1872 was

17% c. per lb. THERE were, in round numbers, at the time of the recent enumeration, 24½ million of inhabitants in Spain and the Spanish territories. Of these, 16,600,000 were in Spain itself, 5½ million in the Philippine Islands, 1,500,000 in Cuba, and 750,000 in Porto Rico. There were in Spain itself 5662 communes that had each less than 1000 inhabitants. The average proportion of popu-lation was from 32 to 33 persons to every square kilometre. The most thickly-peopled district is the province of Barcelona with 108 to the square kilometre; and the most thinly-peopled is Ciudad Real, which has only 13 inhabitants to the square kilometre. The most populous cities are Madrid, with, in round numbers, 500,000 inhabitants; Barcelona, 249,000; Valencia, 143,000; Seville, 134,000; Malaga, 116,000; Murcia, 92,000; Saragossa, 84,500; Cadiz, 65,000; Palma, 58,000; and Valladolid, 52,000.

Palma, 58,000; and Valladolid, 52,000. A NEW fireproofing liquid—Astrop's patent—is being now intro-duced to the public by the Patent Liquid Fireproof Cyanite Com-pany, Mildmay-chambers, Bishopsgate, E.C. It is a basic silicate of alumina, and is said to be far preferable to tungstate of soda, because cyanite does not evaporate or scale off, while soda requires applying each week. This has been proved, amongst other places, at the Princess's Theatre, where the use of the latter has been given up and cyanite adopted instead. The Cyanite Company claim that the use of cyanite is economical, because it can in most cases, it affirms, secure a reduction in the cost of fire insurance to cyanite users, while cyanite takes the place of and saves a coat of priming, and lasts for many years when once applied. We notice that Mr. Thomas Verity, F. R.I.B. A., says that cyanite "soaks into the wood, and is not therefore liable to be chipped or knocked off."

chipped or knocked off." THE most recent report of the Department of the Interior states that there are in Switzerland 8642 factories and workshops under legal supervision, 1472 of which are worked by machine power. Of these water furnishes the movement to the amount of 41,316-horse power, steam to the amount of 18,064, and gas to the amount of 117. The number of operatives employed is 134,862, of which 70,364 are males and 64,498 females. There are 10,462 children between 14 and 16 years of age, 14,590 between 16 and 18, and 109,810 over the latter age. The textiles, such as cotton, silk, woollen and linen, occupy 1619 factories, with 85,705 work-people; 68 establishments carry on tanning, leather dressing, hair weaving, &c., with 3753 hands; there are 6636 hands employed in 143 food preparing shops; 2749 in 102 chemical works; 4950 in 150 printing shops. There are also 111 wood working establishments occupying 2913 hands; 353 for clock and jewellery making, with 24,988 workpeople; and 96 for glass making, &c., with 3170. It is stated that a new electrical contrivance has been perfected

IT is stated that a new electrical contrivance has been perfected y Mr. A. St. George, the inventor of the telephone which bears by Mr. A. St. George, the inventor of the telephone which bears his name. This invention is really supplemental to the telephone, and will, the *Times* says, enable every description of conversation carried on through the instrument to be not only recorded, but reproduced at any future time. Briefly stated, Mr. St. George's invention may be thus described : A circular plate of glass is coated with collection and made sensitive as a photographic plate. This is invention may be thus described : A circular plate of glass is coated with collodion and made sensitive as a photographic plate. This is placed in a dark box in which is a slit to admit a ray of light. In front of the glass is a telephone diaphragm, which, by its vibrations, opens and closes a small shutter through which a beam of light is constantly passing and imprinting a dark line on the glass. Vibrations of the shutter cause the dark line to vary in thickness according to the tones of the voice. The glass plate is revolved by clockwork, and the conversation as it leaves the telephone is recorded on the sensitive plate, the imprinted words spoken being fixed as is done in photography. The plate can be brought forward afterwards, and when replaced in the machine and connected with a distant telephone will, when set in motion, give back the original conversation. conversation,

MISCELLANEA.

MESSES. JOSEPH EVANS AND SONS, of Wolverhampton, have been awarded a gold medal for steam pumps at the Amsterdam Exhibition.

THE whole of the machinery at the West Hartlepool Wagon Works, which has been idle for several years, is about to be offered for sale by auction.

THE port of Vladivostock has just received a new iron dock from England, and the naval men cherish the hope that their ships will now become independent of Japanese ports.

MESSES. NEGRETTI AND ZAMBRA, of Holborn Viaduct, have been recently appointed sole agents for the United Kingdom and the Colonies for the patent liquid compasses of Messes. Ritchie and Sons, of Boston, U.S.A.

M. ALEXANDRE POURCEL, the eminent metallurgist, who has contributed so much towards making Terre Noire one of the most famous steelworks of Europe, has resigned, and has accepted the charge of the large steelworks which are now building at Bilbao, Spain.

THE celebrated engineer, Mr. George Remington, after a linger-ing illness, died on Tuesday last, Sept. 11th, at his residence in Ashchurch-grove, Shepherd's-bush. He had lived with his family for some time in the Island of Bermuda, where he was profession-ally engaged, and during his declining years had become totally bind. blind.

At a meeting of the Newcastle City Council on the 5th inst., the following resolution was unanimously agreed to :-- "That a special committee be appointed to confer with the River Tyne Commis-sioners for the purpose of ascertaining the feasibility or otherwise of constructing a ship canal, connecting Newcastle and district with the Solway Firth."

THE Electric Lighting Committee of the Leeds Corporation continue their preparation of specifications with a view to seek new tenders for carrying out the scheme of lighting part of the borough with electricity. The specifications have been prepared with great care, and will shortly be submitted to competent scientific authorities. The work will not be finished this year. The Corporation have no intention of abandoning the scheme.

ABOUT eight years ago a small steamer named the Harbinger, of ABOUT eight years ago a small steamer named the Harbinger, or London, struck on a wreck off Dover, and went down with a valu-able cargo of block tin. Attempts have been made from time to time to recover the cargo, but without success. The plan, however, has been tried of making holes in the vessel to allow the upper portion of the cargo to wash away, leaving the tin exposed. This has succeeded, and the divers are now raising large quantities of the metal daily. the metal daily.

The metal daily. THE disposal of town's refuse by sending it in a special sewage steamer eight or nine miles to sea and then dropping it into not less than 16 or 17 fathoms of water is a method adopted by the Corporation of Liverpool. Messrs. W. Simons and Co., of Ren-frew, have just constructed a second steamer to carry 800 tons of sewage, that is, twice the size of the first one, which has now been in use for some time by the corporation with good results. The same method has been practised at New York for several years. So dissatisfied are works' proprietors at Willenhall, near Wol-verhampton, with the high rate which they have to pay for their gas, that the Montmoor-lane Iron Company has begun manufac-turing on its own account, and its example is to be followed by another large firm. The price charged is stated to be one-third more than other towns in the Black Country. Meanwhile the local authorities are gathering all the information they can upon the subject, with a view to purchasing the works of the gas company. company.

company. OWING to the scarcity of orders for new vessels, it is expected that Messrs. Raylton, Dixon, and Co., of Middlesbrough, will have to reduce the number of workmen employed at their yard. The frames of the last steamer on order have been commenced, and unless fresh contracts are entered into within the next two months, about 1000 men will be thrown out of employment. At the pre-sent time Messrs. Dixon employ about 2700 men, and pay £4000 per week in wages. They have not received an order for a new vessel since March last.

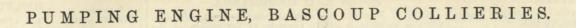
vessel since March last. THE question of providing a thorough system of drainage for the towns of Wednesbury and Darlaston, which shall not pollute the river Tame, has this week come before Mr. S. J. Smith, C.E., Local Government Board Inspector. The authorities of both towns have as yet not determined upon the best scheme to adopt, and asked for time to consider. The inspector intimated that he should expect a scheme for Darlaston within six weeks or two months, and when the Wednesbury authorities demanded the limit of six months accorded by the Rivers Pollution Act, he pressed for a shorter period.

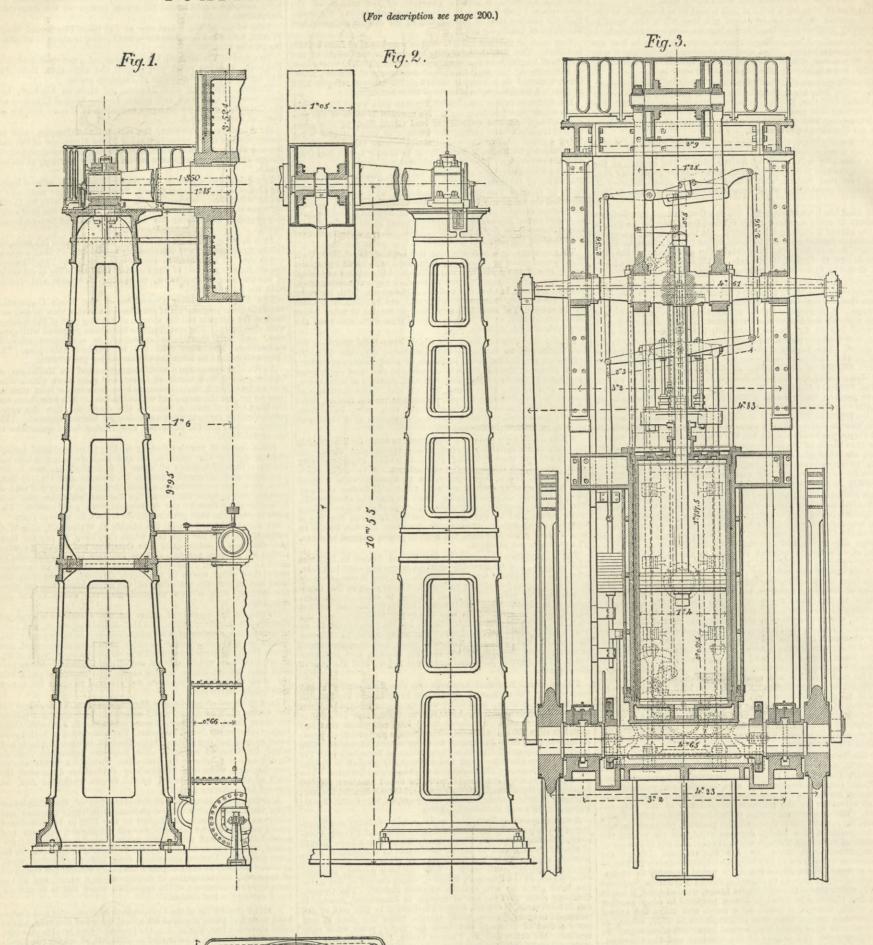
pressed for a shorter period. A SPECIAL sub-committee of the promoters of the Manchester Ship Canal has had a long conference with their engineer and others as to the plan to be adopted in the Bill to be introduced into Parliament next session. Several alternative schemes and several alterations of the original scheme were examined and dis-cussed, and it was decided to adhere to the original scheme in its main features. Various alterations were, however, resolved upon, as it was believed by the committee that they would have the effect of improving the navigation of the scheme as a whole, and at the same time remove much of the opposition which had to be encoun-tered during the last session.

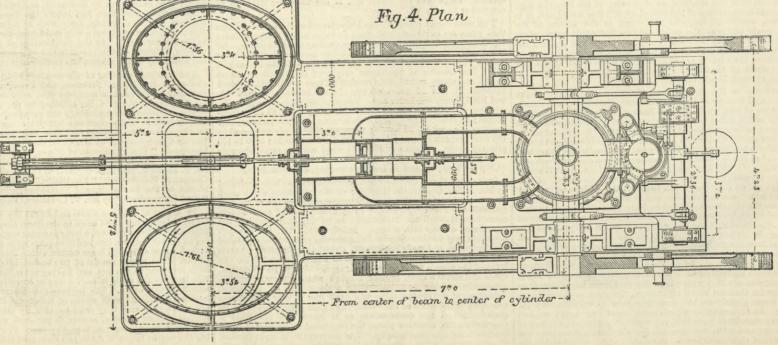
tered during the last session. A JOINT committee of the Corporations of Newcastle and Gates-head have had plans prepared for a steel bridge of one span, at the same elevation from the river as the present "bigh level"—namely, about 90ft. Its cost is estimated at £200,000, of which two-thirds would have to be borne by Newcastle, and one-third by Gateshead. These details have been laid before the Town Council, and the question will be definitely dealt with at a future meeting. It is also proposed to construct a ship canal from the Tyne at Newcastle to the Solway Firth. At the last meeting of the Town Council a motion in favour of the appointment of a committee to ascertain the feasibility of the scheme was carried unanimously. The questerly meeting of the members of the Manchester Asso-

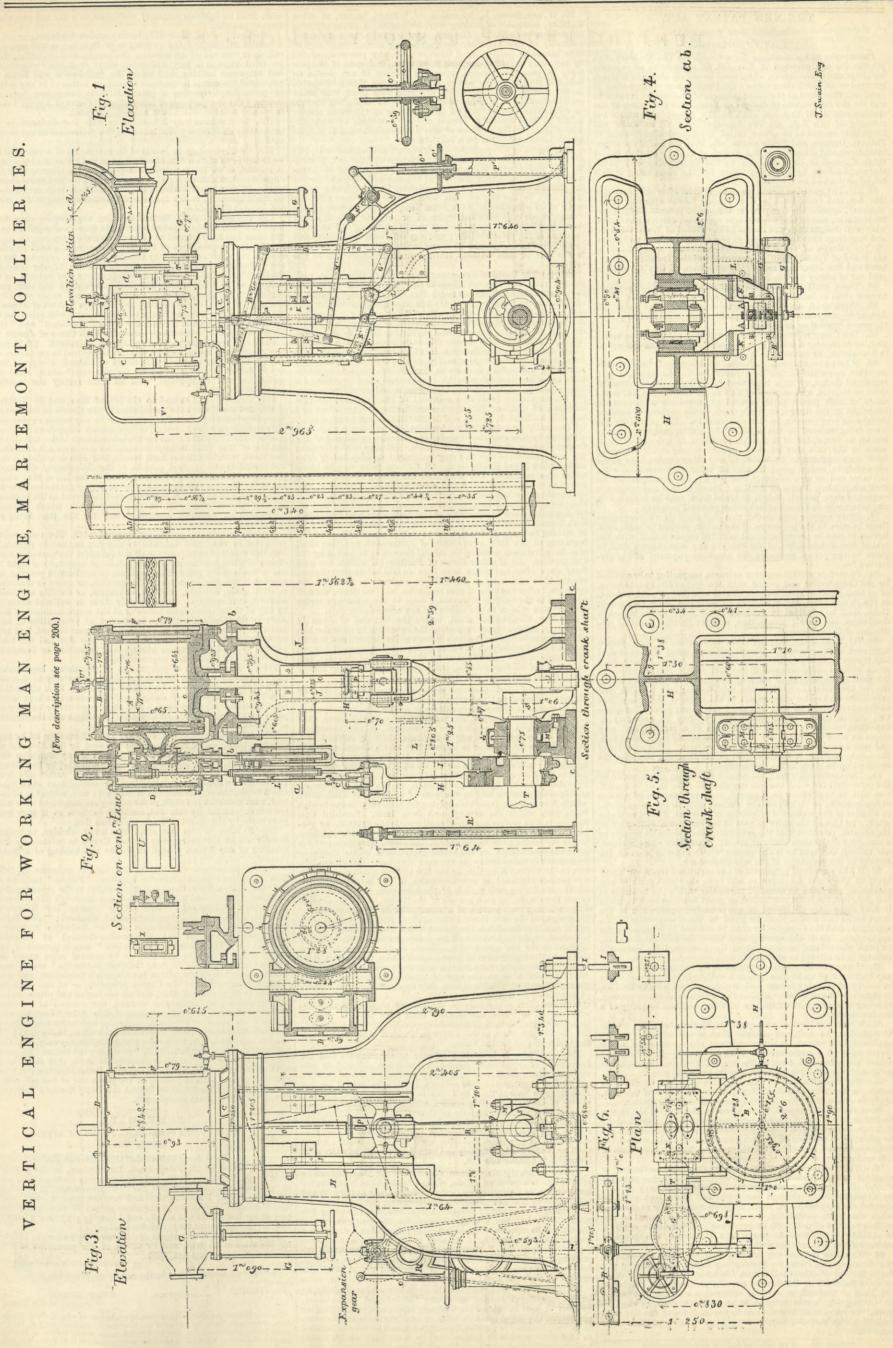
the feasibility of the scheme was carried unanimously. THE quarterly meeting of the members of the Manchester Asso-ciation of Employers, Foremen, and Draughtsmen was held on Saturday, when five new members were admitted. The president, Mr. Thomas Ashbury, C.E., alluding to the approaching winter session, remarked that although the syllabus of papers to be read and subjects to be discussed was not yet complete, he might refer to the following promises :---"The Forging and Finishing of Marine Crank Shafts," by Mr. C. O. Connor, of the Mersey Forge, Liverpool; "The Ventilation of Mines," by Mr. John Crighton, of Ancoats; "The Chapman System of Artesian Well Boring" by Mr. T. Baldwin, late chief engineer to the Mutual Boiler Insurance Company, Manchester; "Electricity," by Mr. Warburton, elec-trician to the Lancashire and Yorkshire Railway Company; and "Fuel Economisers," by Mr. T. L. Daltry, Manchester. AT a cost of between £3000 and £4000 the South Staffordshire

At a cost of between £3000 and £4000 the South Staffordshire Commissioners have laid down in the Stow Heath locality, by the Bilston and Tipton district, a large pumping angine capable of drain-ing an area of between four and five square miles of mines now water-locked. It is a Cornish beam engine with a 76in. cylinder, 8ft. 6in. stroke. The pumps consist of two bucket lifts of 20in. diameter, both throwing to the top, and having brass lined working barrels. The buckets are made in such a way as to withstand the corrosive action of the water. The buckets and their clacks are of the hatband type. At each stroke of the pumps 221 gallons of water are delivered, and they will be able to raise two and a-half million gallons per day, or over 25 per cent. more water than the two Stow Heath engines used to pump. Preparations for start-ing the engine began in April, and since then it has been thoroughly repaired. New boilers, capstan, and winch engines have been fixed, and the engine has been fitted with Davey's patent differential valve gear. AT a cost of between £3000 and £4000 the South Staffordshire valve gear.









THE NEW PATENT ACT. (Concluded from page 187.) PART V.*-GENERAL.

PART V.*-GENERAL. Patent-office and proceedings thereat.-82. (1) The Treasury may provide for the purposes of this Act an office with all requisite buildings and conveniences, which shall be called, and is in this Act referred to as, the Patent-office. (2) Until a new Patent-office is provided, the offices of the Commissioners of Patents for inventions and for the registration of designs and trade-marks existing at the commencement of this Act shall be the Patent-office within the meaning of this Act. (3) The Patent-office shall be under the immediate control of an officer called the Comptroller-General of Patents, Designs, and Trade-marks, who shall act under the super-intendence and direction of the Board of Trade. (4) Any act or thing directed to be done by or to the Comptroller may, in his absence, be done by or to any officer for the time being in that behalf authorised by the Board of Trade. 83. (1) The Board of Trade may at any time after the passing of this Act, and from time to time, subject to the approval of the Treasury, appoint the Comptroller-General of patents, designs, and trade-marks, and so many examiners and other officers and clerks, with which are to the time board of the officers and clerks,

83. (1) The Board of Trade may at any time after the passing of this Act, and from time to time, subject to the approval of the Treasury, appoint the Comptroller-General of patents, designs, and trade-marks, and so many examiners and other officers and clerks, with such designations and duties as the Board of Trade think fit, and may from time to time remove any of those officers and clerks.
(2) The salaries of those officers and clerks shall be appointed by the Board of Trade, with the concurrence of the Treasury, and the same and the other expenses of the execution of this Act shall be paid out of money provided by Parliament.
84. There shall be a seal for the Patent-office, and impressions thereof shall be judicially noticed and admitted in evidence.
85. There shall not be entered in any register kept under this Act, or be receivable by the Comptroller, any notice of any trust expressed implied or constructive.
86. The Comptroller may refuse to grant a patent for an invention, or to register a design or trade-mark, of which the use would, in his opinion, be contrary to law or morality.
87. Where a person becomes entitled by assignment, transmission, or other operation of law to a patent, or to the copyright in a registered design, or to a registered trade-mark, the Comptroller shall on request, and on proof of tile to his satisfaction, cause the name of such person to be entered as proprietor of the patent, copyright in the design, or trade-mark, in the register of patents, designs, or trade-mark, as the case may be, shall, subject to any rights appearing from such register to be vested in any other person, have power absolutely to assign, grant licenses as to, or otherwise deal with, the same and to give effectual receipts for any consideration for such assignment, license, or dealing. Provided that any equities in respect of such patent, design, or trade-mark may be enforced in like manner as in respect of any other personal property.
88. Every

Bations of any be prescribed; and certified copies, sealed with the seal of the Patent-office, of any entry in any such register shall be given to any person requiring the same on payment of the prescribed fee.
89. Printed or written copies or extracts, purporting to be certified of or from patents, specifications, disclaimers, and other documents in the Patent-office, and of or from registers and other documents there, shall be admitted in evidence in all courts in her Majesty's dominions, and in all proceedings, without further proof or production of the originals.
90. (1) The court may on the application of any person from any register kept under this Act, or by any entry made without sufficient cause in any such register, make such order for making, expunging, or varying the entry, as the court thinks fit; or the court may refuse the application; and in either case as the court thinks fit. (2) The court may in any proceeding under this section decide any question that it may be necessary or expedient to decide for the restification of a register, and may duret an issue to be tried for the decision of any question of fact, and may award damages to the party aggrieved. (3) Any order of the court redifying a register shall direct that due notice of the restification be given to the Comptrolle.
91. The Comptroller may, on request in writing accompanied by the prescribed fee,—(4) Correct any clerical error in the name, style, or atade-mark; or (b) correct any clerical error in the name, style, or atade-mark; or (c) correct any clerical error in the maxe, style, or alcellar, not being an essential particular within the meaning of the registered proprietor of a patent, design, or trademark. (c) Cancel the the provided that the application register as the court for leave to add to or alter such mark in any particular, not being an essential particular within the meaning of this Act, and the comptroller shall be given to the Comptroller by the projection. (3) If the court grant leave, the Com

94. Where any discretionary power is by this Act given to the Comptroller, he shall not exercise that power adversely to the applicant for a patent, or for amendment of a specification, or for registration of a trade-mark or design, without—if so required within the prescribed time by the applicant—giving the applicant an opportunity of being heard personally or by his agent. 95. The Comptroller may, in any case of doubt or difficulty arising in the administration of any of the provisions of this Act, apply to either of the law officers for directions in the matter. 96. A certificate purporting to be under the hand of the Comp-troller as to any entry, matter, or thing which he is authorised by this Act, or any general rules made thereunder, to make or do, shall be primif facie evidence of the entry having been made, and of the contents thereof, and of the matter or thing having been done or 94. Where any discretionary power is by this Act given to the

ntents thereof, and of the matter or thing having been done or left undone.

97. (1) Any application, notice, or other document authorised or required to be left, made, or given at the Patent-office or to the Comptroller, or to any other person under this Act, may be sent by a prepaid letter through the post; and if so sent shall be

by a prepaid letter through the post; and if so sent shall be deemed to have been left, made, or given respectively at the time when the letter containing the same would be delivered in the ordinary course of post. (2) In providing such service or sending, it should be sufficient to prove that the letter was properly addressed and put into the post. 98. Whenever the last day fixed by this Act, or by any rule for the time being in force, for leaving any document or paying any fee at the Patent-office shall fall on Christmas Day, Good Friday, or on a Saturday or Sunday, or any day observed as a holiday at the Bank of England, or any day observed as a day of public fast or thanksgiving, herein referred to as excluded days, it shall be lawful to leave such document or to pay such fee on the day next following such excluded day, or days if two or more of them occur consecutively. consecutively.

* Parts III. and IV. refer to designs and trade-marks.

99. If any person is, by reason of infancy, lunacy, or other inability, incapable of making any declaration or doing anything required or permitted by this Act or by any rules made under the authority of this Act, then the guardian or committee (if any) of such incapable person, or if there be none, any person appointed by any court or judge possessing jurisdiction, in respect of the property of incapable persons, upon the petition of any person interested in the making such declaration or doing such thing, may make such declaration or a declaration as nearly corresponding thereto as circumstances permit, and do such thing in the name and on behalf of such incapable person, and all acts done by such substitute shall for the purposes of this Act be as effectual as if done by the person for whom he is substituted.
100. Copies of all specifications, drawings, and amendments left at the Patent-office after the commencement of this Act, printed for and sealed with the seal of the Patent-office, shall be transmitted to the Edinburgh Museum of Science and Art, and to the Rolls-office in the Isle of Man, within twenty-one days after the same shall respectively have been accepted or allowed at the Patent-office is and cortified copies of or extracts from any such documents shall be given to any person requiring the same on payment of the prescribed fee ; and any such copy or extract shall be divided in evidence in all courts in Scotland and Ireland and in the Isle of Man without further proof or production of the originals.

be attinued in evidence in an courts in scottand and Treiand and in the Isle of Man without further proof or production of the originals. 101. (1) The Board of Trade may from time to time make such general rules and do such things as they think expedient, subject to the provisions of this Act :--(a) For regulating the practice of registration under this Act. (b) For classifying goods for the purposes of designs and trade-marks. (c) For making or requiring duplicates of specifications, amendments, drawings, and other documents. (d) For securing and regulating the publishing and selling of copies, at such price and in such manner as the Board of Trade think fit, of specifications, drawings, amendments and other documents. (e) For securing and regulating the making, printing, publishing and selling indexes to, and abridgments of, specifica-tions and other documents in the Patent-office ; and providing for the inspection of indexes and abridgments and other documents. (f) For regulating (with the approval of the Treasury) the pre-sentation of copies of Patent-office publications to patentees and to public authorities, bodies, and institutions at home and abroad. (g) Generally for regulating the business of the Patent-office, and sentation of copies of Patent-office publications to patentees and to public authorities, bodies, and institutions at home and abroad. (g) Generally for regulating the business of the Patent-office, and all things by this Act placed under the direction or control of the Comptroller or of the Board of Trade. (2) Any of the forms in the first Schedule of this Act may be altered or amended by rules made by the Board as aforesaid. (3) General rules may be made under this section at any time after the passing of this Act, but not so as to take effect before the commencement of this Act, and shall (subject as hereinafter mentioned) be of the same effect as if they were contained in this Act and shall be judicially noticed. (4) Any rules made in pursuance of this section shall be laid before both Houses of Parliament, if Parliament be in session at the time of making thereof, or, if not, then as soon as practicable after the beginning of the then next session of Parliament, and they shall also be advertised twice in the official journal to be issued by the Comptroller. (5) If either House of Parliament, within the next forty days after any rules have been so laid before such House, resolve that such rules or any of them ought to be annulled, the same shall after the date of such resolution be of no effect, without prejudice to the validity of anything done in the meantime under such rules or rule or to the making of any new rules or rule. 102. The Comptroller shall, before the first day of June in every year, cause a report respecting the execution by or under him of this Act to be laid before both Houses of Parliament, and therein shall include for the year to which each report relates all general rules made in that year under or for the purposes of this Act, and an account of all fees, salaries, and allowances, and other money received and paid under thits Act.

received and paid under this Act.

an account of all fees, salaries, and allowances, and other money received and paid under this Act. International and Colonial arrangements.—103. (1) If her Majesty is pleased to make any arrangement with the Government or Governments of any foreign State or States for mutual protec-tion of inventions, designs, and trade-marks, or any of them, then any person who has applied for protection for any invention, design, or trade-mark in any such State, shall be entitled to a patent for his invention or to registration of his design or trade-mark, as the case may be, under this Act, in priority to other applicants; and such patent or registration shall have the same date as the date of the protection obtained in such foreign State. Provided that his application is made, in the case of a patent within seven months, and in the case of a design or trade-mark within four months, from his applying for protection in the foreign State with which the arrangement is in force. Provided that nothing in this section contained shall entitle the patentee or pro-prietor of the design or trade-mark to recover damages for infringe-ments happening prior to the date of the actual acceptance of his complete specification, or the actual registration of his design or trade-mark in this country, as the case may be. (2) The publica-tion in the United Kingdom, or the Isle of Man during the respec-tive periods aforesaid of any description of the invention, or the use therein during such periods of the design, or the exhibition or use therein during such periods of the design, or the publication therein during such periods of a description or representation of the design, or the use therein during such periods of the trade-mark, shall not invalidate the patent, which may be granted for the invention, or the registration of a trade-mark. (3) The application for the grant of a patent, or the registration of a design, or the registration of a trade-mark under this section must be made in the same manner as an ordinary application under th design, or the registration of a trade-mark under this section, must be made in the same manner as an ordinary application under this Act: Provided that, in the case of trade-marks, any trade-mark, the registration of which has been duly applied for in the country of origin may be registered under this Act: (4) The provisions of this section shall apply only in the case of those foreign States with respect to which her Majesty shall from time to time by Order in Council declare them to be applicable, and so long only in the case of each State as the Order in Council shall continue in force with respect to that State. 104. (1) Where it is made to appear to her Majesty that the

force with respect to that State. 104. (1) Where it is made to appear to her Majesty that the Legislature of any British possession has made satisfactory pro-vision for the protection of inventions, designs, and trade-marks, patented or registered in this country, it shall be lawful for her Majesty from time to time, by Order in Council, to apply the pro-visions of the last preceding section, with such variations or addi-tions, if any, as to her Majesty in Council may seem fit, to such British possession. (2) An Order in Council under this Act shall, from a date to be mentioned for the purpose in the Order, take effect as if its provisions had been contained in this Act; but it shall be lawful for her Majesty in Council to revoke any Order in Council made under this Act. Offences.-105. (1) Any person who represents that any article

Offences.—105. (1) Any person who represents that any article sold by him is a patented article, when no patent has been granted for the same, or describes any design or trade-mark applied to any article sold by him as registered which is not so, shall be liable for article sold by him as registered which is not so, shall be hable for every offence on summary conviction to a fine not exceeding five pounds. (2) A person shall be deemed, for the purposes of this enactment, to represent that an article is patented or a design or a trade-mark is registered, if he sells the article with the word "patent," "patented," "registered," or any word or words ex-pressing or implying that a patent or registration has been obtained for the article article article or impressed on or otherwise for the article stamped, engraved, or impressed on, or otherwise applied to, the article.

applied to, the article. 106. Any person who, without the authority of her Majesty, or any of the Royal Family, or of any Government Department, assumes or uses in connection with any trade, business, calling, or profession, the Royal arms, or arms so nearly resembling the same as to be calculated to deceive, in such a manner as to be calculated to lead other persons to believe that he is carrying on his trade, business, calling, or profession by or under such authority as afore-

said, shall be liable on summary conviction to a fine not exceeding

said, shall be liable on summary conviction to a fine not exceeding twenty pounds. Scotland, Ireland, &c.-107. In any action for infringement of a patent in Scotland the provisions of this Act, with respect to calling in the aid of an assessor, shall apply, and the action shall be tried without a jury, unless the court shall otherwise direct; but otherwise nothing shall affect the jurisdiction and forms of process of the courts in Scotland in such an action or in any action or proceeding respecting a patent hitherto competent to those courts. For the purposes of this section, "Court of Appeal" shall mean any court to which such action is appealed. 108. In Scotland any offence under this Act declared to be punishable on summary conviction may be prosecuted in the sheriff court.

109. (1) Proceedings in Scotland for revocation of a patent shall be in the form of an action of reduction at the instance of the Lord Advocate, or at the instance of a party having interest with his concurrence, which concurrence may be given on just cause shown only. (2) Service of all writs and summonses in that action shall be made according to the forms and practice existing at the com-mencement of this Act

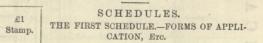
be made according to the forms and practice existing at the com-mencement of this Act. 110. All parties shall, notwithstanding anything in this Act, have in Ireland their remedies under or in respect of a patent as if the same had been granted to extend to Ireland only. 111. (1) The provisions of this Act conferring a special jurisdic-tion on the court as defined by this Act, shall not, except so far as the jurisdiction extends, affect the jurisdicition of any court in Scotland or Ireland in any proceedings relating to patents, or to designs, or to trade-marks; and with reference to any such pro-ceedings in Scotland, the term "the Court" shall mean any Lord Ordinary of the Court of Session, and the term "Court of Appeal" shall mean either Division of the said Court; and with reference to any such proceedings in Ireland, the terms "the Court" and "the Court of Appeal" respectively mean the High Court of Justice in Ireland and her Majesty's Court of Appeal in Ireland. (2) If any rectification of a register under this Act is required in pursuance of any proceeding in a court in Scotland or Ireland, a copy of the order, decree, or other authority for the rectification, shall be served on the Comptroller, and he shall rectify the register accordingly. 112. This Act shall extend to the Isle of Man, and (1) Nothing

served on the Comptroller, and he shall rectify the register accordingly. 112. This Act shall extend to the Isle of Man, and (1) Nothing in this Act shall affect the jurisdiction of the Courts in the Isle of Man, in proceedings for infringement, or in any action or proceed-ing respecting a patent, design, or trade-mark competent to those courts. (2) The punishment for a misdemeanour under this Act in the Isle of Man shall be imprisonment for any term not exceeding two years, with or without hard labour, and with or without a fine not exceeding one hundred pounds, at the discretion of the court. (3) Any offence under this Act committed in the Isle of Man which would in England be punishable on summary conviction may be prosecuted, and any fine in respect thereof recovered at the instance of any person aggrieved, in the manner in which offences punishable on summary conviction may for the time being be prosecuted.

b) any person aggreved, in the number in which observes punishable on summary conviction may for the time being be prosecuted. Repeal; transitional provisions; savings.—113. The enactments described in the Third Schedule to this Act are hereby repealed. But this repeal of enactments shall not (a) affect the past operation of any of those enactments, or any patent or copyright or right to use a trade mark granted or acquired, or order or direction made or given, or right, privilege, obligation, or liability acquired, accrued, or incurred, or anything duly done or suffered under or by any of those enactments before or at the commencement of this Act; or (b) interfere with the institution or prosecution of any action or proceeding, eivil or criminal, in respect thereof, and any such proceeding may be carried on as if this Act had not been passed; or (c) take away or abridge any protection or benefit in relation to any such action or proceeding. 114 (1) The registers of patents and of proprieters kept under may enactment repealed by this Act shall respectively be deemed parts of the same book as the register of patents kept under this Act. (2) The registers of designs and of trade-marks kept under may enactment repealed by this Act shall respectively be deemed parts of the same book as the register of designs and the register of trade-marks kept under this Act. 115. All general rules made by the Lord Chancellor or by any other authority under any enactment repealed by this Act, and in force at the commencement of this Act; may at any time after the passing of this Act be repealed, altered, or amended by the Board of Trade, as if they had been made by the Board under this Act, but so that no such repeal, alteration, or amendment shall take effect before the commencement of this Act; and, subject as afore-said, such general rules shall, so far as they are consistent with and are not superseded by this Act; continue in force as if they had

effect before the commencement of this Act; and, subject as afore-said, such general rules shall, so far as they are consistent with and are not superseded by this Act, continue in force as if they had been made by the Board of Trade under this Act. 116. Nothing in this Act shall take away, abridge, or preju-dicially affect the prerogative of the Crown in relation to the granting of any letters patent, or to the withholding of a grant thereof.

granting of any letters patent, or to the withholding of a grant General definitions.—117. (1) In and for the purposes of this Act, unless the context otherwise requires—"Person" includes a body corporate; "The Court" means (subject to the provisions for Scotland, Ireland, and the Isle of Man) her Majesty's High Court of Justice in England; "Law Officer" means her Majesty's Attorney-General or Solicitor-General for England; "The Trea-sury" means the Comptroller-General of Patents, Designs, and Trade Marks; "Prescribed" means prescribed by any of the schedules to this Act, or by general rules under or within the meaning of this Act; "British possession" means any territory or place situate within her Majesty's dominions, and not being or forming part of the United Kingdom, or of the Channel Islands, or of the Isle of Man, and all territories and places under one legislature, as hereinafter defined, are deemed to be one British possession ; and where there are local legislatures as well as a central legislature, means the central legislature only. In the application of this Act to reland, "Summary conviction "means ay, with reference to the Dublin Metropolitan Police Districts the Acts regulating the duties of justices of the peace and of the police for such district, and elsewhere in Ireland the Petty Sessions (Ireland) Act, 1851, and any Act amending it.



FORM A.-FORM OF APPLICATION FOR PATENT. FORM A.-FORM OF APPLICATION FOR PATENT. I, John Smith, of 29, Perry-street, Birmingham, in the county of Warwick, engineer, do solemnly and sincerely declare that I am in possession of an invention for "Improvements in Sewing Machines;" that I am the true and first inventor thereof; and that the same is not in use by any other person or persons to the best of my knowledge and belief; and I humbly pray that a patent may be granted to me for the said invention. And I make the above solemn declaration conscientiously believ-ing the same to be true, and by virtue of the provisions of the

ing the same to be true, and by virtue of the provisions of the Statutory Declarations Act, 1835. JOHN SMITH.

Declared at Birmingham, in the county of Warwick, this day of 18 .

Before me, JAMES ADAMS, Justice of the Peace.

Nore.—Where the above declaration is made out of the United King-dom, the words "and by virtue of the Statutory Declarations Act, 1885," must be omitted; and the declaration must be made before a British consular officer, or where it is not reasonably practicable to make the before such officer, then before a public officer duly authorised in that behalf.

FORM B .--- FORM OF PROVISIONAL SPECIFICATION. Improvements in Sewing Machines.

Dated this Note.—No	day of stamp is p		.8 . on this	JOHN SMITH.
 -I Tenar G	Forme	E Coupt	DUDE S	PECIFICATION.

FORM C.-FORM OF Improvements in Sewing Machines. Stamp.

Having now particularly described and ascertained the nature of my said invention and in what manner the same is to be performed, I declare that what I claim is

3. &c. JOHN SMITH. 18 . Dated this day of

FORM D.-FORM OF PATENT.

FORM D.—FORM OF PATENT. VICTORIA, by the grace of God, of the United Kingdom of Great Britain and Ireland, Queen, Defender of the Faith: To all whom these presents shall come greeting: Whereas John Smith, of 29, Perry-street, Birmingham, in the county of Warwick, engineer, hath by his solemn declaration represented unto us that he is in possession of an invention for "Improvements in Sewing Machines," that he is the true and first inventor thereof, and that the same is not in use by any other person to the best of his knowledge and belief: And whereas the said inventor hath humbly prayed that we would be graciously pleased to grant unto him—hereinafter together with his executors, administrators, and assigns, or any of them, referred to as the said patentee—our Royal Letters Patent for the sole use and advantage of his said invention: And whereas the said inventor hath by and in his complete specification particularly described the nature of his inventions. And whereas we being willing to encourage all inventions which may be for the public good, are graciously pleased to condescend to his request: The way we herefore, that We, of our especial grace, certain know;

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(Seal of Patent-office).

THE SECOND SCHEDULE. Fees on Instruments for Obtaining Patents		RENEW	ALS.	
(a.) Up to sealing.	£	s. d.		d.
On application for provisional protection On filing complete specification	·· 1 3	0 0 0	1 0	0

On filing complete specification with first application 4 0 0 (b.) Further before end of four years from date of patent. On certificate of renewal 50

Or in lieu of the fees of £50 and £100 the following annual

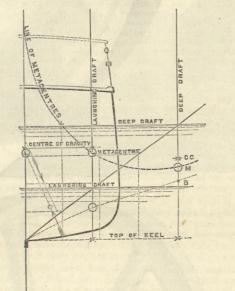
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LETTERS TO THE EDITOR. [We do not hold ourselves responsible for the opinions of our correspondents.]

THE STABILITY OF SHIPS.

THE STABILITY OF SHIPS. SIR,—In answer to Sir E. J. Reed's letter in your last number, I beg to say that in my former letter to you on the launching of the Daphne I meant to imply that the effect of the engines on the thwartship position of her centre of gravity had probably been considered, and that the result of the investigation would be of general interest. The reason now given in your paper, that " as a matter of fact the engines were nearly evenly balanced," has been omitted in all the reports I have read, and I have read a great many notices in the daily and professional papers, and one in the Shipping Gazette of 20th August which professes to be in extenso. Now as the great majority of merchant steamers have engines that are by no means evenly balanced, but have their condensers considerably to the port side of the centre, and their pumps beyond that, with large valves and pipes acting with a leverage of nearly half the beam of the ship, and the bed-plates and engine framing all much heavier on the same side, the fact that the Daphne's engines were nearly balanced shows that they were of an exceptional type, and is of sufficient importance to deserve the same publicity as the rest of the report. J. C. SPENCE. Printing-court-buildings, Newcastle-on-Tyne, September 11th.

September 11th. SR,—The comment of Sir E. J. Reed on the letter and diagram illustrative of the stability of vessels under the condition of launch-ing is perfectly intelligible. My intention in submitting that diagram to your consideration was with the view of introducing the subject to your more general readers, and to those who may not be so thoroughly conversant with the subject. May I be permitted to supplement the views therein stated by wery slight deviation from the ordinary proportions in a ship, a state of instability may be brought about. But the diagrams are not only illustrative of the stability of the vessel under any condition of draft or loading, and the relative value of any form of section and proportion of the vesse! By the construction of the adar forms or sections as producing stability, and the value of breadth over depth and draft in the increase of this most important element. By comparison of the two diagrams it will at once be seen that whereas the former diagram will indicate a certain amount of stability under any condition of loading, the present diagram will show a decrease in stability that may endanger the safety of the vessel, on launching, and in the condition of lading and stability in a sea way; and I am of opinion that if the diagram.



were drawn for the relative proportions and values of the vessels, before the commencement of design or construction of the vessel, both owners and builders would be induced to weigh the relative merits of the sections and proportions. For as much weight carrying may be obtained by the one as the other, and even more by the broader vessel on the same draft; and the cost of con-struction could not be considerably in excess of the narrower and deener vessel.

struction could not be considerably in excess of the narrower and deeper vessel. At the same time, whilst the whole question of the stability of ships is undergoing consideration, would it not be as well to con-sider also the stability of the ship under the condition of any one or more of the holds becoming filled with water? For is it not possible that upon a vessel receiving injury, and any one or some of her holds becoming filled with water, the stability lost through the destruction of the parts may reduce the stability and bring about a state of capsize? The arguments in your article on the former subject in your issue of August the 31st are well worthy of serious consideration. J. ANDREWS. Charlton, September 8th.

THE DEFINITION OF FORCE. THE DEFINITION OF FORCE. SIR,—The letter of "A Student" in your last impression fur-nishes an instance of the results of the existing system of teaching science. Here we have a young man who quotes names glibly enough to gain him credit for erudition, who is not anxious to know what force is in itself, but who is very desirous of knowing what sense he is to attach to the word when he meets with it. One would have thought that for the mere word he would have cared little, for a correct knowledge of the thing a great deal. I have no quarrel with Newton's definition of the sense in which causesmotion..." That definition is wide enough for me, but it my cause confusion in the winds of others and it has evidently created a

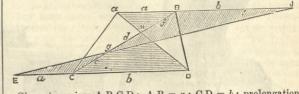
causes motion." That definition is wide enough for me, but it may cause confusion in the minds of others, and it has evidently created a great deal of perplexity in the mind of "A Student." When your correspondent has studied a little more, he will learn that very able men indeed hold that there is no cause of motion distinct from motion, that, in one sentence, motion is the cause of motion. But motion is a thing, at least the word is a noun, and Newton has said that force is anything that causes motion; but motion causes motion, therefore force is motion. If "A Student" will reflect a little he will see that it is impos-sible to prove that motion is not a cause of motion, and all the

If "A Student" will reflect a little he will see that it is impos-sible to prove that motion is not a cause of motion, and all the experience of our lives goes to show that it is *the* cause of motion. Thus, then, it follows, according to Newton, that force and motion are synonymous terms, a conclusion which will perhaps tend to change "Student's" estimate of the value of the definition by Newton, Rankine, Moseley, &c., of the word force. He will also, per-haps, begin to see by this time that words ought not to be used in text-books, to which words meanings conveying no ideas are attributed. His illustration drawn from electricity is not to the purpose. We do not know what electricity is, but we do know, or, at all events, we think we know, with great precision what is the cause of motion. Whether that is or is not force depends on the mean-ing put on the word force. If we accept Newton's definition then

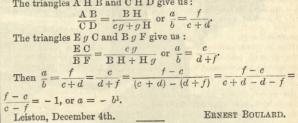
there is no difficulty, because force means anything that causes

motion. Will "Student" favour me with his idea of what was passing Will "Student" favour me with his idea of what was passing through the minds of Newton, Moseley, Rankine, &c., when they penned their definitions of force? Does he suppose that they had motion in view as one at least of the causes of motion? or was the word force associated in their minds with effort, such as pushing ф. П. or pulling? Place d'Armes, Ghent, September 11th.

INDICATOR RIGS. SIR,—In the issue of THE ENGINEER of August the 24th, I noticed an abstract of a paper on the comparison of indicator rigs, ending thus: Given a = b, then $a^2 - b^2 = a \ b - b^2$, (a + b) $(a - b) = b (a - b) \ a + b = b$, or 2 = 1. Now everyone who is but a little familiar with mathematics, or rather with common algebra, will in this case easily find out where the mischief is; but there are other instances, where the course of an absurd result cannot be quite so easily detected; for some time ago I came across the following instance, which might be of interest for some of your readers: of your readers :-



Given trapezium A B C D; A B = a; C D = b; prolongation of A B, B F = b; prolongation of C D, C E = a. If the diagonals A D and B C, and the line F E are drawn, we get B C = C g + g H + H B, or for convenience C B = c + d + f. The triangles A H B and C H D give us:



RAILWAY EXPLOITS.

RAILWAY EXPLOITS. SIR,—After reading an amusing paragraph among your railway items in the current number of THE ENGINEER, in which you say "that bridge jumping is used up, but that the baby-saving business is in full swing," and give an account of the rescue of a Yankee juvenile by a locomotive fireman, I was pleased to see by enclosed paragraph from the *Evening News*, that the bridge-jumping exploit is not yet extinct after all, having merely been transferred from the New World to the adopted country of Columbus :—

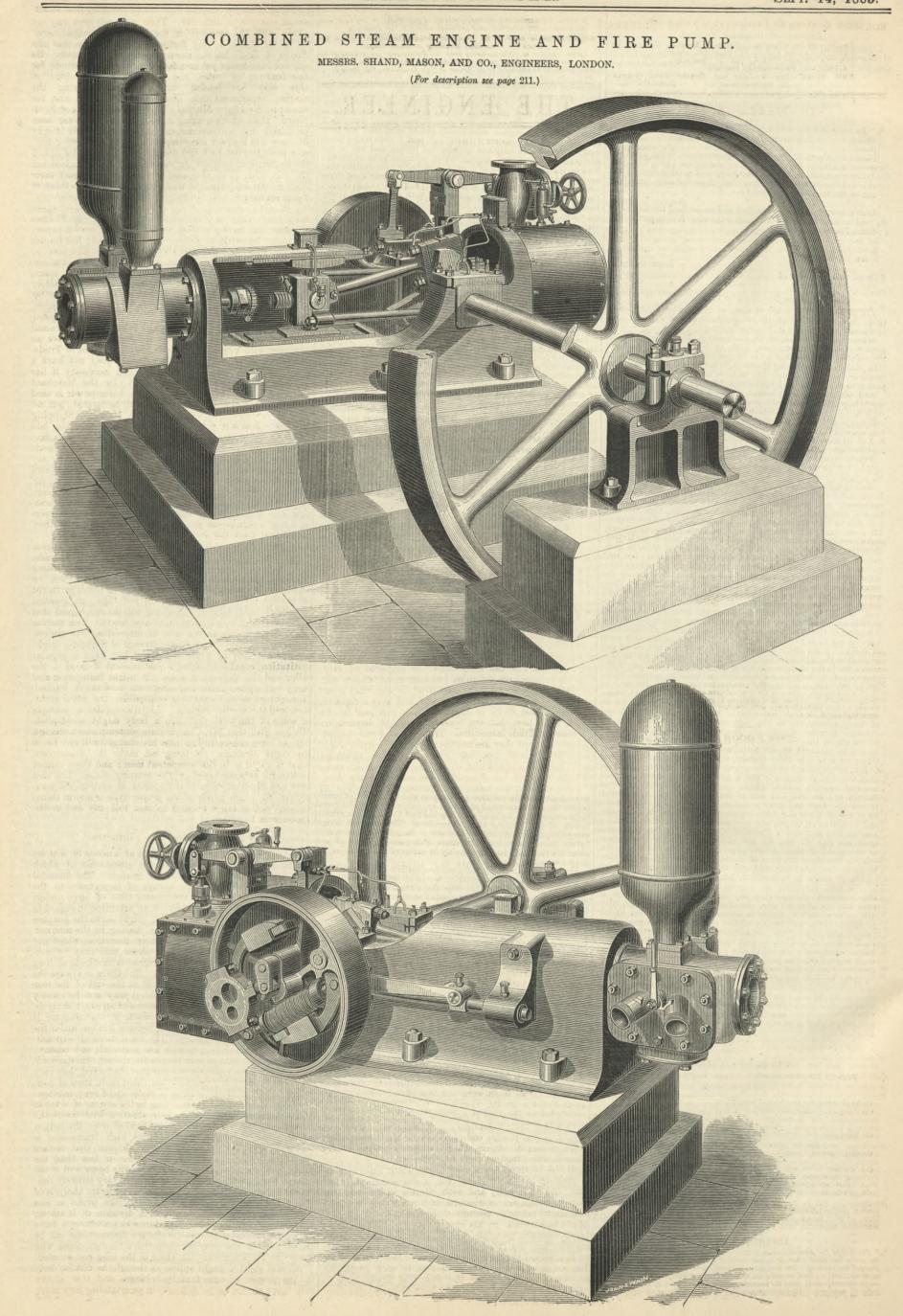
Reading, September 10th. [The "few minutes" spoil the whole thing. The bridge ought to have fallen the moment the last carriage was safe. It is most vexatious that a good story should be spoilt by such a neglect of small details. There are really no trifles in stories of this kind.—ED. E.]

FOREIGN COMPETITION.

FOREIGN COMPETITION. SIR,—I have read with considerable interest your editorial remarks on this subject, and with respect to the suggestion, "the best possible way to deal with foreign competition is to make the working man understand what it is, and this can only be done by taking him abroad," I would propose that the Amalgamated Society of Engineers, as well as that of the Foremen Engineers, should at once send one or two good men drafted from various shops to the Amsterdam Exhibition. They would then, as you truly state, see that there are as good workmen in the world as any that England can turn out. There are exhibits there of some of England's latest industries produced at such a figure as to debar us from competition on the score of cost. ONCE A WORKMAN. London, September 10th.

London, September 10th. POLLUTION OF STREAMS.—An interesting case has just been tried in the Supreme Court, U.S.A., involving the right of the city of Rochester, N.Y., to discharge sewage into a natural watercourse flowing through the suburbs and the surrounding country. The city is divided by the Genesee River, flowing north into Lake Ontario, the land on the east side sloping to the north and east. The river is the outfall for all the main outlets on the west side, and part of those on the east side. There still remain four large outlets draining an extensive territory on the east side that have their outfall into the natural watercourses above mentioned. Numerous suits have been brought against the city at different times, by farmers, through whose lands these streams flow, for the overflow and consequent damage to crops, and the city has generally been beaten, but never before for the pollution of the streams by wewage. The streams had been utilised principally for watering live stock. The plaintiff claimed that the city had turned into the stream running through his farm a large quantity of sewage, which befouled and polluted sail stream, thereby decreasing the rental value of his land. He claimed to recover the difference between the rental value of his farm, before and since the sewage was thus turned upon it, before the year 1870. Judge Rumsey, in his charge to the subject to the drainage of land lying in the city, is bound to receive the natural drainage of the land which would customarily and naturally flow into it. He is bound to receive the natural drainage of the land above him; but he cannot be compelled to take any more drainage than flows by reason of the natural shape of the land, nor can the people above him turn anything into the stream Subject to the drainage of the land which would customarily and naturally flow into it. He is bound to receive the natural drainage of the land above him; but he cannot be compelled to take any more drainage than flows by reason of the natural shape of the land, nor can the people above him turn anything into the stream which would not naturally flow there if left to its ordinary course. They cannot increase the area drained, the amount of the drain-age, or send down into the stream any waters or things that would not naturally flow there. If the jury found for the plaintiff, he was entitled to recover the difference between the rental value as it was after the sewer was opened, and the rental value as it was after the stream, and there was not enough water to carry it off. But through the turning of the water from the city water-works and other water into the stream, it was washed out and the stream benefitted. The city had used the stream for an outlet from 1875 to 1878 inclusive. The jury returned a verdict for the plain-t for 600 dols,—*The Sanitary Engineer*,

SEPT. 14, 1883.



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PARIS.-Madame Boyveau, Rue de la Banque. BERLIN.-Asher and Co., 5, Unter den Linden. VIENNA.-Messrs. GEROLD and Co., Booksellers. LEIPSIC.-A. TWIETMEYER, Bookseller. NEW YORK.-THE WILLMER and ROGERS NEWS COMPANY, 31, Beekman-street.

TO CORRESPONDENTS.

- *** In order to avoid trouble and confusion, we find it necessary to ** In order to avoid trouble and confusion, we find it necessary to inform correspondents that letters of inquiry addressed to the public, and intended for insertion in this column, must, in all cases, be accompanied by a large envelope legibly directed by the writer to himself, and bearing a 1d. postage stamp, in order that answers received by us may be forwarded to their destination. No notice will be taken of communications which do not comply with these instructions.
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 ** All letters intended for insertion in THE ENGINEER, or containing questions, must be accompanied by the name and address of the writer, not necessarily for publication, but as a proof of good faith. No notice whatever will be taken of anonymous communications.
 A. S - Consult the Patent Act, published in our columns.

- communications.
 A. S Consult the Patent Act, published in our columns.
 T. P. G.-Messrs. Selig, Sonnenthal, and Co., Queen Victoria-street, will supply what you want.
 CAM. We are requested to state that Messrs. Smith and Coventry can supply you with the machine you want.
 F. V. All the information we can give you is contained in the Text of the Patent Act, published in our last and present impression.
 H. S Cullen "On the Turbine," published by Messre Spon. There are at least fifty makers of turbines, who all claim to make the best wheels. We may be excused, perhaps, if we refrain from expressing an opinion on the subject.
- subject. SUB-CRIBER. We never heard of Bergen's rotating squeezer. There is certainly nothing of the kind in use in the North of England; nor do we believe any squeezer is to be found in England other than the ordinary ercoedit
- believe any squeezer is to be found in England other than the ordinatory crocodie.
 G. G. (Ware).—You do not say whether the floor is ceiled or not. If it is you can deaden noise by partially filling up the saace between the ceiling@and flooring boards with sawdust: if not, the flooring should consist of two layers of boards put down diagonally, and with a layer of field between them. Unceiled floors are always very troublesome to deal with, and the driver, better, and closer the floor the more does it resemble a drum-head, and the better will it transmit sound.
 R. J. C.—A fin, steam pipe is the smallest that ought to be used for a 24in. cylinder with a good piston speed. There is no fixed rule that can be laid down for the size of ports. However, they ought not to have an area less than one-sizteenth that of the piston. If they are smaller, back pressure will be set up. We cannot understand why you wish to let the size of your steam pipe fix that of your cylinder. The cost of a few lengths of steam piping of the proper size ought not to stand in your way.

SAWDUST PRESSERS.

(To the Editor of The Engineer.) SIR,—Will any reader kindly tell me who are makers of presses for ressing sawdust and chips into fire-lighters? London, September 12th.

WIRE-WORKING MACHINES.

(To the Editor of The Engineer.) SIR, — Can any of your readers give the name of some manufacturers of good wire-working and wire-weaving machinery? ENQUIRER. Birmingham, September 10th.

NOISY GEARING. (To the Editor of The Engineer.)

(To the Editor of The Engineer.) SIR,—Thanks to your correspondent "Tubal Cain," but his reply scarcely answers my query. I may inform him that the wheels are well made and well hung, and that they are not more noisy than is to be expected for wheels of their size, weight, and velocity. Our offices are in close proximity to the engine-room, and the noise is a trouble there. What I want to do is, if possible, to deaden the noise is as trouble there. What I want to do is, if possible, to deaden the noise somewhat. Would a stout wooden case put over the wheels have any effect, or is any other remedy available? In case of alterations to gearing at any future time, I should replace pinion by one with wooden cogs. ALPHA. Birmingham, September 11th.

STEAM HAMMER TUPS.

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THE ENGINEER.

SEPTEMBER 14, 1883.

THE MARINE DEPARTMENT OF THE BOARD OF TRADE. THE Times of Wednesday contained an article on "The Mercantile Marine and the Board of Trade," which says much that ought to be said, while leaving a good deal unsaid that is equally worthy of utterance. Although the article is anonymous, there is no difficulty in identifying the writer with a well-known and eminent authority on naval architecture. We do not intend to reproduce here what he has written concerning the relations which exist between shipowners and the Board of Trade, but rather to extend and supplement his criticisms. He takes a well-known circular by Mr. Chamberlain as a text, and shows that not only is the marine department of the Board of Trade incompetent for the duties which it professes to perform, but that it is quite aware of the fact, and begs to be relieved of further responsibility. Our contemporary confines his remarks almost exclusively to the consideration of the action taken by the Board in stopping ships which are suspected to be unseaworthy; and shows that the officials of the Board really do not know what makes a ship unseaworthy, and are therefore help-less. Concerning the question of load line he is simply scathing in his criticism; and the sting of his criticism lies in the fact that it is all based on admissions made by the Board. Thus, for example, we find in Mr. Chamber-lain's circular the following passage:—"When a ship is stopped, or when an owner is apprehensive that his ship will be stopped, he not unnaturally applies to the Board of Trade to give him a load-line, or otherwise specify what it is that the Board of Trade require. This the Board of Trade have hitherto refused to do, because it is not their business to fix a load-line, or otherwise instruct shipowners as to their business, but only to interfere when the law is broken." A more absurd statement than this will not easily be found. If the Board of Trade cannot define what it wants, it cannot be surprised if its wishes are not com-plied with. Of course, whenever the Board of Trade asserts that a ship is too deep in the water, it virtually force a load him in concernent is to the water. fixes a load-line, in one sense; because it is to be presumed that if the ship were not quite so deep she would be suffered that if the ship were not quite so deep she would be suffered to go on her way. But putting this on one side, it is obviously just the province of a Government Board to say that such-and-such a ship must have such-and-such a free-board, and not less. The excuse put forward by the Board is that they cannot do this, because they have no rules which will apply to all sorts of ships. Of course they have not. No rules of the kind could be prepared or used. What is provined are not what but computer to find ship has What is required are not rules, but competent officials who can decide in each particular case what is and what is not right; but such men would demand, and have a right to, salaries at least twice as large as those now paid by the Board. We have not the least intention of disparaging the Board of Trade inspectors. They are, as a rule, honest, worthy men, but they are not the right men for their work. The want of good men has done more than anything else to bring the Board into disrepute. We cannot agree with the writer in the *Times* who can see no wrong thing in the action of the heads of departments, and lays all the blame directly on system, and indirectly on subordi-nates. When the heads of a department waste their energies in forcing crotchets on the shipowners of the kingdom, they cannot be held blameless. In the case of load lines it may be said that too little has been done; in the case of marine engineering and shipbuilding a great deal too much. Thus, not many years have elapsed since an order was issued by the Board, insisting on the use of gun-metal closet fittings, although cast iron had been used from the beginning, and not a single instance of the dangerous failure of cast iron pipes could be found. The author of this wise order raised a storm among the shipowners and builders which was not readily allayed, and ended in the defeat of the Board.

The rules for the strength of marine boilers are laughed at by the engineers who are compelled to follow them. It is a fortunate circumstance that locomotive superintendents are not in the hands of the Board, or the whole railway traffic of the kingdom would be stopped. There is not now at work a locomotive carrying 130 lb. to 150 lb. pressure, which, were the rules for marine boilers applied to them, could be passed to carry more than 60 lb. The Board, too, continually steps in and stops improvement. A case came under our observation the other day in which a high-speed passenger steamer could not be constructed on certain lines, because the Board of Trade would not pass boilers which were oval, or more properly flat-sided vertically. Cross stays were introduced, according to the rules laid down by the Board for the staying of the flat ends of a boiler; but the Board was inexorable, apparently believing that there must be some broad difference between the flat side and the flat end of a vessel intended to sustain interior pressure. Again, there is not a marine engine builder in the kingdom who has not had the soul vexed within him by troublesome stipulations about superheaters, the opening up of engines, the examination of crank shafts, and such like; and with all this ill-directed zeal defects in design are overlooked, and machinery is passed which ought not to be permitted to go to sea. Mr. Chamberlain in his circular says :---"There is no

rule, no scientific principle, which can be invoked to determine whether any given ship is or is not unseaworthy. *** The charge for Advertisements of four lines and under is three shillings; for every two lines afterwards one shilling and sixpence; odd lines are charged one shilling. The line averages seven words. When an advertise-ment measures an inch or more the charge is ten shillings or inch. All single advertisements from the country must be accompanied by a post-office order in payment. Alternate advertisements will be inserted with all

are in the utmost difficulty. Their own advisers may not agree with the assessors or the Wreck Commissioners." It is, we think, a very fortunate circumstance that the Board of Trade has not more rules to fall back upon. Its officers have never yet manifested any special aptitude for the framing of rules, and what they have done in this way has tended not a little to bring the marine department into disrepute. We may cite, for example, Sir Digby Murray's "approximate tables of Free-board" than which nothing more idially have aver been board," than which nothing more ridiculous has ever been produced by a Government department. Sir Digby Murray did his best according to his light to solve a diffi-cult problem, but he failed disastrously, because he lacked the requisite knowledge. It has been said of these tables that the ease with which they can be departed from was their chief recommendation. Again, what do our readers think of chier recommendation. Again, what do our readers think of the rules for granting passenger certificates to steamers ply-ing in inland waters? For every square yard of deck space they may carry one passenger—that is all. A Thames steamer may have a bottom no thicker than brown paper; she may be without a water-tight bulkhead; her frames may be few and far between; her whole structure so slight that a touch by a barge will send her to the bottom, but provided she has 600 superficial wards of deck space but provided she has 600 superficial yards of deck space, and her boilers and safety valves—especially the safety valves—comply with certain conditions all laid down by rule, she may carry 600 passengers. What may happen, the fate of the Princess Alice tells us. Again, a sea-going teamer if the carries more than twelve preserves. steamer, if she carries more than twelve passengers and has engines over 100-horse power nominal, must have an engineer with a chief's certificate from the Board of Trade. If she carries eleven passengers only, she need not have a chief engineer on board; nor is one necessary if her engines are under 100-horse power. In the Merchant Shipping Act, 1862, the term nominal horse-power is used to settle what grades of engineers shall be carried, but no rule for calculating it is laid down. A Merchant Shipping Act was proposed in 1871, and in that a rule was laid down for calculating it is faid down. A Merchant Shipping Act was proposed in 1871, and in that a rule was laid down for calculating nominal horse-power, but it took into account only the diameters of cylinders and piston speeds without regard to pressure. We are unable to say at this moment on what principle the officers of the Board act in settling the power of an engine. The owner, so far as we can see, may call it anything; and we know of many instances where engines of 120 and 130 nominal horse-power, according to the maker's rule, are put by the owners power, according to the maker's rule, are put by the owners on Lloyd's register as 99-horse power, in order that they may avoid the expense of carrying a chief engineer. It is stated that Mr. Chamberlain intends next session

to remodel the marine department of the Board of Trade. to remodel the marine department of the Board of Trade. Nothing less could be expected; but the remodelling will be entirely useless unless it is carried out on satisfactory principles. The great want in the department is intelligence; its great defect is red tape; its greatest drawback small salaries. Nothing will do much good that falls short of the introduction of new blood. The marine department as it stands is a fossil, interesting but useless, if not in the way. An efficient Bureau of Shipping might become not only an extremely useful but even a popular institution, capable of doing a vast amount of good to the sailor and the shipowner alike. It might inaugurate and tarry out a great many improvements now much wanted. It might guide and assist the shipbuilder, the naval archi-It might guide and assist the shipbuilder, the haval archi-tect, and the marine engineer. Lloyd's supplies an example of some of the work that such a body might accomplish. We are glad that Mr. Chamberlain contemplates a change, but we have reason to fear that his change will not be in the right direction. Nothing can make the department what it ought to be but competent men; and these cannot be had for salaries based on the existing scale. The idea that any kindle for miss or any species of system will comthat any kind) of rules or any species of system will compensate for brain power of the proper type is a vain thing, and any action taken on such an idea will only end in disappointment and loss.

THE DEPRECIATION OF FACTORIES.

WE give on another page the first of a series of articles on the depreciation of factories, the elucidation of which may be interesting to some of our readers. The financial management of a factory—always of importance to the proprietors—demands at the present time of large under-tables and isolat stock composition on transformed to takings and joint-stock companies an attention in regard to certain details beyond that which might serve the purpose of private firms. A few partners sharing in the manage-ment of their business may, at their discretion, adopt any system of account-keeping they please, and may be con-tent with incomplete and even erroneous methods so long as their affairs appear to prosper. But there is always the danger that with an apparent profit at the end of the year the operations which have gained it may not be closely enough examined; and, in the absence of an exact analysis, it sometimes happens that a branch of manufacture is carried on at a loss, unrecognised because hidden under the general gains of the factory. The main items of expendi-ture in the engineering trades are materials and labour; and while these vary in their proportion to each other, according to the precise nature of the business conducted, they vary as much or more in regard to that third main item of cost, which, under different names, is made up of rent, manage-ment, and general expenses. One fertile source of error in the accounts is the too ready generalisation with which the annual total of these expenses is divided over the output of the year, for if, as often happens, each transaction is charged an equal percentage, it is obvious that certain branches of the trade may bear more or less than the share really due to them, as would readily be proved if the charge was compared with that in a factory entirely confined to the one kind of operation. A correct analysis of the past, while necessary to ascertain the profit or loss which may have accrued, and to a division of it among partners, is of still greater importance as providing a basis on which estimates of cost for future transactions can be based, and in the case of competitive tenders, those who know the facts correctly can alone in the long run succeed.

At first sight it might appear as though the risk lay only in the proper allotment of the charges, and that at any rate there should be no difficulty in ascertaining how much

had been spent during a past year. In regard to direct tion of any other railway engineer; and we have no doubt from the north-west in Syria," and " violent agitation about money expenditure this may be so; but the deterioration of the factory itself, and the wear and tear of the machinery by which the revenue has been earned, do not admit of easy calculation, and the danger arising from a wrong system is great, because many years may elapse before an error is discovered. There is too often a disposition to regard as profit the surplus of receipts over expenditure without sufficiently allowing for deterioration, which in the engineering trades is of so varied a character as to admit of no fixed rules for measuring and recording it. If too little be set aside for the renovation of buildings and the purchase of new machinery, the so-called profits of a year may be entirely fictitious; while if too liberal a provision be made out of gross earnings the present owners may be mulcted of their income for the advantage of future proprietors. The physical deterioration of the machinery has not alone to be considered. New inventions may render machinery obsolete; patent rights and monopolies may expire and throw open a trade to those who will have the advantage of starting with later and improved processes and manufacturers may find that what they have been dividing as profit may really have been their own capital which is irrecoverable.

All manufacturers recognise the deterioration of their plant, but the very great diversity in the method and extent of meeting the loss and of providing for renewals shows that some must be working under a wrong system. Of course the error may be in either direction. There may be a lavish writing off for wear and tear, far in excess of the real loss, and while this may, in the case of a private firm, be an excusable and, indeed, a prudent course, it is none the less erroneous, and in the case of a joint-stock company may be unjust to present shareholders, who, if is depreciated, may be led to sell their shares at less than their real value to those who have a fuller and perhaps private knowledge of the real circumstances. We shall be glad if the articles on this subject to which we draw attention may elicit some discussion as to the practice in dif-ferent branches of the engineering trades, which may be serviceable to our readers.

COMPOUND LOCOMOTIVES.

IN our impressions for August 3rd and 10th we published complete drawings of Mr. Webb's compound locomotive, and a full description of the engine and a statement of its performance written by Mr. Webb himself. In our impression for August 31st will be found an account of what has been done in the same direction in Germany. Our readers are, as a result, in possession of all the most recent available information on the subject, If there is not more to be had, that is not our fault, but the result of circumstances over which no one has much control. He would, we think, be a rash man who without hesitation condemned the system as thoroughly bad, or praised it as completely good. system as thoroughly bad, or praised it as completely good. No one possesses as yet the data necessary to enable a final conclusion to be formed as the result of experimental evidence; and so far we must suspend our judgment until events develope themselves. But there are certain aspects of the questions involved which not only admit of being discussed, but which really demand discussion at this moment. Thus, for example, Mr. Webb has now, or soon will have a dozen of his engines at work, and on the results obtained with these a great deal may depend. In such a case as this the inventor is by the nature of things practically debarred from giving evidence. No disrespect will be meant, but nothing which Mr. Webb could say regarding his engines will be accepted as conclusive unless he can support his statements with well authenticated facts, and such facts must also be pertinent-a point very frequently overlooked by inventors. Thus, for example, Mr. Webb may state that his compound engines are burning but 26.6 lb., as compared with 34.6 lb. with non-compound engines on the London and North-Western Railway. Now, we have here an example of what may be termed the non-pertinent statement. In other words, such a fact has by itself little to do with the question at issue, which is, is the compound locomotive more economical than the non-compound? The railway world at large does not care a great deal if one engine on the London and North-Western Railway is more economical than another engine on the same railway system ; but it does want to know very much if the compound type of locomotive is more economical than any other type. To put this more clearly, we may say that while we accept Mr. Webb's statement that the compound engine is burning but 26.6 lb. of coal per train mile, or about three-fourths of the coal needed by other Crewe engines, we can add that there are non-compound locomotives on other lines, working under almost the same conditions of load, speed, and gradients, which are getting on perfectly well with about the same quan-tity of coal that the compound engine is burning. Here, then, if we compare the compound engine with one type of non-compound, we find that it is very much more economical; if with another, we find that it possesses no advantage at all. But this is not all. No comparison of the kind can be complete which omits a statement of the quality of the coal burned. If Mr. Webb is using cheap coal, and his non-compound rival dear coal, then the comparison may, after all, be very much in favour of Mr. Webb. There is yet another point for consideration: How does Mr. Webb arrive at his results? Does he trust his drivers, or has he an independent inspector riding constantly on each of the new engines, and reporting on its performance? It is obvious that the men driving these engines have the greatest possible temptation to make them do well, and there are more ways than one, as every locomotive superintendent knows, of making an engine give a high duty. Of course we do not assert that due care has not been taken to get accurate results; but neither Mr. Webb nor any one else in his position can expect those to whom his invention appeals to be satisfied with anything short of a clear and definite statement of the precautions taken to obtain unimpeachable figures. Mr. Webb himself short of a clear and definite statement of the precautions taken to obtain unimpeachable figures. Mr. Webb himself would be satisfied with nothing less as regards the inven-

but that in due time he will supply all that is wanted; but up to the present this kind of information is lacking, and judgment must therefore be suspended.

The whole system may be dealt with on a theoretical basis. Why, we may ask, should a compound be more economical than a non-compound engine? It is not necessary, fortunately, to enter into any discussion here of the merits of the compound system in preventing cylinder condensa-tion and such like. The whole theory lies in a nutshell. An ordinary locomotive exhausts steam at a comparatively high pressure when it is hard worked. Thus an engine with 18in. cylinders, 24in. stroke, will deliver at each end of each stroke about 3.67 cubic feet of steam into the chimney, and this steam will have a total pressure, according to the speed of the engine and the point of cut-off, of from, say, 100 lb. on the square inch down. It is not likely that it will fall much below 25 lb. above the atmosphere when the train is fairly heavy, unless on a falling gradient. We have here, then, absolutely wasted nearly 3.75 cubic feet of steam per stroke. If the cylinder were augmented in length, then it is clear that the steam might be permitted to follow the piston further, and so falling to a lower pressure give out a great deal of power. In other words, compounding a locomotive means nothing more than augmenting the cylinder capacity. It may be said that it is not quite a fair statement of the case, because in some instances the cylinder capacity has remained unaltered. This is only an apparent exception, as a smaller weight of steam is used at each revolution of the driving wheels in such a compound engine as that of Henschel with two cylinders only. Thus it is clear that the cylinder capacity is virtually augmented; in other cases it is actually increased. But precisely the same effect may be produced up to a certain point by simply putting in larger cylinders. Thus, let us suppose that an engine with a given boiler power has cylinders 16in. diameter and 24in. stroke. If, now, these are removed, and a pair of 18in. cylinders put The engine in, the effect will be that of compounding. can be worked much more expansively than it was before. The experiment has been actually tried, and with such unsatisfactory results that the cylinders have usually been lined up again; but the reason was usually that the load was increased at the same time that the cylinders were enlarged, and the engine performed worse than ever, because the boiler could not keep steam for the extra load behind it. If such experiments had had fair play, there would perhaps have been a saving of fuel. If

not, then the prospects of the compound system are bad. It must never be forgotten that the conditions under which a locomotive operates are of paramount importance in this connection. As a rule, passenger locomotives of the best type are so designed and loaded that very little work indeed is left in the steam as it escapes up the chimney. A glance at the diagrams taken from such engines will show that at high speeds expansion cannot be pushed further with advantage. The case is different with We constantly find them hauling trains goods engines. at slow speeds and working nearly in full gear. The power wasted up the chimney is then very great indeed. To such engines at such times more cylinder capacity would be invaluable. But for reasons very well understood, it is be invaluable. But for reasons very wen understood, it is highly desirable that the increased capacity should be supplied rather by augmenting the number of cylinders than by increasing their diameter. Much is to be hoped, we think, from compounding goods engines. With them there are chances of saving fuel which have no existence in the case of the passenger engine. We may call attemin the case of the passenger engine. We may call attention here to the noteworthy fact, that while passenger engines exert daily a greater horse-power than goods engines, they burn much less coal per train mile, and the reason is that the passenger engine is seldom or never run in full gear, while the goods engine does the greater part of its work with steam admitted for at least 50 or 60 per cent. of the stroke. By augmenting cylinder capacity this would be avoided. The use of bigger cylinders than those now in use would do no good, because they also would be worked in full gear. The great advantage of the compound system is that the driver may do what he pleases, he cannot help work his steam expansively; and in this, much more than in the principle of compounding, will be found, we believe, the secret of all the economy that can be realised by compounding a passenger locomotive engine at all events.

A SEISMIC FORECAST.

SOMEBODY--whether lady or gentleman we know not. we presume the latter-writes to a daily contemporary to say that having for some time past been engaged in tracing the causes of seismic disturbances, he was enabled to anticipate "serious ebullitions of natural forces" within a day or two of the date of the recent earthquakes in Ischia and Java. Of course, we may take the gentleman's word for it; but he also affords us some test with regard to his qualifications by predicting that "earthquakes and volcanic eruptions, probably of a heavier and more serious character than any that have been experienced during the present year, will happen on and within a few days of the 22nd inst." Unfortunately, the learned gentleman is unable to say in what parts of the world these disturbances will present themselves. Accordingly, the inhabitants of all those regions where earthquakes and volcanoes are indigenous must hold themselves in a state of suspense. But this is not a satisfactory state of things. The earth quake oracle should be more precise. The prediction is almost like "a hurricane somewhere." In these matter-offact days people require something definite. Our forefathers were content when "Francis Moore, Physician,' predicted "Thunderstorms in places," and "Rain on or about the 5th, 12th, 23rd, and 30th." We have got beyond this infancy of knowledge, and now we learn in the morning that before the day is out the wind will be north in Scotland, west in the Midland counties, with a brisk little gale in the Channel, and showers in the North

the base of Cotopaxi." If the seer could add "minute vibrations in Middlesex," the interest attaching to the subject would be considerably enhanced, especially with regard to the equilibrium of Cleopatra's Needle. But London has its own peculiar seismic phenomena. Looking at the present state of the streets we should say that never was there such a general upheaval of the surface since the settlement of the British strata. Wood, asphalte, Purbeck, Portland, and granite, are all convulsed. Footways and carriage-roads, all alike appear disorganised. In a November fog, Hood complained there was "no t'other side the way." At the present hour there seems to be neither this side nor the other. Chided by the press for uprooting nor the other. Childed by the press for uproofing certain thoroughfares when London was "in season," the authorities seem determined to hold high revel "out of season." There is a fiction that "London is out of town." Consequently, an army of men with pickaxes and crowbars have torn up almost every inch of pavement, and apparently act upon the principle that "the public is nobody." Let the hapless citizen take his stand on "the finest site in Europe," and look down Parliament-street. The scene is chaos, having in the midst a huge cauldron emitting grimy clouds reeking with pitchy odours. The street is "up," and where is there the street that is not? The peripatetic is made to feel that he is a nuisance-an intruder. The man with the wheelbarrow frowns upon him. The gentleman with the shovel evidently meditates mischief. If the wanderer turns aside in search of quieter scenes, it is in vain. The most secluded nook is under repair. It is the era of barricades. Omnibuses pursue unknown routes, and are to be found where nobody thinks of looking for them. The desperate state of things may be inferred from the fact that an unfortunate cabman, having preserved an unblemished reputation for thirty having preserved an undernished reputation for threy years, became aggravated to such a pitch of indignation by the difficulty of finding his way from the top of the Hay-market to the Waterloo Station, that he swore at his fare, and was fined by the magistrate. If everybody who is exasperated at the incomprehensible blockade which London now suffers were dealt with after the same fashion, the sum total of the penalties would perhaps be considerable. Earthquakes, no doubt, are very dreadful things. But these artificial disturbances of the earth's surface in the midst of the metropolis are excessively inconvenient.

It is to be hoped that amid all the varieties of roadpaving in which the authorities are indulging, a discovery will be made of something so permanent in its character that this kind of visitation will not be continually repeating itself. There is a striking analogy between the true seismic convulsion and this wrecking of the thoroughfares. There is sure to be now and then an upheaval of the surface, but the difficulty is to know where the outbreak will occur. That is just the dilemma of the prophet in our contemporary. Cosmical studies are no help in this matter. The only plan is to go and consult the vestries, and then it may be possible to forecast the event. But there are many vestries, and it is not always easy to penetrate their counsels. Perhaps on the whole it is somewhat easier to study the cosmical than the parochial. But it is a fact to be considered and inquired into that the roads and footways of London seem to wear out faster than ever they did. No doubt the traffic is greater, and there are more occasions for digging holes and trenches now than formerly. The latter is a disturbing cause of great potency; but it may be doubted whether the science of road making is as yet properly understood in relation to the requirements of the metropolis. At the rate at which things are going on, we seem to be threatened with a miniature earthquake, and already the comparison is not utterly remote, so far as the arrest of locomotion is concerned.

EVOLUTION.

ONE of the curious waves of change which scientific thought frequently exhibits appears just now to be impending concerning the theory of evolution. The President of the American Assothe theory of evolution. The President of the American Asso-ciation for the Advancement of Science, Principal J. W. Dawson, took as a text for a recent address, "Some Unsolved Problems in Geology," and without disputing the Darwinian theory, he warned his hearers that it might be well to suspend their judgment in certain matters. One difficulty, for example, the speaker pointed out, lies in the remarkable fixity of the leading types of living beings in geological time. "If instead of framing, like Haeckel, fanciful phylogenies, we take the trouble, with Barrande and Gaudry, to trace the forms of life through the period of their existence, each along its own we take the trouble, with Barrande and Gaudry, to trace the forms of life through the period of their existence, each along its own line, we shall be greatly struck with this, and especially with the continuous existence of many low types of life through vicissitudes of physical conditions of the most stupendous cha-racter, and over a lapse of time scarcely conceivable. What is still more remarkable is, that this holds in groups which, within certain limits, are perhaps the most variable of all. In forms somewhat higher and less variable, this is equally noteworthy. The pattern of the veination of the wings of cockroaches, and the structure and form of land snails, gally worms. and decapod crustaceans, were all settled in the Carms and decap crustacean all ttled in the boniferous age in a way that still remains. So were the foliage and the fructification of club-mosses and ferns. If at any time and the indicator of cub-mosses and terms. If at any time members of these groups branched off, so as to lay the founda-tions of new species, this must have been a very rare and excep-tional occurrence, and one demanding even some suspension of the ordinary laws of nature." Dr. Dawson does not stand alone. the ordinary laws of nature. Dr. Dawson does not stand atom. Professor Williamson, of Manchester, in an address delivered in February last before the Royal Institution of Great Britain, after showing that the conifers, ferns, and lycopods of the palæozoic bave no known ancestry, uses the significant words, "The time after showing that the confers, terns, and tycopods of the palacozote have no known ancestry, uses the significant words, "The time has not yet arrived for the appointment of a botanical king-at-arms and constructor of pedigrees." Dr. Dawson's entire address is written in an extremely thoughtful style. It has been pub-lished in full in *Nature*, and will be found well worth perusal.

AN ELECTRICAL PATENT CASE.

THE original patent for the Gramme dynamo electrical machine will expire in a few months, and the fact that one of the best machines ever produced can then be made by anyone will no doubt have an important bearing, not only on the future of electric lighting, but on the value of other patents. The owners of the Gramme patents are, however, determined to make all the money they can out of the invention, and they have recently brought an action in the United States to establish their rights. The case has at last been brought to final argument before the United States Circuit Court, at Newport, R.I. If the patent is sus-tained, it is supposed that many of the dynamos now running will be found to be an infringement—in which case the Gramme owners will make a rich haul. One of the most serious points urged against the plaintiffs is that the machine was patented in Austria prior to the grant of the American patent, which in Austria prior to the grant of the American patent, which Austrian patent has expired. Under the American law the American patent ceases with the expiration of the previouslypranted foreign patent for the same invention, and if this patent has been clearly proven, the decision must necessarily be adverse to the validity of the Gramme invention. It is expected that several weeks will elapse before the judgment of the Court will be delivered,

LITERATURE.

The Concepts and Theories of Modern Physics. By J. B. STALLO Second Edition. London : Kegan Paul, Trench, and Co. 1882. [SECOND NOTICE.]

WE have shown in our first notice of Dr. Stallo's book that the atomic theory as held by chemists is in direct contradiction to the atomic theory as held by physicists—we use the word physicist for lack of a better, to express what has been called "the man of pure science," namely, one who deals with nature and nature's laws on the broadest principles-on the question of weight. In his fourth chapter our author goes on to deal with the proposition that the elementary units of mass are absolutely hard and inelastic; and in consonance with the general plan of his book he first quotes authorities to show that such a view is held or has been held—" Elasticity involves motion of parts, and cannot therefore be an attribute of truly simple atoms." "The concept 'elastic atom,' says Professor Wittwer, is a contradiction in terms, because elasticity presupposes parts, the distances between which can be increased and diminished." Sir Isaac Newton in his "Opticks" says, "It seems probable to me that God in the beginning formed matter in solid, massy, hard, impenetrable, novable particles, of such sizes and figures, and with such other properties and in such proportion to space as most conduced to the end for which He formed them; and that these primitive particles being solids are incomparably harder than any porous body compounded of them, even so very hard as not to wear or break in pieces, no ordinary power being able to divide what God himself made one in the first creation." Dr. Stallo has not found it necessary to quote many authorities. Indeed the doctrine that the altimate atom is quite and reid and indetic is investiultimate atom is quite hard, rigid, and inelastic, is invariably taught so long as the student is dealing with the con-stitution of matter. But Dr. Stallo goes on to show that the moment we come to deal with the kinetic theory of gases a totally different doctrine is of necessity taught, if not directly then by implication. Mr. Stallo says not directly then by implication. Mr. Stallo says :

The moment we come to deal with the kinetic theory of gases a totally different doctrine is of necessity taught, if not directly then by implication. Mr. Stallo says :— "The most conspicuous among the hypotheses which have been devised since the general adoption of the modern theories of heat, light, electricity, and magnetism, and the establishment of the doctrine of the conservation of energy, in order to afford consistent ground for the mechanical interpretation of physical phenomena, is that known as the kinetic theory of gases. In the light of this theory a gaseous body is a swarm of innumerable solid particles incessantly moving about with different velocities in rectilinear paths of all conceivable directions, the velocities and directions being changed by mutual encounters at intervals, which are short in comparison with ordinary standards of duration, but indefinitely long as compared with the duration of the encounters. It is readily seen that these motions would soon come to an end if the particles were wholly inelastic, or imperfectly elastic. For in that case there would be loss of motion at every encounter. The assumed perpetuity of the motion of the particles, therefore, leads to the necessity of asserting their perfect elasticity. And this necessity results, nort merely from the petuliar exigencies of the kinetic theory of gases, but also from the principle of the conservation of energy in its general application to the ultimate constituents of sensible masses, if these collision of ordinary inelastic or partially elastic bodies there is a loss of motion which is accounted for by the conversion of the collision of the sensersy recognised by all its founders. 'Gases,' says Kroenig,* 'consist of atoms wink behave hek sold, perfectly elastic spheres.': And the highest scientific authorities are equally explicit in declaring that the hypothesis of the atomic or molecular constitution of matter is in conflict with the doctrine of the conservation of the distribution perfect elasticity to the element mundane matter."

We have here a glaring contradiction, and that such a contradiction exists has been fully recognised, and vigorous efforts have been made to escape from the of the horns dilemma—among others, by Helmholtz and Sir William Thomson. Dr. Stallo, as we think easily, disproves the recondite theories advanced, according to which vortex rings in a perfect fluid may be said to supersede the gas atom. It is, of course, not too much to assert that this theory is a mathematical abstraction which will not bear even keen mathematical discussion. Indeed, so great an authority as Clerk-Maxwell has pointed out that vortex rings moving in a continuous fluid would lack the essential attribute of matter, inertia. Sir William Thomson does not stand alone; Poinsot, Secchi, and others have dealt with the problem, and left it where they found it. Let us see exactly what all this implies.

Professor Tyndall was one of the first to put in a popular form the theory that the pressure of gases is due to the violent impact of the gas atoms on the sides of the containing vessel. Let us suppose that we have a membrane like

* Pogg. Ann., vol. xcix., p 316, ‡ Phil, Mag., 4th ser., vol. xix., p. 19 § *Ib.*, vol. xlv., p 321,

a drumhead stretched loosely on a hoop. If, now, a shower of parched peas were permitted to fall on the membrane, held horizontally to receive it, then it requires no great mental effort to perceive that the membrane would become quite tight. There would be no accumulation of peas on the nearly flat surface; but their almost continuous impact would have all the effect of pressure. Joule, long before Tyndall lectured on the subject, had recourse to this theory to explain certain thermal phenomena resulting from the compression and expansion of gases. We shall not err if we say that if we reject the atomic collision theory of gases, we have no theory at all concerning them which will hold water. But, on the other hand, this theory and the proposition that the ultimate atoms of matter are hard and inelastic cannot go hand-in-hand—either must be wrong if the other be right. The physicists may sing, like Contain Machaeth Captain Macheath-

"How happy could I be with either, Were 'tother dear charmer away."

But unfortunately both the theories appear to be indis-pensable to that kind of universe which modern science has built up and teaches the nature of laboriously to the rising generation. To sum up what has already been said in other words, Dr. Stallo shows, and that in a way which is entirely unanswerable, that what is commonly taught concerning the ultimate forms of matter is entirely inconsistent. Furthermore, the scientific world has carefully stopped every loophole by which it might have escaped. The pure physicist can in no possible way dispense with an ultimate atom, absolutely hard and inelastic, and in-variably of the same weight; his universe is built up of such atoms, and of no others. To the chemist the atom is equally necessary; chemical science would be chaos with-out it. But the chemist's atom is quite different from that of the physicist. Indeed instead of one kind of a term has of the physicist. Indeed, instead of one kind of atom, he needs no fewer than sixty-three, or one species for each element; and these atoms, instead of all being of the same weight as the physicist maintains, are all of different weights, varying from that of the hydrogen atom, which is taken as unity or 1, to that of Thorinum, which is 2315. To the chemist again it is a matter of perfect indifference whether the atom is or is not elastic, but he demands that instead of being inert it shall have certain affinities, desires, wishes, so to speak, which result in the production of definite substances from definite mixtures. Whenever substances, either ele-mentary or compound, unite together chemically, they always do so in fixed proportions, and these proportions are regarded as representing the atomic weights of the substances; and to proceed still further, these natural tendencies of the chemical atom are so strong, that when the equilibrium of unstable mixtures is overset, as by heating gunpowder, the most violent mechanical effects are produced, and this by atoms which, according to the physicist, are absolutely inert. Again, the man who makes dynamics his study finds that neither the atom of the chemist nor that of the physicist will answer his pur-pose. He cares nothing about hardness, inertness, or weight. Let his atom be elastic and he asks no more. Thus, then, there are not less than three distinct kinds of atoms demanded by the modern teachers of science; and it is admitted on all sides that the conditions under which the atom of any one of the three can exist must be fatal to the existence of the other two. There is no exaggeration in this picture—that it is absolutely, astoundingly true, the student who reads Dr. Stallo's book cannot help admitting. We have said enough, we think, to show very clearly what our author has to say on one of the foundations of modern physical science, viz., the atom. We may now proceed to consider other of his propositions. In his sixth chapter Dr. Stallo deals with the conserva-

tion of energy. "According," he writes, "to the mechanical theory, motion, like mass, is indestructible and unchange-able. It cannot vanish and reappear. Any change in its rate results from its distribution among a greater or less number of units of mass; and motion and mass being mutually inconvertible, nothing but motion can be the cause of motion. There is, therefore, no potential energy; all energy is really kinetic." Now whether this proposition be true or false we need not dis-uses for the moment. That it is held yary generally cuss for the moment. That it is held very generally is certain. There are exceptions, but they prove the rule. It will be admitted, and that universally, that if motion is the sole cause of motion, there can be no such thing as poten-tial energy. But as a matter of fact, even at this moment, the two doctrines are taught side by side ; and while the student is assured on the one hand that motion is the sole and only cause of motion, he is told on the other that energy-which is motion—has been stored up in coal millions of years ago by the sun; and that a clock-weight when wound up possesses potential energy which makes the clock go. Some years ago the inconsistency struck one able man as being too glaring, and for "potential energy" we had substituted "energy of position." But underlying the whole structure of modern science we have the theory of the storing up of energy in motionless bodies. In our opinion this has resulted, in a very great degree, from mistaken notions or conceptions of the nature of energy. Thus, for example, if it were admitted that motion is the only form of energy,

then it is clear that a motionless body could not store it p. But the word energy, like force, is used in the vaguest ossible way at every turn. "Modern science," says Proup. fessor Stallo-

fessor Stallo— "Asserts that all, or nearly all, physical changes in the universe, are mutual conversions of kinetic and potential energies—that energy is incessantly stored as virtual power and restored as actual motion. When the bob of an ordinary pendulum descends from its highest to its lowest point, its potential energy diminishes in proportion to the increase of its actual motion; when it rises again its energy of motion disappears at the same rate up to its arrival at its highest point opposite the first, where it is for an instant motionless, all its energy being due to its position. And this con-version and re-conversion of the two forms of energy are typical alike of the supposed oscillations of the ultimate atoms or mole alike of the supposed oscillations of the ultimate atoms or mole-cules and of the orbital swing of the large bodies composing a planetary system. A planet moving in an excentric orbit gains energy of motion as it approaches the sun and loses it again in the same proportion as it recedes from it. The same mutual transfor-mation is exhibited in another wide domain of physical phenomena —action due to chemical affinity. A lump of coal lies buried in

the earth for a million years; during all this time there is no appreciable change in its position as referred to surrounding objects, or in the relative positions of its parts—it is without external or internal motion, except that which it shares with the planet of which it is a part; now we bring it to the surface into the atmo-sphere containing oxygen and in contact with a flame. Its latent power at once becomes sensible—it burns, giving rise to vigorous action which manifests itself as light and heat. The tendency of modern science is to trace all physical change to a few primary forms of potential energy, chief among which are gravity and chemical affinity. In the opinion of modern physicists the only plausible theory thus far advanced of the origin of stellar and planetary systems is that known as the nebular hypothesis; and whether we adopt its familiar Kant-Laplacean form or one of its more recent modifications, in either case all the molar, if not the attraction due to the mere position of the original particles sup-posed to be uniformly diffused in space. And all changes in the comparatively minute organic or inorganic forms are referred, proximately at least, in physiology as well as in physics, to the affinities of the chemical elements. In truth, modern science teaches that diversity and change in the phenomena of nature are possible only on condition that energy of motion is capable of being stored as energy of position. The relatively permanent concre-tion of material forms, chemical action and reaction, crystallisa-tion, the evolution of vegetal and animal organisms, all depend upon the 'looking-up' of kinetic action in the form of latent energy. To make this clear, and to show that the effort to abolish avail, it will be useful briefly to review the history of the doctrine of the conservation of energy." of the conservation of energy.

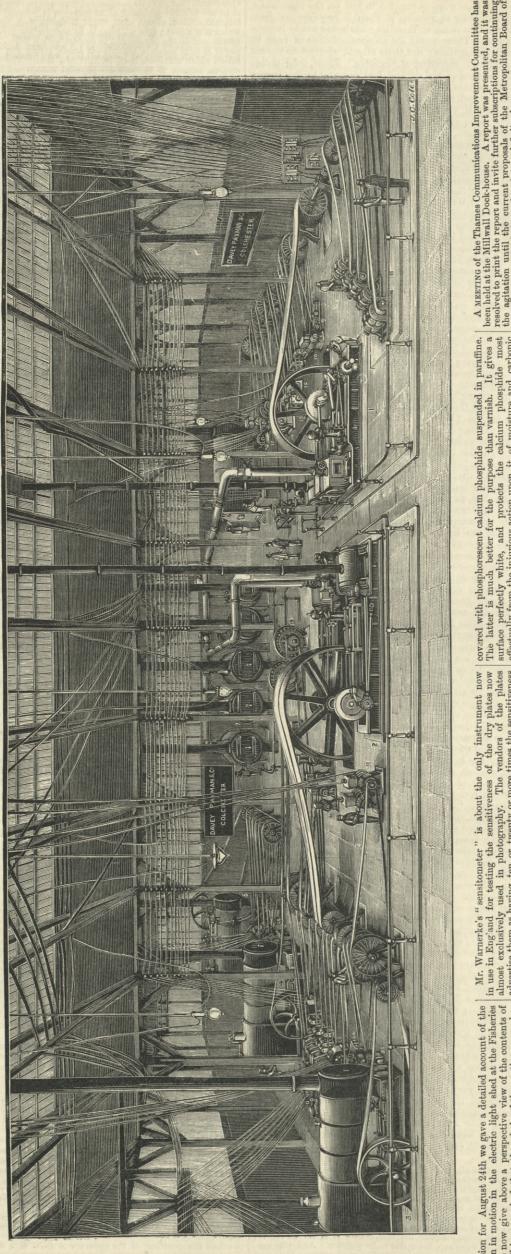
We must refer our readers for the review referred to to Dr. Stallo's book. They will find it worth perusing. The demands on our space prevent us from reproducing it. It displays an enormous amount of reading and research It displays an enormous amount of reading and research on the part of the author, who quotes all his authorities at considerable length. It is, we think, clear that if the potential energy theory be true, then the theory that motion is, like mass, constant, must be false. "If," say Stewart and Tait, speaking of Le Sage's theory of gravita-tion, "this, or anything of a similar nature, be at all a representation of the mechanism of gravitation, a fatal blow is dealt to the netion of the tranequil form of nower blow is dealt to the notion of the tranquil form of power we have called potential energy, not that there will cease to be a profound difference in kind between it and ordito be a protound difference in kind between it and ordr-nary kinetic energy, but that both will be henceforth regarded as kinetic." It is right to point out that long since the preceding passage was written at least one able authority has re-asserted in the strongest language that motion is the sole cause of motion, and so far as human experience goes, motion is never set up in a body at rest save by the contact of some other body in motion. Thus, when we blow a feather off our table, air in motion comes in contact with the feather and puts it in motion. The motion of a rower's arms is required to propel a boat, and so on. The exceptions that will be adduced are extremely limited; they are all summed up under the head of at-traction. Thus it is said that the earth attracts a falling body, and that we have in this way motion produced without the contact of any moving body; we have also the attrac-tions, so-called, of magnetism and electricity. But to the whole doctrine of attraction there are fatal objections, the first being that it is entimely opposed to the theory that matter is inert. So fully has this been recognised, that in order to get rid of the difficulty matter has been dispensed with altogether, and replaced by aggregations of centres of force. The second objection is that the theory of attraction is flatly opposed to the doctrine of the conserva-tion of energy, according to which motion cannot be created any more than matter can. But it is obvious that if a body at rest has motion communicated to it by another if a body at rest has motion communicated to it by another body also at rest, then motion has been created instead of being derived. In other words, it has been produced without any expenditure of energy, which is absurd. This is, however, in some measure a digression, although what we have just said is strictly cognate to the matters discussed by Dr. Stallo.

COMBINED STEAM ENGINE AND FIRE PUMP.

MESSRS. SHAND, MASON, AND Co., Upper Ground-street, Black-friars, in taking an order from Messrs. Holden and Son, manu-facturers, Rheims, France, for a combined steam engine, to be lactifies, thems, it latter, it is a construct state of the second trations of this engine, one being a side elevation showing the general arrangement, and the other an elevation showing the automatic cut-off gear. The engine is of the return connecting-rod description, with two piston-rods attached to the crosshead, the latter being fitted with adjustable slipper blocks with large bearing surfaces. The connecting-rod is jointed to the centre of this crosshead, and a screwed projection is formed for the pur-pose of connecting the outer end of the pump piston-rod by means of a nut, when the engine is to be used as a fire pump. It will be sten from the engraving that the bed-plate is of great strength, while the steam cylinder is overhung at one end and the fire pump at the other. The general arrangement of the valve gear is of novel design.

The general arrangement of the valve gear is of novel design, the cut-off is automatic, and directly under the control of a governor of the Hartnell type, with several improvements. The main valve is of the ordinary description, driven by an excentric, with the cut-off valve working on the back and at right angles to with the cut-off valve working on the back and at right angles to its line of motion. The cut-off valve has several narrow ports through it corresponding with similar ports on the back of the main valve, the stroke being short and the frictional resistance correspondingly decreased. The cut-off valve rod is connected at the upper end by links to one end of a rocking lever, to the other end of which is coupled the rod of cut-off excentric, this latter having a pin forged on it with a bearing in the governor drum; the excentric vibrates on this pin to the position for early and late cut-off. This pin has a lever keyed on its outer end, as shown, and to this lever is attached a rod from an excenas shown, and to this lever is attached a rod from an excen-tric forged on a pin, on which is keyed one of the arms of the governor, this arm being connected by a link on which is the governor spring. This arrangement gives the governor complete control over the cut-off excentric, whilst the latter has no power to affect the position of the governor arms. With the engine running at 250 revolutions per minute the extreme variation of speed was under twelve revolutions, although in the experiment the cut-off was varied in its full range from one twenty-fifth to five-eighths of the stroke. Self-acting lubricators are fitted to all working parts, the surfaces at the same time being made extra large with the revolving parts balanced. We need hardly add that the finish of the engine is all that can be desired.

EXHIBITION 2 E SHERI FI E H H H A A HE 2 LIGHT ELECTRIC THE



investigate. In this car was a baby ownan. Undisturbed by the curious ental highness was still pulling away to the air-brakes, and running along the had been put on, but they did not know how. Extra train No. 3 we only twenty minutes behind them; so they had to send a brakeman bat to flag and prevent a tail collision, while they waited to investigat Nothing could be found to indicate why or by whom the train had bee stopped, so she soon proceeded west. The engineer let the iron hors have the reins, and fue train speed away at a rapid rate to more up som of the lost time. After only a short run the train was brought to investigat on the weat head in explicitly had been stopped, so the soon proceeded west. The engineer let the iron hors have the reins, and fine train speed away at a rapid rate to make up som more whole and inexplicable halt than before. The removing the to invest the reins and inexplicable halt than before. The removing the to invest the removing the train went back and set are a train the train was brought to in the train the tra mellsville, with the conductor guarding the rear platform and m d between each of the other cars, she was an hour late, as abo During the halt at Hornellsville, while one of the car inspecto uting the wheels, lo and behold! the air-brakes were again turn that distinctly audible and unmistakeable "sizz" which mea Everybody had been on the lookout, and nobody in the pa ars had touched the air-brake ropes which run through each be pulled only in case of extreme danger. Here was a qua d inexplicable halt than before. The remaining bri and set another flag to ware actra train No. 3; anot y unsatisfactory investigation was held, and again let lose, to run like the wind. When the train pu with such a jerk as to arouse every sleeping passenger slumbers. The engineer and conductor conferred toge themselves at a loss to account for the event. The bi ut on, but they did not know how. Extra train No. 3 moment's Willwall Dock-house. A rej the report and invite furthe til the current proposals o ved themselves into a defin one morning, owman. his Oriental car to leaving In W train-men. after the W 40 to the wholly iore sudden a tan went bac Works have late. cars BRAKES stopped, have the into Horn lem, to that den with his the only t to fla Nothi story of m erecting a public ribbon 33 experiments convenient plate to be tested. excited plate after its suband not applying and th burnt, another careful series phosphorescence in the plate, subsequently by Mr. Warnerke that the temperature at the time with this instrument does by Mr The as yet, magnesium and ore magnesium may be with another most together. Slowly. ies of arnerke discovered that at first the minute ius has, WILLIAM MURDOCK.—A project has been started for emorial to William Murdock, a man who ought to be ra 1 the Thames Embankm residence at Handsworth, was the on the 18. this century, but whose genius cognition. Among other things a. he claimed the first idea o plates are cemented t less than an inch of but afterwards more Warnerke determined that one minute was to allow the phosphorescent light to act on neans of a special frame each sensitometer a further use his own language, he claimed the first ide first actual application of coal gas to econom constructed the first steam locomotive ever used of covered By Aquarium a committee engin By means of a special frame each sensito distance from the plate under examination. inventions uodn uo purposes may be disregarded m plates 18 oscillating and slide valve ed at the Westminster A Murdock's life and invent matter how much e same amount of by Mr. Cadett, and iam scent coating it was discovered light. testing the sensitiveness of dry determined that residency of Sir W Murdock placed on anoirniaus national recognition not magnesium and it is understood y rapidly, 20100 burning a special CWO lts, so r. Wa inventors of the verified originally DO riment but excite it, and models of osc be exhibited experiments to affect the excited lecture on expe edges memorial obtained testing Macfie. before Will aking the sensitometer thin paper is taken, from one thickness of paper at one end of the sknesses at the other end. A mould is taken is, again. Woodhure ght from a standard source is allowed to shine through for a given time upon the plate to be tested, and the is photographic plate the greater is the number of n of the operator, all such figures are find the Warnerke's served. Marion and Co., Mr. ithout its having been Warnerke himself, who was 0.03 of a millimetre in thickness; squares upon each other, because sub-II with varying of light; each square pe impressions in In order that the paper used in than othe pe-plate, dusted wi then taken y type improtic in the ge uniform each rator, all such figures are sensitometer consists of o twenty-five squares of paratus, glass, with without its tter in the Woodbury ms more as an antisep The and from this, again, Woodbury type atine are printed upon the glasses. In to give omparable into twenty-five casts ty rations. es fil Mr. VIUC blac red to the Woodhur printing the Me by it instrument the testing in the Light from a standard which enough ligh n. In making the to the public Was heat has no action on it, and produced ng ma regards the pure empiricism. Warnerh was used to cement the wort twenty-five thickness itometer mould nts rm tem er glu agination of few during 18 a commercial but as as the sion. sensitive the ith any ares are through em as sensitometer metal. alongside graphic impres ත් is numbered. instruments cangular king the ts not not one Warnerke' and baruc making albumen dn al an. degrees the ted npon more squar of w skill and the test re clearly e public bined engines recently ton. Behind are seen and a few days ago at graphic standards should In the to nothing, why the King of minute study of supply the list. gentle the photogive photography an inter photographic stand ound engine to the right experience to research with this h jurors of the pho motive power motion. from which the an boilers, which complete about sted arnerke, a Russ made a minu agreed that came machinery in such seemed un was the. to ington. nglish

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of converting this inventor's a an International Gas Museum.

e then covered with bookbinder's red cloth. As an easily available standard light, Mr. Warnerke uses a plate vder to increase the opacity of the figures, and varnished with preserve the gelatine surface from moisture. The margins gelatine

its n from i WARNERKE'S SENSITOMETER. For nearly twenty years past Mr. Leon Warnerke, man, has been noted in Fugland for his attempts to or more the character of an exact science by the introduc of measurement wherever the introduction of such see file has been indefatigable in original experimental resea in view. He and Captain Abney were the English jun graphic department at the Brussels Exhibition, and a a banquet of the jurors in that dity. Mr. Warnerke su national congress to establish a universal system of pl ards. Captain Abney demurred to this, statup his that international congresses for scientific purposes unless supported by the Government. The next Belgium visited the photographic department, made what he saw there, and the result was that he agreefor the establishment of international photographic be formed under the auspices of the Belgian We entry in Europe to initiate such a step, because attitude international jealousies were less likely to st the general adoption of the recommendations of the co

contents of the at Infour impression for August 24th we gave a detail machinery shown in motion in the electric light she Exhibition. We now give above a perspective view the shed. It will be remarked that the whole of the been supplied by Mesers. Davey, Paxman and Co, Co middle of our engraving is shown the pair of combine purchased by the Government for South Kensington. the smoke-box ends for five large semi-portable boil steam to the engines just named, and the compound er Three semi-portable engines, and one portable engine "The arrangement of the counter shafts, belting, and d shown. The shed is traversed by fenced warks, from can without danger obtain a good view of the machine

HE IRON, COAL, AND GENERAL TRADES OF BIRMINGHAM, WOLVERHAMPTON, AND THE OTHER DISTRICTS. (From our own Correspondent.)

STEADINESS, with generally firm prices, characterised the iron market to-day—Thursday—in Birmingham, and yesterday in Wolverhampton.

Hoop quotations varied greatly, ranging from £8 to £9 10s. Common hoops were based on £6 10s. easy ; steel, £8 10s. per

Common hoops were based on £610s. easy; steel, £810s. per ton. Sheets for galvanising were, for trebles, £97s. 6d. to £910s.; and doubles, £87s. 6d. to £810s.; while singles for general work-ing-up were easy to buy at from £717s. 6d. to £8. Sheets, galvanised and corrugated, were quoted by some firms at £1310s, for 24g., and £1510s. for 26g.—all in bundles and delivery equal to Liverpool. The market very slightly firmer. The ironworks throughout North Staffordshire are more actively ou this week in the strip and hoop, and also the plate mills. Coal is in fairly good demand at firm rates. Among the ironwork contracts under execution by engineering firms in this district may be mentioned the furnishing of the iron-work for Messrs. Jeavons and Mellor's new premises in Corpora-tion-street, Birmingham, which is being undertaken by Messrs. W. M. Ward and Co., of the Limerick Foundry, Great Bridge, Tipton. The contract is worth about £2000. The same firm have just com-pleted for the new baths in Monument-road, Birmingham, orna-mental arch ribs for carrying the roofs, 'all the girders, and other general ironwork of the building, including the hot water arrange-ments, the whole contract being worth about £3000. A contract worth about £7000 has been successfully filled by the same firm fared in the fitting up of the Rubery-hill Asylum. The operative delegates of the twelve districts represented on the South Staffordshire and East Worcestershire Mill and Forge Wages' Board will next week be occupied in obtaining at mass meetings the views of the ironworkers as to a fresh wages' agreement to supplant that now existing, which is under notice to expire at the end of the present month. At present they are uncertain

to supplant that now existing, which is under notice to expire at the end of the present month. At present they are uncertain whether to retain the sliding scale system or not, but intimate that the end of the present month. At present they are uncertain whether to retain the sliding scale system or not, but intimate that if they do so they would like several alterations, the chief of which is that the selling price upon which wages are calculated quarterly shall be drawn not as now from the sales of puddled bars of twelve firms, but as in the North of England, from the sales of all descriptions of iron sold by such firms. By getting sheets and boiler plates in, the men expect to raise the average price. The difference, however, would probably not be marked. There are not a few masters, indeed, who express the belief that the men would be not better off but worse. Compared with the North of England wages, those of the ironworkers in this district can scarcely be complained of. If no fresh arrangement is agreed to before the end of this month, the arbitrator, Alderman Avery, of Birmingham, will decide how wages shall run pending such arrangements. It any case there is to be no cessation of work. The new line of the Halesowen and Northfield Railway Company was opened for traffic on Monday. It is about seven miles long, and there are two stations, one being at Rubery and the other at Hunnington. The Midland and Great Western Railway Companies work the line, but the Halesowen Company, who launched the scheme, will participate in the receipts. The line affords increased facilities for export of minerals and metal wares to the North. The periodical visitation of the operatives engaged in the nail and chain trades of Staffordshire and Worcestershire to the home have already left.

NOTES FROM LANCASHIRE.

(From our own Correspondents.)

Manchester.—A want of confidence in the future appears to be keeping the business doing in the iron trade of this district at a hand-to-mouth level. Pig and finished iron makers continue gene-rally well employed, the former to a large extent on old contracts, and the latter on orders for prompt delivery, and prices generally are steadily maintained; but there is very little disposition on the part of huvers to go beyond present requirements.

are steadily maintained; but there is very little disposition on the part of buyers to go beyond present requirements. The Manchester iron market on Tuesday was again exceedingly quiet, so far as the weight of actual business doing was concerned. Pig iron makers reported very few inquiries, and where there are buyers of any importance it is only with offers at under current rates. The leading makers do not at present entertain proffered business at under their quoted rates; but some of the inferior brands of district iron are in the market at low figures. Lancashire pig iron makers who have still fairly large deliveries to work off against contracts in hand are firm at their full list rates of 45s, to 45s, 6d., less 2½ per cent. for forge and foundry qualities, delivered equal to Manchester; but at these figures they are doing only a very small business. In district iron the basis of prices remains at about 44s. 10d. to 45s. 10d., less 2½ per cent. for good forge and foundry qualities of Lincolnshire, delivered into this district. In hematites there is still only the most limited business being done; nominally prices are unaltered, but if the market were to be fairly tested, there is little doubt it would show a tendency in the favour of buyers. Finished iron makers are fairly busy with deliveries against medifications and if anything there is no research business doing the set business.

the favour of buyers. Finished iron makers are fairly busy with deliveries against specifications, and, if anything, there is a pressure of present busi-ness which causes some makers to be indifferent about booking prompt orders. This, in fact, has in one case been carried to the extent of putting an advance of 2s. 6d. per ton upon the quoted list rates for bars. It cannot, however, be said that any advance in prices is obtainable. Makers, where they have to get orders, are not able to do more than maintain late rates, and for delivery into the Manchester district the average selling prices are about

are not able to do more than maintain late rates, and for delivery into the Manchester district the average selling prices are about $\pounds 6$ 2s. 6d. to $\pounds 6$ 5s. for bars, $\pounds 6$ 12s. 6d. for hoops, and $\pounds 8$ 5s. to $\pounds 8$ 7s. 6d. per ton for sheets, with no great disposition on the part of buyers to purchase forward at these figures. Ironfounders report business to be very dull. In heavy builders' work, apart from a few special orders distributed here and there, extremely little is being done, and to secure business exceedingly low prices are quoted, cast iron columns and pillars being obtain-able at about $\pounds 6$ to $\pounds 6$ 5s. per ton delivered into the Manchester district, and I hear of orders being taken at even lower prices than these.

Pipe castings, which come largely into this district from Scot-land, are exceedingly low in price, and they can be bought readily at $\pounds 4$ 12s. 6d. per ton delivered here, whilst buyers for shipment at Glasgow have had quotations at as low as $\pounds 4$ 5s. per ton, f.o.b. In the engineering trades prospects for the future continue any-thing here the state of the state In the engineering trades prospects for the future commute any thing but satisfactory. There is a good deal of work still in hand in the district, but orders are being worked off without being replaced, and in the tool-making branch, in which activity so far has been very well maintained. I hear that there is no great weight of new work coming forward.

view of the depression in this branch of trade, there is a domi-ward movement in wages, and in some cases notices have been served upon the men to the effect that the advance of five per cent., which was conceded about twelve months back, will now be taken. Notices to this effect in some cases expire this week, and it remains to be seen what action the men will take. The members of the Association of Municipal and Sanitary Engineers, who have not held one of their district meetings in this

Engineers, who have not held one of their district meetings in this immediate neighbourhood for several years past, on Saturday paid a visit to Bury, where they inspected the various public works in the above town, including the tramways and the new gasworks

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THE SHEFFIELD DISTRICT. (From our own Correspondent.)

THE SHEFFIELD DISTRICT. (From our own Correspondent.) MINERS' demonstrations are beginning to attract a good deal of attention, and excite some uncasiness. The most important of these meetings has as yet been held in the Derbyshire district, but as everything in Derbyshire coalfields reacts on Yorkshire, and the meetings have been addressed by the representatives of the South Yorkshire Association, it is pretty clear that Sheffield, Barnsley, and Rotherham will soon be called upon to agitate in conjunction with Derbyshire. At Ilkeston, on Saturday, a resolution was passed condemning the action of those employers and managers of collieries in Derbyshire who compelled their men to use the safety lamp without remuneration ; the resolution further pointed out the necessity for the miners of Derbyshire to join the Miners' Society, "in order to remedy that and kindred evils," and recommended that advantage should be taken of the improving state of the coal trade to increase wages. Mr. B. Pickard, of the South Yorkshire Miners' Association, was more explicit. In supporting the resolu-tion he announced authoritatively that although they got 10 per cent, last autumn, they intended to try for 20 per cent, this year. Mr. Pickard is also found arrayed on the side of those who oppose the safety lamp. He epitomises the objections to it thus: "It in-creased the liability to ordinary accidents, and made it more difficult to win the coal through the poor light it gave, whilst it led managers to be more lax in the ventila-tion of the mines." One miner went the length of saying that if he never went down a pit again he would not go opassed in favour of the Employers' Liability Act, 1880, and of the efforts to amend the Mines Regulation Act, and also pledging the meeting to regulate the output, so as to ensure the supply being more in proportion to the demand. Another demonstration took place at Chesterfield on Monday, when Mr. C. Bradlaugh, M.P., was the chief speaker.

Messrs. Robert Sorby and Sons, the well-known manufacturers

Messrs. Kobert Sorby and Sons, the well-known manuacturers of steel, edge-tools, saws, sheep-shears, &c., are sending a remark-ably comprehensive selection of their productions to the Calcutta Exhibition, which opens on the 4th of December. Mr. George Barnsley, the new Master-Cutler, was presented by his workpeople with his portrait last Saturday evening, at the usual treat given by the Master-Cutler to his employés after the Cutlers' feast.

THE NORTH OF ENGLAND. (From our own Correspondent.)

(From our own Correspondent.) But little business was done at the Cleveland iron market held at Middlesbrough on Tuesday last, and prices were somewhat more favourable to buyers than on the previous Tuesday. The demand for No. 3, g.m.b., for early delivery is still greater than the supply; but prices do not improve notwithstanding. The small lots of this grade which are in merchants' hands are being offered at 39s. per ton; but the few makers who have any to dispose of will not sell at less than 39s. 6d. per ton. Buyers offer 38s. 6d. per ton for No. 3 for November and December delivery; but in the present unsettled state of the market sellers are reluctant to undertake orders for forward delivery. Holders of warrants are more eager to sell than they were, and ask 39s. per ton. The stock of Cleveland pig iron in Messrs. Connal's Middles-brough stores on Monday last was 71,381 tons, being a reduction of 110 tons for the week. The pig iron exports for September have so far been excellent.

The pig iron exports for September have so far been excellent. Up to Monday night the quantity shipped from the Tees was 31,567 tons. Last month in the same period only 23,001 tons were sent away, and in September, 1882, the figures were 29,787 tons. In the manufactured iron trade there are no signs

were sent away, and in September, 1652, the fightes were 29,787 tons. In the manufactured iron trade there are no signs of improvement, and what little business is being done is for prompt delivery and at the old rates. The outlook for the winter is not promising, and buyers are not disposed to anticipate events. For prompt delivery ship plates are offered at £6 5s. per ton, ship angles at £5 12s. 6d., and common bars at £5 17s. 6d., free on trucks at makers' works, cash 10th, less 2½ per cent. discourt. Puddled bars are £3 12s. 6d. to £3 17s. 6d. per ton net, free on trucks at makers' works, The shipbuilding trade is very brisk on the Tyne and the Wear at present, all the firms being fully employed. At some yards on the Wear the work is being retarded for want of the engines, and unless the engineers' strike is speedily terminated, the ship platers will have to be put on short time. Mr. Isaac Lothian Bell's health has been, and still is, a source of great anxiety to his relatives and friends. During the last few days, however, the accounts have been considerably improved, and it is hoped he is now fairly on the road to recovery. It is under-

stood that he will take no part in the approaching meeting of the

stood that he will take no part in the approaching meeting of the Iron and Steel Institute. The Normanby furnaces, belonging to Messrs. Jones, Dunning and Co., certain repairs and alterations having been completed, will be restrarted next week. It will be remembered they were damped down a few weeks since, owing to certain unreasonable demands made by the workmen, and it was then decided to com-mence the alterations, and stop till they were finished.

NOTES FROM SCOTLAND. (From our own Correspondent.)

(From our own Correspondent.) THE Glasgow pig iron market has again been exceedingly dull this week, there being also a further decline in the values of warrants, which have touched the lowest point since May, 1881. The quotations of warrants have been gradually declining for months, and holders are naturally much discouraged at their con-tinual losses. It is mainly owing to the resolution of some holders to sell either a portion or the whole of their iron that prices have further declined this week. The current shipments are good the past week, having been 12,844 as compared with 10,629 in the corresponding week of 1882. But the orders at present being received are not up to the mark, and it is feared that in coming weeks the shipments will become unsatisfactory. Stocks in Connal's Glasgow stores show an increase of about 450 tons on the week.

week. Business was done in the warrant market on Friday morning at 46s, 54d., 46s. 62d., and 46s. 5d. cash, and 46s. 74d., 46s. 84d., and 46s. 74d. one month; the afternoon quotations being 46s. 5d. to 46s. 3d. cash, and 46s. 7d. to 46s. 5dd. one month. On Monday morning transactions took place at 46s. 3d. to 46s. 24d. cash, and 46s. 5dd. to 46s. 42d. and 46s. 6d. one month, there being business at 46s. 3d. cash in the afternoon. On Tuesday the market was very quiet at 46s. 4d. to 46s. 2dd. and as low as 46s. 1dd. cash. On Wednesday business was done at 46s. 1dd. to 46s. 3dd. cash. To-day—Thursday—business took place up to 46s. 4dd. cash and 47s. 7d. one month. It has been more difficult than usual to dispose of the makers'

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WALES AND ADJOINING COUNTIES. (From our own Correspondent.)

WALES AND ADJOINTING COULTLES. (From our own Correspondent.) A GRAVE difficulty awaits arrangement at the hands of the iron-masters of Wales—one of those peculiar complications which was doubtless foreseen when the sliding scale was established, but could not be avoided. It is this. The coal trade is very brisk. Wales is sending away by sea from the various ports a quantity closely amounting to 250,000 tons per week, and the price of late is such as to justify a small advance at the next audit, so it is thought. Thus, in all probability, the colliers will have an advance at the same time as the ironworkers will be called upon to accept a reduc-tion, and the anomaly will be seen of the same employer deduct-ing from one class of his workmen 5 or 10 per cent., and giving to another at something like the same ratio. That trade justifies this is patent. Ironmasters have been obliged to reduce prices considerably in order to sell, and lower wages are imperative to get anything like a modest remuneration. But workmen may grumble —I fear will grumble—unless this is thoroughly explained. The notices issued by the ironworks is now general, and at some there has been a little exhibition of discontent. Time solves many an enigma, so runs an old apothegm, and it may now by improving trade towards the end of the month, and thus enable ironmasters to withdraw the notice. Rails are low also, and sales effected moderate. In coal there is, as I have stated, a good deal of briskness, Newport and Swansea being quite up to the highest averages. In the Monmouthshire coal districts a good deal is done. Small coal continues in demand, and several iron-works which have large collicries are yet under the necessity of buying large quantities of small coal for their coke ovens. Prices continue stiff for all varieties.

buying large quantities of small coal for their coke ovens. Prices continue stiff for all varieties.

A novelty has been started at Newport, Mon., in the form of a achinery sale. The first took place this week, when over 200 ts were disposed of. Buyers mustered from a wide district, and machinery sale. lots were disposed of. fair prices were obtained. I hear it is to be an annual occurrence. There are signs of discontent amongst colliery engineers, and a society has been formed by them. Their grievance is that they society has been formed by them. work twelve hours daily, six days per week, and get but 3s. 11d.

The general trades of Swansea are in a healthy condition. Coal and patent fuel show an increase over the corresponding month of

last year, and tin-plate is firmer. At Lydney-on-Severn tin-plate works there is a wages dispute which wears an unfortunate appearance as regards the likelihood

which wears an unfortunate appearance as regards the intermeted of a settlement. The air is full of rumours with regard to the next movement on the part of the Barry Dock promoters, and the latest is that an independent line of rail will be sought for between the Rhondda and Cardiff, Barry being abandoned to its legitimate owners, the

THE PATENT JOURNAL.

Condensed from the Journal of the Commissioners of Patents.

. It has come to our notice that some applicants of the Patent-office Sales Department, for Patent Specifications have caused much unnecessary trouble and annogance, both to themselves and to the Patent-office officials, by giving the number of the page of THE ENGINEEE at which the Specification they require is referred to, instead of giving the proper number of the Specification. The mistake has been made by looking at THE ENGINEEE Index, and giving the sumbers there found, which only refer to the pages, in place of turning to those pages and thading the numbers of the Specification.

Applications for Letters Patent. *** When patents have been "communicated." the name and address of the communicating party are printed in italics.

4th September, 1883.

N. Wadia, Bombay.) 4258. METALLIC PACKING, W. R. Lake.-(H. C. Hunt,

Averask, New Jersey, U.S.)
4250. TOOTHED RACKS, R. Adams, London.
4260. GAS ENGINES, A. M. Clark, - (Economic Motor Company, New Fork, U.S.)
4261. HOE, B. S. Harrison, Dronfield.

5th September, 1883.

4262. BALING COTTON, C. J. Ash.-(A. E. Cummins, Tuticorin, India.)
4263. PACKING PISTON RODS, N. Foley, Southampton.
4264. SEPARATING CHVCENISE from FATTY SUBSTANCES, C. Rumble and F. Sear, London.
4265. CHLDREN'S COTS, &C., W. F. and W. H. Keep, London.

4265. CHILDREN'S COTS, &C., W. F. and W. H. Keep, London.
4266. ROLLERS for PREPARING, &C., COTTON, J. T. Chadwick, Salford, and J. Crossley, Bury.
4267. VELOCIPEDES, &C., T. O'Brien, New York, U.S.
4268. EXCATATORS, W. F. Batho, London.
4269. ELECTRIC LAMPS, A. W. Richardson, Lancaster.
4270. PROTECTING WOOD, &C., AGAINST FIRE, D. H. Dade, London.
4271. UMBRELLAS, T. Wrench, Lancaster.
4272. REMOVING DIRT, &c., from RAILS, R. D. Jones, Livorpool.
4273. PUMPING ENGINES, H. Davey, Leeds.
4274. TRAINING and TESTING COURSING DOGS, W. E. Hind, Goole.
4275. LIGHT-FRED LUBRICATORS, W. A. G. Schönheyder, London.
4276. ELECTRICAL SWITCHES, H. H. Lake.-(C. W. Holden, Boston, U.S.)
4278. FELTING HAT BODIES, G. Atherton.-(G. Yule, Newark, New Jersep, U.S.)
6th September, 1883.

6th September, 1883.

6th September, 1883.
4279. CONSTRUCTING TILLS, J. L. Edward, London.
4280. HOES for TILLING LAND, F. Kinder, Cottenham.
4281. ELECTRIC LAMPS, J. R. P. Wallace, Cumberland, and F. Cherry, London.
4282. ASBESTOS PACKED COCKS, J. DEWRANCE, London.
4283. CONSTRUCTING SALOONS of STEAMSHIPS, J. R. Thomson, Dumbarton.
4284. GAS-BURNERS, T. Fletcher, Warrington.
4285. KLINS, W. Lawrence, London.
4286. STRAINERS, W. Lawrence, London.
4287. CONTON GINS, H. J. Haddan.-(D. S. Chapin, Massachusetta, U.S.)
4288. MIDDLINGS PURIFIERS, & C., MACHINES, W. P. Thompson.-(A. Price, Barnawartha, Australia.)
4280. LAMPS for RAILWAY, & C., PURFOSES, A. E. Ragg, Chester.

2200. ROTARY ENGINES, H. C. Bull, Liverpool. 4291. GAS ENGINES, C. H. Andrew, Stockport. 4292. SECURING LIDS OF BASKETS, &C., T. Humphreys, Salford

4293, OPERATING CORLISS VALVES, J. Musgrave, Bolton. 4294, BARRELS of FIRE-ARMS, P. A. Bayle, Paris. 4295, SIGNAL INDICATOR APPARATUS, H. Botten, London. Salford. 4295

4296. STEAM BOILERS, P. A. Bayle, Paris. 4297. HOLDERS for TELEPHONIC INSTRUMENTS, H. H. Lake.-(G. W. Holden, Boston, U.S.) 7th September, 1883.

4298. TELEPHONIC APPEARAUS, E. George, F. A. Pocock, J. S. Muir, and J. S. Muir, jun., London.
4299. APPARATUS for GIVING INFORMATION to TRAVELLERS by RAIL, J. Farrimond, Southport.
4300. FURNITURE CASTORS, A. Skinner and F. J. Rumney, Manchester.
4301. SPLICING APPARATUS, S. Haley, Bramley.
4302. CRYPTOGRAPH, W. R. Jennings.—(A. Bossuat, France.)

France.)

France.) 4303. PAEUMATIC HAMMERS, C. Sholl, London. 4304. LUBRICATING the CYLINDERS of AIR, &c., ENGINES, W. R. Lake.—(F. J. Weiss, Switzerland.) 4805. APPARATUS for CLEANING WINDOWS, &c., W. V. Brasch, London

4305. APPARATUS for CLEANING WINDOWS, &c., W. V. Pragh, London.
4306. TREADLE MECHANISM of SEWING MACHINES, J. Pasheld, Sedgley.
4307. BOTLE STOPPERS, N. Fritzner, Berlin.
4308. BUILDING MATERIAL, J. Bloomfield, London.
4309. ELEVATED STREET RAILWAYS, &c., A. M. Clark.-(Milinaire Frenz, Paris.)
4310. TRAM RAILS, J. Bidder and W. R. Lodge, London.
4311. NEEDLES, W. A. Barlow.-(H. E. Fontaine, Paris.)
4312. REED ORGANS, J. B. Hamilton, London.
4313. TRICYCLES, C. Lee, London.

8th September, 1883.

4814. VALVED DIP-PIPE, J. H. Lyon, Cosham. 4815. SHARPENING SOLID INK PENCILS, &c., J. Darling, Glasgow.

Glasgow.
4316. LAMPS, F. R. Baker, Birmingham.
4317. RALE, &C., J. A. R. Main and J. Dick, Glasgow.
4318. BURNER for COMBUSTION of LIQUID HYDROCAR-BONS, M. F. Perry, West Hartlepool.
4319. ELECTRICAL GENERATORS, F. C. Glaser.-(A. I. Gravier and Messieurs Kuksz, Luedtke, and Grether, Warsan).

Warsaw.) Warsaw.) 4329. METAL TUBES, T. Pritchard, Wednesbury. 4321. HYDRAULIC POMPS, W. H. Watson, Horsforth. 4322. STAMPING LETTERS, H. J. Haddan.-(R. Hinrich-

4322. STAMPING LETTERS, H. J. Haddan.-(A. Hontonsen, Hamburg.)
4328. COTTON BALE FASTENINGS, H. Lindon, Liverpool.
4324. LAMPS, R. Hadkinson.-(J. H. H. Efendi, Smyrna, Asia Minor.)
4325. MAKING TOHES of PAPER, &c., G., E., and R. Ashworth, Collyhurst.
4326. TAPS, W. A. Todd, Stamford.
4327. SURGICAL BELT, E. M. Moore, London.

10th September, 1883.

4328. TREADLE LOOMS, C. D. Abel.-(L. Laeserson and H. Wilke, Moskau, Russia.) 4328. TREADLE HOUSE, HUSSIG.)
 H. Wilke, Moskow, Russig.)
 4339. MAKING of GLAZE or VITREOUS COVERING, J. Pickin, Stoke-upon-Trent, and C. Goodfellow,

4330. BEATING CARPETS, S. Child, Brighton.

2357. LOCOMOTIVES, M. BENSON, LONDON. —A communication from O. Rothrock. — 9th May, 1883.
2360. ADJUSTMENT OF TRICYCLE SADDLES, W. S. HONYWOOD, Aston, and G. T. Cashmore, Handsworth. — 9th May, 1883.
2369. INCANDESCENT ELECTRIC LAMPS, J. Warner, Whitechapel. — 9th May, 1883.
2371. BRICKS, H. H. Lake, London. —A communication from J. A. Buck, J. W. Tubbs, and A. Selkirk, U.S. — 9th May, 1883.
2374. GARDEN FRAMES, W. Wright and T. Holmes, Birmingham. — 10th May, 1883.
2370. LOOMS, G. H. Hodgson, Bradford. — 10th May, 1883. Bolton.
4332. Boots or Shoes, A. Hanniball, London.
4333. Sizino, &c, THREAD, H. J. Haddan.-(A. Hiero-nimus, Strassburg.)
4334. PERMANENT WAY OF TRAMWAYS, J. Y. Johnson.-(H. L. Geveke, Amsterdam.)
4335. BREAKING and BEATING HEMP, &c., J. C. Mew-burn.-(E. Corazza, Paris.) Bolton

THE ENGINEER.

1883.

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2894. DISTILLING, A. Marix, Paris. —11th May, 1883.
2401. CARTRIDGE HOLDERS, T. Nordenfelt, London. — 11th May, 1883.
2460. UTILISING WIND and WATER, E. A. Roy, London. — -16th May, 1883.
2456. TREATING INDIGO, W. Brookes, London. — A communication from T. Holliday.—18th May, 1883.
2493. MEASURING ELECTRICITY, J. D. F. Andrews, Glasgow.—18th May, 1883.
2505. HORSESHORS, T. Allan, Bradford.—19th May, 1883.

1883.
2531. TYPES, &c. F. Wirth, Germany.—A communication from J. M. Hepburn.—*21st May*, 1883.
2570. ELECTRIC ARC LAMPS, P. Jolin and J. Parsons, Bristol.—*23rd May*, 1883.
2601. FIRE-PROF SCREEN, A. Clark, London.—*24th*

May, 1883.
2608. DYEING SILK, T. Holliday, Huddersfield. — A communication from E. Rau. — 29th May, 1883.
2672. CARDING ENGINES, A. M. Clark, London. — A communication from H. Woodman. — 29th May, 1883.
2682. POLVERISING SUBSTANCES, H. C. Bull, U.S. — 30th May, 1883.

May, 1883. 2802. STEAM PISTONS, A. McLaine, Belfast.-6th June,

Patents Sealed. (List of Letters Patent which passed the Great Seal on the The September, 1883.) 957. TIP VANS, &c., E. Burton, London.—23rd February,

1883.
 1034. MANUAL STEERING APPARATUS, J. L. Cathcart, U.S.-26th February, 1883.
 1078. ELASTIC WIRE BANDS, F. Wirth, Germany.-27th February, 1883.

1258. ELECTRICAL SIGNALLING, W. J. Brewer, London. -Sth March, 1883. 1274. SLEEFERS, &C., for RAILWAYS, A. J. Boult, Lon-dom.-91th March, 1883. 1278. RAISING MUD into CARTS, E. Burton, London.-10th March, 1883. 1281. LOOMS, G. H. Hodgson, Bradford.—10th March,

1283. ADJUSTABLE SPANNERS, C. Neil, Sheffield.-10th

1283. ADJUSTABLE SPANNERS, C. Neil, Sheffield.-10th March, 1883.
1284. BLOCKS for FUEL, L. Blackburn, Peckham, and J. G. Elliott, London.-10th March, 1883.
1287. KALELDSCOPIC TOPS, A. A. King, Highbury.-10th March, 1883.
1288. GUN CARRIAGES, W. R. Lake, London.-10th March, 1883.
1299. CASES for CIGARS, &c., F. MaCD. Robertson and J. E. Cousté, London.-12th March, 1883.
1801. CAST METAL SOCKETS, R. Clayton, Deepfields.-12th March, 1883.
1802. FASTESINOS for DOORS, R. Whiston, Wolverhamp-ton.-12th March, 1883.
1803. FRODUCING LETTERS on METAL, W. P. Thompson, Lifverpool.-12th March, 1883.
1311. STEAM, &c., ENGINES, H. H. Lake, London.-12th March, 1883.
1359. FOLE END FITTINGS for VEHICLES, R. Hill and W. Pollitt, Heywood.-14th March, 1883.
1365. SEATS of CHAIRS, H. J. Haddan, London.-14th March, 1883.
1410. CARRIAGES supported by SPRINGS, R. Spence, jun., Richmond.-16th March, 1883.
1437. VENTILATING FANS, E. P. Alexander, London.-19th March, 1883.
144. MUSICAI INSTRUMENTS, P. M. Justice, London.-19th March, 1883.

1441. MUSICAL INSTRUMENTS, P. M. Justice, London.-

19th March, 1883. 1452. ELECTRIC TELEPHONY, J. H. Johnson, London.-

— 28th March, 1860.
 1571. FIRE-RANS, &C., H. Pieper, Belgium.— 28th March, 1883.
 1578. FURNACES for CALCINING CEMENT, P. M. Justice, 1878.

London.-28th March, 1883. 1614. Effecting Interchange of Temperature, J. H.

Johnson, London.-30th March, 1883. 2121. LANTERNS, A. M. Clark, London.-26th April,

2133. PEELING POTATOES, &c., J. C. Mewburn, London.

-27th April, 1883

-27th April, 1883.
2419. FILLING, &C., BOTTLES, F. Foster, London.—12th May, 1883.
2871. BLEACHING, &C., WOVEN FABRICS, J. Farmer, Salford.—Sth June, 1883.
3010. ILLUSORY DRAMATIC EFFECTS, W. R. Lake, Lon-don.—16th June, 1883.
3158. REGULATING FULID PRESSURE, C. D. Abel, Lon-don.—26th Anne, 1883.
3158. REGULATING FULID PRESSURE, C. D. Abel, Lon-don.—26th June, 1883.

don.—26th June, 1883. 3180. LACE, W. Birks, jun., Nottingham.—26th June,

2242. TULLE MACHINES, C. D. Abel, London.-30th June, 1883.

June, 1883. 3412. REED PLATES, W. R. Lake, London.-10th July, 1883.

125

bruary, 1883. . BALE TIES, &c., E. Hale, Liverpool.—8th March,

SEPT. 14, 1883.

 July, 1883.
 MAKING CIGARETTES, A. M. Clark, London.—17th July 1883. MAKING ORALLE, J. J. Bonneville, London.—17th July, 1883.
 Store For Storals, H. A. Bonneville, London.—17th July, 1883.
 Store Structure Machines, J. W. Post, New York.—17th

8504. Fog SIGNALS, H. A. BOHLEVILL, July, 1883.
8506. SEWING MACHINES, J. W. Post, New York.—17th July, 1883.
8509. EMBROIDERING MACHINES, R. H. Brandon, Paris. —17th July, 1883.
8518. BENDING BLANKS for CHAIN LINKS, F. C. Glaser, Berlin.—17th July, 1883.
(List of Letters Patent which passed the Great Seal on the 11th September, 1883.)

426. PRESERVING MILK, E. A. Brydges, Upton.-26th

PRESERVING MILK, E. A. Brydges, Upton.—26th January, 1883.
 IZ3. FASTENINGS for SCARVES, E. Hewitt, London.— 9th March, 1883.
 PROTECTING MACHINES, W. Ashton, Manchester.— 12th March, 1883.
 PROTECTING WIRES, &c., R. Longdon and F. B. Welch, Manchester.—12th March, 1883.
 LAWN-TENNIS BALLS, F. O. Heinrich, Wimbledon. —12th March, 1883.
 Schneifengel, Separating Machines, F. H. F. Engel, Germany.—18th March, 1833.

Engel, Germany. -13th March, 1883. 1341. LUBRICATORS, W. R. Lake, London. -13th March, 1883. 1358. OPENING CLOSED PACKAGES, F. C. Glaser, Berlin. JOES OFEMING CLOSED FACKAGES, F. C. Glaser, Berlin. -14th March, 1853.
 1860. PORTABLE FIRE-PROOF SHELVING, B. Harlow, Macelesfield.-14th March, 1883.
 1868. FIRE-ESCAPES, A. Diss, West Bergholt.-14th March, 1883.

Babucing Loss from Collision of Ships, G. H. Down, Cardiff.—14th March, 1883.
 B373: Gas Stoves, A. J. Boult, London.—14th March, 1882.

1379. EMERY WHEEL, T. West, London.-15th March,

1379. EMERY WHEEL, T. West, London.-15th March, 1883.
1374. FASTENINGS for BOTTLE STOPPERS, J. MUITAY and L. Spring, Kingston-upon-Hull.-15th March, 1883.
1387. PERAMBULATORS, W. H. BRASSINGTON, MANCHOS-tor.-15th March, 1883.
1392. SACK LIFTERS, T. and A. Lewis, Kettering.-15th March, 1883.
1409. LOADING SHIPS with PARENT FUEL, S. Butler, Cardiff.-16th March, 1883.
1423. SORTING COAL, &C., R. H. Silcock, Warrington.-17th March, 1883.
1426. DOMESTIC STOPES, G. Gore, Balsall Heath.-17th March, 1883.
1430. GALVANIC BATTERIES, J. B. Hannay, Glasgow.-19th March, 1883.

1430. GALVANIC BATTERIES, J. B. Hannay, Glasgow.— 19th March, 1883.
1432. TREATING WHITE PEAT, S. 'J. Blane, London.— 19th March, 1883.
1459. METALLIC FOOT WARMERS, T. H. Ash, Birming-ham.—20th March, 1883.
1489. DEFECTING WASTE Of WATER, G. F. Deacon, Liverpool.—21st March, 1883.
1505. VESTILATOR, F. L. Jeyes, London.—22nd March, 1883.

1883.
1558. LOCK NUTS, E. and A. E. Gilbert, Dundee. —27th March, 1883.
1595. FEED-WATER HEATERS, J. Withinshaw, Birming-ham. —29th March, 1883.
1617. ELECTRIC LAMPS, W. R. Lake, London. —30th March, 1883.
1742. SEVERING DOUBLE-FILED FABRICS, J. H. Johnson, London. —6th April, 1883.
2702. Gas Morors, C. Pieper, Berlin. —31st May, 1883.

Liest of Specifications published during the week ending September 8th, 1883. 18988, 4d.; 2258°, 4d.; 6174, 4d.; 31, 6d.; 91, 8d.; 196, 2d.; 171, 4d.; 177, 2d.; 179, 6d.; 184, 1s.; 187, 2d.; 196, 2d.; 204, 4d.; 208, 6d.; 216, 6d.; 217, 8d.; 218, 2d.; 222, 6d.; 224, 2d.; 227, 2d.; 228, 2d.; 229, 8d.; 221, 2d.; 234, 2d.; 245, 4d.; 248, 2d.; 230, 2d.; 240, 2d.; 242, 4d.; 253, 2d.; 254, 4d.; 256, 2d.; 259, 10d.; 251, 6d.; 252, 6d.; 256, 8d.; 264, 4d.; 256, 2d.; 259, 10d.; 264, 6d.; 260, 6d.; 261, 264, 264, 264, 265, 264, 259, 10d.; 264, 6d.; 801, 2d.; 200, 6d.; 201, 4d.; 292, 4d.; 293, 4d.; 294, 6d.; 301, 2d.; 200, 2d.; 201, 4d.; 254, 5d.; 327, 10d.; 372, 6d.; 403, 6d.; 900, 6d.; 1245, 6d.; 254, 8d.

*** Specifications will be forwarded by post from the Patent-office on receipt of the amount of price and postage. Sums exceeding 1s. must be remitted by Post-office order, made payable at the Post-office, 5, High Holborn, to Mr. H. Reader Lack, her Majesty's Patent-office, Southampton-buildings, Chancery-lane, London.

ABSTRAOTS OF SPECIFICATIONS.

Prepared by ourselves expressly for THE ENGINEER at the office of Her Majesty's Commissioners of Patents.

office of Her Majesty's Commissioners of Patents.
6034. PHOTOMETRIC APPARATUS, S. P. Thompson and C. C. Starling, Bristol.-18th December, 1882.-(Not proceeded with.) 2d.
This consists in the employment of interchangeable ongue screens in ascertaining or comparing the Inten-sity of lights, such screens being formed of two members attached to one another at any desired angle, the double screens so formed resembling wedges, having the ends opposite the apex open to admit of their being placed on a support either fixed to or adjustable on the bar of the photometer. The light is carried on a bracket on the bar, and is directed on to one face of the double screen. For lights of higher intensity the light is reflected from a mirror adjust-able on the bar, on to the proper face of the screen.
6073. STOPPERS FOR ALERATED WATER AND OTHER BOTLES CONTAINING LIQUIDS ON FLUIDS UNDER PRESSURE, &c., H. Vollmer, Manchester. - 20th December, 1852.-(A communication from Messre. Gompertz and Meinrath, Hanover.)-(Not proceeded with.) 2d.
This relates to a stopper which will sink in the liquid contained in the bottle, and which is made of five parts talc, three parts manganese, three parts shellac, one part asphalte powder, and one part amber, the whole being heated and mixed together, and then moulded to the required form.
6074. ATTOMITCALLY COUPLING AND UNCOUPLING RALWAY VEHICLES, E. N. Bretton, Liverpool.-20th

and then motified to the required form. 6074. AUTOMATICALLY COUPLING AND UNCOUPLING RAILWAY VEHICLES, E. N. Brereton, Liverpool, --20th December, 1882.-(Not proceeded with.) 2d. Below the centre of the wagon chest a spring buffer is fixed, and its rod runs under the frame and passes therewere a reasonable block with its and resting on a

through a movable block with its end resting on a spring. Upon the rod are fastened two cotters, one near the wagon chest and the other a certain distance from it, and between them is a spring and the block. A second rod connects the block with a crank to which one side of a hook is fastened, and above the crank is a bent plate to which the hook is hinged, and which is held in position by the ordinary hook and

which one side of a hook is lastened, and above the crank is a bent plate to which the hook is hinged, and which is held in position by the ordinary hook and draw-bar. When two vehicles come together the coupling hook is automatically lifted and secures the vehicles together, and by raising a catch (by a handle at either side of the wagon) the hook is disengaged.
6174. Doon LOCKS, W. Morgan-Brown, London. 27th December, 1882. (A communication from 0. Belger and F. Preller, Germany. (Not proceeded with.) 4d.
This relates to the use of a special locker arm for securing the spring bolt in its locking position so that it is impossible to withdraw the bolt by means of the latch and open the door. The arm is carried by a spindle capable of being turned in a tube so as to bring the arm in the desired position.
6087. CONSERVING COMESTIELES, F. Wirth, Germany.

6087. CONSERVING COMESTIBLES, F. Wirth, Germany.

-20th December, 1882.-(A communication from H. Machler, Germany.)-(Not proceeded with.) 2d. This relates to a vessel for preserving comestibles

1883

1883

London.

4331. Cases for PACKING Eggs, W. H. and J. D. Lever,

Inventions Protected for Six Months on Deposit of Complete Specifications.

Deposit of Complete Specifications, 4237. Toornep and PRONGED IMPLEMENTS, A. M. Clark, London. — A communication from A. Holden, Pens-hurst, New South Wales. — 37d September, 1883. 4254. ORAMENTING MEXALIC TUBES, J. Earle and G. Bourne, Birmingham. — 4th September, 1883. 4203. TeleFHONIC APPARATUS, E. George, F. A. Pocock, J. S. Muir, and J. S. Muir, jun., London. — 7th Sep-tember, 1883. 4304. LUBRICATING the CYLINDERS of AIR, &c., ENGINES.

temper, 1888.
4304. LUBRICATING the CYLINDERS of AIR, &C., ENGINES,
W. R. Lake, London. - A communication from F. J.
Weiss, Basle, Switzerland. -- 7th September, 1883.

Patents on which the Stamp Duty of £50 has been paid

3616. AMALGAMATORS, P. B. Wilson, Baltimore, U.S.-6th September, 1880.

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3616. AMALGAMATORS, P. B. Wilson, Baltimore, U.S.-6th September, 1880.
3629. ARMOUR PLATES, J. D. Ellis, Sheffield.-7th Sep-tember, 1880.
3780. ROSES of DOOR KNOBS, &C., F. R. MCESON and J. T. HORKINSON, LONDON.-17th September, 1880.
3611. PORTABLE HYDRAULIC RIVETING MACHINES, A. C. Kirk, Glasgow.-6th September, 1880.
3620. STRAINER OF KNOTTER APPARATUS, F. N. Miller, Sunderland.-6th September, 1880.
3630. REGULATING the FLOW of ILLUMINATING GAS, D. B. Peebles, Bonnington, N. B.-7th September, 1880.
3647. HORSESHORS, W. W. BOX, CRAYford, and F. J. Beadle, Erith.-8th September, 1880.
3667. RAISING and LOWERING OBJECTS, C. D. Abel, London.-9th September, 1880.
3666. DRESSEN GYANNS, W. W. Urguhart and J. Lindsay Dundee.-9th September, 1880.
3660. DRESSING YANNS, W. W. Urguhart and J. Lindsay Dundee.-9th September, 1880.
3660. DRESSING YANNS, W. W. Urguhart and J. Lindsay Dundee.-9th September, 1880.
3610. LOCKS and LATCHES, J. M. Hart, London.-11th September, 1880.
3701. LOCKS and LATCHES, J. M. Hart, London.-11th September, 1880.

3701. LOCKS and LATCHES, J. M. Hart, London.—11th September, 1880.
3741. TAPS, &C., E. Ludlow, Birmingham.—14th Sep-tember, 1880.
3762. INDICATING FARES RECEIVED by CONDUCTORS, G. W. WARTEN, LONDON.—16th September, 1880.
3797. STITCHED MACHINE BELTS, M. Gandy, Liverpool.— 18th September, 1880.
3811. PROTECTING STEEL SURFACES, G. and A. S. Bower, St. Neots. - 20th September, 1880.

May, 1883.
2802. STEAM PISTONS, A. McLaine, Belfast.—6th June, 1832.
2986. TILIS, J. C. Cox, London.—15th June, 1883.
2986. TILIS, J. C. Cox, London..—15th June, 1883.
2981. GAS BURNERS, H. H. Lake, London.—A communication from A. B. Lipsey.—29th June, 1883.
2841. GAS BURNERS, H. H. Lake, London.—A communication from A. B. Lipsey.—29th June, 1883.
2958. DESIONS for PRINTING, &c., J. J. Sachs, London...-30th June, 1832.
2975. JOINTING LEAD PIPES, T. P. Wilson, London.—A communication from W. C. Brookes, London.—A communication from W. L. Libbey.—24th July, 1883.
2620. ANTI-FRICTION ROLLER DEVICES, J. H. Johnson, London.—A communication from H. G. Yate, A. Shotwell, and L. W. Boyer.—24th July, 1883.
2977. PACKING ABRASIVE PLATES, A. G. Brookes, London..—A commondon.—A commendication from L. D. Shepard.—81st July, 1883.
2977. GOLDEN SULPHURET of ANTIMONY, A. G. Brookes, London.—Com. from T. Sanders.—2nd August, 1883.
2981. MARING BERR, &c. W. Clark, London..—A comfrom A. E. and W. E. Feroe, and J. S. Bancroft.—Th August, 1883.
2987. RAKING GASES, W. S. Sutherland, Birmingham.—11th August, 1883.
2987. RAKES, &c., A. M. Clark, London.—A communication from X. B. Stokes, Cleckheaton.—8th August, 1883.
2981. PURFYING GASES, W. S. Sutherland, Birmingham.—11th August, 1883.
2983. TREEPHONIC APPARATUS, E. George, F. A. Poocok, J. S. Bandy, J. S., Jan. Mulr, London.—A composition from A. Holden.—3rd September, 1883.
2983. TREEPHONIC APPARATUS, E. George, F. A. Poocok, J. S. Bandy, J. S. Jandy, J. S. Bartonfuer, 1883.
2984. TELEPHONIC APPARATUS, E. George, F. A. Poocok, J. S. Marto, London.—7th September, 1883. Patents on which the Stamp Duty of £100 has been paid.
3604. PRINTING, &c., MACHINE, W. R. Lake, London.— 14th September, 1876.
3533. SUBMARINE, &c., CABLES, W. C. Johnson and S. E. Phillips, Charlton.—8th September, 1876.
3534. INSULATORS for TELEGRAPH WIRES, W. C. Johnson and S. E. Phillips, Charlton.—8th September, 1876.
577. CARRIACES, &c., J. I. Mitchell, London.—12th September, 1876.

Notices of Intention to Proceed with Applications.

(Last day for filing opposition, 28th September, 1883.) 2199. MAKING CEMENTS, T. Smith, Sunbury.-1st May, 1883.

Sandard Charles S, Sintell, Schluff, 2009, 1883.
 Cooke, Sutton. — 1st May, 1883.
 Cooke, Sutton. — 1st May, 1883.
 Weaving Oarpers, E. Crossley and R. Cochrane, Halifax.— 2nd May, 1883.
 Meaving Machines, W. R. Lake, London.— A communication from T. C. Robinson and E. B. Welch. — 2nd May, 1883.
 Sona May, 1883.
 String Machines, C. Weygang, Child's Hill.— 3rd May, 1883.

May, 1883.
 2254. WEIGHING COUNTS OF YARN, T. KNOWLES, TUrton. --3rd May, 1883.
 2257. HARNESS, E. Edwards, London.—A communica-tion from P. J. Grandy.—3rd May, 1883.
 2258. CHRONOGRAPS, A. H. Arnold and F. H. Huguenin, Conven.—3rd May, 1883.

2205. CHRONOGRAPS, A. H. AIROHI and F. H. Haguenin, Geneva.—3rd May, 1883. 2259. OXIDE of STRONTIUM, W. Moody, West Ham.— 3rd May, 1883. 2262. LEATHER for SETTING, &c., J. Hall, Leeds.—3rd May 1989.

2262. LEATTER IOT SETTING, &C., J. Hall, Leeds.—37a May, 1883.
2272. CONSTRUCTING LIFEBOATS, &C., J. R. Hodgson, Poplar.—4th May, 1883.
2282. OPEN-FIRE PORTABLE COOKING RANGES, T. J. Constantine, London.—4th May, 1883.
2284. GRANES, C. J. Appleby, London.—4th May, 1883.
2319. SPINDLES, &C. D. Skeoch, Stewarton.—8th May, 1883.

2319. SPINDLES, &c., D. Skooch, Stewarton, --Sth May, 1883.
2383. ELECTRIC TRAMWAYS, H. H. Lake, London.--A communication from C. Basto.--Sth May, 1883.
2367. WEAVING DESIGNS on STLK, &c., W. C. Kipling and S. W. Brown, London.--9th May, 1883.
2377. ROLLER MILLS, G. Davies, Manchester.--A communication from J. S. Stark.--10th May, 1883.
2451. CALLIPERS, St. J. V. Day, Glasgow.--A communication from A. Nimmo.--16th May, 1883.
2460. WHEL GERAF for GUNS, C. H. MURTAY, Newcastle-upon-Tyne.--17th May, 1883.
2530. EMBROIDERING MACHINES, W. L. Wise, London. Com, from F. Marthin and Co.-21st May, 1883.
2616. SECURING CANDLES in CANDLESTICKS, W. R. Lake, London.--A com. from J. Taberlet.--25th May, 1883.
2711. BREAKING GRAIN, H. Springman, Berlin.--A communication from A. C. Nagel, R. H. Kaemp, and A. Linenbrügge, -30th July, 1883.
211. METAL TOES, G. H. FOX, Boston, U.S.--31st August, 1883.
211. METAL TOES, G. H. FOX, Boston, U.S.--31st August, 1883.
(Last day for filing opposition, 2nd October, 1883.)

10th March, 1883.
1452: Electrato TELEPHONY, J. H. Johnson, London.— 20th March, 1883.
1454: WORKING TRAMCARS, C. Hinksman, London.— 20th March, 1883.
1488: STABLE DRAINS, A. M. Clark, London.—21st March, 1883.
1500. RING SPINNING FRAMES, J. and W. Monks, and W. J. Redman, Bacup.—22nd March, 1883.
1521. STEAM LUBRICATORS, P. Jensen, London.—22nd March, 1883.
1526. CHECKING FARES, T. A. Silverwood, Brighton.— 24th March, 1883.
1526. FLEXIBLE WHEEL BASES, T. Slater and S. Owen, London.—24th March, 1883.
1534. Looms for WEAVING, J. Hodgson and S. Green-wood, Brearley.—24th March, 1883.
1540. RING SPINNING FRAMES, A. M. Clark, London.— -24th March, 1883.
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1540. RING SPINNING FRAMES, A. M. Clark, London.— -24th March, 1883.
1541. FIRE-ARMS, & C., H. Pieper, Belgium.—28th March, 1883. (Last day for fling opposition, 2nd October, 1883.) 2288. BOTTLE STANDS, J. B. Walker, Sheffield .- 5th

May, 1883.
 2294. TREATING HOPS, A. J. Boult, London.—A communication from F. T. Deinhardt.—5th May, 1883.
 2302. SADUE BARS, J. W. Clarke, Guisborough.—7th

May, 1883. 305. WALL COVERINGS, S. Fisher, Herne Hill.-7th 2305

2305. WALL COVERINGS, S. Fisher, Herne Hill.—7th May, 1883.
2311. REGULATING FLOW of GAS, G. P. Lempridre, Bal-sall Heath.—7th May, 1883.
2315. ENAMELING CAST IRON, G. J. Rhodes, Wolver-hampton.—7th May, 1883.
2317. EMBEOIDERY MACHINES, A. W. L. Reddie, Lon-don.—A com. from J. Jonson.—8th May, 1883.
2325. PEDAL HARP, H. J. Haddan, London.—A com. from E. Meyer and Co.—8th May, 1883.
2326. PURIFYING GLYCENINE, H. J. Haddan, London.. —A communication from C. Moldenhauer and C. Heinzerling.—8th May, 1883.
2355. GAS LIGHTING, D. W. Sugg, London.—8th May, 1883.

1883.
2843. PACKING for PIPE JOINTS, E. Marechal, London. -8th May, 1883.
2845. REFEATING FIRE-ARMS, C. D. Abel, London.-A communication from F. Mannlicher.-Sth May, 1883.
2849. DECOMPOSING FATS, A. Marix, Paris.-9th May, 1882.

2353. FISH JOINTS, A. S. Hamand, London.-9th May,

1883.

and consists of a porcelain dish with a groove round its upper edge filled with water alone, or mixed with salicy ic acid, and a cover whose lower edge dips into such liquid. The top of the cover is fitted with a spring valve operated by hand to allow air to enter or escape when the cover is put on or removed.

escape when the cover is put on or removed.
6182. HORSESHOE MACHINES, F. Wolff, Copenhagen. — 27th December, 1882.—(A communication from S. Möller and A. Andersen, Copenhagen.) 4d.
This relates to machines for grooving and punching blanks for horseshoes, and is used in connection with machines for entring, rolling, and shaping the blanks before and after punching and grooving. The blank is held by a carriage between a raised side thereof and a removable clamp by a roller. The carriage is guided by a large wheel and two rollers, and passes the blank under a sector-shaped die on a revolving spindle, and the sharpened edge of which forms the groove, while punches on the edge form the nail holes.
6180. LOOMS FOR WEAVING, J. F. Brown, Clagorn.

punches on the edge form the nail holes. 6189. LOOMS FOR WEAVING, J. F. Brown. Glasgow.-28th December, 1882. - (Not proceeded with.) 2d. This relates to looms in which shifting shuttle boxes are used for the purpose of using more than one variety of weft in the cloth, and the object is to enable several shuttles, carrying as many different wefts to be used, without requiring shuttle boxes, with the same or an equal number of divisions or shuttle receptacles at both sides of the loom. G2020 TREATMENT OF INGOTS OF STEEL AND OTHER

both sides of the local. Status of Shuttle receptacles at
both sides of the local. Insome of Shuttle receptacles at
C229. TREATMENT OF INGOTS OF STEEL AND OTHER MALLEABLE METALS FOR THE REMOVAL OF IM-PURITIES, H. C. S. Dyer, Manchester.--30th December, 1882.-(Not proceeded with.) 2d.
This consists in removing the part of the ingot which solidifies last, and consequently contains most of the impurities, by placing its bottom on an anvil, and a hollow die, with a hole of about the size of the part to be removed, over its top, and applying pressure, whereby the soft inner part of the ingot is forced inside the die, and can be removed by suitable mecha-nical means.
6240. INDICATING AND RECORDING STOR DE-

6240. INDICATING AND RECORDING THE PRESSURE AND

6240. INDICATING AND RECORDING THE PRESSURE AND DIRECTION OF THE WIND, L. M. Casella, Hampslead, --30th December, 1852. 1s.
62 The apparatus for ascertaining the true direction of the wind consists of a vane composed of a pair of a vertical axis, the motion of the vane being transmitted through a vertical tubular shaft passing down through a fixed co acup capable of rotating on a vertical axis, the motion of the vane being transmitted through a vertical tubular shaft passing down through a fixed co perate two or more pencils, one of which is always on a scale actuated by a clock movement. The apparatus for indicating the angle or plane of the wind—that is, its divergence from a horizontal plane—consists of a similar vane oscillating upon a horizontal axis within the former vane, and balanced axis is horizontal, when there is no wind blowing. The motion of this vane is also transmitted to suitable registering mechanism. A pressure board is fixed to a guide rod fitted to slide in guides in the frame of the vind by the displacement of a column of mercury by a plunger suitably connected to the board.
20. BOOTS AND SNOES, H. H. Lake, London—lat Januare and the fixed to a guide of the vind by the displacement of a column of mercury by a plunger suitably connected to the board.

plunger suitably connected to the board.
20. Boors AND SHOES, H. H. Lake, London.—Ist January, 1883.—(A communication from E. H. Buckley, Philadelphia.) 6d.
This relates to boots in which the sole and upper are secured together by staples, clinched upon the inside, and it consists in making a channel in the sole to receive the heads of the staples, and then by a suitable tool pressing over the letther on each side of the channel, so as to hide the heads.

channel, so as to hide the heads.
28. BREECH-LOADING FOWLING-PIECES and FIRE-ARMS, H. W. Holland and J. Robertson, London.-Ist Janu-ary, 1883. 4d. This consists in causing the hammers of double-barrelled breech-loading fire-arms to be cocked; one when the gun is opened, and the other when it is closed.

closed.
28. ISDICATING ANY INCREASE IN THE TEMPERATURE or COAL CARGORS, &c., T. Rowan, Westminster.— 2nd January, 1883. 6d.
A series of perforated tubes extend from the deck to different positions and levels of the hold of the vessel, and at top are fitted with air abstractors or cowls. In such tubes electrical thermometers are placed, and so arranged that on a rise in the temperature above any regulated point, electrical contact will be established by wires in communication with electric bells and indicating mechanism.

indicating mechanism.
31. CONSTRUCTION, ARRANGEMENT, AND OPERATION OF THILL COUPLINGS, HORSE DETACHERS, &c., D. Green, Cincinnati, U.S.—2nd January, 1883. 6d.
The objects are to prevent, rattling of the parts and enable the thill from to be detached instantaneously from the clips by the occupants of the vehicle, and further, to apply a brake automatically when the thill iron is disengaged. The curved hook of the thill iron fits a socket formed in an elastic cushion, and is lifted out when desired by an arm on a shaft operated by the occupant of the vehicle, such shaft when operated at the same time applying a brake to the hub of the wheels of the vehicle.
40. MACHINERY AND APPARATUS APPLICABLE TO

and time applying a brace to the hub of the wheels of the vehicle.
40. MACHINERY AND APPARATUS APPLICABLE TO STITCHING OR SEWING MACHINES, H. Clarke, Leiczer.—3rd January, 1883. 6d.
This relates to means for cutting off the superfluous portions of fabric as fast as it is stitched from hosiery stitching machines, or turning-off machines, without having to stop the same. A spring plate is attached to the ring cylinder of the machine, and guides the fabric after it is stitched on to a toothed wheel, above which is a recessed circular cutter plate. Above the boss of the first wheel, on the same axle, is a second toothed wheel, carrying a bevel wheel has a recessed circular cutter plate. Above the bracket secured to the cylinder of the machine, and guides the fabric after it is stitched on to a stop wheel as the other end, which gears into the toothed opoint ring of the machine. The bovel wheel and appur wheel at the other end, which gears into the toothed bracket secured to the cylinder of the machine, and the second which, and revolving with it, is a circular cutter plate, and is sharpened by an olletone or emery block. Tho application of the apparatus to sewing machines with vertical needle bars is also described.
45. MACHINERY FOR CUTTING AND RENDING WOOD

machines with vertical needle bars is also described.
 45. MACHINERY FOR CUTTING AND RENDING WOOD INTO S.ZES SUITABLE FOR FIREWOOD, &C., T. Andrew, London.—3rd January, 1883. 6d.
 This consists in the application to the chopping knife of machines for cutting wood of stops or flanges carried by the knife, or working in combination therewith, and so arranged as to leave the discharge mouth of the feed trough clear, and afford free exit to the slice cut or being cut directly after the knife enters the wood. An inclined plate forces the cut slices out of the way of the flanges or stops at the back stroke.
 56. MEASURED CONTRACT, CONTRACT, S. C. L. FOR.

Inclined plate forces the cut slices out of the way of the flanges or stops at the back stroke.
64. Measurano Electrate CURRENTS, St. G. L. Fox, Wetminster.—Ath January, 1883. 6d.
This relates to improvements on patent No. 4626, A.D. 1878, in which a counting apparatus is worked by the movement and position of a solenoid core or the amature of an electro-magnet, the coil of which forms of the conductor, the current passing through which is to be measured, and it consists in combining therewith a management by which the movement of the core or armature is indicated by a gauge and he counting apparatus. According to one arrangement the core of armature is attached to one end of a vivoted lever, the other end being connected to a valve which controls the flow of water through an outlet in a vessel kept charged at a constant level from a gauge. Within the tank is a float, which at a given level actuates the counter. Then a syphon comes automatically into action and empties the tank. The strength of the current passing through the solenoid.

or electro-magnet regulates the extent to which the discharge valve is opened. A modification is also described.

described. 60. APPARATUS FOR COUNTING AND REGISTERING THE REVOLUTIONS OF ROTATING SHAFTS OR WHEELS, G. D. Kittoe, London,—4th January, 1883. 6d. This consists in a weighted arm having a crank pin engaging with a slot in a pivotted lever, and carrying a spring pawl engaging with the teeth of a ratchet wheel. which also carries a pawl arranged to engage with the teeth of a second ratchet wheel, but usually kept disengaged by a spring. Once in every revolution of the first wheel the pawl it carries in passing a stud is forced to engage with the other ratchet wheel. The first wheel carries an index and is carried by a sleeve surrounding the axle of the second wheel, which also carries an index, the weighted arm being free to revolve on this axle.

on this axle 69. APPARATUS TO BE USED IN WELDING BOILER AND

THER SHELLS OF CYLINDRICAL AND OTHER

OTHER SHELLS OF CYLINDRICAL AND OTHER FORMS, S. Alley, Glazgow. - 5th Jawaury, 1883. 6d. This consists in the application to the ram of a hydraulic cylinder of a roller to bear against the edges to be welded, and a second roller to bear on the in-terior of the article diametrically opposite the first roller. The article is placed in parts formed so as to confine the same and prevent its enlargement and resist the internal pressure which is exerted by heated edges to be welded. The confining parts may also form part of the plunger of a hydraulic cylinder.

70. CRANK AND OTHER SHAFTS FOR TRANSMITTING POWER, G. Allibon and T. Turton, Liverpool. — 5th January, 1883. 6d. This consists, First, in forming crank shafts with the webs, the pins, and the length of shaft in separate pieces, the shaft and pin being formed at some dis-tance from the ends, which are connected to the webs with one or more circular excentric collars to fit tance from the ends, which are connected to the webs with one or more circular excentric collars to fit recesses in the webs. The ends of the shaft and pin extend through the webs, and are secured by nuts or cotters; Secondly, in forming marine engine shafts with disc-like ends or couplings having slightly con-vexed faces. Bolts screwed in one disc fit into and pass through holes bored in the other, their outer ends being fitted with nuts bearing against washers with curved faces.

72. GENERATING STEAM FOR OBTAINING MOTIVE POWER 72. GENERATING STEAM FOR OBTAINING MOTIVE POWER, H. J. Haddan, Kensington.-5th January, 1883.-(A communication from A. A. Daussin, France.) 6d. The object is to utilise waste heat of ovens, stoves, furnaces, or other fireplaces, for generating steam to be used for obtaining motive power. The generator is placed on the stove and has a base-plate, from which a number of tubes project. A hollow column serves as a steam dome and as a stand for an oscillating quinter, such column containing water distributing apparatus and being connected to a flexible pipe for conducting steam to the cylinder. The distribution of steam is effected by a disc mounted on a trunnion of the cylinder, and pressed against the valve face by a spring so as to yield under excessive pressure. A special brake regulator is described, and is driven by and regulates the motor. 78. LAMPS APPLICABLE TO VELOCIPPEDES, J. B. Young

and regulates the motor. 73. LAMPS APPLICABLE TO VELOCIPEDES, J. B. Young and W. T. J. Burgess, Birmingham...-5th January, 1883...-(Not proceeded with.) 2d. The lamp body is of glass and may be of any desired colour, parts of the colour being removed to produce the front and side lights. The body of a hub lamp is made of elliptical or other suitable cross sec-tion to facilitate its passing between the spokes of the wheel.

74. FIRE SCREENS, J. Betjemann, London.-5th January

74. FIRE SCREENS, J. Beljemann, London.-5th January, 1883. 6d. The object is to render fire screens useful, and con-sists in forming them in the form of a shallow cup-board and hinging the door so that it will fall down and form a table or shelf. The interior is fitted with a pipe rack, a stand for cigars, and a hook for a spirit bottle. The screen is mounted on a swirel and can be set at any angle.

set at any angle.
76. MANUFACTURE OF ENVELOPES, &C., W. H. Hook, London.-5th January, 1883. 6d.
This relates to means for rapidly pressing over the flaps of envelopes previous to them being closed. A die or plunger reciprocates vertically over a suitably shaped box on a table beneath, and over which a pad of india-rubber is placed and receives the envelope, when the die descending forces it into a box and presses over the flaps. The elasticity of the pad raises the envelope when the die rises. An arrangement is described for gumming the edges of the flaps.
77. Looms FOR WEAVING. W. Priestley and W. Deighten

described for gumming the edges of the flaps.
77. LOONS FOR WEAVING, W. Priestley and W. Deighton, near Bradford.—5th January, 1883.—(Not proceeded with.) 2d.
This relates, First, to that part of the picking mechanism enaployed in putting the picking tappets in and out of position for picking; and consists of a vertical reciprocating bar with a hinged toe piece at its lower end and a connecting rod at its upper end, in contact with a cam. A horizontal rod, connected to a horizontal square bar, is employed for sliding the picking tappets on the picking shaft. The locking mechanism consists of two levers, lifted by a cam, and lowered by a spring into a notch for the sliding bar; and Secondly, to the mechanism in supporting the piece beam, and allowing the shaft to lower as the beam increases in diameter by the material wound on.
78. ELECTRIC FIRE-ALARM APPARATUS, W. C. Gordon,

piece beam, and allowing the shaft to lower as the beam increases in diameter by the material wound on. 73. ELECTRIC FIRE-ALARM APPARATUS, W. C. Gordon, London.-5th January, 1883. 6d. The object is to enable an alarm to be sounded on every floor of a building, and the part whence it emanated to be indicated on every floor, and to sound the alarm in several parts simultaneously; also to means to return all the indicators to their normal posi-tion from any one of them. On each floor is an indi-cator tableau with as many signalling apertures, each provided with a signal disc, as there are floors, and on each floor is a push piece or circuit closer. And lastly, electric bells are placed in the desired parts of the building. There are as many circuits as signalling apertures, such circuits corresponding respectively with the different floors, and each passing successively through the operating electro-magnet of the signal disc in every indicator, and all of them are connected in multiple arc to the main leads from a battery. In the circuit of the main leads from a battery. In the circuit of the main leads from substreating in multiple arc. Each indicator has reversing mag-nets to return all the indicators to their normal position.

79. PRODUCTION OF COLOURING MATTERS SUITABLE FOR DYEING AND PRINTING, C. D. Abel, London.-5th January, 1883.-(A communication from the Farb -5th January, werke vorme () 4d. rmals Meister Lucius und Bruning, Ger

werke vormals Messer Lucus and Bruning, ter-many.) 4d. The object is to produce colouring matters from aranitrobenzylidene chloride, or bromide, their ether lerivatives, and from paranitrobenzylidene, anilide, oluide, or oxylide.

80. CURLING TONGS OR IRONS, C. Carter, Clapham Junction.-5th January, 1883. 4d. This relates to one-handed curling tongs, so that the other hand will be free to use the comb to protect the head from the heat of the tongs, one form consisting in inserting a spring between the arms.

BUCKLE LOCKS, W. A. Shaw, Notlingham.-6th January, 1883. 4d.
 This consists in forming the buckle tongue as a rigid sliding bolt in a swivelled lock case of any suitable construction.

82. Souvers or EMULSIVE FOR USE WITH PAINTS, PIGMENTS, &C., W. Johnston, King's Lynn.—6th January, 1883. 2d.
The object is to prepare from blood a solvent or emulsive for use with paints or pigments as a substitute for glue in the preparation of wateroolour pigments, or in staining wood where varnish is to be

used, or as a substitute for priming used in oil colour painting and similar purposes; and it consists, First, in stirring blood deprived of its fibrine whilst hot, and adding a solution of soluble silicate of soda or potash ; and secondly, in treating blood with hydrate of potassium or sodium, and diluting the product.

potassium or sodium, and diluting the product.
83. RIDDLES, E. de Pass, London.—6th January, 1883.
- (A communication from H. Schmid, Hungary.)— (Not proceeded with.) 2d.
The fan is placed immediately under the sieves, so that the grain on leaving the sieve plates of the riddle chest is exposed to a current of air in the air passage until it is perfectly cleaned and all the lighter particles have escaped. The grain is fed through a hopper and falls on a regulator slide. After it has been riddled the grain passes to the air channel and is cleaned by fans operated by gearing and crank mechanism, and falls on to a receiving board, finally passing through a suitable outlet.

on to a receiving board, finally passing through a suitable outlet.
84. APRARTUS FOR MAKING FLAT WIRE ROPES, J. Lang, Wakrfield, and J. Lang, Hyde. -6th January, 1883. 6d.
The objects are to make flat wire ropes thoroughly straight and of uniform thickness, breadth, and tension, and to dispense with stitching wires or strands. The round ropes are laid parallel upon a bench, and are compressed by dies to uniform width, the pressure being maintained to the end of the rope. The rope is then opened up by the pricker and needle previous to stitching, as usual, but in place of continuous stitching wires steel binders with one or both ends turned up are used, and the rope is then passed under rollers to press it to a uniform thickness.
85. FOLDING BLARS, A. A. Barratt and G. Greenshields, Dittom.-6th January, 1853. 4d.
The side, top, and bottom pieces are all jointed together by canvas, leather, or other material, and when not in use lie flat one on the other. The abutting edges of the different pieces are mitred, so as to interlock when the box is built up, and an elastic band secures them in position.
87. APPARATUS FOR INDICATING AND REGISTERING THE PRESENCE OF EXPLOSIVE OR LAURED GLASES INFORMED THE PRESENCE OF EXPLOSIVE OR LAURDED GLASES INFORMATION FOR AND REGISTERING THE PRESENCE OF EXPLOSIVE OR LAURDED GLASES INFORMED THE CASES AND THE STORMED CASES AND THE STORMED CASES AND THE STORMED CASES AND REGISTERING THE PRESENCE OF EXPLOSIVE OR LAURDED CASES AND THE STORMED CASES AND THE STO

87. APPARATUS FOR INDICATING AND REGISTERING THE PRESENCE OF EXPLOSIVE OR INJURIOUS GASES IN COAL MINES, &C., J. Catz, London.—6th January, 1883.—(A communication from F. Libin, Belgium.) additional communication from F. Libin, Belgium.)

The indicator consists of a porous vessel closed The indicator consists of a porous vessel closed ac one end by an elastic diaphragm, the motion of which closes or breaks an electric circuit. If explosive or injurious gases are in the atmosphere surrounding the indicator the porous vessel will absorb some of it and cause the diaphragm to swell outwards and so close the circuit, in which an alarm is inserted.

METAL ROLLERS FOR PRINTING AND EMBOSSING, &c., D. Appleton, Manchester. -6th January, 1883. 6d.

6d. This consists in rendering such rollers more durable by coating their surfaces with nickel, and in order to btain an even coating the rollers are mounted in the sath and caused to vibrate, oscillate, or rotate either continuously or intermittently during the plating meration hath operation.

89. INSTRUMENTS FOR MEASURING ANGLES BY REFLECTION, J. H. Johnson, London. --Gih January, 1883.--(A communication from E. H. Amagat, Paris.)--(Not proceeded with.) 2d. The object is to render it possible to measure the augle formed by two distant points with the point of observation as well as the projection in a horizontal plane of said angle. The instrument has two mirrors called the horizon and index glasses, the former capable of turning on a horizontal axis, and the latter on a vertical axis situate in a line drawn from the eye of the observer to the distant point viewed by direct vision.

INKSTAND, F. Wirth, Germany.—6th January, 1883. —(A communication from H. Meidinger, Germany.)

6d. The body has a depression at top and bottom con-nected by a small opening. At the lower part is a groove to hold the edges of an elastic disc, and over the bottom screws a cap. The ink reservoir is between the disc and the bottom depression, and by turning the body in the cap the disc is compressed or loosened and the height of the ink in the upper depression regu-lated as desired, so that the pen when dipped in will only take up the necessary quantity. Modifications are described. 64 described

described.
91. COOLING ATMOSPHERIC AIR, &c., A. B. Wilson Holyvood, Ireland, and J. Sturgeon, Westminster.— -6th January, 1883. 8d.
This relates to machines in which air is cooled by compression and re-expansion in the performance of work. To cool the air during compression a number of small tubes with plungers are immersed in water, and all the plungers are worked by one circular cross-head which carries the piston of the expansion cylinder in its centre, and into which the compressed air passes, through values actuated automatically by the pressure of the air itself, and in which cylinder the air acts expansively on the piston.
92. INDUCATING THE NAMES OF STATIONS TO PASSENGERS.

expansively on the piston.
93. INDICATING THE NAMES OF STATIONS TO PASSENGERS IN RAILWAY TRAINS, A. P. Hodgson, Fimilico.-6th January, 1883.-(Not proceeded with.) 6d.
This relates to indicators fixed in the trains, and actuated by rollers connected with the pointer, and which are brought in contact with surfaces fixed between the rails, so as to cause the pointer to move over a dial. over a dial.

95. INTERMEDIATE PARTS FOR ATTACHING VARIOUS UTENSILS AND OTHER ARTICLES TO THEIR HANDLES, &c., J. Lee, Hampstead.—Skh January, 1883. 6d. This consists in making the sockets by which spades and other articles are secured to their handles, with slots or openings in their sides.

and other and as a description of the second seco hydrate.

97. ALUMINIUM AND ALLOYS OF ALUMINIUM, W. Wel-

97. ALDMENION AND ALDONS OF ALDMENION, ". Wet-don, Burstow.--Sth January, 1883. 2d. This consists in reducing aluminium by means either of the metal sodium or of the metal manganese, mixed or alloyed or not with another metal or with other metals from compounds of aluminium formed by double decomposition in the dry way. Either native or artificial cryolite is fused with either the chloride, bromide, iodide, or sulphide of either ealcium, strontium, barium, potassium, or sodium, and the product treated at a suitably high tempera-ture with either sodium or manganese.

98. MANUFACTURE OF CHLORATES, W. Weldon, stor. -St. January, 1883. - (Not proceeded with.) 2d This consists in substituting for the lime used in th manufacture of crude chlorate liquor precipitate magnesium hydrate obtained by the reaction of mag nesium chloride on solution of calcium sulphydrate obtained either by heating alkali waste with wate under pressure, or by treating a mixture of alkali waste and water by carbonic acid.

Waste and water by carbonic acid.
 99. Recovery of Sulprue FROM ALKALI WASTE, W. Weldon, Burstow.—Sth January, 1883.—(Not proceeded with.) 2d.
 This consists in recovering sulphur from alkali waste by means of a solution of magnesium chloride

which is the residual product obtained in the manu-Tacture of potassium chlorate and sodium chlorate and other chlorates when these are manufactured, instead of by means of the solution obtained by treating milk of lime with chlorine gas, by means of the solution obtained by treating milk of magnesia by chlorine gas. 100. RECOVERY OF SULPHUR FROM ALKALI WASTE, W. Weldon, Burstow, --Sth January, 1883.-(Not pro-ceeded with.) 2d.

ceeded with.) 2d. This consists in recovering sulphur from alkali waste by means of a combination of the reactions which take place when alkali waste is heated with water under pressure with the reactions which take place when a solution of calcium sulphydrate is heated by atmo-spheric air at a suitable temperature, and the reaction of hydrochloric acid or other acid upon the product of the treatment by air or oxygen of a solution of calcium sulphydrate.

101. Application of Eosine in Photographic Pro-SES, C. D. Abel, London.—8th January, 1883.— communication from P. A. Attout and J. Clayton,

(A communication from P. A. Attout and J. current, Paris.) 4d. This relates to the application of eosine to the gelatino-bromide process for the introduction of colouring matters, and it consists in the use of eosine dissolved in ammonia or other alkali, and either poured into the emulsion of gelatino-bromide of silver or applied on the dry layer of a prepared plate.

or applied on the dry layer of a prepared plate.
102. FACILITATING THE ACTION OF SPRING ROLLERS FOR WINDOW BLINDS, G. D. Peters, London.-8th January, 1883. 6d.
This relates to the combination with a spring roller of shoulders on the roller spindle, and of one or more pawls, each arranged to silde in a guide at the end of the roller, the pawls operating so that they will either engage with the shoulders or pass clear of them, according to the manner in which the blind is mani-pulated. In a modification an excentric is used in combination with a clutch connected with the spring; and in a third arrangement the roller is formed with a rib so as to weight the roller on one side, and according to the manipulation of the blind it will be drawn up by the spring or held in any desired position.
103. PRODUCING DESIGNS OR PATTERNS ON GLASS,

the spring or held in any desired position.
103. PRODUCING DESIGNS OR PATTERNS ON GLASS, GLAZED AND ENAMELLED SURFACES, D. Reich, Ber-lin.—Sth January, 1883. 2d.
The parts to form the pattern are covered with chalk, magnesia, or other material which will not fuse at so low a temperature as glass-staining colours, and then the whole object is covered with a suitable glass-staining paint and burnt in. The design will remain unfused, and can be readily removed, leaving such parts in the original colour.
104. BOORS AND SHORS, AND MACHINERY FOR LASTING

parts in the original colour.
104. BOOTS AND SHOES, AND MACHINERY FOR LASTING THE UPPERS THEREOF, H. J. Haddan, Kensington,— Sth January, 1853.—(A communication from M. R. Ethridge, Massachusetts) 6d.
The upper is first lasted, and the laps secured down to the insole at intervals by clamps. The outer sole is then laid upon the clamps, the laps, and insole, and mails driven through the outer sole and laps into the insole and between the clamps. The clamps are then separated from the laps and the last extracted, the soles and laps being then connected by sewing or stitching. A suitable machine is described.
105. BEGULATING THE SUPPLY OF GAS AND ALL TO

105. REGULATING THE SUPPLY OF GAS AND AIR TO GAS BURNERS, J. Lewis, Brockley.—8th January, 1883. 6d.

TAS DURNERS, J. Lewis, Proc.etg.—oit January, 1883. 6d. This relates to apparatus for regulating the supply of mixed gas and air to platinum wire gauze gas burners of the kind described in patents No. 1605, a.D. 1881, and No. 1403, A.D. 1882. The gas is supplied in jets to a pipe, and induces currents of air through suitable openings, which mixes with the gas. To reduce and regulate the pressure of the gas the mixing pipe is capable of being enlarged or contracted, and to parts to another mixing chamber or passage also capable of being enlarged or contracted. 106. PEROLEUM LAMP AND APPARATUS CONNECTED

of being enlarged or contracted. 108. PETROLEUM LAMP AND APPARATUS CONNECTED THEREWITH, H. H. Lake, London.—8th January, 1883.—(A communication from A. A. Lamarre, France.) 6d. A square rod with teeth on one side is mounted on a stand, and has at top a ring. The body of the lamp can slide on the rod, being formed with a central aperture corresponding with the section of the rod, a spring catch taking into the teeth of the latter to secure it at any desired height. The lamp body has two apertures at opposite ends, one to receive the bur-ner, and the other for supplying oil. 107. PORTABLE ALARM SIGNALLING APPARATUS. W. J.

ner, and the other for supplying oil.
107. PORTABLE ALARM SIGNALLING APPARATUS, W. J. Brewer, London.—Sth January, 1883. 6d.
This relates to portable signalling alarm apparatus suitable for use on railways, and actuated by approach-ing trains to warn workmen of their approach. A pedal is arranged to be acted upon by the train so as to rapidly make and break an electric circuit, and thus through a suitable wire actuate a gong or bell situated near the workmen it is desired to warn. The apparatus may also be used for signalling to drivers.
108. PRIMARY VOLTAIC BATTERIES, G. G. André.

This through a situative wife actuate a going of bill of a paparatus may also be used for signalling to drivers.
108. PRIMARY VOLTAIC BATTERIES, G. G. André, Doking.-Sth January, 1883. 6d.
This relates to improvements on patent No. 5645, A.D. 1882, in which a powerful and constant current is produced while polarisation is avoided, and no consumption of metal takes place as long as the circuit remains open, a valuable product also resulting from the action of the battery. The hydrogen liberated is allowed to escape freely. The negative carbon is not in bodily contact with the liquid, but the latter has partial access to it through the intervention of an absorbent diaphragm, and the carbon is free to condense oxygen in its pores. It consists in introducing air or a suitable gas under pressure sufficient to depress the level of the exciting liquid in the cell, so that the negative electrode-except the small part which is in contact with the borous diaphragm. Is in air under pressure, and the hydrogen liberated is free to escape or combine with its oxygen. In one form a number of porous cells are connected with a reservoir like a gasholder, the bell of which is weighted. Each collect the current, and is held by a metallic tube inserted through the lid, and having a hole to admit the air to the interior of the cell, the tube being connected to a pipe leading to the reservoir. The porous cell. Modifications are described, and another part of the invention consists in placing hey which is electrode exoled which surrounds the porous cell. Modifications are described, and another part of the invention consists in placing hey electrode exoled, the hydrogen liberated is placed in the orange dependence of sulphate of lead to admit the air to the interior of sulphate of lead to another part of the invention consists in placing hey electrode which surrounds the porous cell. Modifications are described, and another part of the invention consists in placing hey electrode which surrounds the porous di

109. PLOUGHS, T. Sheldrake, Ipswich.-8th January, 1883. 6d. This relates to means for cutting up the furrow slice turned over by the plough, and consists in adapting to the share and breast a series of outwardly project-ing cutting blades or knives, in such a manner that they present their cutting edges at right angles to the winding furrow slice.

winding lutrow slice.
111. NUMBERING, PERFORATING, SEVERING, ROLLING, GUMMING, AND FOLDING TICKETS, CHEQUES, &c., J. Maynes, London, -9th January, 1883. -(Not proceeded with.) 4d.
This relates to the general construction of machines for effecting the above objects, and delivering the tickets or cheques in a continuous roll or in sheets separate bound or rolled.

REFRIGERATORS, H. J. Allison, London. - 9th January, 1883.-(A communication from R. A. Messervey, Massachusetts.)-(Not proceeded with.)

This relates to refrigerators in which air circulates vertical air passages communicating at top and This

bottom with a preserving chamber and having their walls cooled by a refrigerant contained in tanks, and the object is to so form such tanks that when two are placed together S-shaped air passages will be formed between them. This is effected by forming two sides of the tanks with corrugated or wavy sides. 112. VALVES AND TAPS, A. H. Bateman, East Green-wich.—9th January, 1883.—(Not proceeded with.) 2d. This relates to valves in which conical or other

This relates to valves in which conical or other This relates to valves in which conical or other spindle valves open or close a passage through a dia-phragm or partition, and the object is to enable the packing of the spindle to be renewed or the valves and seats to be re-ground while the tap is under pressure, and it consists in providing a supplementary valve actuated by a suitable spindle, so that when desired the valve can be applied to the opposite side of the diaphragm to that on which the usual valve works, and so close the opening in such diaphragm.

and so close the opening in such diaphragm.
113. APPARATUS FOR SIGNALLING ON RAILWAYS, F. Venables, Hadley Green.—9th January, 1883.—(Not proceeded with.) 2d.
An inclined rail is placed at the side of the rails and can be raised or lowered from the signal-box, and when raised acts upon an arm projecting from the engine and connected with a steam whistle.
114. SADLES OR SEATS of BIOYCLES, TRIOYCLES, &c., J. R. Brooks. Birmingham.—9th January, 1883. 6d.

J. B. Brooks, Birmingham. -94A January, 1883. 6d This relates to air bags used in saddles, and consists in forming holes through them and the leather cover-ing so as to ventilate the seat. The base-plate sup-porting the air bag is also perforated, and springs are inserted in the saddle.

porting the air bag is also perforated, and springs are inserted in the saddle.
115. SELF-COUPLING FOR RAILWAY TRUCKS AND WACONS, G. F. Belling, Little Hord.-Oth January, 1883.-(Not proceeded with.) 2d.
The object is to avoid having toget between the wagons for coupling and uncoupling them, and it consists in the employment of a hook and a link with a straight piece projecting backwards. The link works on a cross both held by two pieces attached to wagon end. When the wagons come in contact the loop alides up the hook and couples them. A rod bears on the end of the straight projection from the link, and raises it clear of the hook when desired to uncouple the wagons.
116. Two-WHEELED VEHICLES, H. E. Newton, London. -9th January, 1883.-(A communication from E. Storm, New York.) 6d.
The object is to prevent the swinging action of two-wheeled vehicles, such as gigs or dog-carts, and it consists in the combination therewith of shafts or a pole secured to the axle, side bars mounted on the axle, and springs connecting the side bars with the body. The springs are preferably torsion springs.
117. DRILLE AND AFPARATUS FOR SHARPENING DRILLS, J. H. Johnson. London. -9th January 1888.-(d.

117. DRILLS AND APPARATUS FOR SHARPENING DRILLS.

117. DRILLS AND APPARATUS FOR SHARPENING DRILLS, J. H. Johnson, London.-9th January, 1883.-(A communication from J. S. Bancroft and W. H. Thorne, Philadelphia,) 8d. This consists essentially in the combination with a revolving grinding wheel of a swinging chuck, which clamps and holds the drill so that its axis is not parallel to, nor will it meet the axis about which the chuck swings, which axis is at an angle with the grinding surface, whereby as the chuck swings about its axis, and presents the drill to the grinding wheel, the end surface of the drill itp is ground conical, the apex of the conical surface being beyond the point of the drill, while its axis is not parallel to, nor does it meet the axis of the drill. The chuck revolves about the axis of a right cone, to which the end of the lip of the drill is shaped.

shaped.
119. PORTABLE RAILWAYS, E. de Pass, London.-9th January, 1883.-(A communication from G. A. Béliard, Paris.)-(Not proceeded with.) 4d.
This relates to a complete system for laying down a portable railway, permanently jointed with the cross sleeper and the fish-plates so as to form straight or curved lines of rail in one piece, which may be laid down and removed instantly.
120. MAGNETO-ELECTRIC MACHINES. H. F. Joel. Dals.

120. MAGNETO-ELECTRIC MACHINES, H. F. Joel, Dals ton.—9th January, 1883.—(Not proceeded with.) 2d 120. MAGNETO-ELECTRIO MACHINES, H. F. Joel, Dalston.-9th January, 1883.-(Not proceeded with.) 2d. This consists mainly in a novel construction of wheel armature, which depends for its action upon the passage across the magnetic field of a series of single section bars are flat, and arranged radially between two concentric supporting rings of different diameters. This wheel is mounted in bearings so as to cause the spokes of magnetic field produced by a number of permanent or electro-magnets, the poles of which are concentrated to a point, and are paired immediately in front of one another so as to allow bare clearance for the ring. Collecting brushes and contact rings collectivity generated by the passage of the radial bar armatures through the magnetic fields.
121. PICKERS FOR LOONS, H. Ingham, Thornton,

. PICKERS FOR LOOMS, H. Ingham, Thornton Yorkshire. — 9th January, 1883.—(Not proceeded with.) 2d. 121.

Yorkshire. - 9th January, 1883.--(Not proceeded with.) 2d. The body of the picker is of the usual form, but a bridge-shaped cut is made in the back, and the picce formed by the cut is pressed out at right angles to the body, and the picking strap attached to it so as to be in line with the centre of the spindle, there being no twist or turn in the strap, which can be fastened by a pin, bolt, or thong. At the same time, the old place for attaching above the spindle can be used if required.

pin, bolt, or thong. At the same time, the old place for attaching above the spindle can be used if required.
123. SPARK ARRESTERS, A. J. Boult, London.--9th January, 1883.--(A communication from J. A. Sterling, New York.) 8d.
This relates to spark arresters, more especially for socondives, in which the smoke arch has a downwardly extending deflector or descending flue extending out from the tube sheet, over the boiler tubes and opening into a mass of water in the base of the smoke arch, whereby the draught is directed upon the water and the sparks extinguished. The smoke arch is fixed to the front end of the boiler and rests on a saddle, from each end of which the cylinders project, the centre of the saddle resting on a swivel of a fourwheeled truck supporting the front end of the smoke arch and discharge under the centre of the smoke arch has a bottom of the smoke arch and discharge under the centre of the stack. The smoke arch has a discharge into the smoke arch has a discharge into the smoke arch and discharge under the centre of the stack. The smoke arch has a discharge into the smoke arch has a discharge into the smoke arch and the extension is an extinguishing chamber or water tank. The smoke arch is divided diagonally by a spark deflecting partition terminating over the middle of the water tank. An exhaust or steam jet discharges above the deflector directly under the stare.

124. MEANS FOR COMMUNICATING BETWEEN PASSENGERS AND THE GUARDS AND DRIVERS OF RAILWAY TRAIN W. Rathbone, New Southgate.—9th January, 1883.

W. Kathome, New Southgate.—9th January, 1883.— (Not proceeded with.) 2d. The invention is applicable to trains fitted with an atmospheric brake, and consists in connecting to the atmospheric tube a pipe communicating with a whistle or other alarm actuated by valves in the different compartments of the carriages, and which when open cause air from the atmospheric tube to operate the alarm. alarm

alarm. 126. VELOCIPEDES, J. White and J. Ashbury, Coventry. -9th January, 1883.-(Not proceeded with.) 2d. This relates to an arrangement of differential gear; and also to the attachment of the spokes of a wheel to a tubular felloe of the "Salamon" pattern.

125. ELECTRICAL FIRE-ARMS AND ORDNANCE AN ARTRIDGES THEREFOR, B. A. Monfort, New York. AND

OARTRIDGES THEREFOR, E. A. Monfort, New York.-Oth January, 1838. 6d. A galvanic battery, a storage battery, or other source of electricity is provided, and the conducting wires connected with contact points in the cartridge chamber of the firm-arm. There is a break in one wire, and a button is provided so as to close the circuit and dis-charge the fire-arm. Another means is also provided for opening and closing the circuit, and is set with the circuit open under ordinary circumstances, so as to

prevent accidental discharge. The cartridge has tw^o conducting wires leading into the powder charge, and connected by a platinum wire.

connected by a platinum wire. 128. SIGNALLING APPARATUS FOR RAILWAYS, R. Chidley, Wood Green.—Oth January, 1883.—(Not proceeded with.) 2d. The object is to signal to drivers and guards of trains both by audible and visible signals, and consists of a lever travelling on a quadrant shaped track, and actuated from the signal box, such lever carrying a system of pivotted levers, the outer one of which is acted upon by an arm extending down from the engine, and causes the inner one to strike a gong mounted on the pivot of the first lever. A disc and a lamp on this pivot turns with the first lever, and so indicates the state of the line when the weather is clear. clear

131. MECHANISM FOR OBTAINING STEP-BY-STEP ROTARY MOTION, &c., C. D. Abel, London.—9th January, 1883.—(A communication from A. Kaiser, Bérlin.)

A toothed wheel gears with a wheel having either a A toothed wheel gears with a wheel having either a single tooth or two or more teeth, whose pitch is a multiple of that of the first wheel. During the time that the second wheel does not gear with the first wheel, a projecting rim on its periphery provided with a gap or gaps corresponding with the position of its tooth or teeth, passes between the teeth of the other wheel, and locks it in position until the tooth again arrives in position for imparting motion thereto. Modifications are described. 132. Gas ENGINES, W. R. Lake, London —9th January

Modifications are described.
Modifications are described.
1322. GAS ENGINES, W. R. Lake, London.-9th January, 1883.-(A communication from H. S. Maxim, Brook-lyn, U.S.)-(Not proceeded with.) 10d.
This relates to the general construction of a gas engine in which the explosion takes place at each revolution. The cylinder compresses air alternately on opposite sides of the piston, that compressed as the piston is impelled forward being caused to pass to the other side of the piston, and assist in expelling the products of combustion through a port controlled by the travel of the piston, and then being compressed again by the outstroke, and the piston again impelled forward. The supply of gas is governed by a roller forced against a cam, which is so acted upon by weights mounted on the fly-wheel so as to move out of contact under excessive speed.
138. GAS COOKING STOVES AND BURNERS FOR BOILING

contact under excessive speed.
133. GAS COOKING STOVES AND BURNERS FOR BOILING or HEATING BY GAS, J. Allen, Crouch Hill. - 9th January, 1883. - (Not proceeded with.) 2d. This relates to means whereby the pot when placed on the stove opens the gas tap of the burner, and the latter is ignited by a small jet kept constantly burn-ing. When the pot is removed a weight or springs turns off the tap, thus preventing waste.
135. Caturnue Lungerson & L. Beachlaimt and the start and the sta

135. CALCINING LIMESTONE, &c., J. Brocklehurst, near Slockport.—10th January, 1883. 6d. The ordinary process of converting limestone into lime consists in driving off the carbonic acid gas by burning the limestone and fuel together in a kiln, and the present invention consists in introducing into the kiln during the burning jets of steam, which act upon the red-hot limestone and greatly assist the driving off of the gas. Instead of steam, water in the form of spray may be injected.

138. Instead of steam, water in the form of spray may be injected.
138. GOVERNORS FOR STEAM ENGINES, &c., J. A. Paxman, Colchester,-10th January, 1883.-(Not proceeded with.) 2d.
This relates to governors on the quick-speed dead-weight principle, and has for its object to render them capable of adjustment whilst in motion, so that the engine may be run and controlled by the governor at any required speed. A spring presses on the weight, and is enclosed in a casing, the cap of which is acted upon by a nut screwing on a rod connected to the top of the governor spindle, so as to be capable of remaining stationary whilst the spindle is running. By arresting the motion of the cap and nut the pressure of the spring may be regulated as desired. To prevent overrunning when the governor stops by accident, the piston of the dash-pot controlling the working of the governor has valves arranged to come infall of the piston, and preventing the fall of the balls.

Dails.
187. CLASPS OR SNAPS FOR BRACELETS, NECKLETS, &c., *T. Burgess, Birmingham.*—10th January, 1883.— —(Not proceeded with.) 2d.
The tongue of the clasp is flat, and has a wide slot near each of the sides running from the back towards the front edge and terminating in a circular cutting. In front of each circle is a short slit, so as to form each side edge into a spring piece, from each of which a knob projects, so as to force them inwards, and release them from notches in the mouthpiece of the fastening.
180. PRODUCTOR OF ADVICE & With Comparison 139. PRODUCTION OF ANILINE, F. Wirth, Germany .-

139. PRODUCTION OF ANILINE, F. Wirth, Germany.— 10th January, 1883.—(A communication from P. Greiff, Germany.)—(Not proceeded suith.) 2d.
The distillates from coal tar are extracted by means of hydrochloric or sulphuric acid, which cause the bases to pass into the aqueous solution. The bases are liberated from the solution and separated by distilla-tion, those of a high-boiling point being collected apart from those of a low-boiling point. The latter contain aniline along with other bases, and to separate the aniline 100 parts of the mixture of bases are dis-solved in 100 to 150 parts crude concentrated hydro-chloric acid, and allowed to stand, whereby crystals of aniline hydrochloride are formed, and can be separated by suitable means.
140. CONSTRUCTION OF BOILERS. M. H. Smith. Halifac.

140. CONSTRUCTION OF BOILERS. M. H. Smith. Halifax -10th January, 1883. (Not proceeded with.) 2d. The fire-box crown of vertical high-pressure bollers is inclined, and provided with fire tubes passing through a waterway, and leading to a combustion chamber, whence they pass by other fire tubes through the body of the boiler to the smoke-box. Modifications are described.

are described. 141. WOOLLEN FABRICS, &c., B. Josephy, Leeds.-10th January, 1883.-(Not proceeded with.) 2d. This relates to the use of a worsted warp instead of a cotton or woollen warp in the manufacture of "presidents," "president mays," "president twills," "beavers," and "meltons," whereby a finer, stronger, and more durable fabric is obtained.

and more durable horie is obtained. 144. APPARATUS FOR WASHING CLAY, &c., L. A. Groth, London.—10th January, 1883.—(A communication from L. Ramberg, Sweden.) 6d. The object is to wash clay and other similar sub-stances more thoroughly, and at about one-fifth of the usual cost. A conical drum is mounted on and revolves with a shaft, and in it is fixed a spiral frame revolves with a shaft, and in it is fixed a spiral fram carrying knives. The clay is fed in at the large end and passes to the small end, being acted upon durin its passage by a stream of water, the washed mas falling through a circular grating fixed to the end of the drum, while the stones and gravel pass out at the

146. WHEELS AND PULLEYS, R. R. Gubbins, New Cross. -10th January, 1883. 6d.

146. WHELLS AND PULLEYS, R. R. Gubbins, New Cross. —10th January, 1883. 6d. This consists in making wheels and pulleys with a cast malleable iron boss with radiating projections to receive tubular spokes, the outer ends of which are fastened to the periphery of the wheel by malleable cast lugs or feet, projections on which enter the spoke ends, and which have holes in them for bolting them to the rim. When necessary to split the wheel the hub is made in two parts and provided with inter-locking divided rings which screw upon the ends of the hub.

145. BREECH-LOADING SMALL-ARMS, J. F. Swinburn, Birmingham.—10th January, 1883. 6d. This relates to drop-down small-arms, and it consists in giving the long arm of the top lever fastening for securing the barrels at its junction with the short arm, a breadth equal to that of the tang at its junction with the break-off, and making the short arm taper from

its junction with the long arm so as to give it a broad or tongue-like figure, the lever thus constructed being centred at the edge of its broadest part, so that on the motion of the lever the broad short arm partakes of the cross motion of the ordinary lever combined with the longitudinal motion of the ordinary sliding bolt operated by a top lever. The short arm works under a strap on the break-off, and which supports it at the barrels are fixed, thus giving greater security and rigidity to the connected parts.

147. Woven FABRICS, J. Crabtree, Heckmondwike.— 10th January, 1883. 2d. This consists in the production of a double-faced fabric by arranging the healds and pegging apparatus so that the same thread of weft will appear on both sides. Only one warp beam is used, the warp being separated by the healds.

148. Woves FABRICS, J. Crabtree, Heckmondwike.— 10th January, 1883.—(Not proceeded with.) 2d. This consists in producing a spotted design by means of the weft upon a single fabric, by depressing the warp threads by any suitable arrangement of pegging mechanism which will operate the warp thread so that the weft will produce spots on the face of a single fabric.

149 MACHINERY FOR THE MANUFACTURE OF SCREW 149 MACHINERY FOR THE MANUFACTURE OF SCREW BOLTS, RIVETS, SPIKES, &C. W. Barvell and T. Johnstone, Birmingham.-10th January, 1883. 6d. This relates to machinery for heading heated blanks for the manufacture of screws, bolts, and other headed articles. The blank is placed in a holder on a sliding saddle, which then moves under a main slide when the latter is ascending, and which in descending causes a heading die at the bottom to enclose the upper heated end of the blank. A heading tool carried by the middle sliding bar or plunger now descends in the heading tool to compress the blank end in the heading die and so form the head. When the main slide scends it takes with it the plunger and bolt, and the plunger being stopped at a certain height, the con-tinued ascending motion of the slide ejects the bolt. 151. HARVESTING MACHINES, W. P. Thompson, Liver-

tinued ascending motion of the slide ejects the bolt. 151. HARVESTING MACHINES, W. P. Thompson, Liver-pool.—Olth January, 1885.—(A communication from H. McCormick, Chicago, U.S.) 8d. This relates to "one wheel" harvesters, that is having at the stubble end a main or driving wheel, and at the outer end a grain wheel or caster with a platform supported between the two and a sweep or other rake to clear the gravels therefrom. It consists in improved means for raising and lowering the plat-form, for tipping it upon its supporting wheels, to change the angle of the knives to the standing grain or to plok up lodged grain, and various other improve-ments. There are thirty-four claims in the specifica-tion. tion

152. HYDRAULIC AND OTHER CEMENTS, MORTAR, ARTI

102. HYDRAULIC AND OTHER CEMENTS, MORTAR, ARTI-FICIAL STONE, &C., W. P. Thompson, Liverpool... 10th January, 1883. -(4 communication from M. M. R. Bosse and Dr. P. S. Freise, Germany.) 4d. This consists in producing cement by combining "puzzolane" with slaked lime after having ground and sifted both, and then carefully mixing them. The word" puzzolane "is employed to indicate such matters as contain silicious compounds, which have been rendered soluble in alkalies by previous artificial or natural burning or calcining.

natural burning or calcining.
158. SEFARATING VOLATILE FROM NON-VOLATILE SCE-STANCES, &c., W. P. Thompson, Liverpool.-10th January, 1883.-(A communication from J. A. Mathieu, Detroit, U.S.) 6d.
The substance to be treated is first admitted to a kettle through a perforated pipe, so as to enter in fine streams, and is boiled by a steam coil. A vacuum is maintained in the kettle, and carries off a large part of the water in the form of steam. When sufficiently concentrated, the mixture is passed to a tank, also heated by a steam coil, and which contains a pipe in which a vacuum is maintained, the pressure of air in the tank forcing the mixture into such pipe through small holes, so that the sudden decrease of pressure due to the vacuum in the pipe will cause the volatile elements to pass off as vapour, while the non-volatile substance remains in the vessel.
154. CARS, OMNEUSES, &c., S. Andreves, Cardiff.-10th

154. CARS, OMNIBUSES, &c., S. Andrews, Cardif. -10th

January, 1883. 6d. The principal object is to enable omnibuses to run The principal object is to enable omnibuses to run with greater case, safety, and comfort by increasing the size of the front wheels, and lowering the centre of gravity, the wheels being arranged to project up through the under carriage and frame, and into the body of the vehicle under the seats. Six or more wheels, arranged in two or more gauges, are prefer-ably employed. If the gauge of the wheels is narrow, the axles are extended and fitted with outside springs.

155. PEN FOR FOUNTAIN PENHOLDERS, G. S. Rayson, Balham.-10th January, 1883. 6d. Balham.—10th January, 1858. 6d. This consists in providing the pen with an ink retainer enclosing the concavity beneath the ribs so as to conduct the ink from the holder to nib, and permit the flow of ink in writing, but prevent its escape at other times. other times.

157. RECOVERING AMMONIA FROM GASES OF VARIOUS

107. RECOVERING AMMONIA FROM GASES OF VARIOUS KINDS, F. Wirth, Germany.—10th January, 1883.— (A communication from F. Philipp, Switzerland.)— (Not proceeded with.) 2d. This relates to the recovery of ammonia from various gases by a heated solution of acid (preferably sul-phuric), which is presented to them in the form of spray, and also to apparatus for effecting such opera-tion.

tion.
158. CUTTING OF SAWING MARELE, GRANITE, &c., E. Educards, London.—10th January, 1883.—(A com-munication from A. Jeansaume, Paris.)—(Not pro-ceded with.) 2d.
The stone is placed on a table, above which is an arm with a pulley, over which a steel band passes, and is acted upon by a roughened steel wheel so as to make notches in its edge, to which emery or sand and water are supplied, so that when the band is caused to travel and brought in contact with the stone, it rapidly cuts through the same.
159. Situa Bucks, H. Dumachie, Glascon.—11th

159. Sinca Bricks, H. Dunnachie, Glasgow.-11th January, 1883. 4d. This consists in making bricks of a naturally plastic fre-clay (which can be obtained at Glenboig and other places) mixed with silica or pulverised sand, or sili-clous material in any convenient way.

clous material in any convenient way.
180. LOOMS FOR WEATING, G. A. Shiers and A. Wright, Oldham.—11th January, 1883. 6d.
This relates to the "tappet motion" which actuates the healds for effecting the shedding of the warp threads, and more especially to oscillating tappets, the objects being to give greater facility for setting the "peg wheel" earlier or later as may be required, and to give more room for passing round the back of the loom. It consists in mounting the oscillating tappets at the side of the loom and actuating them from a crank pin mounted on a spur wheel in gear with a similar wheel on the end of the crank shaft. By this means the "peg wheel" can be set without interfering with the rocking action of the tappets.
161. CHIMPING OR CORFIGATING AND CLOSING METALLIC

with the rocking action of the tappets. 161. CRIMPING OR CORRUGATING AND CLOSING METALLIC CARTENDE CASES, H. A. A. Thorn, London.-11th January, 1883. 6d. This relates to apparatus for effecting the crimping or corrugating and closing of the corrugated ends of cartridge cases in one operation. A cylinder, with the usual bevelled inclined studs near the bottom beyond the studs, is of a hollow conical form. A mandril or plunger of small diameter has its end tapered, and an adjusting screw at the bottom of the cylinder regu-lates the backward play of the mandril so as to adjust it to the various charges in the cases. The conical part of the cylinder closes the ends of the case over the end of the plunger when the case is pressed in, the studs corrugating the ends in the usual way.

SEPT. 14, 1883.

162. INDICATING THE PRESENCE OR ABSENCE OF WATER

162. INDICATING THE PRESENCE OR ABSENCE OF WATER IN CISTERNO OR OTHER VESSELS 4N CONNECTION WITH BATHS, &C., J. Show and F. Milan, near Huidersfield.—11th January, 1883. 6d.
A tube is supplied with mercury from an outer tube at the bottom, on the surface of the mercury in which the water pressure acts. The first tube terminates at top in a cup, so that when the pressure is excessive the mercury is forced into the cup, and the water following it up the tube escapes through a pipe which may lead to the fire heating the boiler. Indicating tablets are arranged to show the level the mercury should stand at in the first tube, when the cistern or boiler is full and when it is empty, and may be adjusted to suit the vessel to which it is applied. The mercury entering the cup at the top of the tube may complete an electric circuit and sound an alarm..
163. VARNISHING, GUMMING, AND SIZING PAPER, &c.,

COMPLETE an electric circuit and sound an alarm. 163. VARNISHING, GUMMING, AND SIZING PARER, &c., G. Newsum, Leeds, and W. H. Ibbetson, Bradford,— 11th January, 1883.—(Not proceeded with.) 2d. The paper is placed on a table and fed into grippers fixed on a rotating cylinder, which brings it in contact with a roller driven at the same surface speed, and in contact with another roller driven at a different speed and revolving in a trough containing varnish, gun, or size. The latter roller has also a lateral movement imparted to it by a cam. 164. BRAKE APPARENTIES FOR PERAMETICATORS for C.

164. BRAKE APPARATUS FOR PERAMBULATORS, &c., C. Coleman, Oxford street.—11th January, 1883.—(Not proceeded with.) 2d.
 This relates to the application of a spring bolt to the wheel axle, so as to lock the same when the bolt is shot, the bolt being actuated by a cord or strap attached to the handle of the perambulator.
 165. Kynappio articles and a strain a str

165. KNEADING AND AIRING DOUGH FOR BAKING, Dathis, Paris.—11th January, 1888.— (Not proceed with.) 2d.

with.) 2d. The dough is drawn out between bars or teeth arranged on two parallel discs turning in opposite directions. To introduce the dough between the discs, one of them is caused to turn back. Plates are pro-vided to remove the whole product.

vided to remove the whole product.
166. MOVABLE OVEN FOR COOKING AND BAKING, L. Dathis, Paris.—11th January, 1883.—(Not proceeded with.) 2d.
A metallic base plate is placed over a fire and supports a hood lined with a bad conductor of heat and containing trays supported on racks, and made hollow to direct the heat equally upon the articles to be cooked, which are placed in or near the focus or foci of radiating surfaces forming the inside of the hood.
167 MUNUNCS PURPERSE AL Baddan Kensington

radiating surfaces forming the inside of the hood. 167. MIDDINOS PURIFIES, H. J. Haddan, Kensington. —11th January, 1883.—(d communication from J. D. Hurst, Oregon, U.S.) 6d. This consists in the combination of a vibrating frame containing a series of screens arranged in suc-cessive order with the front end of one below the rear-end of the preceding one, with stationary perforated pipes under the screens, and made tapering towards their rear ends, and through which fans force air. Reciprocating rubbers keep the screens clean. The hypes are in communication with an air chamber having valved openings and dead air spaces or pockets for collecting heavy impurities carried off by the blast. 168. Tools for SHARING, PURCHING, AND CLAMPING.

for collecting heavy impurities carried off by the blast. 168. TOOLS FOR SHEARING, PUNCHING, AND CLAMPING, *T. Perkins, Hitchin, and S. Gilbert, jun., Wansford. Northampton.*—11th January, 1883. 6d. To shear metal by manual labour a tool is employed consisting of a frame supporting a fixed blade, and having a movable blade mounted on a pivot, and acted upon by a spring to separate the blades, while a lever with an excentric boss acts upon the movable blade so as to force the blades together. The punch is arranged below the shears, and the punching tool is carried by a lever acted upon by a spring to draw it upwards, and by an excentric boss on a hand lever to depress it. Two forms of clamping tools actuated by a lever with an excentric boss are also described. 169. PAVEMENT, W. Berry and P. Stuart, Edinburgh.—

160. PAVEMENT, W. Berry and P. Stuart, Edinburgh,— 11th January, 1883.—(Not proceeded with.) 2d. The object is to construct paving blocks of concrete or artificial stone with channels under the wearing surface to receive telegraph, telephone, or other wires, and consists in moulding such blocks with the desired channels.

channels. 171. INCUBATORS, &C., W. Muir, Renfrew, N.B.—11th January, 1883.—(Not proceeded with.) 4d. This relates to means for heating, regulating, and ventilating incubators, so as to maintain a uniform temperature, and it consists principally in causing the heat of water placed in a tank and heated by a lamp to act upon a column of mercury, and so open or close a damper in a ventilating tube passing through the incubator.

Incubator.
172. CUTTING OR REAPING SUGAR CANE, &c., J. Burns, R. Barr, and A. D. Hunter, London.—11th January, 1883.—(Not proceeded with.) 2d.
One or more pairs of circular disc knives or saws are caused to revolve at a high speed in opposite directions, and are mounted in a carriage to be pushed or drawn by animal, manual, steam or other power. A clutch is arranged for throwing the discs in and out of gear, and guards are arranged to throw the cane cut clear of the machine.
172. Hyperpublic discussion of the machine.

clear of the machine. 173. HYGIENIC FILLOWS AND BEDDING, H. T. Baeschlin, France. – 11th January, 1883. 6d. This consists in forming pillows and bedding of a combination of pervious material, such as hygroscopic cotton lint, with less pervious carded fibrous material placed beneath it, and resting on an impervious mate-rial consisting of double paper or fabric made imper-vious to liquid, or india-rubber or other naturally impervious material. The whole is enclosed in a cover of one or more layers of hygroscopic fabric, impreg-nated or not with antiseptic materials. The upper-surface will readily absorb any liquid, and the imper-vious layer will prevent the same passing through to the underside.

 CANDLE-MOULDING MACHINES AND CANDLES, H. A. Biertumpfel, Regent's Park.—11th January, 1883.
 8d. 174.

174. CANDERSOUTENES AND TRAINES AND CARARY, 1883. 8d. This relates to machines for making candles with self-fitting ends, and consists in making the "cone" of the moulds in two parts hinged together and fitted with a spring at the joint, so as to readily deliver itself from the newly-made candle. To facilitate the inser-tion of the cones in the mould, the "clamps" are sup-ported by rods passing to the piston or driving plates, through holes in which they pass, so that the candle tubes may be raised and lowered without interfering with the clamps, but by drawing a plate across the holes the rods will be raised with the plate and the clamps lifted so as to to insert the cones. To reduce the amount of candle material known as scrapings, the bulk of the space in the trays is reduced by inserting a mid-feather, and also a piece at each side. The bridge end of the tray is made solid in the casting. The rows of moulds are brought close together in the trays by employing a clamp in one piece with a shifting edge at bottom to hold the candles in position. The pistons are arranged so as to take out, and the "cover plate" can take off without unsoldering the flanges of the pistons. The invention also relates to means for saving water for heating and cooling the moulds and candle material, and various other improvements.

and candle material, and various other improvements. 175. KNITTING MACHINERY FOR THE PRODUCTION OF COLOMED FAREICS, F. J. Dretory, Burton-on-Trent (executor of W. Morgan-Brown, London.) - 11th January, 1883.-(A communication from H. Martini, Germany.) 10d. A thread is laid over a number of needles and under another number of needles of the row, thus forming loops only on the first needles and hanging on the others behind the old loops stretched out on the back of the fabric. The needles which can be moved separately are lodged in groove of two plates, one connected to a knocking over bar, and can be displaced with it. The needles are provided with two butts, and they are all pushed simultaneously to-and-fro through the needle bars. The frame holds the needles in guides, and when

advanced the thread is laid over them and formed into loops by sinkers. If a broken row of loops is to be worked the first mentioned needles, which are not to form loops, are automatically drawn back. The needle plate is provided with thin plates behind these needles in each groove, receiving one of the needle butts in a notch and connected with levers arranged in two rows, every one carrying a horizontal rod at top placed before a jacquard prism with cards pushed to the left towards the rods by levers and excentric on the driving shaft.

a jacquard prism with cards pushed to the left towards the rods by levers and excentific on the driving shaft.
176. APPARATUS FOR LUBRICATING STEAM CYLINDERS, &c., W. P. Thompson, Liverpool.—11th January, 1883.—(A communication from C. H. Parshall, Detroit, U.S.) 6d.
The body of the oil reservoir is connected by a stem to the steam chest, and a pipe connects the steam port between the steam chest and cylinder with a cylinder formed in the body, and containing a plunger with a larger head at top than its stem below. The plunger is forced down by steam pressure against the action of a spring surrounding the stem. A regulating valve adjustable from the outside of the oil reservoir governs the flow of liquid into the plunger with the plunger, and the latter when forced down by steam pressure lifts a valve opening upwards into the passage in the stem connecting the reservoir with the steam chest, and so causes a quantity of oil to pass the valve closes under the plunger rises, and the valve closes under the plunger rises, and the valve closes under the pressure of steam in the steam chest.
177. SEWING MACHINES, E. W. Lee, Leiceter.—11th

177. SEWING MACHINES, E. W. Lee, Leicester.--11th January, 1883.-(Not proceeded with.) 2d. The object is to remove the raw edges of the fabric when sown by means of a revolving circular blade working against a fixed blade, both attached to the sewing machine.

178. MACHINES FOR HOEING BETWEEN ROWS OF PLANTS, E. Edwards, London. — 11th January, 1883.—(A communication from L. Viet, Paris.) 6d. This relates to hoeing machines, the wheels of which, and also the implements, can be adjusted to suit the distance between the rows of plants.

distance between the rows of plants.
180. INCANDESCENT ELECTRIC LANES, T. E. Gatehouse, Cambervell, and H. Alabaster, South Croydon.—11th January, 1883. 6d.
This relates to the construction of carbon filaments for incandescent lanens, with metallic terminal leads, without mechanical joint. Upon the ends of the fila-ment copper is electrolytically deposited, and over the copper a layer of platinum is deposited, and over the metallic ends sealed in the neck of the globe, so that they project through it.
181 APPLIANCE END EUTERCLUX CONTINUES

they project through it.
181. APPLIANCES FOR ELECTRICALLY CONTROLLING AND REGULATING THE SPEED OF ENGINES EM-PLOYED FOR DRIVING DYNAMO-ELECTRIC MACHINES, J. Richardson, Lincoln.—11th January, 1883. 6d.
This consists in the combination with an ordinary speed governor of an electro-motor connected with the throttle valve, so that when the governor slide rises an electric circuit is completed, and the motor being started will operate the throttle valve.

Statical will operate the throttle valve.
182. COVERINGS FOR PREVENTING THE RADIATION OR TRANSMISSION OF HEAT, C. Toope, Stepney.--11th January, 1883. 6d.
This consists in the manufacture of non-conducting coverings for pipes of silicate cotton or fibrous asbestos and sheet asbestos, coiled up together to form alternate layers, with internal and external layers of sheet asbestos.

layers, with internal and external layers of sheet asbestos.
183. ELECTRIC ARC LAMPS, J. G. Lorrain, Westminster. —11th January, 1883. 8d.
One form of lamp consists in providing a solenoid of witable resistance with rollers, so that it can move between two guide rods, the solenoid being placed as a shunt between the terminals of the lamp. Through the centre pass two cores of soft iron, placed end to end, and having between their ends a spring tending to separate them. The lower core is hollow, and the upper carbon holder attached to the upper carbon holder attached to the guide rods, and consists of two bars, each supports dy a link attached to the bottom of the solenoid, and the inner end of each pivotted to the lower core, while their outer ends carry brake shoes. When the current passes through the solenoid, the lower core is drawn upwards, releasing the pressure of the brakes on the guide rods, and allowing the solenoid to slide down until the carbons is diverted from the solenoid, and the upper core to be lifted, whereby the are is struck.

185. HARNESS SADDLES FOR FACILITATING THE RE-133. HARNESS SADDLES FOR FACILITATING THE RE-LEASE OF FALLEN HORSES FROM THEIR HARNESS, G. Oraddock, London.—12th January, 1883. Got The tugs and crupper are connected to the saddle by means of a screw pin, taking into a socket in a metal trough, fixed on top and across the centre of the saddle-tree, so that by removing the pin the tugs and crupper are immediately released.

186. PREVENTING THE ENTRY OF WATER INTO THE AIR

AND WATER-TIGHT COMPARTMENTS OF WATER INTO THE AIR AND WATER-TIGHT COMPARTMENTS OF SHIPS, &c., A. H. Williams, Peckham.—12th January, 1883.— (Not proceeded with.) 2d. This consists in filling such compartments with a imber of small light hermetically closed cases, so at if the compartments are fractured water will be evented from entering the same. SUVALVES AND VALVE GEAR FOR MOTIVE POWER SUVALVES AND VALVE GEAR FOR MOTIVE POWER

the compartments are fractured water will be prevented from entering the same.
188. VALVES AND VALVE GEAR FOR MOTIVE POWER ENGINES, &C., J. Aimers and J. Tinline, Selkirk.— 12th January, 1883. 6d.
As applied to steam engines the steam inlet and exhaust ports are formed to suit a rotating valve of disc shape fitted on a spindle in line with the centre of the exhaust port. A single admission port is cut formed by a segmental recess communicating with a central circular recess opposite the exhaust port of the cylinder face. The valve is rotated from the governor spindle, and inlet and exhaust ports pass alternately over each inlet port, whilst the central circular recess of a disc with two segmental ports of a disc with two segmental ports opposite the lastributing valve, and consists of a disc with a lever. The disc is carried by a hollow shaft surrounding the distributing valve spindle, and is fitted with a lever connected to a spindle, and is fitted with a lever is kept in a normal position in which the steam ports by cams on the distributing valve spindle.
189. SHEAVES FOR FULLEY BLOCKS, W. Alexander, Govern, W.B.-212h January, 1883.

189. SHEAVES FOR PULLEY BLOCKS, W. Alexander, Govan, N.B.-12th January, 1883. 4d. This relates to the manufacture of sheaves with a metal frame having a groove on its periphery to receive sections of hard wood secured therein by suitable bolt or rivets, and which form the rim of the sheaves. 190. STEAM BOILERS AND LIKE FURNACES, J. Williams,

190. STEAM BOILERS AND LIKE FURNACES, J. Williams, Cardiff.-12th January, 1883. 6d. The object is to secure more perfect combustion of the fuel and diminish the formation of smoke, and it consists in attaching a hollow perforated chamber to the dead plate, and resting the front ends of the grate bars thereon, the chamber being connected to pipes through which currents of air are induced by steam jets. A corresponding perforated chamber is placed behind the bridge in the combustion chamber, and air forced therein by a similar arrangement of pipes. 101. SUFFYE LINKS, SOLITAIRES, STUDS, BUTTONS, AND

forced therein by a similar arrangement of pipes.
191. SLEEVE LINKS, SOLITAIRES, STUDS, BOTTONS, AND OTHER DRESS FASTENERS, W. J. Jordan, Canonbury, —12th January, 1883.—(Not proceeded witk.) 2d.
A metal slide is placed inside the link, one end being attached to its side and the other a certain distance beyond the centre. A loop is attached transversely to the connecting link, and runs on the slide. A spring keeps the loop in the centre of the link.

198. CENTRIFUGAL MACHINES FOR SEPARATING SUBSTANCES, &C., J. E. Meyer, Copenhagen.—12th January, 1883. 6d.
A drum is connected to its spindle at top and bottom, and apertures are formed at top for access to the interior, and are closed by doors secured by a cross bar. The drum is equally divided by two or more vertical radial partitions extending from the bottom to the cover, and each having on its edge next the spindle a deep groove extending from the bottom the the cover, and terminating in a lip turned outwards to throw any liquid leaving it into a fixed receiver surrounding the lip. At bottom the groove is deepened until the bottom of each reaches to the outer wall of the drum, and at the extreme end of the deepened part holes are pierced through the side walls. On the drum bottom are several vertical projections extending up some distance, and preferably of U section, the channel extending through the bottom of the drum, so that liquid leaving by them will pass to a fixed receiver below.
194. MANUFACTURE OF BOOTS AND SHOES, E. Quick, Bristol., -12th January. 1883. - (Not presended with the side with the statement of the drum so that liquid leaving the maximum site of the drum is the statement of the drum will pass to a fixed receiver below.

194. MANUFACTURE OF BOOTS AND SHOES, E. Quick, Bristol.-12th January, 1883.-(Not proceeded with.) 2d.

2d. The object is to render button and lace holes less liable to be burst away by the strain of the buttons and laces, and consists in securing a string or cord round the edge of such holes.

round the edge of such holes.
195. PROCESS FOR THE IMPROVEMENT OF TOBACCO, W. B. Gedge, London.—12th January, 1883.—(A commu-mication from F. C. Glaser, Berlin.) 4d.
The object is to improve tobacco by removing there-from, without injury to the aroma, the fatty, waxy, and resinous substances contained therein, and it con-sists essentially in the employment of volatile sub-stances that are solvents of the fatty and other matters, the extract being treated with alkaline re-acting fluids to separate the substances containing the wax and fat, and the remainder poured back over the tobacco.

tobacco. 1986. GRINDING, BREAKING, OR PULVERISING STONES, *dc., S. Mason, Leicester.*—12th January, 1883.—(Not proceeded with.) 2d A cylindrical jaw is supported on a frame, and within it upon an approximately vertical shaft is a crushing head tapering towards its upper end and of circular section. The shaft is suitably supported and is caused to revolve, the lower bearing revolving with it, and being arranged so as to give an excentric motion to this end of the shaft.

198. ETCHING ON ROLLERS, C. J. Appleton, Salford, and D. Appleton, Manchester.—12th January, 1883. 2d.

2d.
2d.
The etching is effected by the aid of electric or magnetic currents, and it consists in making the roller the anode of a battery, the current passing from it to the cathode. The roller is preferably caused to revolve or oscillate during the process. By these means the parts of the roller unprotected by a coat of protecting varnish will be acted upon by the current, and the required design etched upon the roller.
199. WORKBASKETS, &c., J. Johnson and E. Renaudin, London. -12th January, 1883. -(Not proceeded with.) 2d.

This consists in combining with cane, wicker, straw

and cotton or hemp string, cord or string made of exotic hemp, as aloe, alpha Mexico, and manilla hemps, China grass, and other plants of the same family, which are made into string or cord and dyed, and have the appearance of silk. 200. MANUFACTURE OF STEEL, R. Hadfield, Shefjield.— 12th Lawaren 1883 Ad

12th January, 1883. 4d. This consists in the method of treating iron or metal This consists in the method of treating iron or metal either wholly or to a great extent decarbonised, or steel while in course of manufacture by introducing therein a sufficient proportion of rich forro-manganese to pro-duce in such decarbonised iron or metal or steel a per-centage of manganese varying between 7 per cent. to 20 per cent. according to requirements, whereby the processes of tempering, rolling, forging, and hardening are dispensed with, and a steel obtained of higher quality, greater commercial value and at less cost than hitherto.

dualty, greater commercial value and at less cost than hitherto.
201. COMPOUND STEAM ENGINES, J. R. Wells, New York.-13th January, 1883. 6d.
A high-pressure and low-pressure cylinder are placed in line with each other, and have a stuffing-box between them, the steam being conducted through the high-pressure cylinder, and then through a jacket surrounding the latter to the low-pressure cylinder. The piston smove in opposite directions, the high-pressure piston descending, and the low-pressure piston descending, and the low-pressure piston faign until they are close together. The high-pressure piston has one rod passing through stuffing-boxes in the low-pressure cylinder below, and in its piston, and is connected by a crosshead and rod to a single crank. The low-pressure piston has two rods, each connected by an independent crosshead and rod to a separate crank on either side of the former single crank, which is diametrically opposite the other two. Piston valves are used for distributing and exhausting the steam, and they are arranged so as to be worked by a single lever.
202. FORMING THE HEADS OF BALTS, RIVETS, SPIKES,

a single lever. 202. FORMING THE HEADS OF BOLTS, RIVETS, SPIKES, &c., J. Bilsland, Glasgow.—13th January, 1883.— (Not proceeded with.) 2d. This relates to dies for forming the heads of bolts, &c., the object being to form the heads more accurately concentric with the stem, and consists in forming the lower die with its upper and outer part tapering, and the upper die with a recess in its under side to fit over the tapering part of the former, the "snap" or cup being formed in the upper part of the recess. 2028. IRON HAND-BAIL STANCHIONS. W. Rockbiff. Sum-

203. IRON HAND-RAIL STANCHIONS, W. Rockliffe, Sun-derland.—13th January, 1883. 2d. 203. 1808 HAND-RATE STANDINGS, W. AUCHLYC, Sum-derland.—13th January, 1883. 2d. This consists in taking iron direct from the furnace to rolls constructed with grooves in the proper posi-tions to form the bulbs on the stanchion, and of the proper shapes to roll the stanchion to the required taper, the circumference of each roll being the length of a stanchion.

of a stanchion. 5. Posts for Supporting Wires for Telegraphic and other Electrical Purposes and Electric Lamps, C. E. J. May, Charlton.-18th January, 1883. 4d. 205. Posts for

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side and secures the two lengths securely together.
206. LOCOMOTIVE ENGINES, R. F. Fairlie, Westminster.
—Bith January, 1883.—(Not proceeded with.) 2d.
This relates to locomotives of the Fairlie type, and consists, instead of carrying the steam pipe through the smoke-box, of carrying the through the boiler into the bogic centre, and thence to the cylinders, the object being to prevent condensation of steam and reduce the cost of steam pipes. The tender wheels of sungle boiler Fairlie engines are driven by steam conducted to cylinders arranged for the purpose, and from which it is exhausted into tanks and condensed. The bogic centre is of greatly enlarged diameter, to steady the engine. Large tubes communicating with the water space extend across the fire-box.
207. DRAWING CORES FROM BOTTLES, F. H. F. Encel

space extend across the fire-box.
207. DRAWING CORES FROM BOTLES, F. H. F. Engel, Hamburg.-18th January, 1883.-(A communication from E. Berlien, Germany.) 6d.
A strip or band of linen or other suitable material is placed over the mouth of the bottle and driven in under the cork, the ends being then secured to the sides of the bottle in any suitable way. To withdraw the cork, the ends of the linen strip are released, and the two pulled upwards, while the bottle is held firmly. The part of the strip inside the bottle is pro-tected from the action of the liquid by a coating of wax.

208. COLOUR BOXES, T. Foxall, London .- 13th Janu This relates to boxes for receiving pans of moist

colour, and it consists in forming such boxes with a strip of metal having turned-up edges with parts cut away, so that the turned-up parts will have a spring action, and firmly secure pans placed between them and one side of the box, by which means no cross strips between the pans are required, and the edges of the adjacent pans may touch.

the adjacent pans may touch. 212. LETTING DOWN CARRIAGE WINDOWS, G. T. Cheet-ham, Bradford.—13th January, 1833. 6d. The object is to enable the opener of the landau carriage, to lower the window at the same instant, and thus prevent the breaking of the glass and the trouble of putting the window down when the person inside desires to get out, and it consists in a suitable arrangement of levers connected with the French slam lock of the carriage door. 213. SASE AND CAREMENT FASTENINGS. R. A. Shonell.

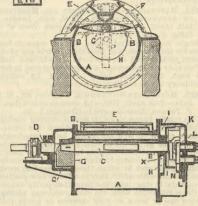
213. SASH AND CASEMENT FASTENINGS, B. A. Showell, jun., and C. Turner, Birmingham.—18th January, 1883. 4d.

1883. 4d. Opon the meeting rail of the lower sash is a short tube, and upon the meeting rail of the top sash is a similar tube, and in the former a spring bolt is fitted so as to be capable of turning therein, and having at its inner end a tooth, which enters a groove in the tube on the other rail, the rear end of which is inclined, so that when the bolt is turned—after the tooth has passed through the latter tube—the tooth is caused to travel up the incline and so pull the meeting rails firmly together, and at the same time securely fasten-ing them. ing them

ing them.
214. Hor-AIR ENGINES, H. H. Lake, London.-18th January, 1883.-(A communication from J. Schreiber and M. Fellner, Vienna.) 6d.
This relates to hot-air engines, designed for driving sewing and other small machines, and it consists partly in providing the cylinder of the engine at a point between the extreme positions occupied by the piston, with means whereby at certain moments during the ascent of the piston air will be admitted to the cylinder and allowed to pass out during its de-scent; and it comprises means for adjusting and fixing the lead of the displacer or plunger with regard to the piston. Other improvements are also described.
216. ROTARY FUMPS AND ENGINES, E. B. Donkun, Ber-

216. ROTARY PUMPS AND ENGINES, E. B. Donkin, Ber-mondscy.-13th Jamuary, 1883. 6d. This relates to rotary pumps and engine, especially applicable for drawing or forcing air. The cylinder A is in transverse section approximatively a cardioid curve. The piston B is oblong, and through its centre passes a crank pin C carried by an axis D, the centre of which coincides with the centre of the stationary circle from which the curve of the cylinder is struck, the radial distance between the centre of axis D and that of the crank pin being somewhat less than the radius of such circle, and the extreme point of the inward bend of the cardioid curve is also cut off so that the piston may have sufficient thickness at the centre. The ends of the piston fit the ends of the casing, and its always fits up to the side thereof. E is the inlet and F the outlet. The crank pin projects from disc G, mounted on shaft D, and fitting a recess in the casing. 216. ROTARY PUMPS AND ENGINES, E. B. Donkin, Ber-mondsey.-13th January, 1883. 6d.

216



The other end of the crank pin passes through disc H, concentric with the crank and free to revolve in a recess at the opposite end of the casing. A tubular neck projects from the piston and also passes through disc H, and carries rods I, with projections at their ends carrying pairs of parallel guide bars K, in the form of a right angled cross, one pair being parallel with the piston. Between each pair is a block L, turning on a pin carried by the casing, the two pins being on opposite sides of and equidistant from the crank pin is an arm X, carrying a pin concentric with the crank axis, and which fits a bearing in the centre of the bar N. 2233. DOUBLE-LOCK UNIVERSAL JOINT FOR COUPLE

223. DOUBLE-LOCK UNIVERSAL JOINT FOR COUPLING PIPES, &C., R. Watkinson, Salford.—15th January, 1883. 6d.

PPES, &c., R. Watkinson, Salford.--15th January, 1883. 6d. This relates to an improvement on patent No. 1823, A.D. 1876, and consists in applying thereto a double-snap lock which cannot accidentally become un-fastened. The two ends of pipe are drawn together by fastenings formed partly by segmental ribs at the end of one pipe, and segmental recesses in a union coupling piece loose on the other pipe. The ribs are wedge shape in front, and press against the projections, drawing up the two parts, between which india-rubber is inserted. Behind the wedge end of the rib is a first lock shoulder which slips over the first projection, making a first lock. It is then further twisted until it comes in contact with a second projection near the centre of the segmental ribs, such projection again coming in contact with a recess cut in the projection, and entering therein forms a double-lock joint. 2322. CARBONATE OF STRONTIA, D. Urgubart, West-

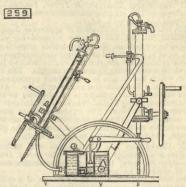
and entering therein forms a double-look joint. 232. CARBONATE OF STRONTIA, D. Urquhart, West-minster. -15th January, 1883. 4d. This relates to the manufacture of carbonate of strontia from sulphate of strontia or celestine. Accord-ing to one method the sulphate is ground to a fine powder and boiled with black ash liquor obtained in the manufacture of carbonate of soda by the Leblanc process, and which contains carbonate of soda, caustic odd, and some sulphide and by it is subplate as soda, and some sulphide, and by it the sulphate of strontia is decomposed and carbonate of strontia and stroutia is decomposed and carbonate of stroutia and caustic stroutia are formed, and sulphate of soda. The precipitated carbonate of stroutia is washed to remove the soda salts and dried. The wash liquors and the first liquor are treated with carbonic acid to recover the caustic stroutia which is in solution, and they are then evaporated down and sulphate of soda obtained from them. By another method the sulphate of stroutia is mixed with black ash and carbonaceous substances and the mixture roasted, and by a third method sulphate or sulphile of stroutia is converted into aluminate and decomposed by carbonic acid or an alkaline carbonate.

265. SEPARATING SOLIDS OF DIFFERENT SPECIFIC GRAVITIES, T. B. Sharp, Smethwick.-16th January, 1883. 6d.

1883. 6d. The apparatus employed consists of a vertical water tube in which an ascending current of water is caused to meet a descending stream of particles to be sepa-rated, the heavier particles descending and being col-lected at the bottom of the tube, while the lighter particles are carried upwards and pass with the over-flow water into a suitable receptacle.

now water into a suitable receptant.
259. AFPARATUS FOR DRILLING OR BORING ROCKS, &c., H. H. Lake, London.—16th January, 1883.—(A com-munication from A. Cantin, Paris.) 10d.
This consists, First, in the mode of mounting the drilling machine upon its frame, so that the direction of the holes drilled is independent of the position of

such frame; Secondly, in operating the drill by hydraulic pressure; and Thirdly, in arranging and constructing the drill so that it segregates the material by cutting and tearing, and so that the material is conducted automatically by the tool out of the hole



bored, such hole being large enough to allow full play to the rear part of the tool in proportion to its advance. The drawing shows the general construction of the workline. machine.

The drawing shows the general construction of the machine. 312. TYPE WRITERS, &c., J. J. Raggett, Aston, near Birmingham.—18th January, 1883. 1s. As applied to a label type writer, the invention consists in fixing the types, which are preferably of indiarubber, in a row or rows on the rim of a cylindrical wheel which rotates on an axis near the end of a lever capable of motion in a vertical plane. The joint on which the lever turns is fixed on a table with a rib on which the lever turns is fixed on a table with a rib on which the lever turns is fixed on a table with a rib on which the lever turns is fixed on a table of traversing in one of a series of parallel grooves in a stationary guide table, the grooves being the distance apart that the lines of writing are required to be written. The types are inked by a pad, which also acts as a shield, or by a roller. The outer face of the pad rests on the paper, and has a slot in it to permit only one letter or type to come in contact with the same. The type wheel has teeth with which engages a stop carried on the end of spring lever, by depressing which the wheel can be turned to the required position, and then by depressing the lever carrying the type wheel the impression is produced. The movable table is then shifted to carry the paper the necessary distance to receive the next letter, and the operation repeated. When the line is finished the movable table is moved to the next groove in the fixed table.

to the next groove in the fixed table. S27. NETTING MACHINERY, J. H. Johnson, London.— 19th January, 1883.—(A communication from Gal-land and Chaunier, Paris.) 10d. The machine is worked with a double jacquard action forming meshes and knots similar and in the same direction as those made by hand with great rapidity. The double jacquard motion employed for the distribution of the motive power is composed of two slide boxes partaking of a reciprocating vertical motion destined to elevate hooks, which are caused by the jacquard action to engage successively with cross bars on the boxes, and which hooks in rising actuate levers which transmit motion to the various parts of the machine. the machine.

levers which transmit motion to the various parts of the machine.
340. COKE OVENS, R. H. Brandon, Paris.-20th January, 1883.-(A communication from E. Franzen, Belgium). 6d.
This relates to vertical coke ovens, and consists, First, in forming a series of small inclined flues round the entire periphery and the entire height of the carbonising chamber for the escape of the gas; Secondly, in arranging a series of vertical combustion that the carbonising chamber and below with a fue, where the flames unite for the purpose of receiving, through a series of small flues in order to impart a uniform heat to the whole carbonising chamber; Thirdly, in arranging round the carbonising chambers, serving to hamber and section of superposed chambers, serving to heat the ast different places, how as a series of superposed chambers, serving to heat the external air by small flues which can be regulated, and with the outer mate of superpose of mixing the flames, and Which allows of passing the wate flames, and which allows of passing the wate flames from one or more ovens through the combustion chambers for an adjacent oven.

oven. S72. BRACES FOR SUPPORTING TROUSERS, &C., F. Hovenden, West Dulwich.—23rd January, 1883. 6d. A long strap starts from the right-hand loop of the junction piece behind, passes under the right arm-pit over the shoulder across the back, under the left arm-pit, and is fastened to the buttons in front under the left breast. The other strap passes similarly under the left arm-pit, over the left shoulder, across the back, under the right arm-pit, and is fastened to the buttons in front under the right breast. The junction piece has tabs which are fastened to the rear buttons as usual. 498. WINDING THEEAD UPON SPOOLS OF BORENAL & B

pice has tabs which are fastened to the rear buttons as usual.
493. WINDING THREAD UPON SPOOLS OR BOBBINS, J. P Kerr and T. Law, Paisley, N.B.-30th January 1883. 6d.
The machine is constructed to operate simultaneously on a number of spools, the winding spindles being horizontal, and there being a winding spindle and a back spindle for each spool, all in the same line. Below the spindle sare two horizontal rods, to one of which the winding spindles are attached, while the back spindles are attached to the other, the two rods having the necessary movements imparted to them by cams at one end. An adjustable connection is introduced between the rod to which the back spindles are attached and the part directly acted on by the cam, so as to allow all the back spindles to be simultaneously and uniformly adjusted for different sizes of spools. The driving clutch on each driving spindle is large enough to take within it the boss on the spool end. To further ensure this the kinding on the boss, and the thread may be cut closer to the spool successively to the winding spindles is also described.
635. SATCHEL FOR CARRYING MUSIC, DRAWING, KC., C. A. MORTIG HERMENDER (1990) 635. SATCHEL FOR CARRYING MUSIC, DRAWINGS, C. A. Morris, Herne Hill.-6th February,

C.4d.A.

This consists in making the satchel of half cylindri-cal form with a flat bottom, so that the music or other papers need not be folded. It may open at the ends or bottom. bottom. 706. COLOURING MATTERS SUITABLE FOR DYEING AND

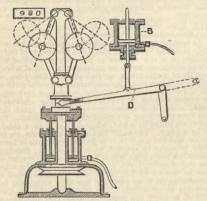
PRINTING, I. Levinstein, Manchester.—9th Feb 1883. 4d.

PRINTING, I. Levinstein, Manchester.—9th February, 1883. 4d. This relates to a new method of producing sulpho acids of beta naphtol, and obtaining red colouring matters by combining these sulpho acids or their salts with certain diazo compounds. 10lb. of dry finely powdered beta naphtol is dissolved in 30lb. of sul-phurio acid of 170 deg. Twaddells, keeping the tempera-ture below 30 deg. Cent. The solution is stirred con-stantly for ten or twelve hours at a temperature of 30 deg. to 35 deg. The sulpho acid of beta naphtol obtained is diluted with 20 gallons of water and lime added to neutralise excess of sulphuric acid and con-vert the sulpho acids of naphtol into their lime salts. The mixture is then heated to boiling, and filtered and concentrated until it does not show a precipitate on further concentration. It is allowed to cool and the

precipitate is separated, when the solution, which is the easier soluble lime salt of the mono-sulpho acid of beta naphtol, is converted into its sodium salt and combined with certain diazo compounds in the well known manner.

known manner.
838. GAs Moror ENGINES, J. Imray, London.—15th February, 1883. - (A communication from J. Schweizer, Paris.)-(Complete.) 4d.
This relates to a modification of apparatus described in patent No. 742, a. D. 1883, for compressing air by successive explosions of a combustible gaseous mix-ture, so as to combine in one apparatus arrangements for compressing the air and the engine worked by it, the whole constituting a gas motor engine. The cylin-der in which the engine is compressed communicates by a check valve with the motor cylinder. At the upper end of the air cylinder is an aperture to admit air and the igniting flame. The motor cylinder is kept on by a water tank. The explosion takes place in the compressing cylinder, and actuates the piston therein, which is connected to a crank shaft.
960. GOVEENORS FOR REGULATING THE SPEED OF

therein, which is connected to a crank shaft. 960. GOVERNORS FOR REGULATING THE SPEED OF STEAM AND OTHER ENGINES, F. M. Rogers, London. -21st February, 1883 -(A communication from J. M. Gorham, Roumania.) 6d. The boiler pressure is used by means of a cylinder piston and rod to operate any convenient part of the ordinary centrifugal governor, with the object of counteracting or assisting the centrifugal force of the



same as the boiler pressure rises or falls. One mode of effecting this is shown in the drawing. The boiler pressure acts on piston B, and the motion of such piston is transmitted to the fork lever D of an ordinary governor. Other arrangements are described to suit different forms of governors.

1245. GOVERNORS, &C., W. Murdoch, Glasgow.-Sih March, 1883. 6d.

124D. GOVERNORS, &c., W. Murdoch, Glasgow.-Sth March, 1883. 6d. The governing movement set in action by change of speed does not act directly on the throttle valve but on a cylinder and piston worked by steam and arranged to apply the power required to shift the valve. In one arrangement a fly-wheel acting by momentum is com-bined with four balls operating by centrifugal action, and these parts are directly connected to the relay cylinder, the valve of which is of hollow cylindrical form divided inside by a longitudinal diametrical partition, and it has both a turning and a longitudinal motion in a cylindrical chamber. Each compartment of the valve has a helical slot in its side, and when the governor acts upon it the valve turns and puts one port in communication with one of the inlet ports and the other with the exhaust port. On the piston moving it moves the valve longitudinally and cuts off the steam. 1877. STANNERS, J. Robson and J. W. Tingle, Shefield.

the steam. 1377. SPANNERS, J. Robson and J. W. Tingle, Shefildd. —15th March, 1883. 6d. This relates to spanners with an adjustable jaw and known as "Clyburn" spanners, and it consists in forming the movable jaw with a projection extending under the cross bar or slide, and the end of which rests and slides against the end of a slot in the solid part of the spanner. The jaw is actuated by a screw with a bearing in the solid part of the spanner, and fitted which a milled wheel to rotate the screw, the outer end of which works through a screw hole tapped in the projection on the movable jaw. 1580. FARTENINGS FOR GLOVES. BOORS, Strops. & dc.

in the projection on the movable jaw. 1580. FASTENINGS FOR GLOVES, BOOTS, SHOES, &c., *E. D. J. Neupert, Germany.*—28th March, 1883.— (Complete.) 4d. A lever with a long slot is mounted on a loop secured to the glove, and has at its outer end a button to enter the hole in the other side of the glove. The slots end in a recess, and when the button has been inserted in the button-hole the lever is turned over and then drawn back until the loop enters the recess at the end of the slot. A modification is shown in which the lever, instead of being slotted, slides in a bush hinged to the loop.

1009.
1063. TREATING MILK FOR PRODUCTION OF BUTTER AND CHEESE, &C., H. J. Allison, London.—3rd April, 1853.—(A communication prom E, R. Powell, Vermont, U.S.)—(Complete) 6d.
This consists in treating milk for the manufacture of butter and cheese by first heating it and then cool-ing the same in vacuo. Suitable apparatus is described for effecting this object.

for effecting this object.
1763. HORSENDE BLANK ROLLS, H. J. Haddan, Kensington...-Tth April 1883...(A communication from S. T. J. Coleman, J. N. Clark, and E. B. Reynolds, Cincinnati, U.S.).-(Complete.) 6d.
This comprises a special construction of rolls wherewith a peculiar horseshoe blank bar can be produced in the most uniform, rapid, and economical manner, said bar being capable of being subsequently cut into sections and then bent, so as to afford two entirely distinct forms of horseshoes.
1910. SCREW-CUTING MACHINES A. M. Clark Lender

tinct forms of horseshoes. 1910. SCREW-CUTING MACHINES, A. M. Clark, London, -14th April, 1883 -(A communication from L. E. Lepins, Paris.)-(Complete.) 6d. This relates to a universal screw-cutting machine tool for cutting right or left-hand screw threads of any desired pitch, and capable of the most minute varia-tion, and the principle of the apparatus consists in making the rate of motion of the slide rest of a lathe depend upon the degree of obliquity in a horizontal plane given to a leading or guiding bar fixed upon a slide, mounted in ways beneath the slide rest in a direction perpendicular to the motion of the slide rest. 1945. APPARATUS FOR USE IN THE MANUACCURE OF

arrection perpendicular to the motion of the sinde rest. 1945. Apparatus for use in the Manufacture of Pithe FABRIOS, W. R. Loke, London.—17th April, 1883.—(A communication from C. Coupland, Seymour, U.S.)—(Complete.) 10d. This relates to the general construction of the appa-

1983. SUBTERRANEAN ELECTRIC CABLES, H. J. Allison London.—19th April, 1883.—(A communication from S. F. Shelbourne, New York.)—(Complete.) 6d. This consists, First, in the use of annular notched

This consists, First, in the use of annular notched templates within the cable to secure uniform distances between the wires; Secondly, in the relative disposi-tion of those templates so that the continuity of the surface area of one template at any given point; and also so turning the templates as to cause the wires of one sories to pass in spirals of opposite direction to the next inner series. The same series in each alter-rate division of a cable are turned in succession from right to left and left to right, so that when two divi-sions are connected the corresponding series are in a relation to reverse the magnetic polarity of the currents in each successive division. The cable is enclosed in a mould and an insulating composition poured round it consisting of parafine, resin, or asphalte, and the product or distillate of the residuum or tar of petroleum.

A metal strip is wound outside the cable in the oppo-site direction to the outer series of wires. which the electricity is to be derived, and it consists

A metal strip is wound outside the cable in the oppo-site direction to the outer series of wires. 2050. GLASS LAMP CHIMNEY, P. A. Bayle, Paris.-23rd April, 1883.-(Complete) 4d. This consists in forming lamp chimneys of a conical convergent divergent form to increase the combustion and the light of the lamp. 2070. ROLLER MILLS, A. J. Boult, London.-24th April, 1883.-(Complete) 4d. This consists, First, in means for ridding the stock of fluff while on its way from the tail of each sieve to the next grinding rolls; and, Secondly, in devices for adjusting the fast rolls to and from the slow rolls. Pipes extend over the adjacent faces of each pair of rolls, and are connected at one end to a fan blower placed over the mill. The other end of each pipe carries a sliding gate to regulate the draft. The face of each pipe is slotted to communicate along its entire length with a hopper having a channel leading from the pipe out over the adjacent faces of a pair of rolls and then down between them, and also has a flange to guide the fluff from the slow rollers have stationary bearings. The arms pass through a cross bar of the frame, and are pivotted upon short shafts that fit round openings in the cross bar. The arms on each side are connected by other arms, rods, and shafts, the latter carrying between jaws in the lower end of the arms an excentric, about which is fitted the eye of a screw bolt, the shank of which screws into a socket in the end of a shaft fitted in a housing in the frame, and surrounded by a spring. By turning this shaft the rolls are adjusted, and the spring allows them to yield when necessary. 2074. BOILER CLEANERS, J. F. Hotchkiss, New Jersey,

2074. BOILER CLEANERS, J. F. Hotchkiss, New Jersey, U.S.-24th April, 1853.-(Complete.) 6d.
The invention consists in carrying the impurities which are raised to the surface of the water by ebulition below that surface, and then upward into a reservoir by an ascending current induced by the displacement of a descending cooler body of water passing from the said reservoir, the impurities being deposited in the reservoir is placed on the boiler, and in the latter a funnel is placed with its bottom edge not higher than low-water level. A tube connects the apex of the funnel with the top of the reservoir, and on the other side of the top of the latter a return pipe leads down below the funnel in the boiler. A blow-off pipe is connected with the bottom of the reservoir. A deflector depends from the top of the reservoir. A lower the cunnet.
2081. UMBRELLAS OR PARASOLS, O. Imray, London.-

2081. UMBRELLAS OR PARASOLS, O. Imray, London.— 24th April, 1883. - (A communication from W. S. Hoke and C. S. Westcott, Philadelphia)-(Complete.) 4d.

4d. This relates to means for holding the runner of an umbrella or parasol in the position on the stick corre-sponding respectively to the closed and opened condi-tions of the umbrella or parasol, without the employ-ment of springs.

ment of springs. 2084. MANUFACTURE OF WIRE ROPE AND MACHINERY OR APPARATUS THEREFOR, H. H. Lake, London.— 24th April, 1883.—(A communication from C. C. Colby, Quebec.) 6d. Single wires are first placed around cores to form cores for the strand or strands, and lastly the strands are laid around a main rope or core to form the rope, the whole being effected by suitable machinery in one continuous operation. 2025. MANUFACTURING CORDAGE WEREING & H. H.

the rope, the whole being effected by suitable machinery in one continuous operation.
2085. MANUFACTURING CORDAGE, WEBBING, &c., H. H. Lake.-24th April, 1883.-(A communication from J. P. Tolman, Masachusetts.)-(Complete.) 6d.
This relates to machines for manufacturing cordage, webbing, or similar fabrics, in which the strands forming a cord or web are united by an interlocking twist, and in which the travellers carrying the strands forming a cord or web are united by an interlocking twist, and in which the travellers carrying the strands forming a cord or web are united by an interlocking twist, and in which the travellers carrying the strands in such guide ring; and the invention partly consists in the combination with the usual revolving platform having one or more circular recesses or guide paths cut in it, of one or more independent switch levers or points adapted to be operated in one direction by the travellers and in the opposite direction by a spring or springs, for the purpose of automatically guiding the travellers alternately into and out of the recesses in the revolving platform. The invention further consists in certain details of construction.
2110. ENDLESS BAND KNIFE MACHINES FOR CUTTING

Bists in certain details of construction.
 2110. ENDLESS BAND KNIFE MACHINES FOR CUTTING FARICS, &c. R. Sanson, Mile End. -26th April, 1883.-(Complete.) 6d.
 This consists in a double-edged band knife with its two edges included to form a succession of long cutting edges inclined at a very acute angle to the centre line of the blade, the successive inclines being connected by short curved or straight edges inclined in the oppo-site direction.

alte direction.
2143. CLINOMETER COMPASS, &c., W. R. Lake, London. -27th April, 1883.-(A communication from E. F. Macgeorge, Victoria.)-(Complete.) 6d.
This relates to a clinometer compass or altazimuth instrument, and to apparatus for reading its indica-tions. Either a combined clinometer and compass is mounted in a bulb on the end of a phial, or the clino-meter is in a bulb at one end of a phial and the com-pass in a bulb at the opposite end, such bulbs being filled with a fluid in which they float. The instrument for reading off the angles of inclination to the horizon or perpendicular, and of magnetic azimuth as indi-cated by the consolidated contents of the phials, con-sists of a frame carrying two microscopes rigidly connected at right angles, and mounted on a tripod frame carrying a graduated arc.
2204. ELECTRIC RAILWAYS, S. Pitt, Sutton.-1st May,

frame carrying a graduated arc. 2204. ELECTRIC RAILWAYS, S. Pitt, Sutton.—1st May, 1883.—(A communication from L. Daft, New Jersey, U.S.)—(Complete) 6d. The object is to enable two engines to be operated simultaneously by electricity from the same conductors. The rails are preferably utilised to convey the current and the engines are provided with armatures of equal resistance, and by operating with low tension currents of great quantity two or more dynamos moving upon the same track may be operated simultaneously. A resistance, and by operating with low tension currents of great quantity two or more dynamos moving upon the same track may be operated simultaneously. A regulator is provided to regulate the quantity of elec-tricity in proportion to the amount needed upon the rails. The dynamo to supply the current is operated by an independent charging machine having a number of independent coils united at one end and discon-nected at the other, where they are connected to wires leading to corresponding springs on the cylinder of the regulator, which consists of a brass cylinder with an annular edge adjacent to an insulating surface. The springs are arranged so that as the cylinder rotates they bear successively against the insulating surface and throw the coils connected therewith successively into circuit. The rotation of the cylinder is effected by a magnet, the axial core of which is in circuit lead-ing to the rails, and is connected by levers with the switch cylinder. As the current varies in this magnet the core is raised or lowered, and the cylinder turned to bring the required number of coils of the charging machine into or throw them out of circuit. The circuits of the charging machine are through the field magnet cores of the dynamo, by a wire to the cylinder of regulator, and thence to the coils of the charging machine.

nine.

MACHINES AND LAMPS CONNECTED THEREWITH, S. Pitt, Sutton. - 1st May, 1883. - (A communication from L. Daft, New Jersey, U.S.) --(Complete.) 6d.
 This relates to the construction of the armature, and to the method of concentrating the magnetic force of the field magnet immediately upon the wires from

which the electricity is to be derived, and it consists essentially of an armature wound with a series of superposed coils, between the layers of which three flat plates of magnetic material are circumferentially placed, in combination with a field magnet, for the purpose of producing a magnetic field by said field magnet, and concentrating the induced magnetism in immediate proximity to the wire of the armature. Various forms of lamps are described for use with the said dynamo. said dynamo.

Various forms of lamps are described for use with the said dynamo.
2218 WARPING, SPOOLING, OR COPPING YARN, W. R. Lake, London. - 1st May, 1883. - (A communication from R. L. Carr, Masacchusetts.) - (Complete.) 6d.
The object is to prevent the waste incident to the warping of mule cop yarn, because of the liability to injury to the cops during the draught of yarn therefrom in a line parallel with the axis of the cop, during the preliminary operation of spooling, and also to beam directly from the cops without intermediate spooling operations. The machine consists in the combination with a beam, suitable driving mechanism and tension devices of cop supporting spindles on which the cops may rotate during the draught of the yarn therefrom in a line at right angles to the axis. The warp yarn is beamed directly from mule cope, but instead of drawing it from them will remain fixed; the yarn is drawn from them in line at right angles to their axis, and the cops are permitted to revolve backwardly during the draught of the yarn thereform on its way to the beam, and therefore, the yarn is beamed without further twisting and also without intermediate spooling. The spindles must be formed so as to slightly bend under the tension of the yarn in order that the cop can change its position sufficiently to make the yarn the revision of the yarn in order that the cop.
2242. CATCHING SOOT FROM SMOKE IN CHIMNEVS, F. C. Glaser. Berlin.--2nd May, 1F83.- (A communi-

snarl, or mat in the cop.
2242. CATCHING SOOT FROM SMOKE IN CHIMNEYS, F. C. Glaser. Berlin.—2nd May, 1883.—(A communi-cation from C A. Petsold, Berlin.)—(Complete.) 4d. Above the chimney two vertical cylindrical tubes of equal diameter are fixed one above the other, the lower end of one reaching down into the chimney. Between the adjacent ends of the tubes a smaller tube is inserted, and to its lower end an inverted cone reach-ing into the lower tube is fixed. Upon the outer sur-face of the small tube a conical shield is fixed with its larger edge upwards, and a space between it and the lower edge of the top tube.
2255. RAULS FOR TRAMWAYS, H. H. Lake, London.—

10 Wer edge of the top tude.
2255. RAILS FOR TRAMWAYS, H. H. Lake, London.— 3rd May, 1883.—(A communication from T. Bladen, New South Wales)—(Complete.) 4d.
Ordinary Trails are formed with projections near the head to receive a rectangular web or arm formed on the guard rail, so that when the two are bolted together a rigid girder will be formed.
0000 Deconcore UNEXPER WURD LIGHT C. D. Abd.

together a rigid girder will be formed.
2290. PRODUCING INTENSE WHITE LIGHT, C. D. Abel, London.-5th May, 1883.-(A communication from C. Clamond, Paris.)-(Complete.) 4d.
This relates to improvements on patents No. 2110, A.D. 1880, and No 2035 and No 2757, A D. 1882, in which light is obtained by the incandescence of a cage formed of threads of magnesia or other suitable refractory material heated by means of air and combustible gas, and the object is to obviate the necessity of supplying the air under pressure and to obtain the same results by simple air draughts, the air being heated by small jets of combustible gas in the lower part of the lamp burner. burner

PLE OF CONDUCTIVE OF LEAST OF CONDUCTIVE STATES OF CONDUCTIVE STATES OF CONSTRUCTIVE STATES OF CONSTRUCTIVE STATES OF CONSTRUCTIVE STATES OF CONSTRUCTIVE STATES, J. H. Johnson, London.—5th Mey, 1883.—(A communication from P. J. Garin-Morey, France.).—(Complete.) 6d.
This consists in constructing supports or bearings with contractile sockets, preferably made in one piece with the frame or support. The sockets have opening formed by cutting away part of the metal at the side, and means are provided for contracting or opening them, such as holts passing through lugs formed on the sides of the opening, whereby the socket can be readily made to grip or release the shaft, rod, or other part inserted therein.
2314. Surs' SIGNALLING APPARATUS. M. D. Porter.

inserted therein. 2314. SHIPA' SIGNALLING APPARATUS, M. D. Porter, Boston, U.S. - 7th May, IFS3. - (Complete.) Sd. The invention is designed to operate in accord with a mariner's compass, and a code for the purpose of emabling a vessel to be informed of the course of an approaching vessel, such code consisting in sounding audible signals at intervals of time, variously repeated according to the number of repetitions required to indicate the particular point of the compass at the time represented by such repetitions. The code is on the dial of the compass and a hand wheel with a pointer moves over the dial, and is connected to suit-able mechanism for automatically sounding the signal the required number of times and at the necessary intervals of time. 2341. VULCANISING AND OTHERWISE TREATING COM-

intervals of time. 2341. VULCANISING AND OTHERWISE TREATING COM-POUNDS OF CAOUTCHOUC, &c., H. H. Lake, London.— 8th May, 1883.—(A communication from A. C. Eddy, Providence, U.S.)—(Complete) 6d. This relates to apparatus for working vulcanisable compounds into articles of great length, by vulcanising the same by dry heat.

2351. REMOVAL AND PREVENTION OF SCALE IN BOILERS, G. Downie, California.-9th May, 1883.-(Complete.)

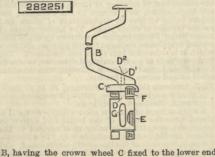
22... This consists essentially in subjecting the interior of boilers to the action of an infusion or decoction of eucalyphus for the purpose of preventing and removing scale scale

Scale.
 2545. DENTISTRY, S. Pitt, Sutton.-22nd May, 1883.
 -(A communication from C. M. Richmond, New York.)-(Complete.) 8d.
 The object is to readily and firmly apply artificial teeth to roots existing in the mouth, and which are prepared to receive them.

SELECTED AMERICAN PATENTS.

From the United States' Patent Office Official Gaztte.

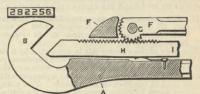
282.251. BORING BRACE, Arro H. Adams, Senta Rosa, Cal.—Filed April 20th, 1853. Claim.—(1) In a boring brace the crank B, having the crown wheel C fixed to the lower end thereof, in com-bination with the hand block D, provided with the upper projections D⁸ D¹, the pinions F, and spindles E, the pinions F being mounted on the shoulders of the block D, substantially as described, and for the purposes set forth. (2) In a boring brace, the crank



B, having the crown where C niced to the lower shut thereof, in combination with the block D, having opening G, said block being provided with projection D³, mounted thereon, and spindle D¹, projecting from projection D³, the pinion F, mounted on the shoulder of block D, and the spindles E, incased in said block, substantially as described, and for the purposes set forth. forth.

SEPT. 14, 1883.

282,256. COMBINED PIPE TONGUES AND WRENCH Eldridge F. Barnes, New Haven, Conn.—Filed January 294b, 1883. Claim.—The combination, with the frame A, having hook B, central vertical core, recesses, and horizontal extension E, a spring secured at one end within the recess, lever F, pivotted at G within the horizontal extension E, and having a semicircular row of teeth



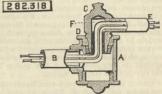
at its upper end, and the separable and reversible bar H, having on one edge a row of teeth, its end I having a a corrugated or roughened surface, and its other end having a place face, of a shape corresponding with the shape of the inner face of the hook B, substanti-ally as and for the purpose set forth.

282,258. BELT FASTENER, Henry Blake, Pepperell, Mass.—Filed May 28th, 1853. Claim.—(1) A belt stud having Theads, and a bar or shank flattened approximately at right angles to said heads, said bar or shank being compressed by swag-ing, substantially as described. (2) A belt stud having



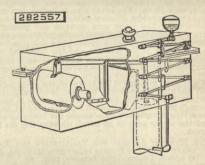
cross-heads, and a bar or shank flattened approxi-mately at right angles to said heads and bent near its ends, so that said heads lie flat upon the belt, sub-stantially as described.

stantially as described. **282**,318. JOINT FOR ELECTRIC LIGHTS, Charles H. Hinds, New York, N.Y.—Filed December 20th, 1882. Claim.—(1) The combination of the tube A and the swivel head C, through which the electrical con-ductors are adapted to pass, with the serve cap D, into which the swivel head is ground, and means for securing the head in the screw cap, substantially as



described. (2) The combination of the tube A. ard the swivel head C, provided with the insulating lining F, through which tube and head the electrical con-ductors are adapted to pass, with the screw cap D, in which the swivel head is arranged, and means for securing the head in the cap, substantially as de-sorted scribed.

school 282,557. REDUCING VALVE, Robert Newton, Provi-dence, R I.—Filed January 2nd, 1883. Cloim.— The combination, in a reducing valve operated by a float sustained by mercury or other fluid, with the chamber containing the float, of



lengths of pipe connected together by swivel-fitting constructed so that the height of the column can be adjusted to balance the desired pressure, as described.

CONTENTS.

states have been able to see the second second			
THE ENGINEER, September 14th, 188	33.	PA	GE
THE DEPRECIATION OF FACTORIES		100	199
THE DEPRECIATION OF FACTORIES THE CHICAGO RAILWAY EXPOSITION. N	0.	V.	
(Illustrated.)			199
THE MARIEMONT AND BASCOUP COLLIERY.	(Illu	18-	
trated,)		!	200
LOCOMOTIVES IN THE SNOW		!	202
RAILWAY MATTERS		!	203
NOTES AND MEMORANDA			203
MISCELLANEA			203
THE NEW PATENT ACT			206
LETTERS TO THE EDITOR-			
THE STABILITY OF SHIPS. (Illustrated)		:	
THE DEFINITION OF FORCE			207
INDICATOR RIGS	**		
RAILWAY EXPLOITS	••		
NALWAT DATIONS FOREIGN COMPETITION SAWDUST PRESSERS WIRE-WORKING MACHINES NOISY GEARING	**	!	
SAWDUST PRESSERS			
WIRE-WORKING MACHINES	••	!	
NOISY GEARING			209
STEAM HAMMER TUPS			209
LEADING ARTICLES-			
THE MARINE DEPARTMENT OF THE BOA	ARD		
TRADE	••		209
THE DEPRECIATION OF FACTORIES A SEISMIC FORECAST COMPOUND LOCOMOTIVES EVOLUTION AN ELECTRICAL PATENT CASE			209
A SEISMIC FORECAST		3	210
COMPOUND LOCOMOTIVES	••		210
EVOLUTION			210
AN ELECTRICAL PATENT CASE			210
LITERATURE-			
The Concepts and Theories of Modern P	nysı	C8,	
By J. B. Stallo COMBINED ENGINE AND FIRE PUMP. (Illust	- 1	::	211
COMBINED ENGINE AND FIRE PUMP. (IIIus)	trate	a.)	211
ELECTRIC LIGHT SHED, FISHERIES EXHIBIT	ION	••	212
WARNERKE'S SENSITOMETER THE IRON, COAL, AND GENERAL TRADES (MINGHAM, WOLVERHAMPTON, AND DISTRIC			213
THE IRON, COAL, AND GENERAL TRADES (OF D	IR-	010
MINGHAM, WOLVERHAMPTON, AND DISTRIC	т		213
NOTES FROM LANCASHIRE		••	216
NOTES FROM SHEFFIELD	••		214
NOTES FROM THE NORTH OF ENGLAND	••	••	21.
NOTES FROM SCOTLAND	**		21.
THE PATENT TOURNAL	TES		01
THE PATENT JOURNAL	1110		21
ABSTRACTS OF PATENT SPECIFICATIONS. (II ABSTRACTS OF PATENT AMERICAN SPECIFIC	LUS.		ar
(Illustrated.)			91
PARAGRAPHS-			51
A Hydraulic Curtain			10

A Hydraulic Curtain Extreme Minuteness Accidents in English Mines Pollution of Streams William Murdock.... Brakes and Beasts :: ::

THE ENGINEER.