MESSRS. MAUDSLAY, SONS, AND FIELD'S WORKS.

The visit which the members of the Iron and Steel Institute will pay to the Lambeth works of Messrs. Maudslay, Sons, and Field, will be, perhaps, more interesting to those of mechanical engineering proclivities, than others to more modern establishments. Especially will this be so for those well acquainted with and interested in the history of the development of mechanical engineering during the past century. Unfortunately, much of that which is of absorbing interest will be lost in a mere walk through the shops, so that it should be known that besides the work and tools illustrative of modern engineering practice, there is to be seen a large number of machines, tools, and models, of great historic interest, affording striking evidence of the genius of the founder of the works, and of the development of the marine engine. The works were founded by Henry Maudslay, the son of William Maudslay, a Royal Artilleryman. He was born in 1771 when his father was stationed at Woolwich, and may be said to have commenced life in the Woolwich Arsenal, passing from cartridge making to the carpenter's shop and smith's shop. Subsequently he was employed by Joseph Bramah, and became foreman, but as Bramah refused to give him more than an ordinary rate of pay, he commenced business for himself in 1797 in Wells-street, Oxford-street, and afterwards in Margaret-street, Cavendish-square. Here, amongst other things, he invented and made the slide rest, and it need hardly be said that this brought him fame and trade. He turned his attention particularly to the improvement of hand tools, and the construction of machine tools. In pursuit of this he made a screw-cutting lathe, of which a well made model, dated 1800, is to be seen in the model room, and to do this made a master screw of one hundred threads to the inch, and subsequently went far towards perfecting a systematic standard pitch and form of thread for screws. In this work he has been successfully followed by Whitworth, who was for some time in his employment. Maudslay not only made the slide rest, standard screws, and screw-cutting lathe, as the forerunners of these tools as at present employed, but he made use of his standard screws in the construction of a standard measuring machine very similar to that since made by Whitworth. A model of this tool, made about 1800, is still preserved, with many other tools, models, and machine tools, in the works and model room at Lambeth; and it will be remarked by all visitors that to Henry Maudslay belongs the credit of introducing into mechanical engineering workshops that accuracy which has become the most essential feature in good engine and machine work. When Brunel was employed to construct the block-making machinery for the Portsmouth Dockyard, he found that the tools made by Maudslay were necessary to their production, and he called in the assistance of Maudslay. The success of this machinery brought Maudslay a great increase in business, and he removed his works to Lambeth, where, in 1810, he bought land on the Lower Marsh, with a riding school which stood on the ground, and formed the first workshop of what is now a world-famed place. Here, besides carrying on the work for which he had made a name in Margaret-street, he turned his attention to the construction of steam engines, for which he had obtained a patent while at the old house. In 1816 he made the engine for the Regent, which was the first steamboat to ply between London and Margate, and this boat was followed by others which Maudslay engined. In this work he was successfully followed by his fourth son, Joseph, born in 1801. It was intended by his father that he should become a shipbuilder, but circumstances of some kind prevented this, though he was for a time placed with Mr. W. Pitcher, of Northfleet. He became a partner in his father's firm, and made many improvements in the marine engine. Amongst these were the construction of the oscillating engines, fitted with slide valves worked by excentrics; direct-acting engines for screw-propelled ships; annular cylinder engines; the feathering screw; and the construction of ships to find the best form for propulsion by screws.

Just so much of the history of the firm we have given because in the works will be found models of the engines and tools invented by the early members of the firm. These models and the machine tools, some of which are still in occasional use, are of the greatest interest to the mechanical engineer, and the names of the different engines and tools would form the title and the subject matter for some of the most interesting chapters in the history of engineering since the latter part of the eighteenth century. These works must therefore not be run through, if the visitor would gather anything at all like a good part of the interesting information there to be gained.

It would form no useful purpose to describe the different shops forming the works of Messrs. Maudslay, Sons, and Field, or their arrangements, for, like all old-established works, these have been altered and extended from time to time, so that the arrangement is not that which would be adopted by choice. For instance, the foundry in which are produced some of the heaviest castings ever made for marine engines, is approached by a flight of stairs, it being necessary to build it above ground to keep out of the water with deep castings. In the works there is not perhaps in all respects that perfect facility which in an entirely new place would be given for intercommunication between the different departments through which work must pass. There are, however, certain of the finest tools ever constructed in the turnery and machine-shops, and some of these have recently been made by Messrs. Smith, Beacock, and Tannett. One we illustrate, Barrow's screwing machine This is quite a new tool, less than 100 having been yet sold. That which we illustrate is of the largest size, and will screw a bolt 5½in. diameter complete at one operation. There are four radial cutters inserted in a disc, which rotates in a ring A. Each of these has four cutting teeth stepped after each other, and the rotation of the disc thus brings sixteen cutting edges to bear on the bolt. This seems to be about the best screwing machine yet made. The works are undergoing considerable alteration and additions, and it may be mentioned that Messrs. Maudslay, having succeeded in obtaining a decision in a Chancery suit regarding their Lambeth premises, which has been in litigation for many years, have decided upon removing their boilermaking department entirely to their extensive premises at East Greenwich. They will, in consequence, give up what is known as the "front erecting shop," of which the lease has expired. It was over this shop, we believe, that one of the first iron roofs—if not the first—was erected by the founder of the firm, Mr. Henry Maudslay. This roof has cast iron principals, and is hipped. A similar roof is over the erecting shop, in which will be seen in course of erection the compound engines of the Colussus. The old boiler-shop is now being converted into another erecting shop, which will have every modern facility for erecting heavy machinery. Owing to the transitory state of the works, there are not many engines or boilers being finished. There are, however, in hand, besides the Colussus engines, those for the Triton, a surveying ship, and large oscillating engines for the continental boats of the London, Chatham, and Dover Railway Company.

In passing into the works after leaving the model room, where numerous models may be seen in motion, the visitors will immediately reach two things of interest—namely, the two table engines constructed by Henry Maudslay, and to this day giving motion to the principal machinery of the works. These engines were made in 1824 and 1825, and one of them has a cast iron crank shaft, which has been at work for a great many years.

In the small machine shop will also be seen in successful operation some of the old machinery we have referred to, and planing machines fitted with the "Jim Crow" tool-holder patented many years ago by Whitworth, but discarded in several places because of the inaccuracy in the work caused by the wear of the tool-holder in its socket. This has been overcome by Mr. Timme, the manager of the works, by an arrangement for taking up the wear of the tool-holder, which consists in giving it a small taper, and providing for the necessary adjustment. In the shop wherein the boiler plates are punched, are still in perfect working order the machines made by Henry Maudslay for punching and shearing the plates for tanks, made by the firm many years ago for the Navy. These machines are fitted with some curious and interesting devices for obtaining slow working stroke and quick return stroke, and with a simple, yet effective, arrangement for automatically punching boiler and circular tank-plate holes at the proper distance apart to allow for the difference between the pitch of the exterior plate and the inner plate to which it is rivetted. In one of the departments will be found a working model of Brunel's shield, as employed in the construction of the Thames Tunnel. A number of these machines is worked from one long cast iron line shaft, and although they have been at work at least fifty years, they are doing excellent work now.

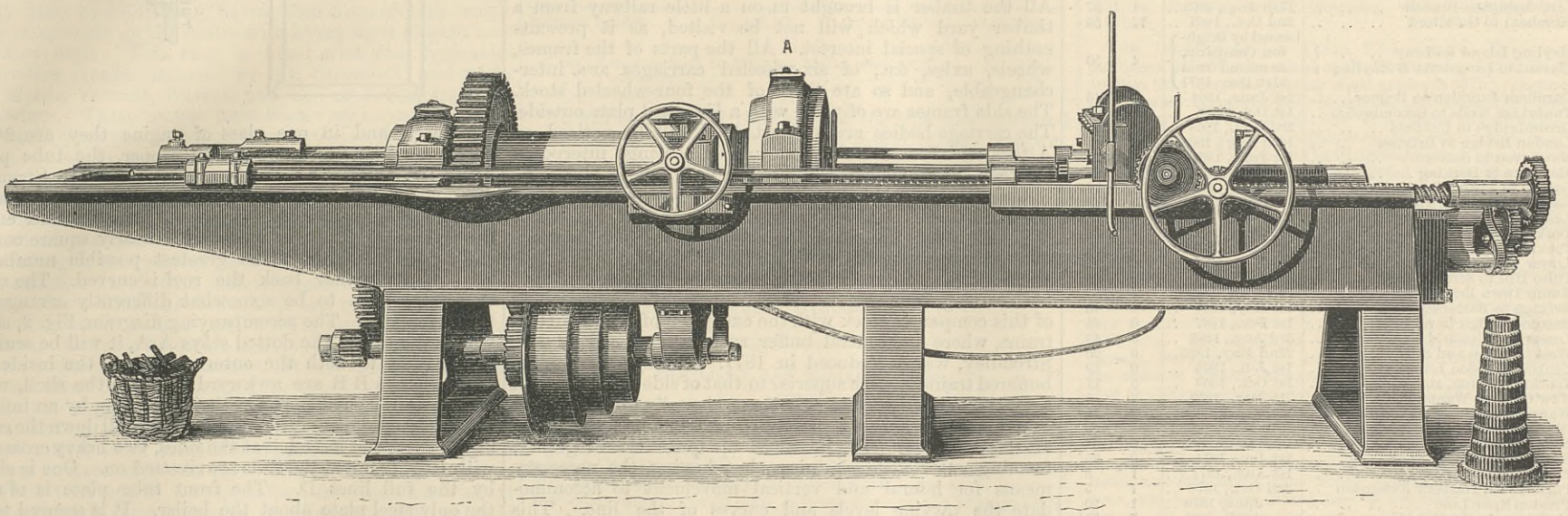
In the model-room will be found tabular records of the names, dates, size, and horse-power of the ships engined by the firm. With paddle-engines the number of ships fitted is 244, the aggregate horse-power being 37,585. The first engine was put into the Richmond in 1815; it was 10-horse power nominal, and the largest paddle-engines made by the firm were fitted into the Royal yacht, Osborne, in 1870, and were of 3374 indicated horse-power. The first engines made with surface condensers were fitted to the Grappler in 1842, and were 220 nominal horse-power. The total number of ships fitted with screw engines, including the celebrated fast speed ships of the White Star line, with engines of about 5000 indicated horse-power, is 334, and the aggregate indicated-horse power down to the end of 1880 was 89,858. The first screw-propeller engines were fitted into the Rattler in 1841, and were of 519 indicated-horse power. The largest were fitted into the Kœnig Wilhelm in 1876, with 8344-horse power. Besides these engines mentioned, those made for the Agincourt of 6867 indicated-horse power; the Lord Warden, of 6705 indicated-horse power; the Iris, 7714; and the Mercury, 7513. Nearly all the modern engines have been designed by Mr. Charles Sells, and are fitted with his arrangement for using all the cylinders of a compound engine as low pressure cylinders, if necessary. The engines of the Dandolo, which were sent out to Italy several years ago, are expected to indicate over 8000-horse power. It is rather a curious fact that four of the finest sets of engines have been ordered for Turkey, but subsequently became the property of other Powers. These are our Orion, Superb, and Belle Isle, and the German Kœnig Wilhelm.

THE LONDON, BRIGHTON, AND SOUTH COAST RAILWAY COMPANY'S WORKS, BRIGHTON.

Among the various excursions to be made by the Iron and Steel Institute during next week, one of peculiar interest has been planned. A special train will, on Friday, the 14th inst., convey members and their friends to Newhaven, where the London, Brighton, and South Coast Railway Company is constructing docks, wharfs, and workshops. From thence they will proceed to Brighton, and visit the locomotive and carriage-building shops of the company there. Although these works cannot be compared as to size with such a gigantic establishment as that at Crewe, we question if in any shops more will be found to interest the visitor who goes resolved to see what is to be seen. The defect of a large place as the locality of a visit is, that it is impossible to do more than glance at the greater portion of it. The Brighton shops, however, can easily be traversed in a few hours, and the visitor can go away with an impression that he has spent his time to advantage. The present article has been written with the special purpose of directing the attention of those who take part in the excursion to certain characteristics of the works, and of the operations carried on within them, which ought not to be overlooked, and will be found to deserve notice. Within the space at our disposal we shall not attempt to describe the Brighton Railway shops; we shall better serve our readers by telling them something of what they may see in them.

The Brighton Railway had small beginnings. It originated as the London and Croydon Atmospheric Railway. The table on the next page shows the progress of the undertaking, from which it will be seen that until 1841 Brighton was not connected to London by rail.

The original workshops were small and few in number. Indeed, they consisted of little more than a running shed, and a single row of fitting, repair, and smiths shop at the side of the line close to the arrival platform. Mr. Craven was from the first locomotive superintendent of the line, and he did good service to his directors and the public. On his retirement about ten years ago he was succeeded by Mr W. Stroudley, who has almost revolutionised the whole of the rolling stock with great advantage. The principal object which Mr. Stroudley has kept in view has been the simplification of everything, and he has adopted the system of interchangeability with the happiest results. When he took the command he found that there were 233 locomotives, representing no fewer than seventy-two different types or varieties. That is to say, there were such differences between these engines, that none of one class could use anything belonging to an engine of another class. Mr. Stroudley's engines may all be classed under about half-a-dozen types, each quite distinct from its fellows, but the parts of any one of these engines will fit any other engines of the same type, and not only this, but many parts are common to all the types, if we exclude



BARROW'S SCREWING MACHINE

the little Terrier's, which are totally distinct and *sui generis*.

Particulars of the London, Brighton, and South Coast Company's System of Lines, and Number of Miles Open Sept., 1881.

Year authorised.	Line.	Opened.	Length. Miles	chains
1835	London to West Croydon	5th June, 1839	10	28
1837	Croydon to Hayward's Heath	12th July, 1841	27	31
	Hayward's Heath to Brighton	21st Sept., 1841	12	70
	Brighton to Shoreham	12th May, 1840	5	72
1843	Bricklayers' Arms Branch	July, 1849	1	51
1844	Shoreham to Worthing	24th Nov., 1845	4	57
	Worthing to Arundel	16th March, 1846	9	1
	Arundel to Chichester	8th June, 1846	8	75
	Croydon to Epsom	10th May, 1847	9	27
	Brighton to Lewes	8th June, 1846	7	78
	Lewes to Hastings	27th June, 1846	26	42
1845	Lewes to Keymer Junction	Oct., 1847	9	9
	Three Bridges to Horsham	14th Feb., 1848	8	38
	Chichester to Havant	15th March, 1847	8	68
	Havant to Portsmouth	14th June, 1847	7	16
1846	Lewes to Newhaven	8th Dec., 1847	5	47
	Polegate to Hailsham	14th May, 1849	2	71
	Polegate to Eastbourne	14th May, 1849	4	31
	Deptford Wharf Branch	July, 1849	1	21
1853	Croydon and Wimbledon	22nd Oct., 1855	5	58
	Three Bridges to East Grinstead	9th July, 1855	6	71
	Sydenham to Crystal Palace	10th June, 1854	1	5
	Crystal Palace to Wandsworth	1st Dec., 1856	4	57
	Crystal Palace to Norwood Junc.	1st Oct., 1857	1	19
	Wandsworth to Battersea	29th March, 1858	3	20
	Battersea Wharf Line	30th April, 1862	0	10
1856	Epsom to Leatherhead	8th Aug., 1859	3	53
1857	Lewes to Uckfield	18th Oct., 1858	7	22
	Horsham to Petworth	15th Oct., 1859	17	32
1858	Shoreham to Partridge Green	1st July, 1861	9	65
	Partridge Green to Horsham	16th Sept., 1861	6	77
	Battersea to Victoria	1st Oct., 1860	0	73
1859	Norwood to Beckenham	18th June, 1862	0	40
	Clapham Junction to Kensington	1st March, 1863	3	33
	Petworth to Midhurst	15th Oct., 1866	6	10
	Midhurst (Bn. Station to S. Wstn.)	15th Oct., 1866	0	5
1860	Croydon to Balham	1st Dec., 1862	5	14
	Norwood Fork (Selhurst)	1st Dec., 1862	0	27
	Pulboro' to Ford Junction	3rd Aug., 1863	9	39
	Littlehampton Branch	17th Aug., 1863	1	57
	Horsham to Guildford	2nd Oct., 1865	17	56
	Hayling Island Railway	Leased by Brighton Company, as on and from 31st Dec., 1871	4	50
	Havant to Langstone & Hayling			
1861	Barnham Junction to Bognor	1st June, 1864	3	46
	Tunbridge Wells to Groombridge	1st Oct., 1866	3	29
	Groombridge to Uckfield	3rd Aug., 1868	12	19
1862	London Bridge to Brixton	13th Aug., 1866	5	9
	Newhaven to Seaford	1st June, 1864	2	25
	Horsham to Dorking	1st May, 1867	13	24
	Sutton to Epsom Downs	22nd May, 1865	4	10
	East Grinstead to Groombridge	1st Oct., 1866	10	10
1863	Leatherhead (old to new station)	23rd Dec., 1866	0	35
	Dorking to Leatherhead	11th March, 1867	3	78
	Peckham Rye to Sutton	1st Oct., 1868	10	0
	Lower Norwood Spur	1st Nov., 1870	0	27
	Tulse Hill to Streatham Spur	1st Aug., 1871	0	23
1864	Kemp Town Branch	2nd Aug., 1869	1	33
	*Brixton to Battersea Park	1st May, 1867	2	46
	Battersea High Level Line	1st Dec., 1867	0	61
	†Lewes and Uckfield Junction	3rd Aug., 1868	3	44
	West Croydon and Selhurst Junc.	22nd May, 1865	0	20
	‡Central Croydon Line	1st Jan., 1868	0	29
	Tooting, Merton, and Wimbledon	1st Oct., 1868	5	17
1865	New Cross to Wapping	7th Dec., 1869	2	5
	Wapping to Liverpool-street	10th April, 1876	2	15
	Old Kent-road Spur	13th March, 1871	1	5
	New Cross Spur	10th April, 1876	0	31
	South Bermondsey Spur	1st Jan., 1871	0	36
1870	Eastbourne Spur	1st Aug., 1871	1	8
1873	Portsmouth Harbour Extension	2nd Oct., 1876	1	5
	Preston Spur Line	June, 1879	1	20
	Hailsham to Heathfield	April, 1881	7	74½
	Heathfield to Eridge	Sept., 1881	9	48
	Chichester to Midhurst	July, 1881	12	3
	†Deduct old line *via* Keymer, closed on opening of Lewes and Uckfield Junction		2	31
	The total number of miles now open is		422¾ miles	

* Authorised by Chatham and Dover Company's (New Lines) Act, 1864
‡ Closed 1st December, 1871.

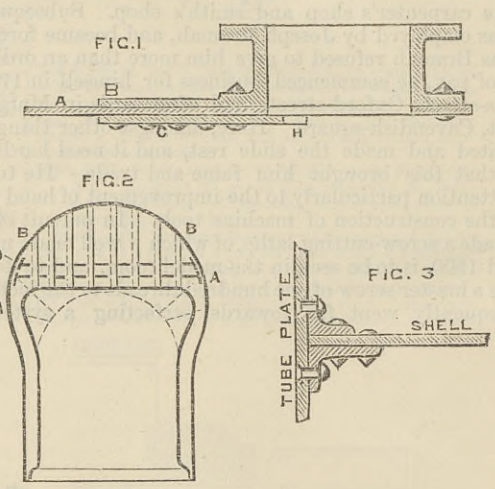
When the shops were reconstructed from Mr. Stroudley's designs, it also became necessary to consider the best form of locomotive for the particular work of the company. Mr. Stroudley came to the conclusion that it would be well to have a large and small engine, and decided to make those for goods traffic with 17in. × 26in. cylinders and 5ft. wheels, and for passenger traffic with cylinders 17in. × 24in., with wheels varying according to the nature of the trains to be worked; and for the suburban lines and branch work, a light engine now known as the "Terrier," in which the whole of the weight of the engine is utilised by coupling all six wheels, was designed; this engine has, as nearly as possible, one-half the proportions of the full power engines. Having decided upon a complete set of details, therefore, and made gauges and standards, it only became necessary to arrange them as circumstances required. On the Brighton line it is possible to change any part of one engine to another; except as in the case of the difference between the driving wheel of a goods and a passenger engine, where the wheels are not interchangeable by reason of the difference in their diameters; but the axles, brasses, boxes, horn blocks, springs, &c., are all alike. The whole of the connecting rods, side rods, &c., are in a similar manner interchangeable; and the excentric rods—a very unusual thing in locomotive work—are all fitted to a cast iron gauge, which determines their length and set exactly, so that they may be removed from one engine to another without making the slightest difference in the set of the slide valves. Case hardened surfaces and gun-metal bearings have been adhered to, and great accuracy has been aimed at in the fit of all the details. From the Brighton works have now been turned out 220 entirely new engines from Mr. Stroudley's designs, and up to the present time there has not been a broken tire, nor a breakage or failure from defect of material or design. The engines have been made with a moderate amount of travel of the slide valve, and with comparatively small steam ports, it being Mr. Stroudley's opinion that the travel of slide valves has been increased by many engineers very much beyond what is profitable or necessary; and also that the steam ports have been made much larger than requisite. The engines have also been constructed with comparatively small driving wheels, it being also his opinion that driving wheels are very generally made much larger than there is any occasion for. So long as the speed of sixty miles per hour is not required to be exceeded—as he thinks it should not be in this country—there can be no occasion for a wheel exceeding 6ft. 6in. in diameter. The same argument applies to other classes of engines; thus the "Terriers" for working suburban trains have wheels 4ft. in diameter. No fewer than three large sheets of drawings were made of the various axles in use on the line ten years ago. Now there is only one form of axle, and this was carefully designed by Mr. Stroudley many years ago, with the wheel seat larger than the part of the axle visible to the eye, so that the strength is not only placed where most needed, close to the wheel, but should a fracture of the axle at any time take place, it would be in that part which could be readily observed by the examiner. The whole of the wheels are put upon the axles without keys; being forced on by a pressure equal to 12 tons end-pressure for every 1in. of the diameter of the axle, and no wheel is permitted on an axle that has not this degree of tightness, and none has ever been found to get loose or move from its position. This rule applies to engines and tenders also, as well as carriages and wagons. The advantage gained by the adoption of the interchangeable system will be patent to our readers, and the visitors to the works will do well to see for themselves how completely the system is carried out.

The visitor will enter the works through a pair of gates at the side of the railway close to the outer end of the arrival platforms. The engineers' offices are on the left-hand side. The carriage building shop will be first entered. Here several good wood-working machines will be seen in operation. In the corner furthest from the entrance will be found a double bit drill for boring holes in ventilators for carriage doors. This is a very neat tool, devised by Mr. Stroudley. A simple horizontal saw used for channelling the insides of roof sticks also deserves notice. It can be driven in either direction, and so does the work of a machine for the same purpose with two saws close by. All the timber is brought in on a little railway from a timber yard which will not be visited, as it presents nothing of special interest. All the parts of the frames, wheels, axles, &c., of six-wheeled carriages are interchangeable, and so are those of the four-wheeled stock. The side frames are of wood with a ¼in. steel plate outside. The carriage bodies are supported, it will be noticed, on Attock and Spencer's recessed rubber bearings interposed between the frame and the carriage body.

The whole of the buffer and draw-bar gear has been arranged to one uniform standard, the face of the buffer being 18in. from the end of the carriage; this being the minimum distance required to secure the safety of the shunters when coupling and uncoupling; and this distance applies to both carriages and wagons, and is being adopted in the whole of this company's stock with the exception of the suburban trains, where the central buffer system, designed by Mr. Stroudley, was introduced in 1871. The system of close buffered trains is much superior to that of side buffers; when they are coupled very closely there is really no buffer, the centre couplings being merely movable joints; the whole of the carriages being screwed up quite close together, forming one continuous piece, but having the necessary means for lateral and vertical movement to accommodate the varying levels and curves of the line. This arrangement saves about 17 cwt. of steel and iron in each vehicle, does away entirely with the shock in stopping and starting, and shortens the train very materially, prevents danger from passengers falling between the carriages, and enables the guard to get along the train more quickly than with the long buffers. Continuous footboards have been fitted to the whole of this company's stock, placed at a uniform height above the rails, and having an extreme width across of 9ft. The platforms of this railway have been raised or lowered to a uniform height of 2ft. 6in. above the rails, and a uniform distance of 2ft. from the outside of the rails, so that passengers become accustomed to the same step from the carriages, and a very great reduction in the number of accidents from passengers falling down has taken place. The wagons are also being made to uniform standards, and to meet the requirements of the company's traffic. They have also the same axle as the carriages, but have a wheel smaller in diameter, viz., 3ft. instead of 3ft. 6in., as in the case of the carriages.

At one side of the carriage shop is a pit, over which the work of fitting the carriages with the Westinghouse brake is carried on. No fewer than 1590 vehicles have now been supplied with this brake. The carriages are not quite finished in this department. They are afterwards sent to another shop to be trimmed, painted, and varnished; and we may digress here for a moment to state that this carriage shop is at the other side of the line, and must by all means be visited. It covers seven acres of ground, is 900ft. long, and 25ft. high to the eaves. It is heated by steam pipes, 7in. diameter, lying along the floor. These pipes have no expansion joints. They are secured firmly at the middle, and are supported along their whole length on small rollers, so that 450ft. of pipe can expand in each direction. The actual range of expansion is found to be about 3in. The site for this splendid carriage shed was cut out of the chalk cliff, and the chalk was all sold at a price which just paid for the excavation, so that the site may be said to have been obtained for nothing. In this shed will be found several engines being painted and varnished. As the visitor proceeds to this part of the works, he will do well to notice at the right-hand side just before he enters the running shed a building in course of erection 72ft. long and 40ft. wide. Within will be placed a traveller for lifting engines, and tools and benches for a staff of fitters. On top will be a great cast iron tank 40ft. by 72ft. by 9ft., which holds about 700 tons of water for the use of the engines and the buildings generally. We may now take leave of the carriage department, and return to the engine shops.

The visitor passing out of the carriage-building shop enters the boiler shop, and his attention will be directed to the work done. In the boiler shop great care has been taken to make sound work. The boiler plates are first planed at the edges, afterwards heated slightly, and then bent to the correct form. They are afterwards strapped together by heavy iron straps and bolts, and then the holes are drilled through both plates; the longitudinal joints being placed above the water line, and fitted with butt strips inside and out, each double rivetted. The rivets are countersunk through the butt strip inside and out. These rivets are driven home by hammers of about 7 lb. weight, and having to be forced into the countersink only, are very quickly closed. The manhole ring is made of wrought iron, with a very thick flange, as in the sketch, Fig. 1. It is made out of a piece of angle bar 14in. by 1in., and 4½in. by 2in.; this is bent round, welded, and flanged to fit on to the boiler, the butt strip for the joint in the boiler plate being welded thereto, and the upper face for the dome being turned, and after rivetting on, scraped up to a steam-tight joint, so that the dome can be taken off and on without trouble. The inside butt strip is prolonged to hold the regulator, as shown in the sketch. Mr. Stroudley having tried various sizes, now always uses tubes 1½in. diameter outside, and he places the thinnest end of the tube next the fire-box. The tubes are spaced



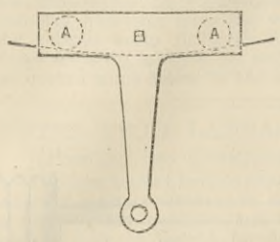
⅝in. apart, and in one class of engine they are 262 in number. The fire-boxes are of copper, the tube plates being 1in. thick. All rivets are of iron. Mr. Stroudley does not use bridge stays, and the system of staying adopted deserves to be examined. The forward end of the internal fire box is made with nearly square corners and a flat top to admit the greatest possible number of tubes, but further back the roof is curved. The stays, therefore, have to be somewhat differently arranged in the two places. The accompanying diagram, Fig. 2, shows what we mean. The dotted stays A A, it will be seen, are nearly radii to both the outer shell and the inside box, but the stays B B are awkward to fit in the shell, which is accordingly thickened for their reception by an internal plate. The tendency of the stays being to pull down the crown of the shell, and stretch it at the sides, two heavy cross stays with large palms at the ends are rivetted on. One is shown by the full lines D. The front tube plate is of steel, the only steel plate about the boiler. It is secured to the shell by two angle iron rings to prevent grooving, as shown in Fig. 3.

It will be seen that little or no caulking is allowed, and it will not escape attention that there is not a rivetting machine in the establishment. Mr. Stroudley holds that if plates are properly put together, and the rivets are a good driving fit in the holes, hand work is much better than machine work, because machine work tends powerfully to split the plates by cramming too much rivet into each hole. The boiler work turned out of the Brighton shops is as good as possible, and reflects much credit on all concerned, from Mr. Stroudley down. Last week we saw in the sheds the first engine built in the Brighton shops by Mr. Stroudley, having the tubes taken out to be renewed for the first time. This engine commenced to work in 1871; it has performed continuously ever since, almost without cessation, and has not had any renewals except new leading axle brasses, new connecting rod end-brasses, and new stays round the lower part of the fire-box. The ferules have never been taken from the tubes, nor have any other repairs worth mentioning been effected. The whole of the joints in this and every other engine made since are scraped up to a perfect face, so that when rubbed with a little oil and screwed together, they are steam tight; and these faces are now in the same condition as when first put out of the shop, thus proving that scraped joints can be made and maintained. The advantage and economy of this is very considerable when we consider the amount of running-shed expenses in joint making, under the old style of locomotive practice.

This engine had not had the lagging off before for ten years; no trace of leakage could be detected anywhere, save one small spot under the barrel at a transverse seam. The engine had run 300,000 miles in the time. Close by was the 206th engine built by Mr. Stroudley. This engine had been incessantly at work for three years and two months, with the exception of one day spent in skimming the tires while the engine was at the running sheds. The registered mileage was 116,000. The same bushes were in the coupling rods as were in them at first, and the tool marks are still on the horn plates, a result of the peculiar arrangement of the coupling rod cranks—not opposite to, but at the same side of the axle, as the main crank—adopted by Mr. Stroudley. It may be mentioned that much of the durability of the boilers is due to the use of hot water, much of the lime being deposited in the tender. A portion of the exhaust steam is taken into the tank and raises the temperature nearly to boiling. The consequence is that injectors are not used, all the boilers being fed by pumps. Of these pumps we shall say more in a moment. As no injectors are used, it becomes necessary to provide means for keeping down the production of steam and waste of water while the engine is standing; and this is done by

the use of an ash-pan fitted quite tight with red lead on three sides. Air is admitted only at the back, where are fitted two doors—one perforated to let in air and keep in cinders, and the other a flat plate to exclude the air. All this work should be examined, and also the draw-bar arrangement. The engine is coupled to the tender by a

FIG. 4



T-headed draw-bar B, Fig. 4, in which are fitted two rollers A, which traverse on a heavy curved angle-iron beam. The centre of the curve is placed far forward, and as the engine travels over a crooked road the tie-bar rolls along the curved segment, and the engine does not drag the tender after it sideways. The arrangement works beautifully. A single heavy india-rubber washer takes the pull beneath the tender, and provides all needful elasticity.

Visitors will do well to examine the peculiar form of feed-pump used, which is exceedingly simple, and yet is such that, even when running at a very high speed, the clacks do not make a noise. The suction clack, it will be seen, is the seat for the delivery clack, and in the top of this last is contrived a small air vessel which effectually prevents the thrashing of the valve on its seat. These pumps will be found to repay inspection.

The erecting shop is excellent and convenient, about 82ft. wide by 380ft. long, having four lines of rails and a row of columns up the centre with a very light elegant roof in two bays. This shop is fitted with four hydraulic travelling cranes, designed by Mr. Stroudley, and made by Messrs. Tannett, Walker, and Co., of Leeds, from his drawings. These cranes have been very successful—they lift and carry about the engines very smoothly, and have been copied by many railway companies. They are, we believe, the first travelling hydraulic cranes worked by power—at least, the first that worked through any considerable distance, such as 200ft. or 300ft. The lifting cylinder has a spherical collar placed at about the middle of its length, the cylinder itself being 11in. diameter, and has a piston fitted with ordinary hemp packing. A rod passes down from the bottom of the cylinder, having a gland similarly packed and with a swivel sling at the bottom. Suitable hooks are made to take hold of the buffer beam, and a proper pair made to fit into the drag bolt hole in the after buffer beam, and by attaching the cranes to these the engines are lifted without damage or trouble. The carriage on which the hydraulic cylinder is slung is fitted with a set of three-throw plunger pumps, which are always at work while the crane is in action. The water is allowed to escape by a by-pass back into the tank when it is not required, and a separate handle with a stop valve is provided for lowering when necessary. Thus the hoisting is done by the direct action of the pump, which forces the water through a stop valve on the side of the cylinder, the connection between the pumps and the cylinder being made by a spiral pipe of sufficient elasticity to allow the cylinder to move about as may be required, and the discharge water passes through an india-rubber hose back into the tank. Up to this time, now more than ten years, no accident or trouble of any kind has been caused by these four cranes, which are managed by two workmen, who keep them clean, and oil and attend to every detail connected therewith. The shafting, running down each side of the centre column of the erecting shop, is driven by a tight and slack pulley, geared at the end of the shop. The belt can be moved into and out of gear by a rope passing over the head of the crane man, so that he can stop the shafting when the crane is not in action. A considerable number of tools and machines has been introduced—many of them from Mr. Stroudley's own designs—with a view to perform the work required in modern locomotives.

Want of space prevents us from doing more than glancing briefly at many things of interest which we must perforce leave undescribed. The visitor will do well to examine a double-cylinder compound engine made a great many years ago by Messrs. Eastons and Amos, now used for pumping. The pump has a stroke of 4ft. and is 2ft. in diameter of barrel; it works against a head of 170ft. The whole of the water passes through a surface condenser, which is coupled by a pipe to the original jet condenser, into which no injection is admitted. The two cylinders of this engine are cast in one piece. A double-cylinder vertical engine close by also deserves notice. Steam is supplied by a fine battery of six single-flued boilers, each 24ft. long by 6ft. 6in. diameter, with a 3ft. 6in. flue; one boiler has a Fox's patent corrugated flue, the others have flanged flues made on what is commonly called Adamson's system, invented, we believe, originally by Hackworth, and used on the Stockton and Darlington Railway. There are in each flue nine Galloway tubes. These boilers ought to be examined, their fitting and workmanship being of the highest class. Among the tools a horizontal punching and shearing machine in the smithery deserves notice.

We feel that we have left much unsaid that ought to be said concerning the Brighton Railway shops, but we have said enough, we believe, to show that they will very well repay inspection It may be stated that the original shops of the company were at New Cross. Their removal to Brighton has been of considerable advantage to that town, as some £2500 per week are paid in wages, and the whole of this sum is, practically speaking, spent in Brighton. All wages are paid on Friday afternoon, that the men may have the full advantage of Saturday's markets.

We cannot conclude better than with the accompanying tabular statement of the working stock of the line now and eleven years ago:—

Statement of Working Stock.

Description.	June, 1881.	Dec., 1869.	Increase.	Decrease.
Engines and tenders	353	256	97	—
First-class carriages	598	413	185	—
,, coupé ,,	5	18	—	13
,, bogie	12	—	12	—
Composite	310	54	256	—
Second-class	337	312	25	—
Mail vans	3	—	3	—
Third-class carriages	807	549	348	—
Horse-boxes	193	127	66	—
Carriage trucks	126	111	15	—
Luggage or brake vans	245	151	94	—
Invalid rail or road cars	4	2	2	—
Total coaching	2730	1737	993	—
Goods wagons, covered and open	4156	1361	2795	—
Cattle wagons	224	146	78	—
Goods brake vans	150	92	58	—
Coal and coke trucks	1731	1916	—	185
Timber wagons	378	245	133	—
Machinery trucks	105	—	105	—
Ballast wagons	443	270	173	—
Travelling tool-boxes, &c.	4	4	—	—
Water and tar tanks	7	1	6	—
Stores and lamp vans	4	—	4	—
Total mineral and merchandise	7202	4035	3167	—
Total carriage and wagon stock	9932	5772	4160	—

Comparison of Train Miles run in the years 1869 *and* 1880.

Year.	Passengers.	Goods.	Total train miles.
1880	5,945,504	1,283,895	7,229,399
1869	3,512,335	699,172	4,211,507
Increase in 1880	2,433,169	584,723	3,017,892

No. of engines built in Brighton Works since 1870 220
,, carriages ,, ,, ,, ... 975
,, wagons ,, ,, ,, ... 5115

It will be seen that the traffic of the line has increased by leaps and bounds, and the interests of the company have obviously been well cared for by Mr. Knight, the general manager, Mr. Stroudley, the locomotive superintendent, and Mr. Williams, the traffic manager—all three able men and in their right place.

We have said nothing concerning the steamship work of the company. Of that we shall speak at another time. For the present our business has been more particularly with the Brighton Works only.

SOCIETY OF ENGINEERS.

IRON ROOFS.

At a meeting of the Society of Engineers, held on Monday evening, October 3rd, in the Society's Hall, Victoria-street, Westminster, Mr. Charles Horsley, president, in the chair, a paper by Mr. Arthur T. Walmisley on "Iron Roofs" was read, in which the author drew a comparison between some of the principal large roofs in the kingdom. The early types of construction resembled the old timber examples, the only alteration being in their section and detail of attachment at the joints. The adoption of roofs of large spans was comparatively of recent date. There was still much difference of opinion as to the advisability of single or multiple spans. The advantages of clear spans were (1) freedom from all intermediate supports, giving facilities in laying out the space to the greatest advantage, or in subsequently altering the arrangements, and this freedom is especially valuable when it is required to transfer the traffic of the station from one line to another, diagonally at the shortest possible intervals, as at New-street station at Birmingham and other places; (2) getting rid of annoyance of snow lodging in the valleys; and (3) the grander architectural effect of the structure, which was evident by comparing Euston station with St. Pancras station. The roof over the latter station is one clear span of 240ft., with arched ribs, and this type of construction has been adopted also at the Central station, Manchester, of 210ft. span, and St. Enoch's station, Glasgow, of 198ft. span. Another mode of covering large spaces was to bridge the space to be roofed over with transverse girders, placed at convenient intervals, and to carry the covering on these supports. This plan has been adopted at the Central station, Glasgow, of 213ft. span, and also at Bridge-street station, Glasgow, which was divided into two spans of 114ft. and 49ft. respectively. In both these roofs the covering is on the ridge and furrow system, running longitudinally from end to end. In the Carlisle station advantage is taken of the necessary longitudinal bracing required to stiffen the transverse girders by placing the gutter midway between the girders, and supporting the slope of the roofs on cantilevers meeting under the gutter, and connected to the main girders at distances of 15ft. apart, the ridge being carried on the top flange of the girders, and running transversely across the station. There are two spans of 128ft. and 154ft. respectively. The Victoria station of the London, Brighton and South Coast Railway is divided into two spans of 124ft. and 117ft. respectively. The covering rests on roof trusses of 50ft. spans, supported on girders. The York station, which was about the same width as St. Pancras station, was divided into four spans, and glazed on the ridge and furrow system; but it is open to argument whether this was the best way to glaze or not. When the ridge and furrow follow the curve or slope of the roof, one side of the sash bar suffers more from the weather than the other, and wears away the putty; but the author considered that the systems of glazing without putty ought universally to be adopted, and that a glazier's tool should never be used in construction, as it was easy in design to ascertain manufacturers' sizes, and work them in accordingly. Various patents had been taken out for glazing without putty. That by the late Mr. Rendle, who was the originator of the system, had been largely used in many roofs of large and small dimensions, and its merits were well known. Another system, patented by Mr. T. W. Helliwell, was also worthy of description, though not so extensively used as Rendle's system. In the design of a roof, the importance of all parts being as much as possible accessible to a painter's brush should be borne in mind. The construction of expansion roller frames was still very unsatisfactory, as rollers were so often found to rust in their bearings under the foot of the rafter. The roof over the Bristol station was a good and economical form of a rigid arch. No provision was in this case necessary for variations under change of temperature, as the ridge, by the construction, would rise and fall with the structure without spreading at the feet. It is unnecessary to spread wind ties offensively all over a roof as was generally done. It is sufficient to connect the end bays, as was done in the Earl's Court station of the Metropolitan District Railway, the Drill Hall, Edinburgh, and other recently-erected roofs, and trust to the purlin connections, which should be arranged to give the required stiffness to the intermediate bays of the roof. The general use of iron in works of construction renders it desirable to arrive at the best form to adopt in different cases consistent with efficiency and economy, and much might be learnt by comparing different systems that have been adopted both in trussed and arched roofs.

TENDERS.

SWING BRIDGE AT MINET-EL-BASSAL.

The following are the tenders sent in to the Committee of Commerce of Alexandria for the construction of an iron swing bridge known as the Pont Ibrahim. The work is to be constructed according to a schedule approved by the Minister of Public Works.

	£	s.	d.
M. Ferdinand Turin	8,400	0	0
Mr. George Archer	7,000	0	0
M. Katzenstein	8,150	0	0
MM. Storari and Radice	7,000	0	0
Engineering Company, Carmoos	8,500	0	0
The Cleveland Bridge Company	36,000	0	0
Messrs. Allen Alderson and Co.	6,700	0	0

According to the *Moniteur Egyptien*, from which we gather these figures, Messrs. Allen Alderson's tender has been accepted, but the work will not be commenced until April next.

Four new iron vessels are to be constructed for the Admiralty. Three of these—to be named the Mistletoe, Watchfire, and Albacore are to be built by Messrs. John Elder and Co., and the fourth, the Arethusa, by Messrs. Napier and Co. During the past month twenty-four vessels, of 29,300 tons, were launched from the Clyde yards, as compared with twenty vessels, of 24,900 tons, in September, 1880. For the nine months the vessels launched number 179, with a total tonnage of 244,290, against 188 vessels, of 171,000 tons, in the corresponding month of last year.

Naval Engineer Appointments.—The following appointments have been made at the Admiralty:—John W. Agnew, assistant engineer, to the Asia as supernumerary; A. Shoolbread and Charles E. Stewart, to the President, additional, for the Royal Naval College at Greenwich; James Melrose, chief engineer, additional, to the Grappler, for service at Gibraltar Yard, dated the 8th of October; James M'Gough, chief engineer, to the Asia, additional, for torpedo course in the Vernon, to join on the 6th inst.; Joseph O. Wilson, engineer, to the Grappler, when commissioned on the 8th inst.

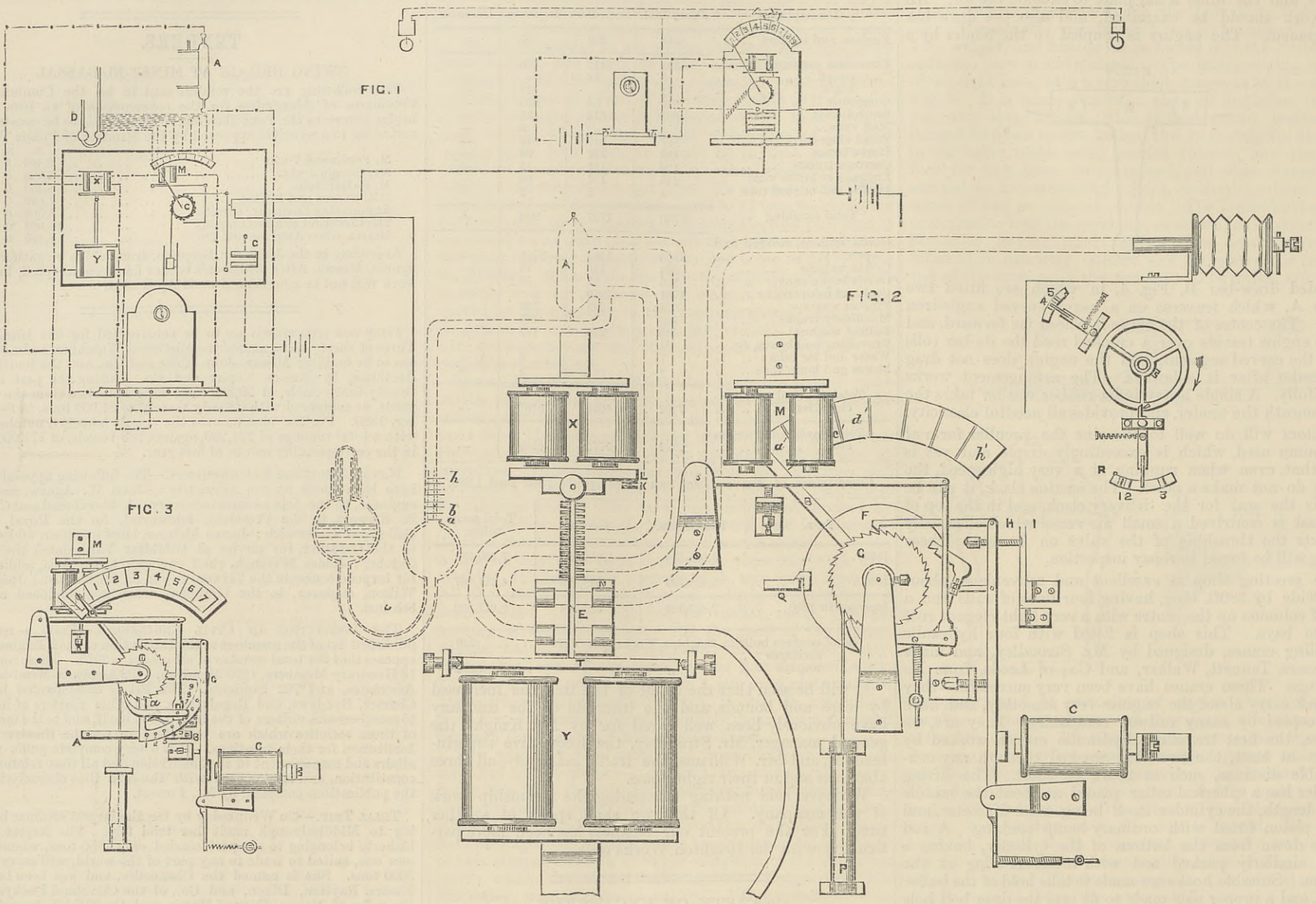
The Institution of Civil Engineers.—From a recently published list of the members of the Institution of Civil Engineers, it appears that the total number of all grades is 3975. These comprise 18 Honorary Members, 1270 Members, 1422 Associate-Members, 563 Associates, and 702 Students. The list is accompanied by the Charter, Bye-laws, and Regulations, and other matters of interest to members and visitors of the Institution itself, and to the members of those societies which are permitted to use the theatre of the Institution for their meetings. It is a very complete guide to the affairs and management of the Institution and all that relates to its constitution, and is prepared with the care that characterises all the publications compiled by Mr. Forrest.

Trial Trip.—On Wednesday by far the largest steamer belonging to Middlesbrough made her trial trip. The largest vessel hitherto belonging to the port carried only 1850 tons, whereas the new one, suited to trade to any part of the world, will carry about 3000 tons. She is named the Chancellor, and has been built by Messrs. Raylton, Dixon, and Co., of the Cleveland Dockyard, to the order of Messrs. Edward Harris and Co., Middlesbrough, and is of the following dimensions:—Length, 279ft.; breadth, 37ft. 3in.; and depth of hold, 24ft. 6in., with a carrying capacity of about 3000 tons dead weight. She is built on the three-decked principle, having two decks laid, the main one of iron and the upper of wood. She has also water ballast in a double bottom in the after, main, and fore holds, four steam winches, patent steam steering gear, &c., iron lower masts, and is schooner rigged. Her cabins for captain and spare state rooms are placed in a short poop aft, and the accommodation for officers and engineers under the bridge amidships. Her engines of 180-horse power are by Messrs. Thos. Richardson and Sons, Hartlepool, and during the trial gave every satisfaction.

Suicide of an Engineer.—The *Port Elizabeth Telegraph*, of the 26th ult., reports the death, by his own hand, of Mr. John Hamilton Wicksteed, C.E., resident engineer of the Van Staaden's River water scheme, and engineer to the Town Council of Algoa Bay. He had been missing for several days from his office at the Town-hall, and his greatcoat, portmanteau, and travelling-bag were in the office, apparently prepared for a journey. Search parties were set to work in various directions, and at length his body was discovered in the bushes between Shark's River and what is known as Happy Valley, on slightly rising ground, but surrounded by bushes. The deceased was lying on his back, with a single-barrelled pistol in his right hand, the butt near his chest, and the muzzle of the pistol in the direction upwards towards his head. From examination it appeared that the weapon must have been discharged into his mouth, for the ball had come out at the top of the forehead, near the left temple. There was apparently no indication of struggle, and the surrounding bushes were undisturbed. Mr. Wicksteed had not been in good health lately, and he had occasionally shown great signs of depression of spirits, and an overworked brain. The coroner's inquiry resulted in a verdict of "Temporary insanity.'

University College, London.—Three courses—A, B, C—of evening lectures on architecture, construction and modern practice, will be given this session at the College, Gower-street, by Professor T. Roger Smith, F.R.I.B.A. The subjects treated remain substantially the same as in previous sessions, but such alterations will be made in the mode of dealing with them as, in the opinion of the professor, may render the lectures useful to students preparing for the associates' examination at the Royal Institute of British architects, or the district surveyors' examination, as well as pupils and other students of architecture. Course A: Architecture as a fine art—about thirty lectures on Mondays at 6 p.m. "An outline of the leading peculiarities of the principal styles of architecture" historically and analytically treated. In each session, some lectures will also be devoted to a fuller examination of "the special characteristics and history, the mouldings, features and ornaments" of some one style. Greek architecture will be so treated in the coming session. Course B: Construction and materials—About thirty lectures on Tuesdays at 6 p.m.; the first week in each month on Wednesday. "The nature and properties of building materials, including their decay, preservation, quality, and strength, and their application to building. The principles of construction as applied in practice to foundations, walls, arches, vaults, roofs, floors, and partitions. Drainage, sanitary arrangements and requirements. The application of formulas for calculating the strength of materials. Shoring and underpinning; and dealing with ruinous and dangerous structures." Course C: Modern practice—not less than fifteen lectures on Tuesdays at 7.10 p.m., except the first week in each month. Planning for special purposes and sites. "Specifications and the modes of estimating cost. The general conditions usually appended to a building contract." Quantities; the conduct of works; the adjustment of accounts; professional charges; the London Building Act; the model bye-laws; light and air; litigation; arbitrations; professional evidence; dilapidations; surveys; valuations; miscellaneous professional duties. A public introductory lecture, explanatory of the course and with suggestions as to modes of study, will be given at the College, by Professor Roger Smith, on Monday, 10th October, at 6 p.m. Admission free, and without tickets. Architects and students of architecture are invited to attend.

MONNIER'S AUTOMATIC METHANOMETER.



THE PARIS ELECTRICAL EXHIBITION.

No. VIII.

The automatic methanometer—or analyser of fire-damp—of M. Denis Monnier, professor of chemistry at the University of Geneva, shown in the Swiss section, is not only an alarm-giver of fire-damp, but gives also, at a distance, an automatic and quantitative analysis. It consists of two separate instruments—(1) the analyser; (2) the receiver.

The analysers are placed in the galleries and workings of the mines, while the receiver is in the office, or wherever desired, under the eyes of the manager or engineer. The analyser periodically, say each hour, transmits to the receiver the proportion of fire-damp between 1 and 9 per cent. that is mingled with the air of that part of the mine in which it is placed. It is important that the receiver should be so placed as to be constantly before the eyes of the manager, because he can himself arrange the contacts which regulate the sounding apparatus or other alarm when the mixture of gases has attained dangerous proportions. He will give the necessary orders, and the apparatus enables him at a distance to follow the effects of the attempts to ventilate the dangerous part. The action which renders the methanometer useful is the decomposition of methane—marsh gas—in presence of an excess of ordinary air under the influence of a high temperature, such as an induction spark or incandescent platinum, into products condensable or non-condensable. The condensation is shown by a change of height in the column of mercury in the manometer. It was formerly supposed that this decomposition was indicated by the following equation—

$$C H_4 + O_4 = C O_2 + 2 H_2 O.$$

M. Berthelot has demonstrated that the reaction is more complex, and that other compounds, such as naphthaline, are formed. M. D. Monnier has assured himself of the accuracy of M. Berthelot's investigations. He obtained from the burning for three months of pure marsh gas small crystals, of which the fusing point was 79 deg., burning with a sooty flame, insoluble in water, and very soluble in alcohol.

The analyser is represented in Fig. 1. The different parts of this apparatus are mounted on a strong plate of bronze, upon one of the sides of which are the burner, the manometer, and the pendulum; on the other, the clutching gear. The whole is enclosed in a closely fitting case. The burner or exploder A, Fig. 1, is a little receiver, with a platinum wire of small section across its longest axis. It communicates, as shown, with the manometer, made of glass, D, containing mercury. The two side tubes issuing from the exploder are of glass, upon which are fixed tubes of india-rubber, first connected so as to pass under the bar E; then, one to the bellows actuated by the movement of the sounding apparatus, the other carried through a hole in the case to take in the air of the mine. The apparatus to close the india-rubber tubes consists of an electro-magnet, covered with wire of large section, and a soft iron armature in the form of L. The lower part of the armature is guided by two screws. When the current passes into the electro-magnet Y, this piece T, and consequently the bar E which crushes the tubes resting upon the metallic plate N. This plate is not fixed, and is grooved to insure the hermetic sealing of the tubes between the edge of the bar and the plate. The end of the lever E is bevelled, and stops against a conical piece of steel fixed upon the armature of the electro-magnet X, used to disengage the tubes. This conical piece is pulled by the spring as shown in the figure, which at the same time insures the withdrawal of the armature of X. The india-rubber tubes under the rod E spring open when not under pressure. In this position the end of the bevel of the rod is towards the top of the cone, but when the current passes into the electro-magnet Y, the rod attracted raises the cone, passes its base a little, and is stopped by the detent of the spring. The contacts are distributed by a disc fixed upon the wheelwork of the pendulum; they serve to engage and disengage the tubes, and to complete the circuit for raising the platinum to incandescence.

The designer is satisfied by a number of determinations that the manometric indications given are always similar under similar conditions. The height of the barometer has little influence on the results obtained; temperature has more, but this varies little in the positions in which the apparatus is intended to be used. Suppose the analyser to work in a gallery where the temperature varies from 30 deg. to 40 deg. The average is 35 deg., for which the instrument is regulated, and the observer proceeds to determine the height of the mercury column, which shows a mixture of 5 volumes of marsh gas to 95 volumes of air. This height divided by five gives the height corresponding to 1 per cent. of marsh gas. The experiment should be repeated with 2, 4, 6, 8 per cent. of gas to verify the determination. Suppose this height 4mm. Starting from 0mm., platinum wires are fused into the manometer tube to the height of 4mm. The manometer thus prepared is ready to act with its exploding chamber. We see then that the apparatus is graduated empirically, and not according to the equation given above. M. Monnier prefers to graduate his apparatus with pure marsh gas, even when it is to be used in places when other gases predominate, the aim being to avoid accidents, and not to obtain exact results.

When the apparatus is intended to analyse quantitatively the gaseous escape in public buildings, theatres, &c., the inventor uses an indicator with ten divisions, 0 to 9, each platinum wire from the manometer being connected directly to one of the divisions, thus necessitating ten wires for indications of 1 to 9 per cent. It is hardly necessary to say that the regulation of the apparatus should now be made with coal gas. In theatres, &c., it is unnecessary to consider much the number of wires between analyser and receiver, as the distance is insignificant; but in places where the distances are considerable the number of wires requires consideration, as their cost is a large item in the installation. M. Monnier has given attention to these facts, and has designed apparatus whereby one transmitter and one receiver works with eight, ten, and even twelve analysers and only one line wire.

The nine platinum wires from the manometer D, Fig. 1, are connected with an equal number of platinum plates insulated in ebonite and arranged in the form of an arc, Fig. 1, $a^1, b^1, \ldots h^1$. At the centre of the arc is a ratchet wheel G furnished with pawls and carrying a contact B, which passes from plate to plate as the wheel turns. The mercury of the manometer is in permanent contact with one of the poles of the battery. The ratchet wheel and arc, electro-magnet C—which actuates by its armature a lever L, and thus the pawls—are connected to the other pole of the battery. When the mercury of the manometer reaches the first wire a, the circuit of the battery is closed. The current then passes by the first plate a^1, the contact B, the ratchet wheel, and the electro-magnet C; the magnet attracting its soft iron armature L, makes the wheel advance by one tooth, the contact B comes to the second b^1, and the circuit is again open. This movement of L is uesd to put the current to line by means of two springs H I.

When the mercury reaches the second wire b, the same movement is repeated, and so on till the contact (5) of the wheelwork will close the circuit of the electro-magnet M, which, reacting upon its armature, releases the two pawls F and O. The disc becomes free, and influenced by the weight P returns to its normal position, being stopped by the stop Q.

The central receiver is almost identical with the transmitter, but is more simply constructed, inasmuch as the nine plates of the transmitter which serve to distribute the contacts are replaced by a simple enamel dial divided into as many parts as indicate 1 to 9 per cent. of fire-damp. The ratchet wheel of the receiver carries underneath but above the pointer a brass plate in the form of a quarter circle $a\,b\,c$. The circumference of this arc is pierced with as many holes as the dial has numbers. These holes are to receive a contact peg. A spring, A B, is made bulging in the centre to insure contact with the pegs. The numbering of the openings in the quarter circle correspond to the sections of the dial. Thus, if the pointer indicates a certain division of the dial, the corresponding hole ought to place itself above the contact of the spring A B. It suffices, then, for the manager or engineer to place the peg in the hole corresponding to the proportion of fire-damp beyond which he does not think the mine safe, to then obtain continuous action of the bell. It is this part of the receiver which constitutes the alarm. The receiver acts in the following manner:—When the contact B—Fig. 1—of the transmitter passes from the first to the second plate, viz., from a to b, Fig. 1, the current is put to line by the contacts H I. The electro-magnet C, Fig. 2, attracts its armature, and the pointer originally placed over O passes to the section No. 1, which indicates 1 per cent. of fire-damp.

At the end of five minutes, the time fixed for the analysis, the pendulum of the receiver closes the circuit of the coil M, Fig. 2, and returns the pointer to 0, by the same mechanism as returns the contact of transmitter, to its normal position. The bellows acts six consecutive times in each hour, the air of the mine passing in and out of the tube in the box a similar number of times. This operation is sufficient to renew the air of the small burner; about one minute afterwards, the knife, which is placed on the side of the disc which influences the working of the pendulum—see Fig. 1—comes into contact with a platinum lever, and causes it to traverse a circular disc of ivory on

1½d. respectively in wages. Some of the Sandwell Park Colliery Company's men showed their dissatisfaction by refusing to begin work on the Monday, but they were induced to resume next day. The Dudley miners have determined to call a general meeting for the revision of the sliding scale; and in event of failure to obtain a rise, to terminate present agreements.

The South Staffordshire Mill and Forge Wages Board is suffering from the want of subscriptions. In order to insure regular payment, it has been resolved, at a meeting of ironworkers held in Wolverhampton, that the ordinary subscriptions—3d. per man per quarter—be deducted quarterly from the wages of the members throughout the various works in South Staffordshire by their employers. Steps are being taken to get employers' consent.

Cut nails are quoted much dearer by the leading makers.

NOTES FROM LANCASHIRE.

(From our own Correspondent.)

Manchester.—The iron market here continues to move upwards. Lancashire makers of pig iron continue to do a moderate business both in forge and foundry qualities, and the minimum price at which local iron can now be bought for delivery into the Manchester district is 46s. 6d. for No. 4 forge, and 47s. 6d. for No. 3 foundry, less 2½ per cent. Upon the basis of these prices sales have been made during the week, but makers are now asking a trifle more, and still decline to book any orders for delivery beyond the end of the present year.

In Lincolnshire forge iron business has been done for delivery equal to Manchester over the next four or five months at 48s. per ton, less 2½ per cent., and in Middlesbrough iron a few odd sales have been made at 50s. 10d. net cash, with 2s. 6d. more than this being asked by some makers. Derbyshire iron is scarcely being offered here, some makers having withdrawn their brands altogether from this market.

General activity still prevails throughout the finished iron trade of this district, with a good inquiry for export, and an improvement in the demand, so far as the home trade is concerned. Local makers, who are mostly well sold for the remainder of the year, are decidedly stiffer in their prices, and for bars delivered into the Manchester district the average quotations are now £6 10s. to £6 15s. per ton, which represents an advance of fully 20s. per ton upon the figures ruling a couple of months back. Hoops are quoted at £6 17s. 6d. to £7 2s. 6d., and sheets at £8 to £8 15s. per ton.

The Ince Hall Rolling Mills, situated near Wigan, which are now in liquidation, and were a few weeks back offered for sale by auction in Manchester, when only one bid of £9000 was made, have within the last few days been purchased from the liquidator by the Wigan Rolling Mills Company for the sum of £12,500. The works of the Wigan Rolling Company have been dle for some time, but these, I understand, will now be restarted in conjunction with the Ince Rolling Mills, which are in full operation.

There is also a good deal of foreign work stirring amongst tool makers, who, as I have pointed out for several weeks past, are generally well employed.

The colliery proprietors in the Manchester district, who have hitherto paid by measure for coal getting, are now generally adopting the weighing clauses of the Mines Registration Act, and at Messrs. Andrew Knowles and Sons' Pendleton collieries, where the new system came into operation last week, I saw a couple of pit bank weighing machines put down by Messrs. Henry Pooley and Son, of Manchester and Liverpool, in which quite a new principle is introduced. These machines are the first of the kind which Messrs. Pooley have as yet put down, and they are so arranged that the use of weights, springs, racks, pinions, and wheels is altogether dispensed with, the principle upon which they are worked being the creation of a vacuum in a column of water. This is effected by a simple arrangement; an ordinary steelyard is connected at the poise end with what may be described as a piston contained in a column of water which takes the place of the usual poise weight. The pressure brought upon the short arm of the steelyard by the colliery tubs passing over the weighing tube causes the piston to be lifted through the water, and the weight is recorded by a finger on a quadrant dial in proportion to the quantity of water displaced. The machines were remarkably quick in their action, six weighs per minute being readily taken over each, and Messrs. Pooley, who are applying the same principle to railway wagon weighing machines, claim that a whole train can be easily weighed without stopping whilst in transit over the weighing tables. Another feature in connection with the machines is the distance at which the weighing tables can be placed from the weighing room, this, in the case of one of the machines at Messrs. Knowles's collieries, being upwards of 73ft. The working parts of the machine are so simple that there is very little liability to disarrangement, the chief danger in this direction being the possible action of the weather upon the water column either by freezing or evaporation, but this is reduced to a minimum by having the apparatus placed under cover in the weighman's office

The works and plant of the Newton Heath Copper Smelting Company, situate at Miles Platting, near Manchester, were on Friday offered for sale by auction at Manchester. The sale, however, attracted only a very small attendance, and no bid whatever was made for the property, which was consequently withdrawn.

In the coal trade the exceptionally active demand experienced during September for all descriptions of fuel suitable for house fire purposes has naturally brought about this month an advance in prices, although the upward movement, as I intimated last week, has been only to a comparatively limited extent. The average prices now being quoted at the pit mouth are about as under:—Best coal, 9s. 6d.; seconds, 7s. to 7s. 6d.; common round coal, 5s. 6d. to 6s. 3d.; burgy, 4s. to 4s. 3d.; and slack, 3s. 3d. to 3s. 6d. per ton.

Barrow.—My notes for some little time back have notified the improvement which has taken place in the hematite market, and this week's transactions still show that a gradual rise is taking place, and gives evidence of being healthy as it gets older. The demand from America is well maintained, while the Continental and home inquiries show much vitality. Stocks, which some months ago accumulated to very undesirable dimensions, have gradually decreased, and the large deliveries which have been made have reduced them within the past week or two very considerably. A heavy tonnage of metal has yet to be delivered. The improved demand which has thus set in, and continues to give increased hopefulness to the iron market, is likely to have some permanency with it, and considering the near approach of winter the demand all round is very good. Quotations have taken an upward tendency, and No. 1 Bessemer is selling at 61s. 6d. per ton at makers' works, No. 3 forge is selling at 59s., while all round qualities fetch 55s. The steel mills are well supplied with work, and activity characterises all the establishments except where repairs are being made. Iron shipbuilders, engineers, and other industries fairly active. Iron ore in good demand, and raisers in many cases are well sold forward. An advance of 1s. to 1s. 6d. per ton may be noted.

THE SHEFFIELD DISTRICT.

(From our own Correspondent.)

A VERY marked improvement has taken place since my last in the value of iron. Common pig irons were in very slight request a month ago. They are now meeting with a ready sale at 2s. per ton advance; medium are 5s. per ton higher, and on superior makes the rise is equal to 10s. per ton. At present there is every evidence that still further advances will shortly be secured. A rise of 2s. to 10s. per ton means a great deal for large houses who have heavy stocks of iron, and it is not surprising therefore to find that the shares in "limited" concerns dealing in coal and iron have promptly responded to the increase in values. In coal, household sorts are in much better demand, the metropolis taking an unusually heavy supply of South Yorkshire and North Derbyshire fuel. An advance in the price of coal has been generally secured this week. Coal for local consumption is 5d. per ton higher, one colliery has raised its price 10d., and for "foreign," *i.e.*, for use outside Sheffield—all coal put on trucks—1s. per ton more is asked. Steam coal averages 6s. 3d. per ton.

In the table-knife department of the cutlery trades orders are coming in freely from the United States, Canada, and Australia. There is a good colonial demand, mainly on account of the failure of the American corn crop, which gives the colonists an opportunity of sending in food produce. Our colonial cousins are now realising on their matured corn, which has been harvested a year or two, and is superior to the present crop. The colonial trade is largely one of barter. If the colonist sells his produce freely in this country, he takes about 90 per cent. of the value in goods manufactured in this country, and receives the balance in cash. The American reverses the order of things. He takes away 90 per cent. of the cash, and leaves but ten in the old country.

I have recently met a number of travellers who have returned from their Irish journeys. They all speak encouragingly of the trade prospects there. A very brisk trade has been done, not only in season goods, such as sickles, scythes, &c., but in cutlery and silver goods, the demand for the latter being a certain sign of returning prosperity. Several very heavy "lines" have recently been taken in Ireland, and firms doing an Irish business anticipate a very good autumn business this season.

The two local companies engaged here in the production of armour-plates—Messrs. John Brown and Co., Atlas Works, and Messrs. Charles Cammell and Co., Cyclops Works—have each secured a heavy order for compound armour-plates. Messrs. Samuda Brothers, of London, are constructing two new ironclads for the Brazilian Government, and 1000 tons of armour-plates have been ordered for one of these vessels. The order has been equally divided between the two companies. Brazil will thus have a war-ship partly armoured with "Ellis" and partly with "Wilson" plates. This important speciality of the Sheffield heavy trades is at present in a very brisk state.

The directors of Messrs. Charles Cammell and Co., Limited, Cyclops Steel and Ironworks, Sheffield, paid on Wednesday an interim dividend of £2 per share, or after the rate of 5 per cent. per annum. This is the same rate as was paid at the corresponding period of last year. The company are busy in all departments of their works.

Mr. F. T. Mappin, M.P., presiding at the meeting of shareholders in the Sheffield Gas Company, on Saturday, said there was some advantage in using the electric light in large places, such as railway stations, but even in these places there was the difficulty that the light sometimes went out. In London, during the last six months, the electric light had gone out eleven times entirely. One of the companies, he added, which had adopted it in the neighbourhood of Sheffield had decided to give it up and return to gas. On inquiry, I found that the chairman meant the Nunnery Colliery, where the electric light has been used for screening coal. Mr. Mappin is not quite correct. The colliery company want a light which they can concentrate on a given spot, instead of being spread over a wide space, and they are experimenting with Bray's burners to see if these are likely to answer the purpose. If gas suits the purpose better, and is equal in other respects, then the electric light will be superseded. Messrs. Tasker, Sons, and Co., engineers and electricians, Sheffield, are arranging with several firms for illuminating their premises with the electric light. A successful experiment was made with their own premises in Station-road on Monday night. An arc light of 2000-candle illuminating power, placed in a reflector, was used.

THE NORTH OF ENGLAND.

(From our own Correspondent.)

THE Cleveland iron market has, after a slight reaction, again become stronger, and a sanguine feeling has taken possession of most of those who are connected with the trade. Sellers are holding back for higher prices, and are particularly averse to contracts for forward delivery. Buyers are, under these circumstances, increasingly anxious to protect themselves in case of a further advance. The official statistics for the month of September are now published, and are more favourable than had generally been anticipated. Notwithstanding that shipments were diminished as compared with August, in the proportion of 78,897 to 84,911 tons, or by 6014 tons, there was a reduction of stocks of 2710 tons. This is the first reduction which has occurred for many months. Taken in connection with the not very favourable shipment statistics, and with the still undiminished production, it would appear as though the local and inland distribution must largely have increased.

Inasmuch as the consumption cannot have proceeded at any materially augmented rate, it is probable that consumers have have increased their stocks all over the country, under the impression that prices were likely to rise. Whatever may be the explanation, there is no doubt but that the tone of the market was on Tuesday very strong and buoyant. The market opened with No. 3 g.m.b. at 42s. 9d. f.o.b., but the price afterwards rose to 43s., and even 43s. 6d. Warrants are in less than usual request, which seems to indicate that warrant holders are trying now to realise, and are pressing their securities upon the market. The market price for them did not rise above 42s. 9d. Forge iron is in less request than No. 3, and the usual difference of 1s. per ton has now risen to 1s. 3d. The stock of pig iron in Connal's Middlesbrough stores stands at 184,983 tons, being a decrease of 1137 tons, as compared with a week previously. At Glasgow the stock is 591,776 tons of hoarding metal on the part of consumers, and a large increase of contracting for future delivery on the part both of consumers and merchants. The enhanced price which has ensued, and caused entirely by wide-spread speculation, has everywhere been mistaken for an improved state of trade, which it is not. Increase of number of contracts made has been confounded with increase of tons of pig iron consumed. Sellers, when they have reported with elation their sales, have made no distinction between selling to a merchant, who simply intends to sell again, and selling to a consumer who would use up the iron.

Turning to the position of the pig iron trade, we see that it is now entirely altered from what it was a month ago. Furnaces then must needs be put out, because trade was bad. Now the trade is no longer bad, will the furnaces still be put out? If so, and if prices have risen 15 per cent. at the very notion, what may they not rise to at the fact? Suppose they rise to 50s. per ton, or higher, will the furnaces still go out? or if out, will they not be put in again? If they are put on again, will prices not fall back to their old level—always supposing that consumption remains steady? At the end of the six months for which the compact was entered into, will not such a collapse in any case take place? In the meantime the ironmasters who have taken upon themselves to interfere with and attempt to control economic laws, will certainly not be allowed to enjoy the sole privilege of interfering. Their apparent and preliminary success has excited other classes. Coal-owners have decided to curtail their production 10 per cent., and colliers in Scotland their labour to the same extent.

Ironworkers in every branch and miners are already uneasy, and they will certainly demand and obtain immediately an increase of wages proportionate to the enhancement in the value of pig iron. Meanwhile the increase of price will certainly cut off some of the more distant markets, which will be taken possession of by competing iron-producing districts.

All the collateral forces inadvertently invoked will combine to produce the collapse which sooner or later is inevitable, and which will probably come at the end of the six months' compact, if not before. When it does come, and the ironmasters have to accept again the previous low prices, they will find their cost of production has been raised in all directions, and the gains they make from contracts now entered into will be slowly filched away from them.

The only thing to save them from this dismal position would be a steady increase of consumption, so as to take up the whole of the current make, and increased by such additions as could be quickly made by setting to work existing idle plants.

Their true and sound policy would have been to set themselves to extend in all directions the consumption of their product. This they personally never attempt to do. They never employ travellers, nor make mercantile journeys themselves. The distribution of their iron they leave entirely to merchants, who are equally interested in pushing any other kinds of iron. The present action of the ironmasters tends, indeed, as has been shown, entirely in the direction of curtailment of consumption and increase in the cost of production, and although they are doubtless obtaining a considerable temporary advantage, they will have to pay dearly for it sooner or later. They have stolen a march upon the public, but that is a device which may be adopted by others besides themselves. They have set themselves temporarily against society, as it were, to obtain by compulsion what could not otherwise be obtained. Society is a large, slow-moving, unsuspecting kind of creature, and not very difficult to drive into a corner, so long as it does not perceive that it is a corner, and that there is no way out without paying. Society, however, is stronger than any section of itself, and it has the power and the will to avenge in its own peculiar way any undue advantage which may be taken of it. Let the ironmasters pause and think in their elation whither they are drifting. It is easy to draw the sword; but those who take the sword are apt to perish by the sword.

NOTES FROM SCOTLAND.

(From our own Correspondent.)

THE resolution of the Scottish ironmasters made simultaneously with those of Cleveland, to damp down a proportion of the blast furnaces, and so limit the production and reduce as much as possible the large additions to stocks, has now been carried into effect. Between Saturday and Monday sixteen furnaces were extinguished, leaving 105 in blast. The output of these sixteen furnaces would be about 3200 tons a week, so that the production will be limited by that arrangement. Is is doubtful whether this will have the effect of altogether stopping the storing of pigs, seeing that in the course of the past week, although the shipments were larger than usual, upwards of 4000 tons were added to the stock in Messrs. Connal and Co.'s stores. The quantity of iron being stored at the makers' works is not ascertained; but the reduction, while it may not give so much relief as was anticipated, can scarcely fail to have a beneficial influence. Towards the close of last week, the market had been wavering; but the actual accomplishment of the makers' resolution has this week brought out a number of fresh buyers, so that prices both of warrants and makers' iron have very decidedly advanced. The pig iron exports were very good, amounting to 16,434 tons, as compared with 12,841 in the preceding week, and 11,725 in the corresponding week of last year.

Business was done in the warrant market on Friday up to 51s. 8½d. per ton. On Monday a strong feeling prevailed, with a large business from 52s. fourteen days to 52s. 8d. cash. The market was irregular on Tuesday, with business at 52s. 10½d. to 53s., and back to 52s. 7½d. cash and 53s. 1½d. to 52s. 9d. one month. On Wednesday the market was strong, at 52s. 6d. to 53s. 4d. cash, and 53s. 5d. fourteen days, closing at 53s. 5d. cash, and 53s. 7d. one month. To-day—Thursday—flat, with business at 53s. 5d. cash, and 53s. 6d. fourteen days, to 52s. 11d. cash, and 53s. one month, closing, buyers at latter prices, sellers near it.

As indicated above, the prices of makers' iron have been somewhat irregular; but a very decided rise took place on Tuesday, to the extent of about 2s. per ton, the quotations now being as follows:—G.m.b., f.o.b. at Glasgow, per ton, No. 1, 58s. 6d.; No. 3, 50s. 6d.; Gartsherrie, 62s. and 54s.; Coltness, 64s. and 54s.; Summerlee, 62s. and 52s.; Langloan, 64s. and 54s.; Carnbroe, 57s. and 51s. 6d.; Calder, 62s. and 53s.; Clyde, 55s. and 51s.; Grangemouth, at Ardrossan, 57s. and 52s.; Eglinton, 54s. and 49s.; Dalmellington, 53s. and 50s.; Shotts, at Leith, 62s. and 53s.; Kinneil, at Bo'ness, 53s. and 50s.; and Carron, at Grangemouth, 53s. 6d. and 51s. 6d. The arrivals of Middlesbrough pig iron have been rather smaller than last week.

The reports from the different localities of the manufactured ironworks are to the effect that trade is improving, and a cheerful feeling everywhere prevails. There has been an advance this week of 10s. per ton in the values of manufactured iron, consequent upon the rise in the price of pig iron. Iron angles are quoted at £6 5s. to £6 10s.; ship plates, £6 17s. 6d.; and boiler plates, £7 5s. Steel angles, £8 10s.; plates, £9 10s.

The coal trade is active, and its prospects are apparently cheering. During the past week the inland demand has been increased by larger purchases being made than usual by persons apprehensive that the prices were about to be raised. It has been no secret that the coalmasters have been anxious to obtain another shilling per ton for their coals, which would enable them to concede the request of the colliers for an increase of wages. On this account the inland trade has been rather brisk, and the demand for export has also been very good.

The miners of Lanarkshire are continuing their agitation with the view of obtaining better wages. Those of Fife and Clackmannan have been unsuccessful in their application. The coalmasters of these counties met at Burntisland a few days ago, Mr. Spowart, of Dunfermline, presiding, when, after discussion, it was resolved to decline complying in the meantime with the miners demand for 6d. per day, on the ground that the present shipping prices do not warrant any advance.

The Clyde shipbuilding trade is in a very prosperous condition just now, and quite a host of new contracts, some of them of great importance, have just been arranged.

WALES AND ADJOINING COUNTIES.

(From our own Correspondent.)

TAFF Vale original stock reached £290 last week. I am not surprised at the effort now making by other companies to get a share of the enormous coal traffic now being worked to Cardiff. The Great Western Railway Co. contemplates going to Parliament next session for powers to construct a line from Quakers-yard to Cyfarthfa works, taking its course by the large collieries of Cyfarthfa, and joining the rail sheds at the works. The idea, so I understand, is to work the whole of the Cyfarthfa traffic just as that of Dowlais is now done, the Great Western Railway finding locomotives and officials. Another line is also in contemplation by the Rhymney and Great Western Railway over the course of the old tramway on which Trevethick ran the first locomotive. Should anything be done at Plymouth Works—nothing is yet fully decided—this line may figure in other ways than on paper. The Clydach railway is making good progress, and I hear of a pair of pits to be speedily sunk there. The new line connecting the Rhondda with Newport is also showing signs that it is in good energetic hands.

I am told that the details of the new Cyfarthfa lease are now all arranged, and that it simply awaits signature. Some little fear has been aroused that after all Cyfarthfa was finally to stop, but the delay was inevitable. Old conditions are gone. Formerly Cyfarthfa only worked the coal it used, and did not sell a ton. Now coal is everything, and iron ore a drug.

Messrs. Crawshay Bros. have several thousand tons yet of old Welsh mine in stock, and this will be used up. I fancy, too, seeing that Bilbao ore is too rich to be used alone, that some mixture of Welsh ore will always be useful. The tone of trade, both in iron and coal, is decidedly good. In the former prices are improving and orders coming in very well.

The Great Western Railway Company is in the market for 10,000 tons of steel bridge rails. The present quotations for iron rails are £5 7s. 6d. to £5 15s. Steel rails remain at £6 to £6 5s.

The total exports of iron and steel last week from the Welsh ports amounted to a little over 5000 tons, of which the American consignments, as usual, figure in the largest proportion. In coal the exports took a more prominent position than usual. In one day last week over 30,000 tons were despatched from Cardiff alone, and the total last week from that port came very close to 140,000 tons, or fully 25,000 tons over the total of the previous week. The total of Newport was about the same as the preceding week, namely, 25,908 tons. Swansea maintained its average, and the total from the whole of the Welsh ports came close to 165,000 tons. There seems a strong probability now, if the output continues at its present high rate, and prices remain as they now are very firm, that at the next examination of books an advance will be made to the colliers. They are working well and tranquilly, and appear to abide with confidence upon the action of the sliding scale. Certainly its action hitherto has been decidedly in their favour, for the last advance was scarcely justified by the prices that had been obtained in the period under examination.

The Government Commission on Mines have been at the Electrical Exhibition in Paris during the preceding week—Sir Geo. Elliott, Mr. Wm. T. Lewis, and others—and their object, I hear, is to see how far the electric light may be used with safety in the fiery veins of South Wales. This is a question of the greatest importance. In the Rhondda Valley collieries it is well known that the working of a colliery discharges a great quantity of gas per minute, and nothing but the greatest attention to ventilation and the most watchful care prevent a calamity. The rigid prosecution of all colliers found smoking, or with pipes in their possession, has given immunity of late, and it is gratifying to record that the mass of the colliers now support the managers in detecting offenders.

A sad accident occurred at the sinking of Tynywain pit, near Bridgend, last week; four men were killed, and several severely injured.

At Swansea serious efforts are now being made to get the preliminary notices ready for the Rhondda and Swansea Railway. I am assured that no labour or expense will be spared the next session.

The award of the adjudicators in the dispute between the Treforest Tin-plate Company and their men has been rejected, and a strike is imminent.

Tin-plate trade continues unsatisfactory, principally from the action of the men. Business is slightly improved.

In patent fuel Swansea is taking a brisk lead, having despatched no less than 8000 tons last week.

Preparations are on foot for tapping the Rhondda by no less than four railways. One of the principal is the revival of Mr. Thomas Josephs' scheme for a connection with Swansea.

Bilbao ore is at 15s. per ton. The price has advanced 1s. during the last fortnight.

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 annoyance both to themselves and to the Patent-office officials by giving the number of the page of* THE ENGINEER *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 ENGINEER *Index and giving the numbers there found, which only refer to pages, in place of turning to those pages and finding 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.

27th September, 1881.

4150. Displaying Articles, F. McIlvenna, Liverpool.
4151. Fireplaces, &c., W. Thompson.—(*J. Cook, U.S.*)
4152. Heating Buildings, W. Lake.—(*B. Hawley, U.S.*)
4153. Stop-cocks, H. Hughes, Leicester.
4154. Valves, J. Thompson.—(*W. Thompson, Ireland.*)
4155. Navigable Vessels, J. Simpson, Liverpool.
4156. Floating Batteries, A. Longsdon.—(*A. Krupp, Essen, Germany.*)
4157. Reflectors, F. H. and F. A. Hamilton, London.
4158. Rotary Blowers, &c., F. M. Roots, London.
4159. Book-binding, W. Morgan-Brown.—(*E. S. Boynton, Bridgeport, U.S.*)
4160. Tunnelling, &c., F. B. Dœring, Trefriw, N.W.
4161. Band Wheels, &c., A. Goodwin, London.
4162. Paper Pulp, H. Olrick.—(*M. L. Keen, U.S.*)
4163. Treating Brewers' Waste, A. G. Salamon, Clapham Park, London.
4164. Chronographs, W. H. Douglas, Stourbridge.
4165. Telephone Exchange Apparatus, E. de Pass.—(*F. Shaw and W. A. Childs, New York, U.S.*)
4166. Barrels, W. Smedley, Burton-on-Trent.
4167. Bicycle Springs, &c., J. F. Walters, London.
4168. Governing Apparatus, W. P. Thompson.—(*Prof. J. W. Langley, Ann Arbor, U.S.*)
4169. Combustion of Gas, &c., F. W. Stokes, London.
4170. Corking Machines, C. Farrow, London.
4171. Hydraulic Cranes, C. R. Parkes, London.
4172. Rousing Beer, F. Miller, Brightlingsea.
4173. Applying Organ Pedals to Pianofortes, H. J. Rummens, Brixton, London.
4174. Electric Lamps, E. G. Brewer.—(*T. Edison, U.S.*)
4175. Crushing Mill, W. P. Savage, West Winch, Lynn.

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4176. Preparing Clay, J. Gillespie, Garnkirk.
4177. Smoke-consuming Firegrates, G. E. Wolff, Hamburg, Germany.
4178. Superheating Steam, C. D. Abel.—(*A. Estrade, Perpignan, France.*)
4179. Carding Engines, J. Beard, Ashton-under-Lyne.
4180. Steam Boilers, C. W. King, Manchester
4181. Walking-stick, &c., L. M. Promis, U.S.
4182. Making Paper, &c., G. Tidcombe, jun., Watford.
4183. Bricks, R. Stone, London.
4184. Printers' Type, W. Lake.—(*J. Perrachon, France.*)
4185. Calcareous Bricks, F. H. F. Engel.—(*J. A. A. Renck, Wickendorf, Germany.*)
4186. German Yeast, G. W. von Nawrocki.—(*C. Paulmann, Hanover, Germany.*)
4187. Heating Water, G. W. Wigner and R. H. Harland, London.

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4188. Sun Blinds, G. Hatton, Southport.
4189. Steam Winches, E. Latham, Birkenhead.
4190. Steam Engines, H. S. Swift, London.
4191. Gas Stoves, G. J. Cox, Maidstone.
4192. Ventilating Ships, J. H. Johnson.—(*C. Archer, Norway.*)
4193. Electric Lamps, C. H. Gimingham, Newcastle-on-Tyne.
4194. Signals, F. W. Durham, New Barnet.
4195. Coating Iron, C. J. Davidson, Wolverhampton.
4196. Consolidating Scrap Iron, &c., W. R. Lake. (*H. Revsch, Dillingen-on-the-Saar, Germany.*)
4197. Umbrellas, J. Minière, Quai de Valmy, Paris.
4198. Armour-plates, W. Lake.—(*H. Revsch, Germany.*)
4199. Glass Bottles, A. Michel, Brussels.
4200. Brush Receiver, A. Bottin, Brussels.
4201. Oxide of Iron, E. A. Parnell, Swansea.
4202. Electric Lamps, J. Swan, Newcastle-on-Tyne.
4203. Heating, &c., Liquids, J. T. Goudie, Glasgow.
4204. Securing Doors, &c., H. Parsons, London.
4205. Arranging, &c., Needles for Papering, V. Milward, Redditch.
4206. Washing Clothes, T. W. Walker, Hanley.
4207. Dynamo-electric Machines, C. A. Barlow.—(*A. de Meritens, Paris.*)
4208. Bottle Stands, J. Meeson, Sheffield.
4209. Cutlery, L. Meyer.—(*L. Frobeen, Germany.*)
4210. Boats, S. Pitt. -(*R. P. Pictet, Geneva.*)
4211. Feeder for Marine Guns, R. H. Brandon.—(*The Gatling Gun Company, Hartford, U.S.*)
4212. Purifying Sewage, P. Spence, Manchester.
4213. Drying Fabrics, J. Worrall, Salford.
4214. Treating Seaweed, H. E. Newton.—(*L. de Roussen, Paris.*)
4215. Knitting Machinery. W. H. McNary, Brooklyn.
4216. Protecting Buildings from Fire, E. Leonard, Philadelphia, U.S.
4217. Weighing Machines, T. Moore, South Stockton-on-Tees.

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4218. Treating Mineral Pyrites, &c., J. R. Francis.—(*H. Wurtz, New York, U.S.*)
4219. Securing Knobs, J. Hill, London.
4220. Metal Wheels, W. R. Lake.—(*L. May, Austro-Hungary.*)
4221. Purses, W. Morgan-Brown.—(*F. W. Schwarz, Germany.*)
4222. Safety Valves, A. C. Henderson.—(*V. Bablon, Paris.*)
4223. Gas Motor Engines, C. W. King, Manchester.
4224. Presses, H. Springmann.—(*The Berlin Maschinenbau-Actien-Gesellschaft, Berlin.*)
4225. Colliery Corves, &c., J. Trippett and F. Hallam, Sheffield.
4226. Window Sashes, C. Hook, Bridgwater.
4227. Insulators, J. Lyon, St. Helen's.
4228. Receptacles for Watches, &c., T. Hughes, Regent-place, Birmingham.
4229. Composing, &c., Type, H. J. Haddan.—(*C. G. Fischer, Schlos Holte, and A. von Langen, Germany.*)
4230. Carding Cans, H. J. Haddan.—(*Galmiche-Narjoz,*
4231. Feeding-bottles, H. J. Haddan.—(*F. Klingspor, Siegen, Germany.*)
4232. Watch Winders, H. J. Haddan.—(*J. B. Etcheverry, La Teste, France.*)
4233. Weighing Wool, H. Haddan.—(*J. Gebhart, U.S.*)
4234. India-rubber, H. J. Haddan.—(*Prof. Dr. U. Kreusler, Germany, and Dr. E. Budde, Rome.*)
4235. Pumps, H. J. Haddan.—(*C. Arentsen, Norway.*)
4236. Steam Generator Incrustation Preventive, H. J. Haddan.—(*I. F. Baudet, France.*)
4237. Mixing Flour, H. Haddan.—(*C. Le Mee, France.*)
4238. Protecting Engines, C. Colwell, Southtown.
4239. Pressure-regulating Apparatus for Gas, J. C. Stevenson, Layland-street, Liverpool.
4240. Corrugated Plates, &c., R. Armitage and T. Gillott, Farnley Ironwerks, near Leeds.
4241. Bone Black, A. W. L. Reddie.—(*R. A. Chesebrough, New York, U.S.*)
4242. Shutting Off the Supply of Gas, &c., A. Aron.—(*A. Silvain, Fribourg, France.*)
4243. Generating Steam, G. W. Wigner, London.
4244. Motor Engines, C. D. Abel.—(*J. Spiel, Berlin.*)
4245. Saddles, J. E. Purdon, London.

1st October, 1881.

4246. Hops, A. Walker.--(*J. Walker, U.S.*)
4247. Coupling, &c., Railway Wagons, J. Jackson, Kirkintilloch and T. Ballantyne, Uddingston.
4248. Lamp Burners, B. Schwartz and R. Huppertsberg, Berlin.
4249. Umbrellas, J. Minière, Paris.
4250. Separating Gases, E. P. Alexander.—(*H. Haug, Germany.*)
4251. Floorcloth, F. Versmann, New Charlton.
4252. Ornamenting Surfaces, A. N. Hopkins, Birmingham, and G. Hatton, Kidderminster.
4253. Feeding Fuel, J. McMillan, Glasgow.
4254. Lifts, M. T. Medway, New-cross, London.
4255. Secondary Galvanic Batteries, &c., A. Watt, Liverpool.
4256. Raising, &c., Liquids, J. W. Lowther.—(*W. Sharnock and T. Ormston, Serpukoff.*)
4257. Gas Stoves, J. Wadsworth, Manchester.
4258. Looms, W. Ashworth, Crowther-street, Burnley.
4259. Registering, H. H. M. Smith, London.
4260. Folding Ladder, &c., W. Clark.—(*A. Schlaefli, Soleure, Switzerland.*)
4261. Cutting, &c., Weeds, G. Hamit, Haddenham.
4262. Trans-shipping Salt, &c., R. Verdin, Northwich.
4263. Actuating Steam Boiler Dampers, G. Wainwright, Sheffield.
4264. Tyicycles, G. Schulz & W. Harrison, Manchester.
4265. Rotary Valves, P. G. B. Westmacott, Newcastle-on-Tyne.
4266. Furniture Cord, L. A. Walters and A. George, Newgate-street, London.
4267. Exhibiting Apparatus, W. R. Lake.—(*T. L. Jones, St. Louis, U.S.*)
4268. Traction Engines, W. Wilkinson, Wigan.
4269. Sewing Machines, F. Cutlan, Cardiff.
4270. Constructing Foundations, E. A. Brydges.—(*G. Gregersem, Budapest.*)
4271. Electro-magnetic Apparatus, W. R. Lake.—(*A. D. Maikoff and N. de Kabath, Paris.*)

3rd October, 1881.

4272. Scouring Wool, J. McNaught and W. McNaught, jun., Rochdale.
4273. Grinding Soda, R. H. Davis, Liverpool.
4274. Stowing, &c., Ships' Boats, I. Timmis, London.
4275. Steam Boilers, J. L. Rastrick, London.
4276. Steam Boilers, C. Pieper.—(*A. Knaudt, Prussia.*)
4277. Food, E. J. T. Digby, London.
4278. Sliding Seats, H. Goatley, Medley.
4279. Printing Machines, H. Jullien, Brussels.
4280. Finishing Nuts, &c., J. P. Binns, Halifax.
4281. Magnesia, F. Wirth.—(*A. Blumenthal, Germany.*)
4282. Lozenges, J. L. Collier, Rochdale.
4283. Drying Grain, J. Coultas, Grantham.
4284. Distilling Shale, G. T. Beilby, Mid Calder.
4285. Printing, &c., W. Conquest.—(*R. Hoe & Co., U.S.*)
4286. Dyeing, J. R. Beard and C. Faesch, Chester.
4287. Cheque Valve, M. Merichenski, London.
4288. Gas Engines, R. Simon and F. Wertenbruch, Nottingham.
4289. Harrows, A. M. Clark.—(*T. Haxton and G. Beattie, New Zealand.*)
4290. Printing Floorcloth, &c., W. R. Lake.—(*C. E. Benedict, New York, U.S.*)

Inventions Protected for Six Months on deposit of Complete Specifications.

4154. Valves, J. G. Thompson, Little Guildford-street, London.—A communication from W. J. F. Thompson, Cashirseveen Camp, Kerry, Ireland.—27*th September*, 1881.
4158. Rotary Blowers and Pumps, F. M. Roots, Chancery-lane, London.—27*th September*, 1881.
4168. Governing Apparatus for Magneto-electric, &c., Machines, W. P. Thompson, High Holborn, London.—A communication from Prof. J. W. Langley, Ann Arbor, U.S.—27*th September*, 1881.
4211. Cartridge Feeder for Machine Guns, R. H. Brandon, Paris.—A communication by the Gatling Gun Company, Hartford, Connecticut, U.S.—29*th Septemner*, 1881.
4283. Weighing Wool, H. J. Haddan, London.—A communication from J. F. Gebhart, New Albany, U.S.—30*th September*, 1881.
4234. Treating India-rubber, H. J. Haddan, London.—A communication from Prof. Dr. U. Kreusler, Germany, and Dr. E. Budde, Rome.—30*th September*, 1881.

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

3807. Stoppers, &c., L. Vallet, Liverpool.—27*th September*, 1878.
3826. Springs, T. Bradford, Manchester.—28*th September*, 1878.
3822. Applying Chineeing, W. A. Barlow, London.—27*th September*, 1878.
3868. Corkscrews, E. P. Alexander, Southampton-buildings, London.—2*nd October*, 1878.
3878. Breech-loading Fire-arms, A. M. Clark, Chancery-lane, London.—2*nd October*, 1878.
3861. Composition for Railway Arches, H. Lockwood, Manchester.—1*st October*, 1878.
3848. Equalising Tension, T. G. F. Dolby, London.—30*th September*, 1878.
3862. Cooling, &c., the Temperature in Cabins, &c., H. and J. Bell and J. J. Coleman, Glasgow.—1*st October*, 1878.
3988. Obtaining Light by Electricity, St. G. L. Fox, Telegraph-street, London. - 9*th October*, 1878.
4043. Applying Electricity to Lighting, &c., Purposes, St. G. L. Fox, London.—12*th October*, 1878.
4526. Obtaining Light by Electricity, St. G. L. Fox, London.—14*th November*, 1878.
3877. Toilet Mirror Holders, H. M. Williams, London.—2*nd October*, 1878.
3891. Combs, J. L. Nelson, Aberdeen.—3*rd October*, 1878.
3892. Telephones, J. H. Johnson, Lincoln's-inn-fields, London.—3*rd October*, 1878.
3989. Screws, E. T. Periam, Birmingham.—9*th October*, 1878.
3876. Musical Instruments, M. Gally, Golden-square, London.—2*nd October*, 1878.
3902. Spindles, W. R. Lake, Southampton-buildings, London.—3*rd October*, 1878.
3928. Metallic, &c., Tubes, A. Clifford, Birmingham.—5*th October*, 1878.
3992. Plumbago Crucibles, S. A. Peto, South Kensington, London.—9*th October*, 1878.

Patents on which the Stamp Duty of £100 has been paid.

3338. Washing, &c., T. Bradford, High Holborn, London.—29*th September*, 1874.
3334. Actuating Railway Brakes, E. D. Barker, Bedford-row, London.—29*th September*, 1874.
3425. Cooling, &c., J. Siddeley and F. N. Mackay, Liverpool.—7*th October*, 1874.
3481. Sash Lines, &c., G. E. Mewis, Birmingham.—10*th October*, 1874.

Notices of Intention to Proceed with Applications.

Last day for filing opposition, 21*st October*, 1881.

2275. Reaping Machines, A. C. Bamlett, Thirsk.—24*th May*, 1881.
2280. Gas Engines, S. Ford, South Lambeth, London.—24*th May*, 1881.
2284. Steam Generators, G. Allibon, T. Turton, and J. Jones, Liverpool.—25*th May*, 1881.
2292. Laying Gas, &c., Pipes, D. Nichols, Leeds.—25*th May*, 1881.
2296. Ring Frame Bobbins, J. W. Wilson, Barnsley.—25*th May*, 1881.
2302. Explosive Compound, S. H. Hinde, Bishopsgate-street, London. — A communication from R. E. Sjöberg.—25*th May*, 1881.
2307. Shields, I. A. Canfield, Middletown, U.S.—26*th May*, 1881.
2319. Ploughs, S. Pitt, Sutton.—A communication from S. Seegmiller and R. Ransford.—26*th May*, 1881.
2320. Finings for Beer, &c., G. W. Ewens, Percy Hall, Bedminster.—26*th May*, 1881.
2330. Castors, A. C. Fontaine, Bennett-street, Fitzroy-square, London.—27*th May*, 1881.
2333. Vessels, J. F. Jaquess, Chancery-lane, London.—Com. from W. Atwood.—27*th May*, 1881.
2405. Folding Arm-chair, W. H. Beck, Cannon-street, London.—Com. from E. Dubreil.—31*st May*, 1881.
2408. Raising, &c., Water, A. Clark, Lancaster-gate, London.—31*st May*, 1881.
2450. Stencils, D. Gestetner, South-street, Thurloe-square, London.—3*rd June*, 1881.
2471. Cutting and Bruising Straw, J. M. Gorham, New-road, Lincoln.—7*th June*, 1881.
2481. Spinning Machinery, W. R. Lake, Southampton-buildings, London.—A communication from E. and A. W. Harris.—7*th June*, 1881.
2519. Packages for Paint, &c , R. R. Gray, Liverpool.—7*th June*, 1881.
2520. Protectors from Drowning, &c., J. Sexton, Great Winchester-street, London.—9*th June*, 1881.
2560. Motive Power, W. R. Lake, London.—A communication from I. L. Landis.—13*th June*, 1881.
2579. Moulds, A. M. Clark, London.—Com. from H. D. Atwood and W. Driscoll.—14*th June*, 1881.
2605. Sun-lights, W. T. Sugg, Vincent-street, Westminster.—15*th June*, 1881.
2624. Gas Cooking Stoves, W. T. Sugg, Vincent-street, Westminster.—16*th June*, 1881.
2687. Governor for Steam Engines, J. M. Gorham, New-road, Lincoln.—20*th June*, 1881.
2742. Calendering, &c., H. H. Lake, London.—Com. from C. Chambers, jun.—22*nd June*, 1881.
2815. Coating Bags, &c., A. M. Clark, Chancery-lane, London.—Com. from I. T. Tichenor.—27*th June*, 1881.
3016. Velocipedes, G. L. O. Davidson, Hanover-square, London.—9*th July*, 1881.
3043. Bicycles, &c., G. J. T. Barrett, Gray's-inn-square, London.—12*th July*, 1881.
3173. Raising Beer, &c., P. J. Catterall and E. Birch, Manchester.—21*st July*, 1881.
3243. Combing Fibres, G. Little, Oldham.—25*th July*, 1881.
3329. Ploughs, J. Cooke, Lindum Works, Lincoln.—1*st August*, 1881.
3424. Driving or Propelling Shaft, G. M. Cruikshank, Glasgow.—A communication from A. Houston.—8*th August*, 1881.
3478. Turning, &c., Machinery, R. A. Lee, Victoria-yard, Broadway, Westminster.—11*th August*, 1881.
3483. Electric Conductors, Chancery-lane, London.—Com. from T. A. Edison.—11*th August*, 1881.
3580. Weighing Machines, T. H. Ward, Tipton.—17*th August*, 1881.
3581. Weight Indicator, T. H. Ward, Tipton.—17*th August*, 1881.
3619. Purifying Coal Gas, C. C. Walker, Lilleshall, and W. T. Walker, Highgate.—19*th August*, 1881.
3667. Drilling Machinery, W. R. Lake, London.—Com. from L. W. Tracy.—23*rd August*, 1881.
3807. Drying Rice, &c., A. W. Gillman & S. Spencer, Castle Brewery, Southwark.—1*st September*, 1881.
4154. Valves, J. G. Thomson, London.—A communication from W. J. F. Thomson.—27*th September*, 1881.

Last day for filing opposition, 25*th October*, 1881.

2351. Affixing Steps or Stairs, &c., T. A. Brockelbank, Old Broad-street, London.—28*th May*, 1881.
2357. Screw Propellers, Capt. G. Peacock, Regent House, Starcross.—28*th May*, 1881.
2358. Arranging Orchestras, H. J. Murcott, Endell-street, Long-acre, London.—28*th May*, 1881.
2363. Cleaning Milk Cans, S. J. Pocock, Vauxhall, London.—30*th May*, 1881.
2366. Covers, F. H. F. Engel, Hamburg.—Com. from Guhl and Harbeck.—30*th May*, 1881.
2367. Water-meters, &c., J. C. Dennert and G. G. Lind.—30*th May*, 1881.
2368. Hand-carts, A. Specht, Hamburg.—A communication from O. Schumann.—30*th May*, 1881.
2369. Electric Lamp, S. Cohné, Gracechurch-street, London.—30*th May*, 1881.
2372. Actuating Signals, &c., B. C. Scott, Regent's Park, London.—30*th May*, 1881.
2383. Grinding, &c., Machinery, F. M'D. Robertson, Croydon, and R. Gubbins, New-cross.—31*st May*, 1881.
2387. Grinding Apparatus, H. Gibbons, Kennet Ironworks, Hungerford.—31*st May*, 1881.
2392. Harrow, J. McKinley, Coleman-street, London.—Com. from R. Cockerell.—31*st May*, 1881.
2402. Electric Lamps, G. Hawkes, Victoria-chambers, Westminster, and R. Bowman, Ipswich.—31*st May*, 1881.
2403. Paint, D. Brown, Falmouth, and R. Michell, Combe Hill.—31*st May*, 1881.
2417. Cutting Grass, &c., H. H. Duke, Westbury.—1*st June*, 1881.
2418. Metallic Fencing, &c., E. Steer and J. Sheldon, Birmingham.—1*st June*, 1881.
2429. Planishing, &c., Metals, H. Mainwaring, Manchester.—2*nd June*, 1881.
2433. Potato Diggers, W. Dewar, Strathmartin.—2*nd June*, 1881.
2434. Looms, G. H. Smith, Manchester.—2*nd June*, 1881.
2436. Breech-loading Rifles, R. Hibbert, Manchester.—Com. from V. Saverbrey.—2*nd June*, 1881.
2444. Middling Purifiers, W. H. Dickey, Mark-lane, London.—Partly a communication from G. T. Smith.—3*rd June*, 1881.
2453. Roadways, &c., J. Herd, Birmingham.—3*rd June*, 1881.
2455. Fog-horns, J. Sturge and J. Grubb, Birmingham.—3*rd June*, 1881.
2480. Turbines, W. R. Lake, London.—A communication from W. F. Jobbins, G. E. Raymond, and I. Sherck.—7*th June*, 1881.
2522. Chains, J. Imray, Southampton-buildings, London.—Com. from E. Oury.—9*th June*, 1881.
2682. Soaps, W. Green, St. Lawrence, Thanet.—18*th June*, 1881.
2818. Preventing the Escape of Sparks, &c., W. R. Lake, Southampton-buildings, London.—A communication from A. Petzold.—27*th June*, 1881.
3332. Road-making Engines, A. Lamberton, Coatbridge.—2*nd August*, 1881.
3815. Stay Busks, H. and B. G. Simpson, Sheffield.—2*nd September*, 1881.
3863. Ornamental Tiles, G. Jobson, Derby. — 6*th September*, 1881.
3955. Lamps, J. Whitehead, Southport.—13*th September*, 1881.
4011. Electric Lamps, B. Hunt, Serle-street, London.—Com. from A. E. Brown.—17*th September*, 1881.
4046. Utilising, &c., Heat, H. Defty and C. C. Braithwaite, Queen Victoria-street, London.—20*th September*, 1881.
4110. Fire-arms, H. H. Lake, London.—A communication from J. H. Bullard.—23*rd September*, 1881.

Patents Sealed.

(*List of Letters Patent which passed the Great Seal on the 30th September*, 1881.)

1420. Glazing, J. Russell, Charing-cross, London.—31*st March*, 1881.
1436. Photography, L. Warnerke, Champion-hill, London.—1*st April*, 1881.
1444. Millstones, W. R. Lake, Southampton-buildings, London.—1*st April*, 1881.
1452. Tills, T. E. Boyce, Westbourne Park, London.—2*nd April*, 1881.
1465. Spinning Apparatus, G. Bodden, Oldham.—4*th April*, 1881.
1470. Sugar, A. M. Clark, Chancery-lane, London.—4*th April*, 1881.
1473. Pipes, Syphon Boxes, &c., G. B. Jerram, Walthamstow.—5*th April*, 1881.
1489. Flour, A. Crabtree and J. Jackson, Bolton.—5*th April*, 1881.
1490. Fibrous Material, W R. Lake, Southampton-buildings, London.—5*th April*, 1881.
1492. Looms, H. A. Foster, Queensbury.—5*th April*, 1881.
1499. Treating Tobacco, J. Hopkinson, Manchester, and F. Wills, Bristol.—6*th April*, 1881.
1503. Cupola Furnaces, H. A. Dufrené, South-street, Finsbury, London.—6*th April*, 1881.
1509. Water-heaters, &c., H. Schofield, Stannington.—6*th April*, 1881.
1513. Vessels, J. Taylor, Gracechurch-street, London.—6*th April*, 1881.
1524. Pickers, M. Holt, Todmorden.—7*th April*, 1881.
1531. Breech-loading Fire-arms, P. T. Godsal, 52nd Regiment Light Infantry.—7*th April*, 1881.
1617. Sewing Machines, F. Heyrich and F. Quenstedt, Berlin.—13*th April*, 1881.
1651. Excavating Tunnels, &c., J. D. Brunton, Great George-street, Westminster.—14*th April*, 1881.
1652. Propelling Ships, &c., J. H. Johnson, Lincoln's-inn-fields, London.—14*th April*, 1881.
1653. Electric Lamps, J. H. Johnson, Lincoln's-inn-fields, London.—14*th April*, 1881.
1657. Fabrics, W. Thacker, Nottingham.—14*th April*, 1881.
1706. Mechanical Movement, A. M. Clark, Chancery-lane, London.—19*th April*, 1881.
1712. Odometers, E. S. Ritchie, Massachusetts, U.S.—20*th April*, 1881.
1733. Keyless Watches, H. A. Dufrené, South-street, Finsbury, London.—21*st April*, 1881.
1737. Nut-crackers, L. A. Groth, Finsbury-pavement, London.—22*nd April*, 1881.
1811. Treating Vegetable Textile Materials, W. R. Lake, Southampton-buildings, London.—26*th April*, 1881.
1834. Reflectors, H. J. Haddan, Strand, London.—28*th April*, 1881.
1835. Current Governors, H. J. Haddan, Strand, London.—28*th April*, 1881.
2036. Ticket Delivery Apparatus, J. J. Mielecki, George-street, Portman-square, London.—10*th May*, 1881.
2404. Portable Effervescent Fountain, R. Seager, Ipswich.—31*st May*, 1881.
2663. Rope Compresser, W. McGlashan, Leith.—18*th June*, 1881.
2952. Preparing Textile Materials, L. A. Groth, Finsbury-pavement, London.—6*th July*, 1881.
3011. Tobacco-pipe Joints, W. H. Sharman, Highbury.—8*th July*, 1881.
3049. Electric Lamps, F. W. Haddan, Strand, London.—12*th July*, 1881.
3074. Turbines, F. W. Haddan, Kensington, London.—14*th July*, 1881.
3091. Fluid Meters, T. R. and T. W. Harding, Leeds.—15*th July*, 1881.
3100. Motive Power, W. R. Lake, Southampton-buildings, London.—15*th July*, 1881.
3158. Weighing Cranes, L. A. Groth, Finsbury-pavement, London.—20*th July*, 1881.
3225. Sawing Machines, T. N. Robinson, Rochdale.—23*rd July*, 1881.
3251. Supplying Water to Marine Engines, D. Halpin, Victoria-chambers, Westminster.—25*th July*, 1881.
3269. Circular Knitting Machines, J. Bradley, Lowell.—26*th July*, 1881.
3307. Weighing Machines, J. Cluett and W. Hanchard, Stafford-road, North Bow, London.—28*th July*, 1881.

(*List of Letters Patent which passed the Great Seal on the 4th October*, 1881.)

533. Bicycles, &c., W. Mickelwright, Shepherd's-bush, and A. G. Gladwyn, Hammersmith.—8*th February*, 1881.
1471. Filling Apparatus, G. Gilders, Stratford-by-Bow, London.—5*th April*, 1881.
1497. Varnishing, &c., Paper, W. and S. Rawcliffe, Liverpool.—6*th April*, 1881.
1517. Photographic, &c., Apparatus, E. Edwards, Southampton-buildings, London.—7*th April*, 1881.
1521. Shuttles, J. Lomax and R. Dawson, Over Darwen.—7*th April*, 1881.
1536. Electric Lamps, J. L. A. Dupont-Auberville, Paris.—8*th April*, 1881.
1538. Treating Paper, H. J. Haddan, Strand, London.—8*th April*, 1881.
1544. Drying Coffee, J. Walter, Leadenhall-street, London.—8*th April*, 1881.
1546. Menstrual Apparatus, F. A. C. Grœbert, St George's-street, Peckham.—8*th April*, 1881.

1547. ARTIFICIAL BUTTER, E. G. Brewer, Chancery-lane, London.—*8th April*, 1881.
1551. SPEED INDICATORS, W. Stroudley, Brighton.—*9th April*, 1881.
1555. TREATING, &c., BITUMINOUS SUBSTANCES, J. G. Tongue, Chancery-lane, London.—*9th April*, 1881.
1590. PIPE JOINTS, T. Lloyd, Winchester.—*12th April*, 1881.
1598. HORSESHOES, G. W. von Nawrocki, Leipzigerstrasse, Berlin.—*12th April*, 1881.
1605. EXTRACTING OXIDES, &c., from ORES, A. M. Clark, Chancery-lane, London.—*12th April*, 1881.
1609. MEASURING, &c., LIQUIDS, J. H. Kidd, Wrexham.—*13th April*, 1881.
1613. SIGNALLING, &c., APPARATUS, W. R. Lake, Southampton-buildings, London.—*13th April*, 1881.
1616. SASH BARS, F. A. Lawrence, Stevenage.—*13th April*, 1881.
1650. STEAM PUMPS, T. H. Ward, Tipton.—*14th April*, 1881.
1654. ASCERTAINING the CAPACITY of CASKS, &c., A. M. Clark, Chancery-lane, London.—*14th April*, 1881.
1658. SUGAR, H. E. Newton, Chancery-lane, London.—*14th April*, 1881.
1672. WALKING-STICK SKETCHING EASEL, A. J. Welsby, Clare-street, Bristol.—*16th April*, 1881.
1679. TELEPHONES, &c., J. N. Culbertson, Antwerp, and J. W. Brown, Upper Kennington-lane, London.—*16th April*, 1881.
1714. HEATING, &c., APPARATUS, C. R. Stevens, Lewisham.—*20th April*, 1881.
1744. PREVENTING EXPLOSIONS, C. D. Abel, Southampton-buildings, London.—*22nd April*, 1881.
1804. CULTIVATING PLANTS, J. Imray, Southampton-buildings, London.—*26th April*, 1881.
1809. TELEGRAPHIC CABLES, W. R. Lake, Southampton-buildings, London.—*26th April*, 1881.
1864. VELOCIPEDE, J. E. Hatch, Camberwell, London.—*29th April*, 1881.
2025. ELLIPTIC SPRING, A. M. Clark, Chancery-lane, London.—*9th May*, 1881.
2218. PADLOCKS, T. Harby, South Albert-road, Sefton Park, Liverpool.—*20th May*, 1881.
2325. CRUSHING, &c., ORES, A. M. Clark, Chancery-lane, London.—*26th May*, 1881.
2326. ASH-PANS, A. M. Clark, Chancery-lane, London.—*26th May*, 1881.
2502. STEAM GRAIN DRIERS, A. M. Clark, Chancery-lane, London.—*8th June*, 1881.
2630. STOPPERS for BOTTLES, J. Massey, Kirkwhite-street, Nottingham.—*16th June*, 1881.
2632. PLAITING FIBROUS, &c., MATERIALS, N. Fraser, Arbroath.—*16th June*, 1881.
2670. MOTIVE POWER, B. J. B. Mills, Southampton-buildings, London.—*18th June*, 1881.
2672. TREATING TAN or SPENT BARK, W. Guest, Deptford.—*18th June*, 1881.
2872. TREATING PAPER, F. Nowlan, Soho-square, London.—*1st July*, 1881.
2896. WHEELS, W. H. Carmont, Manchester.—*2nd July*, 1881.
3082. FOOD for HORSES, &c., J. Long, Reading.—*14th July*, 1881.
3083. FOOD for HORSES, &c., J. Long, Reading.—*14th July*, 1881.
3282. CAOUTCHOUC SHOES, S. Pitt, Sutton.—*26th July*, 1881.
3308. BRONZE, H. H. Vivian, Park Wern, Swansea.—*28th July*, 1881.
3320. FITTING the HOLDS of COLLIERS, C. H. Mowll, Dover.—*30th July*, 1881.
3326. OPERATING the VALVES of ENGINES, H. H. Lake, Southampton-buildings, London.—*30th July*, 1881.
3342. RAILWAY SLEEPERS, H. H. Lake, Southampton-buildings, London.—*2nd August*, 1881.
3388. UNDERGROUND PIPES, C. Detrick, Philadelphia, U.S.—*4th August*, 1881.
3396. CAR COUPLINGS, A. J. Boult, High Holborn, London.—*5th August*, 1881.

List of Specifications published during the week ending October 1st, 1881.

5282, 4d.; 417, 2d.; 529, 4d.; 674, 8d.; 695, 6d.; 712, 10d.; 716, 8d.; 730, 6d.; 758, 6d.; 768, 6d.; 773, 6d.; 777, 8d.; 778, 6d.; 781, 6d.; 786, 4d.; 789, 8d.; 795, 6d.; 803, 10d.; 806, 4d.; 808, 4d.; 809, 6d.; 810, 6d.; 822, 4d.; 824, 6d.; 829, 4d.; 831, 8d.; 833, 6d.; 834, 8d.; 835, 6d.; 839, 4d.; 841, 8d.; 846, 4d.; 847, 6d.; 848, 8d.; 850, 6d.; 851, 6d.; 856, 6d.; 857, 2d.; 859, 6d.; 860, 6d.; 861, 6d.; 862, 2d.; 863, 6d.; 864, 2d.; 865, 6d.; 866, 6d.; 867, 6d.; 868, 4d.; 869, 8d.; 870, 2d.; 871, 6d.; 872, 2d.; 874, 6d.; 875, 4d.; 878, 2d.; 879, 4d.; 880, 6d.; 881, 6d.; 882, 6d.; 883, 6d.; 884, 6d.; 885, 2d.; 886, 6d.; 887, 6d.; 888, 6d.; 889, 2d.; 890, 4d.; 891, 6d.; 892, 2d.; 893, 8d.; 894, 6d.; 895, 2d.; 896, 6d.; 898, 6d.; 900, 2d.; 903, 4d.; 905, 6d.; 906, 6d.; 907, 2d.; 208, 8d.; 911, 6d.; 912, 6d.; 814, 2d.; 915, 6d.; 916, 2d.; 917, 2d.; 918, 8d.; 919, 6d.; 920, 2d.; 922, 4d.; 924, 6d.; 926, 2d.; 927, 2d.; 928, 2d.; 929, 6d.; 931, 4d.; 933, 6d.; 936, 2d.; 937, 2d.; 940, 8d.; 946, 6d.; 949, 6d.; 950, 6d.; 951, 6d.; 959, 1s.; 968, 6d.; 977, 6d.; 987, 6d.; 1013, 4d.; 1024, 6d.; 1114, 6d.; 1512, 6d.; 1836, 4d.; 2543, 4d.; 2548, 6d.; 2943, 6d.; 2947, 6d.; 2997, 2d.

*** 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.

ABSTRACTS OF SPECIFICATIONS.

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

417. RAILWAY SIGNALLING APPARATUS, *J. N. Maskelyne.*—*31st January*, 1881.—(*Void.*) 2*d.*

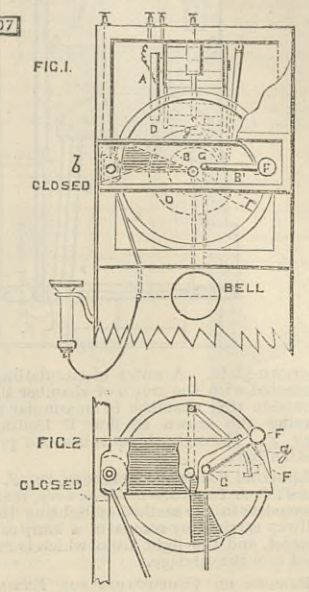
This relates to means for working the distance and other signals on railways, whereby the stretching and contracting of the wires or rods used for the purpose—whether such variation in the length of the wires or rods be due to atmospheric changes or to other causes—will be compensated for.

529. MACHINERY for PRESSING with PERFORATIONS BRICKS, TILES, &c., *B. C. D. Greenhill.*—*8th February*, 1881. 4*d.*

This relates to a machine consisting of a die, upon which a cube of clay is placed, the clay having been previously passed through an ordinary die and cut to the desired size and shape. The impressed cube of clay is then carried down into the die by means of a lever or wheel, which acts upon an excentric, and while forcing the clay downwards communicates a motion to and forces upwards the plate at the bottom of the die. The same lever or wheel which puts in motion the excentric brings down a series of plungers for forming the perforations according to the number desired.

607. IMPROVEMENTS in APPARATUS for TELEGRAPHIC and TELEPHONIC COMMUNICATION, *P. M. Justice.*—*11th February*, 1881.—(*A communication from J. V. M. Bartelous.*) 1*s.* 4*d.*

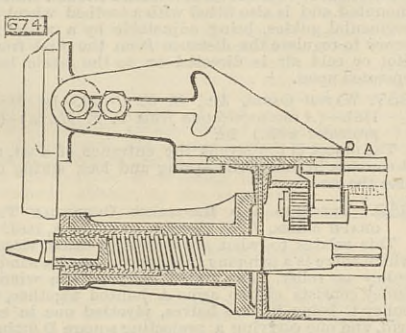
The first series of apparatus described in this specification permits of the establishment on a system of three wires of an unlimited number of stations, giving to each the right of calling a central office. The different stations can also be connected with one another or with other lines; for the time being all communication can be stopped except between the caller and called; and also during communication between two persons, one wire remains free, either to put the first caller in communication with a third subscriber, or to call all the subscribers and put them in communication with another caller. The means by which subscribers are informed that the line is in use are thus described: Suppose a call to be sent to the central office, as soon as it is produced four successive emissions of the current are sent through the working wire; this has the effect of causing the toothed wheel B B¹, Fig. 1, which is governed by the electro-magnet A acting on a lever, to advance four divisions, or one-twelfth part of the circumference. This effect is produced in all the apparatus, causing the discs to advance one-twelfth of their circumference, and will prevent any other subscriber from pressing his button *b* to effect communication, besides he will be informed of this fact by a special arrangement as follows:—The discs D D are painted in two colours, red and blue; the greater part of the surface is red, except a sector of a one-twelfth part of the circumference, of which the lower radius is horizontal, and which is painted blue. The portion of the front face of the box corresponding to this sector is coloured in the same



shade and cross-sectioned. It has the word "closed" on it, cut out in a thin plate; so long as this blue sector is at the back of these cut-out letters the word is hardly apparent, but when the disc turns the red colour shows through plainly, and subscribers will see that the line is in use. They can, however, apply for communication by moving the rod G F to the position G F¹, as shown in Fig, 2, when it will make contact with the metal button *g*, and so with the line wire. The second series of apparatus refers to the instillation at any required distance from a central office of an instrument which may be called a distance commutator, and which does away with the necessity for the establishment of an auxiliary office, substituting therefor an automatic station.

674. APPARATUS for PIT and SHAFT SINKING, *W. R. Beith.*—*16th February*, 1881. 8*d.*

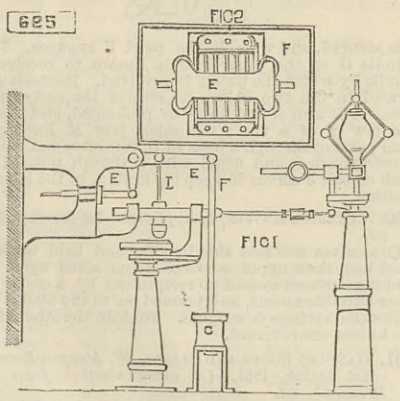
This consists in the combination of a ring frame A



with saddles D, capable of being moved around the frame and carrying power drills capable of being set to bore the positions desired.

695. STEAM and AIR ENGINES, *G. Sellers.*—*17th February*, 1881. 6*d.*

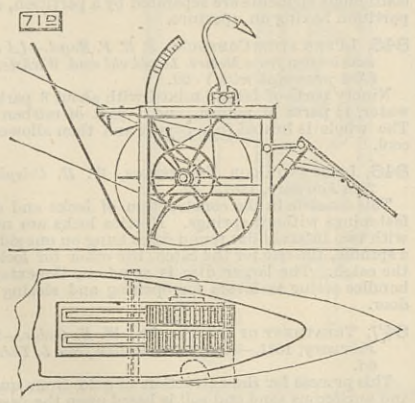
This relates, First, to the expansion gear or automatic cut-off apparatus employed in steam or air engines, for the purpose of closing the passages for the inlet of steam or air into the cylinders of steam or air engines at earlier or later periods in the stroke of the piston as and when desired. Fig. 1 shows this part of the invention applied to a McNaught beam engine. A suitably-shaped fixing is attached to the side of the steam chest or other suitable place, and connected thereto is a bell-crank or other lever E, one end of which is connected to the cut-off valve spindle and the other end connected to the upright rod F of a vacuum cylinder G, or weight or spring may be employed for instantaneously dropping the bell-crank lever after it has been lifted by another upright rod I, the upper end of which is connected to the bell-crank



lever, and its lower end connected to and operated by a series of levers and rods from the governors. On the bottom of the latter-mentioned upright rod is a suitably shaped socket, having one or more balls therein resting or bearing upon a cam attached to or forming part of a revolving circular or other shaped plate employed for the purpose of raising one end of the bell-crank lever, and so regulating the position of the cut-off valves. The Second part relates to the means of mounting the expansion valve or cut-off valve on the back face of the main slide valve. Fig. 2 is a plan of a slide valve and expansion or cut-off valve working in grooves C on the back face of the main slide valve. The cut-off valve is connected with the spindle D by means of a saddle composed of a plate E and antrifriction pulleys, which, whilst preserving a firm hold upon the valve, allow of a slight lateral motion, thus accommodating the saddle to the movement of the valve, and preventing frictional strain.

712. THRASHING MACHINES, *A. M. Clark.*—*18th February*, 1881.—(*A communication from A. L. Drudoüy.*) 10*d.*

This relates to apparatus to be combined with or attached to a thrashing machine for weighing and binding the straw as it is discharged from the shakers. Fig. 1 shows the straw binder. The straw passes down a shoot and falls into a trough at the bottom, where it is seized by arms and raised between spring blades. When sufficient straw to form a truss has thus been brought within the range of the binder, a shaft is caused to revolve and an arm carries the binder wire round the truss from reels. Disc cutters sever the wire, and the truss falls down a board on to the ground. A feed apparatus to



ensure the parallelism of the straws is described, and it consists of two shafts mounted on frames on the feed board, and carrying tines. The second figure shows the binder head with a spring acting cutter.

716. REPEATING FIRE-ARMS and REVOLVERS, &c., *J. J. Atkinson and J. Needham.*—*19th February*, 1881. 8*d.*

This consists, First, in the arrangement and combination of parts of repeating fire-arms and revolvers for lifting and letting fall the hammer or striker for firing, and for ejecting the spent cartridge by means of a cam; Secondly, in repeating fire-arms and revolvers ejecting the spent cartridges forwards from the charge chamber block by means of the hammer or striker or firing pin; Thirdly, in repeating fire-arms and revolvers holding the charge chamber block in firing position by means of the lever or trigger; Fourthly, constructing cartridges with a gas check at the front end in addition to that at the rear end thereof, and with or without a flange at the rear end.

730. TREATING TEXTILE FABRICS, &c., WITH FLUIDS, GASES, or VAPOURS, *J. Patterson and D. Stewart.*—*21st February*, 1881. 6*d.*

This consists in passing the materials over hollow perforated cylinders, frames, or supports, through which the fluids, vapours, or gases are sucked or are impelled.

758. MACHINES for TENTERING or DRYING FABRICS, *C. Heap.*—*23rd February*, 1881. 6*d.*

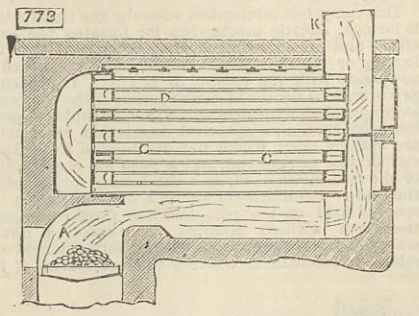
This consists in directing the hot air blown in so that it will first come against the selvages by a pipe with two branches, one for each side, or by a pipe and directors or deflectors, which may be arranged in any convenient manner, but so that the hot air when entering will first come into contact with the selvages on those parts of the cloth near the selvages, and then pass to or in contact with the other portions of the fabric.

768. IMPROVEMENTS in CONNECTING the ENDS of the CARBON to the CONDUCTING WIRES in ELECTRIC LAMPS, *E. G. Brewer.*—*23rd February*, 1881.—(*A communication from T. A. Edison.*) 6*d.*

This invention is intended as a substitute for the clamps usually employed to fasten the wires to the carbon, and consists in uniting the wires and carbon and then electro-plating the union.

773. HEATING AIR in MOTION, *G. Seagrave and S. B. Bevington.*—*23rd February*, 1881. 6*d.*

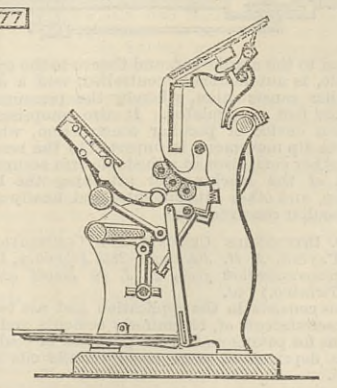
A is a furnace, and C series of tubes arranged in boxes in a superposed manner, and one within the other. The products of combustion pass among



the outer tubes, through tubes C under a partition, and return through the tubes D to the chamber above the partition on their way to the chimney K. The air passes through the space between the tubes.

777. PRINTING PRESSES, *A. M. Clark.*—*23rd February*, 1881.—(*A communication from W. H. Golding.*) 8*d.*

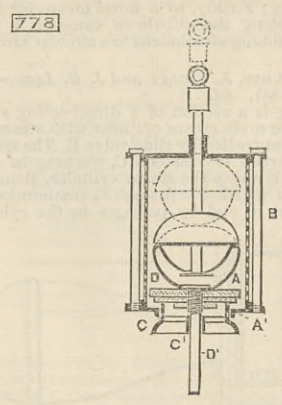
This consists, First, in the construction of the mechanism for communicating movement from the main shaft to the platen, so that it is caused to receive a reciprocating movement, which has an interval of rest when in position to receive the sheet; Secondly, in the mechanism for adjusting the platen to the face of



the bed, and also for throwing off the impression; Thirdly, in the mechanism for giving motion to the ink frame; Fourthly, in the ink frame; Fifthly, in the mechanism for moving the ink disc; Sixthly, in the employment of an ink distributor under the bed; and Seventhly, in giving the distributor a double movement. The drawing is a vertical section of the machine.

778. VALVES or APPARATUS for PREVENTING WASTE of WATER, *E. O. Mundy.*—*24th February*, 1881. 6*d.*

The apparatus consists of a hollow ball A of india-rubber or other elastic material working up and down within a covering or cage B of perforated zinc or other suitable metal or material, thus preventing any kind of chip, straw, or refuse, which at times enter the cistern, coming in contact with the working parts. The orifice in the base plate A¹ is provided with a screw-thread, so as to allow of its screwing on to a metal seating C, which is soldered into the cistern or other place where the apparatus is fitted, and thus allow of its removal when necessary in the usual manner. The valve D works up and down, and is kept in position by means of the rod or stem D¹ attached to it, which



latter works through a bridge piece C¹ formed in the seating C.

781. EXTRACTING OXYGEN from ATMOSPHERIC AIR, *H. J. Haddan.*—*24th February*, 1881.—(*A communication from E. B. Reynolds.*) 6*d.*

This consists in the separation or liberation of the oxygen of the atmosphere by passing the air through a separating vessel containing a fibrous material saturated or moistened with naphtha, petroleum, or any of its products, together with broken charcoal, wherein the nitrogen is arrested and the oxygen set free to pass on to the point of combustion or to be collected in receivers for subsequent use.

786. SPANNER or SCREW WRENCH, *G. Jacquemet.*—*24th February*, 1881.—(*Not proceeded with.*) 4*d.*

The adjustment of the jaws is obtained by means of a variable number of small discs set upon a rod or stem which supports no strain.

789. CHARGING and DRAWING GAS RETORTS, *J. West.*—*24th February*, 1881. 8*d.*

This relates, First, to the construction and arrangement of apparatus for conveying the coal from the first fixed hopper to the secondary fixed hoppers or travelling hoppers; Secondly, to the construction and arrangement of air reservoirs, air cylinders, and the attendant apparatus, whereby compressed air may be used to charge and draw gas retorts.

795. MANUFACTURE of WOODEN PACKING CASES, *F. Myers.*—*24th February*, 1881. 6*d.*

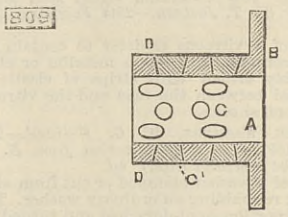
This relates to improvements on patent No. 3555, dated 1st September, 1880, and consists essentially in the combination of an adjustable table, slotted standards, and vertically adjustable cross-bar with nail-driving mechanism.

806. APPARATUS for PURIFYING and INCREASING the ILLUMINATING POWER of COAL GAS, *G. A. Northcote.*—*25th February*, 1881. 4*d.*

This consists in causing the gas to be purified and enriched to traverse a series of curtains or partitions of absorbent porous material arranged above a float and dipping or extending into hydrocarbon, in which that float is immersed.

808. APPARATUS for WOODEN BLOCK SHEAVES or PULLEYS, *J. Gordon, jun.*—*25th February*, 1881. 4*d.*

Metaline or a similar anti-friction substance is made into the form of plugs which fit exactly into holes in the metal bushes. The bush consists of a cylindrical



part A through which the spindle passes, and a flange B to fix it to the sheave. Holes are drilled through the cylindrical part and receive the plugs of metaline C, the thin tube D being forced over the cylindrical part to prevent the displacement of the plugs.

809. MANUFACTURE of VELVET, *I. Bamford.*—*25th February*, 1881. 6*d.*

The velvet is made with a ribbed back, and with either a double or single lock face pick before or after the back pick.

810. ROASTING COFFEE, &c., *P. Pearson.*—*25th February*, 1881. 6*d.*

The apparatus consists principally of a long trough of a semi-cylindrical section, in which revolves slowly a worm or screw, the upper part being enclosed by a semi-cylindrical cover of wire gauze, above which is a long metal plate which is kept at a red heat.

822. SOCKET PIPES for SEWERS and DRAINS, *B. C. Cross.*—*26th February*, 1881. 4*d.*

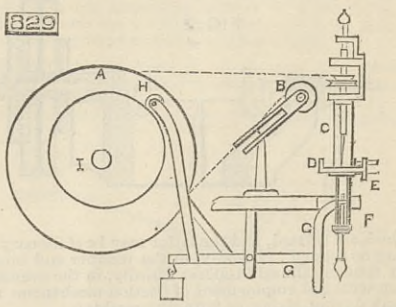
The thickness of the pipe on one side is made equal to the combined thickness of the other side and the socket.

824. APPARATUS for DRYING WOOL, COTTON, FLAX, &c., *D. Dawson.*—*26th February*, 1881. 6*d.*

This consists in the use and employment of a revolving cage with inward projections or stop pieces for drying wool and other fibre.

829. BORING MACHINES, *F. Wirth.*—*26th February*, 1881.—(*A communication from J. Liefmann.*) 4*d.*

The belt wheel A attached to the shafting sets the spindle B in motion by means of a strap, the borer being attached at C to the spindle B. The article to be bored is fixed at D in a parallel vice E. The parallel



vice E is carried in the bearings F, in which it can move up and down; this necessary movement is obtained by the lever G and friction wheel H working against the excentric I, by which means it is lifted and let fall.

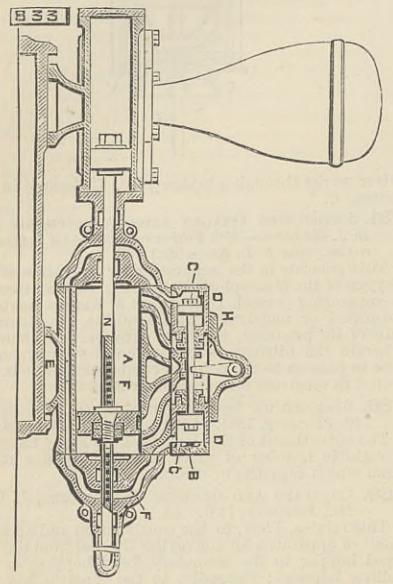
831. MANUFACTURE of STOCKINGS, &c., *R. P. Robertson.*—*26th February*, 1881. 8*d.*

This relates, First, to the employment of jacks or slides in place of sinkers and burr wheels or similar mechanism in knitting machines constructed with barbed needles, a needle bed, a cam carrier, and cams to actuate the needles. An improved arrangement of pressing devices for closing the barbs of the needles is employed. Secondly, the combination and arrangement of needle bed and needle, whereby a larger number of needles may be used in a machine constructed to make a rounded [or curved heel piece—as

in the well-known "Niantic" hosiery—than by any arrangement hitherto used; Thirdly, to a new method or manner of fashioning a plain stocking leg or similar web; Fourthly, to a novel method of fashioning a ribbed stocking; Fifthly, to a novel means for automatically actuating the out-throw cams on a cam-carrier of the ribbing attachment to a circular knitting machine.

833. Steam Pumps, *J. Shanks and J. G. Lyon.*—26*th February*, 1881. 6*d*.

The drawing is a section of a direct-acting steam pump. A is the main steam cylinder with steam and exhaust ports controlled by slide valve B. The spindle of this valve carries two pistons C, working in auxiliary cylinders D above the steam cylinder, along the whole length of which is a passage E, communicating with valve chest H, and by passages in the cylinder



covers with the cylinders D. The piston rod N of the main piston extends through both ends of the cylinders, and is pierced with holes F to establish communication between the main and auxiliary cylinders when necessary to move the slide valve. The pump piston is connected to one end of piston rod N as shown.

834. Perforating Paper, &c., for Mechanical Organs, *H. H. Lake.*—26*th February*, 1881.—(*A communication from The Automatic Paper Music Company.*) 8*d*.

This consists essentially in a machine for cutting or perforating paper or similar material to be employed as music sheets or tune bands in automatic or mechanical musical instruments, of the combination of a series of independent punches or cutters, and a corresponding series of rocking dogs mounted upon a reciprocating support and having a reciprocating motion, and adapted to select at each reciprocation those punches which are required to act and to engage with and drive the said selected punches through the paper; the proper selection being indicated or controlled by a stencil or pattern sheet.

835. Apparatus for Carrying Milk, &c., *E. J. Gaskell and W. T. Jackson.*—28*th February*, 1881. 6*d*.

This consists of a vitreous canister to contain the liquid food, surrounded by a tough metallic or other casing, preferably armed with strips of elastic or yielding material between the case and the vitreous canister to take off shocks.

839. Nut Lock Washers, *W. G. Gulland.*—28*th February*, 1881.—(*A communication from N. B. Denny.*)—(*Not proceeded with.*) 4*d*.

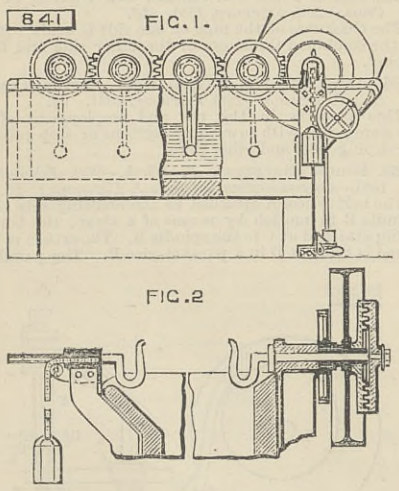
This consists of a washer stamped or cut from steel plate, the blank resembling an ordinary washer. This is cut, leaving a portion semi-detached and turned up at its outer end.

840. Materials for Construction of Internal Parts of Cupolas, Retorts, Stoves, Furnaces, and Fireplaces, *B. G. D. Cooke.*—28*th February*, 1881. 4*d*.

This consists in forming those portions of cupolas, retorts, stoves, furnaces, and fireplaces that are usually made of burnt firebrick, of unburnt blocks or bricks of silica, or silica in combination with lime or other cementacious matter moulded under great pressure.

841. Apparatus for Dyeing, Sizing, and Winging Hanks, *J. Conlong and J. Robertshaw.*—28*th February*, 1881. 8*d*.

Fig. 1 shows front view of a sizing machine, and Fig. 2 a transverse section of the winging mechanism. The invention consists essentially, First, in the combination of top and bottom rollers, the former of



which are rotated, and the latter may be stationary or may be rotated; Secondly, in the manner and means for rotating the said rollers; Thirdly, in the combination with and employment of friction mechanism to a hank dyeing, sizing, or wringing machine.

843. Improvements in Cards and Magnetic Needles for Mariners' Compasses, *H. J. Haddan.*—28*th February*, 1881.—(*A communication from J. Lewis and F. A. Brown.*) 6*d*.

The First part of the invention relates to the construction of the compass needle so as to taper at its poles, being rectangular between them and slotted in its body between the poles and its pivotal bearing, this being stated to make it very sensitive. The Second part relates to the prevention of local attractions by neighbouring metal. This is done by combining with the needle and the card a series of U-magnets, arranged at proper distances apart with their axes in lines radiating from the centre of the card, and with the north pole of each of such magnets towards the south pole of the needle.

844. Galvanic Batteries, *F. Wirth.*—28*th February*, 1881.—(*A communication from E. M. Reiniger.*)—(*Not proceeded with.*) 2*d*.

The invention consists in making the cells of batteries angular in section, with a recess of such size that the external fittings are included in the recess and thus protected, and also in combining the cells to form a battery by placing them in one row where contiguous elements are separated by a partition, each partition having an aperture.

845. Lubricating Compound, *F. H. F. Engel.*—(*A communication from Messrs. Lehmkuhl and Wechsler.*)—(*Not proceeded with.*) 2*d*.

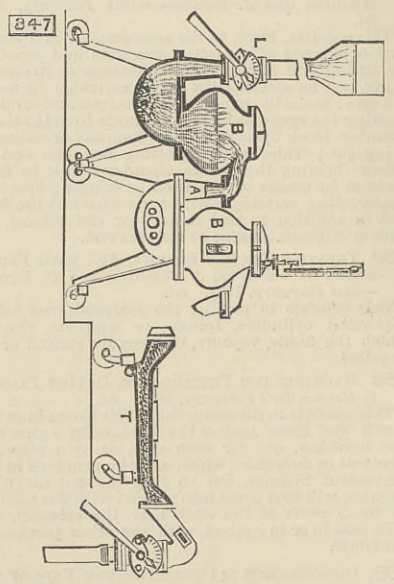
Ninety parts of fat are mixed with about 8 parts of water, 1½ parts of potash, and ½ part of mirban oil. The whole is heated in a copper and then allowed to cool.

846. Lock and Door Fastenings, *W. H. Crispin.*—28*th February*, 1881. 4*d*.

This consists in the construction of locks and door fastenings without springs. Mortice locks are made with two internal flat round discs hung on one side on a spindle, the one for the catch, the other for locking the catch. The larger disc is acted on, the external handles acting as levers for opening and closing the door.

847. Treatment of Quartz, &c., *W. E. Gedge.*—28*th February*, 1881.—(*A communication from L. Thénot.*) 6*d*.

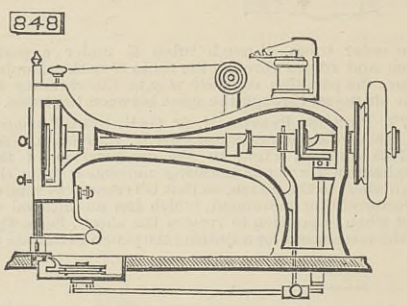
This process for the extraction of gold from quartz and auriferous sand and soil is based upon the passage of the ore carried by a stream of water through columns of quicksilver having columns of water above them. The apparatus consists of a number of sections each comprising two vertical tubes A and B of different form and diameter united at their lower part by a



basin. The tubes A and B of each section are united by an elbow pipe. At the end where the material escapes tubular parts T are provided. Quicksilver is placed in the different sections and in the tubular parts, and the whole apparatus is then filled with water; the water mixed with sand or crushed ore descends from an elevated reservoir and enters the apparatus at L, passing through the tubes A and B, and along the tubes T.

848. Sewing Machinery, &c., *H. H. Lake.*—28*th February*, 1881.—(*A communication from J. M. Fair.*) 8*d*.

This comprises mechanism whereby the chain-stitch is formed, shuttle mechanism for forming the lock-stitch and an adjusting device, whereby either the looping or the shuttle mechanism may be caused to co-operate with the needle in sewing. It also comprises various details of construction of the combined looping and shuttle mechanism, a loose pulley of peculiar construction, a spherical connection for driving the upright shaft which imparts motion to the hook and shuttle mechanism, and a peculiar construction of the feed mechanism, and the means for actuating the same. It further comprises a device whereby the spool is held on the post, and the thread unwound therefrom without rotating the spool, a device whereby the tension wheel is automatically held and released; mechanism whereby the movement of the



thread to the needle bar, and thence to the eye of the needle, is automatically controlled, and a device of peculiar construction, whereby the pressure on the presser foot is regulated. It also comprises a head motion device of peculiar construction, whereby a double-dip movement is imparted to the needle bar. It further comprises an adjustable arm secured to the head of the machine for attaching the hemmer, ruffler, and other attachments, and finally a shuttle of peculiar construction.

849. Bituminous Cements and Compositions for Paving, *J. H. Johnson.*—28*th February*, 1881.—(*A communication from E. J. de Smedt and W. J. Twining.*) 4*d*.

This consists in the application and use to, and in the manufacture of, bituminous cements and compositions for paving and other purposes of coal tar products deprived of their more volatile oils and oxidised.

851. Street Paving, &c., *E. A. Brydges.*—28*th February*, 1881.—(*A communication from Count L. von Hegnenberg.*) 6*d*.

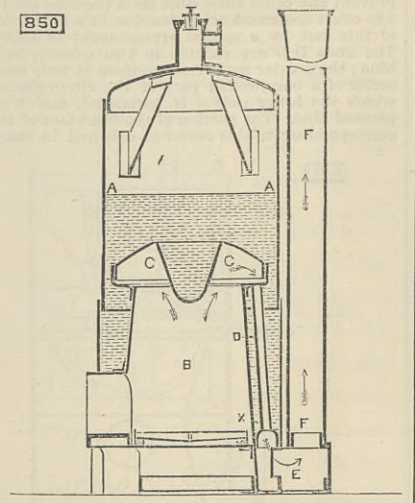
This consists of rows of wood blocks with intermediate spaces filled in with asphalte.

852. Fastenings for Bracelets, *G. W. Dawson.*—28*th February*, 1881.—(*Not proceeded with.*) 2*d*.

This consists of sliding plates working at the back of the mouthpiece; at the inside end of this sliding or gripping plate is a hoop or catch which passes through the mouthpiece and works in a slot in it, and takes into a slot in the opposite mouthpiece; these slides or gripping plates are actuated or forced into their normal position by a spiral spring fixed between them to release the catch; to open the bracelet pushers or knobs are provided on the side of the bracelet, which, when pushed, compress the spiral spring and allow the grips to pass freely through the slot in the mouthpiece.

850. Vertical Steam Boilers, *J. Shanks and J. G. Lyon.*—28*th February*, 1881. 6*d*.

The boiler consists of an outer shell A, within which is the combustion chamber B of tapering circular form, with an enlarged head C having a coniclar recess



in the crown-plate. A series of circulating tubes D are connected with the crown of chamber B, and pass down outside this chamber to an annular tube-plate X, forming the crown of flue E leading to the chimney F. Through these tubes the products of combustion pass.

853. Lighting Railway Carriages, &c., *J. F. Shallis and T. C. J. Thomas.*—28*th February*, 1881. 6*d*.

This consists in the method of lighting the interior of a railway carriage by means of a lamp carried outside thereof, and the light from which is reflected or refracted into the carriage.

854. Powder or Composition for Extinguishing Fire and Preventing it from Rekindling, *C. Tuchmann.*—28*th February*, 1881.—(*A communication from J. Schambeck.*) 2*d*.

The composition consists of common salt 3 parts, alum 3 parts, silicated solution of soda 6 parts, and carbonate of soda 4 parts.

856. Stentering, Stretching and Drying Fabrics, *W. Mather.*—1*st March*, 1881. 6*d*.

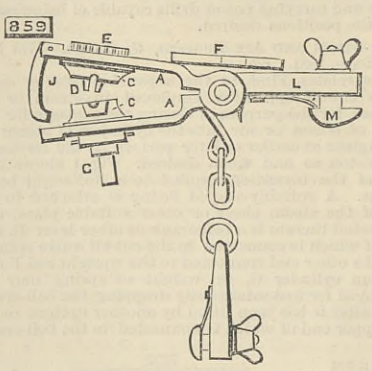
This relates to improvements on patent No. 2956, A.D. 1876, and it consists of a central hollow shaft carrying a circular frame near one end to which a number of studs are fixed, and fitted with anti-friction rollers carrying an annular internally toothed wheel to which stretching clips and guide rollers are attached. A varying speed is imparted to the annular wheel. On the periphery of the circular frame segmental guides are fitted and actuated by hand wheels to regulate the opening or stretching of the fabric. A lateral to-and-fro motion is imparted to the frame by an excentric. On the shaft a second circular frame is mounted and is also fitted with a toothed wheel and segmental guides, being adjustable by a wheel and screw to regulate the distance from the first frame. Hot or cold air is directed on to the fabric being operated upon.

857. Watch Cases, &c., *H. G. Grant.*—1*st March*, 1881.—(*A communication from G. F. Mertz.*)—(*Not proceeded with.*) 2*d*.

The object is to prevent the entrance of dust, and it consists in fixing the spring and lock spring outside the case.

859. Erecting and Repairing Overhead Telegraph Wires, *J. W. Fletcher.*—1*st March*, 1881. 6*d*.

This relates to what are known as draw vices in which there is a gripping piece or vice, and a winding pulley or roller. The frame carrying the winding pulley consists of two arms A jointed together, the pulley C being in two halves, pivotted one in each arm, and one carrying a projecting square D fitting a recess in the other half. To one half a ratchet wheel



E is secured, and with it the pawl E engages. The spindle G of the other half is square to receive a handle by which the pulley is revolved. Recesses are formed in the two halves to receive the end of the wire. One arm of the frame is prolonged, and forms one jaw of a vice; the other jaw M having a stem passing through a hole in L, its outer end being screw-threaded, and fitted with a thumb nut. The latch or bolt J serves to keep the arms A in the locked position.

860. Cleaning Knives, *L. Appleton.*—1*st March*, 1881. 6*d*.

The knives are laid side by side and held upon a fixed bed, their upper surfaces being acted upon by rubbing surfaces caused to reciprocate by a crank or other suitable means, and pressed on to the blades by adjustable springs or weights. To clean the other side the knives are reversed.

861. Hanging Doors and Blinds, *W. Morgan-Brown.*—1*st March*, 1881.—(*A communication from E. Prescott.*) 6*d*.

This relates to devices for hanging blinds and doors, and consists of hangers formed by pivotted levers connected with the door or blind and fixed frame, so as to sustain and permit a free sliding movement of the door. The weight of the levers is in such relative position to the points of support that the levers tend to remain in a certain position or to return thereto when moved from such position, and unless this tendency is overcome the door will tend to return to the position where the levers hang in equilibrium.

862. Securing Corks in Bottles, *A. M. Clark.*—1*st March*, 1881.—(*A communication from B. Robinson.*)—(*Not proceeded with.*) 2*d*.

This consists of a wire bent at an acute angle, and having the limbs joined by a cross-tie near the middle, the loose ends of the limbs and cross-ties being folded round the bottle neck, and the angle part being turned over the cork, and the loop tied to the end of the wings.

863. Calculating Instrument, *J. B. Fearnley.*—1*st March*, 1881. 6*d*.

This relates to instruments in which a movable logarithmic scale is employed in combination with fixed and movable indices, and it consists in forming the divisions at the upper end of the scale larger in proportion than usual, so as to facilitate the reading off and adjusting to the indices. For this purpose a dial is used, on the surface of which is described a diverging spiral line, each convolution being divided into the logarithmic scale in such nanner that the commencement and end of each such scale is on one radial line. The dial can revolve round a centre. A wire or other index extends over the dial from the centre to the circumference, and other similar indices are adapted to turn on the centre, so as to sweep over the surface of the dial. The outer edge of the dial is divided into ten equal parts.

864. Fire-alarms, *C. Spratt.*—1*st March*, 1881.—(*Not proceeded with.*) 2*d*.

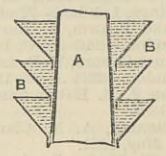
This relates to means for sending an alarm to the nearest fire brigade station by any person, and also for firemen to send messages to such station.

865. Safety Lamps for Mines, *W. P. Thompson.*—1*st March*, 1881.—(*A communication from Dr. C. Heinzerling and V. Hammeran.*) 6*d*.

This relates to means for increasing the safety and intensifying the light of the lamps, and to enable petroleum to be used in them, and it consists principally in filtering the air through glass, wool, or other finely divided fibrous material before it enters the cylindrical chamber of the lamp, by which means the particles of coal dust are eliminated.

866. Steam Boilers, *T. May.*—1*st March*, 1881. 6*d*.

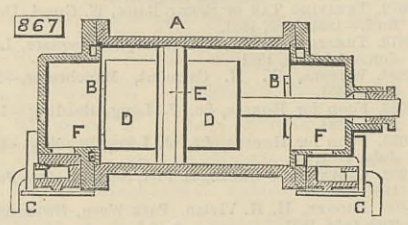
The object is to construct steam boilers so as to reduce the weight, prevent priming, and save fuel, and it consists in forming tubular boilers with dishes or



shallow receptacles B surrounding the tubes, the water being fed into the top one, and overflowing successively to the next below until it reaches the bottom one.

867. Combined Gas and Heated Air Engines, *F. H. Wenham.*—1*st March*, 1881. 6*d*.

The air cylinder A has a port B at each end which by the action of a slide valve admits air at the commencement of the stroke, and cuts off after the piston has travelled some distance, and during the return stroke remains open to allow the contents to be completely discharged. On both sides of the



piston is a cylindrical trunk D extending outwards to nearly one-half the length of stroke of piston E, and which pass into gas cylinders F, forming prolongations of cylinder A. The gas enters cylinders F by pipes G, and being exploded heats the air in cylinder A, the combined pressure of the heated air and the gas actuating the piston E.

868. Preparation of Vegetable Substances for Food, *H. Guiliani.*—1*st March*, 1881. 4*d*.

This relates to a vegetable preparation to be used as a substitute for coffee, chocolate, or cocoa, and it consists of barley grain and carob fruit or beans. The barley is cleaned and separated by immersion in water from light and faulty grains, and then exposed to a moist heat, and afterwards roasted. The carob fruit is similarly treated, and the two crushed or ground and mixed.

869. Lifts or Hoists, *D. Edwards.*—1*st March*, 1881. 8*d*.

This relates to improvements on patent No. 1223, A.D. 1879, and consists in simplifying the mechanism, in suspending the load automatically at any height, readily lowering the same by reversing the motion of the winding shaft, and suspending it in its lowered position. On the shaft of the lift is a tube, the outer end of which carries a ratchet wheel with which a pawl engages. The other end of the tube carries a drum with conical edges, forming part of two clutches. The shaft carries two discs forming the other part of the clutches, one fixed and the other attached to a second tube working on the first, and forming the winding drum. The two discs are connected by links, which when parallel to the shaft keep the discs from gripping the drum.

870. Working Wood, Metals, &c., *H. E. Newton.*—1*st March*, 1881.—(*A communication from Messrs. Challiot, Grateot.*)—(*Not proceeded with.*) 2*d*.

This relates to means for placing the cutting instrument or the material in the greatest number of positions to facilitate the action of the instrument at any desired point, and its consists of a series of radial brackets combined to the number of two or more, and so arranged as to turn on axes parallel to one another.

871. Rowlocks and Oars for Ships' Boats, &c., *S. S. Hazeland.*—1*st March*, 1881. 6*d*.

A hole is formed through the waist of the oar at the point where it should rest in the rowlock, and at right angles to the blade, and in it a metal tube is inserted. The tips of the rowlocks are pierced to correspond to the bore of the tube, and through both a pin is passed. The rowlock swivels on a vertical pin. The oars are formed with self-feathering blades.

872. Attachment for Engines, to make their Throttle Valves Self-closing, *W. Green.*—1*st March*, 1881.—(*Not proceeded with.*) 2*d*.

One end of a spring is attached to the arm which works on the throttle valve stalk, and the other end is attached to the rod which connects the governors with the arm attached to the throttle valve stalk, the spring being held at tension when both ends of it are attached.

874. Compressing Fuel, *H. J. Haddan.*—1*st March*, 1881.—(*A communication from E. Geisenberger and E. Picard.*) 6*d*.

This relates to the manufacture of compressed fuel from coal, bark, sawdust, peat, &c., and consists in introducing the material into a heating and mixing apparatus with a binding substance, such apparatus being preferably a horizontal boiler through which a shaft with revolving blades passes, and has at one end a syphon pipe leading from the top upwards, and dipping with its free end in a liquid tank. From this apparatus the material passes into the compressing machine, which consists of a helix revolving in a conical barrel, from the smaller end of which the material issues in a compressed form.

875. Treatment of Concrete and Cement for Building, &c., *H. Faija.*—1*st March*, 1881. 4*d*.

This relates to speedily hardening blocks or other forms of concrete or cement, first by subjecting it to a moist heat; Secondly by the use of a warm silicious bath; and Thirdly, by mixing with an alkaline solution.

878. Combing Wool, *W. and H. Smith and S. Stell.*—1*st March*, 1881.—(*Not proceeded with.*) 2*d*.

This relates to machinery whereby the wool or other fibre is doubly acted upon by nippers before being drawn into a sliver, by which means it is thoroughly cleaned from noils and other impurities. To an ordinary Lister's nip comb is fitted at a certain distance a second nipping apparatus, which deposits the fibres from the first nipping apparatus on to

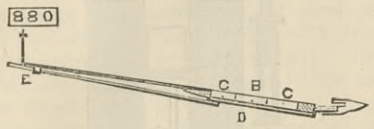
the teeth of a circular comb, and which fibres are nipped by the second and drawn out of the teeth of the circular comb, and carried from there by means of aprons on to a gill box, to be from there delivered into a sliver.

879. IMPROVEMENTS IN ELECTRIC LIGHT SIGNALLING AND MEANS OR APPARATUS CONNECTED THEREWITH, *A. Shippey.*—*1st March*, 1881. 4*d.*

In carrying out this invention the inventor makes use of a balloon, to which are attached an apparatus for providing electric light, and also for the periodical discharge of rockets, &c., which balloon and apparatus are connected by a conducting wire with the ship, on which is the battery or generator, and also by another wire with a float in the sea, which is used as the return wire.

880. PLATFORMS OF HARVESTING MACHINES, *H. Andrews.*—*1st March*, 1881. 6*d.*

The portion of the platform near the finger end or front is formed with perforations B, so that the seeds beaten out from the straws may pass into receptacles



C beneath, from which they are removed at intervals. The receptacles are shown in the form of sliding trays D attached to a handle E.

881. MOULDING APPARATUS FOR CASTING SCREWS, *W. A. Ingalls.*—*1st March*, 1881. 6*d.*

This consists in screwing the screw pattern into and out of the mould box through the mould board, so that after the mould box has been rammed, the pattern is removed by screwing it out through the mould board, thus forming the complete mould for the screw without any parting of the mould box.

882. OPEN LINKS, RINGS, OR SHACKLES FOR CHAINS, &c., *W. A. Ingalls.*—*1st March*, 1881. 6*d.*

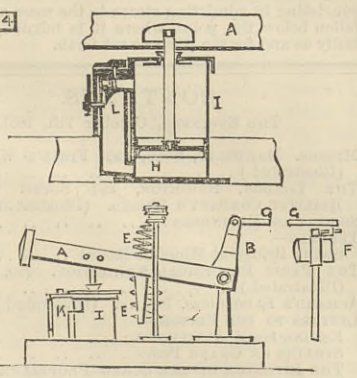
Links to admit closed links or shackles to be introduced are formed in two separate halves, the parts forming the loops being made to overlap each other, and they are connected by a pin at the one loop, upon which they turn freely. The overlapping parts have projections and recesses at the meeting surfaces so formed that when the halves are closed up the projections on one half enter the recesses of the other, and prevent the two parts opening out again.

883. MOULDS FOR PRODUCTION OF CAST STEEL OR INGOT IRON, *C. W. Siemens.*—*1st March*, 1881. 6*d.*

So as to produce perfect ingots the moulds are made of circular section, and preferably of cast steel or wrought iron and steel, so that the thickness of the wall may be reduced to about one-third of the usual thickness, and the surface in contact with the fluid steel is also reduced to a minimum owing to the circular form of the mould. The moulds are stoppered by means of a plate attached to a screw, by which pressure is brought to bear on the upper surface of the metal. Steam pressure may also be brought to bear on the metal.

884. GOVERNOR FOR MARINE ENGINES, *J. G. Tongue.*—*2nd March*, 1881.—(*A communication from W. Würdemann.*) 6*d.*

This consists in the use of a weighted lever, which as the vessel pitches operates the steam valve so as to cut off the steam. A B is the lever mounted on a horizontal axis and weighted at one end, being held in position by a spring E. To the arm B is jointed a rod G connected to valve F, by which steam is supplied to the engine. A piston H is hung to the lever and moves in a closed vessel I filled with a liquid operating on



the movements of the beam A as a moderator. A side channel K connects the interior ends of vessel I. A valve L opening upwards is placed in channel K, and is closed and opened by means of two screws, both with divided plates and indices, giving the means of exactly timing the down and the upward movement of the piston H.

885. NAME PLATES AND INSCRIPTION TABLETS, *J. Edwards.*—*2nd March*, 1881.—(*Not proceeded with.*) 2*d.*

Perforated letters are made from plates of metal, and behind them a back ground of any suitable material, the whole being placed in a frame, and (if glass is used as the back ground) it may be illuminated by a light placed behind the back ground.

886. LOCOMOTIVE CARS FOR TRAMWAYS OR LIGHT RAILWAYS, *F. E. B. Beaumont.*—*2nd March*, 1881. 6*d.*

This relates to means for inverting the position of the engine, so that it may always be in front of the car in the direction of its travel, and it consists in causing the body of the car with the engine to pivot on the under frame, the engine being connected with a shaft on one side of the frame when travelling in one direction, and with a second shaft on the other side of the frame when travelling in the opposite direction.

887. JOURNALS AND THEIR BEARINGS, *J. Imray.*—*2nd March*, 1881.—(*A communication from R. W. Jones.*) 6*d.*

This relates to means for cooling and lubricating bearings and journals of rolls and other revolving shafts, and of relieving their frictional pressure. The lower bearing block has a recess in the form of a T, the middle limb extending nearly the whole length of the bearing, and the transverse limb extends over a considerable arc of the semi-circumference. This recess communicates by a passage with a pipe at a higher level supplied with water or oil, which flowing into the recess spreads over the surface of the journal.

888. DRYING WOVEN FABRICS AND WARPS, *J. Smith.*—*2nd March*, 1881. 6*d.*

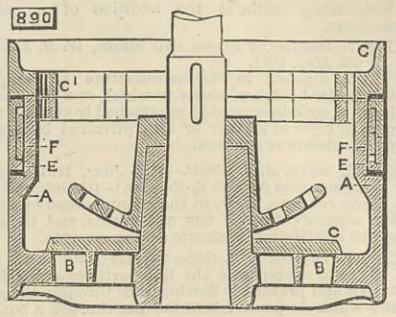
A long casing is placed horizontally, and has vertical sides closed, whilst its top and bottom are formed of boards placed so as to leave transverse slits between them. The interior of the casing is partly occupied by longitudinal tubes fixed in boxes at the ends, and through which steam is passed. These tubes are arranged in upper and lower sets with some space between such sets, and air is forced by a blower to enter at one end of the casing into the middle space between the tubes. The other end of the case is closed, and the air passes out through the slits between the boards. The fabric passes over guide rollers through the casing, and is acted upon by the jets of heated air.

889. CUTTING THE PILE IN VELVETS, &c., *F. W. Paschen.*—*2nd March*, 1881.—(*A communication from H. Wauer.*)—(*Not proceeded with.*) 2*d.*

The apparatus is applied direct to the loom, and consists of a transverse rod situated above the fabric, and secured to the sides of the loom, parallel with the slay, and a short distance in front of where the beating up of the weft takes place. This rod has fixed upon it a series of blades corresponding in number to the longitudinal cuts required to be made in the fabric, and the bottom edges of which are arranged to press on the top of the material. The fronts of these blades are suitably formed and carried to a point, where they are provided with tubular extremities, and a groove is formed in the sides. Through each groove and extremity a wire passes, and extends through the reed on to a rod which keeps the wire at a medium tension, and a cam raises and lowers such wires as the shed opens and closes. The wires become woven in the fabric, and revolving cutters are mounted above the blades, and cut the weft which crosses such wires.

890. AIR PUMP BUCKETS, *J. Musgrave.*—*2nd March*, 1881. 4*d.*

A is a deep hollow metallic bucket, in the bottom of which are apertures B. The valve C is placed in the bottom of the bucket. An annular recess extends



round the outside of the bucket, and in it metallic packing rings E and springs F are placed and secured in position by an annular cover G forming part of the wearing surface of the bucket.

891. WHEELS FOR BICYCLES, &c., *T. Humber, T. R. Marriott, and F. Cooper.*—*2nd March*, 1881. 6*d.*

This consists, First, in so constructing and arranging the several parts that the change of sectional form is prevented, and thereby the strength and rigidity is greatly increased; and, Secondly, in attaching the spokes to the rims in such a manner that such attachment also adds to the strength of the rim by forcibly drawing the plates together, and thus imparting an additional security against bending or rupture of the rim.

892. ECRASEURS, *J. Arnold.*—*2nd March*, 1881.—(*Not proceeded with.*) 2*d.*

This relates to means whereby the chain which is now generally used is properly placed round the object to be removed, such as an internal tumour, and the screw can be turned forthwith to cut away the excresence or other growth by the chain.

893. SIZING MACHINES, *T. Singleton.*—*2nd March*, 1881. 8*d.*

This consists, First, in the use of a horizontal float with a ball-and-socket joint or vertical float, and arrangements and contrivances for giving signals when the level of the size in the size trough is too high or too low; Secondly, of self-acting arrangements for blowing steam through the coils in the steam box for the purpose of cleansing the coils and pipes in connection with them; Thirdly, in the employment of two, three, or more taps worked by toothed wheels for equalising the supply of size to the size trough; Fourthly, in an arrangement of one or more markers or dabbers with one or more levers coming through the sheet of yarn and the parts connected with them, for the purpose of marking the cuts or pieces as required; Fifthly, in the employment of a comb between the immersion and squeezing rollers in the size.

894. IMPROVEMENTS IN ELECTRIC LAMPS, *J. J. Sachs.*—*2nd March*, 1881. 6*d.*

The inventor places the carbons in tubes ranged side by side, either vertically or at an angle, with the bottoms of the carbons resting upon an asbestos or porcelain plate of suitable shape. At the point of contact of the carbons, this plate is perforated so as to admit of the emission of light, whilst preventing the carbons from passing through. The carbons descend by gravitation, assisted if necessary by a weight or spring. In another arrangement the carbons are placed one above, the other below, a perforated plate, the lower one being raised by a spring, and the upper one descending as before by gravitation, the plate keeping the carbons adjusted at the requisite distance for the formation of the arc.

895. LOOMS, *H. A. Dufrené.*—*2nd March*, 1881.—(*A communication from J. Bicking.*)—(*Not proceeded with.*) 2*d.*

This relates to means for moving the treadles which operate the healds, and supporting or retaining the connections of these healds at the bottom.

896. REFINING CAMPHOR, *W. H. Atkinson.*—*2nd March*, 1881. 6*d.*

This relates to the construction of apparatus for refining or subliming camphor, consisting of boxes or vessels having removable linings made of sheet lead or other suitable metal or alloy (and used with or without a jacket for superheated steam).

898. PUMPS FOR SALTING MEAT, &c., *W. Wright.*—*2nd March*, 1881. 6*d.*

This consists in an instrument for salting or curing meat, of the combination of a pointed and perforated discharge nozzle with the suction and discharge valves, piston, and barrel, or their respective equivalents of an ordinary force pump, whereby a light and handy instrument may be produced, which is capable of drawing its supply at each stroke direct from an independent vessel.

899. VALVES OR REGULATORS FOR FLUIDS, *W. Wright.*—*2nd March*, 1881. 6*d.*

An outer barrel or pipe or equivalent contains a smaller inner one, having an annular space containing a piece of rubber pipe or other suitable spring or springy substance. The inner tube projects downwards, and passes through and is secured to a ball of ordinary construction. The top of the outer tube is closed in, and through the cover is a form of seating, through which the water enters from a suitable branch or pipe. A valve, preferably of rubber, is secured in a convenient manner upon the upper and closed end of the inner tube (and suitable apertures are provided for the ingress of the water), so that when this rises the valve is pressed upon the seating, and closes the aperture.

900. LUBRICATING THE AXLES OF COLLIERY WAGONS, &c., *W. James.*—*2nd March*, 1881.—(*Not proceeded with.*) 2*d.*

The apparatus comprises a reservoir or cistern placed below the rails, and containing the lubricant, such reservoir being fitted with mechanism for projecting the lubricant against the axles to be lubricated.

903. TANNIC BLACK, *W. G. Gard and T. H. Cobley.*—*2nd March*, 1881. 4*d.*

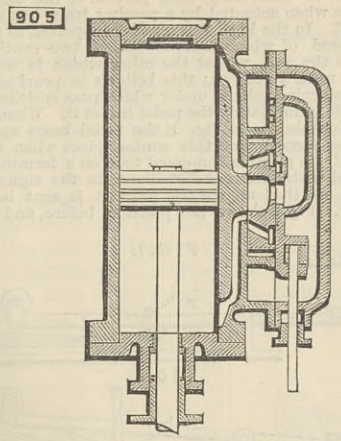
This consists in the production of tannate of iron from the tannic acid contained in leather waste by the action of salts of iron, preferably a chloride or sesquichloride of iron, or both, and fixing the same upon the gelatine and fibrine of the leather and analogous substances.

906. STOVES AND FIREPLACES, *G. L. Shorland..*—*3rd March*, 1881. 6*d.*

This consists essentially in a stove provided with side and back air warming boxes or chambers, and with air warming and delivery pipes exposed to the heat of the fire.

905. DIRECT-ACTING ENGINES AND PUMPS, &c., *C. T. Wordsworth.*—*2nd March*, 1881. 6*d.*

This consists in the method of admitting steam to



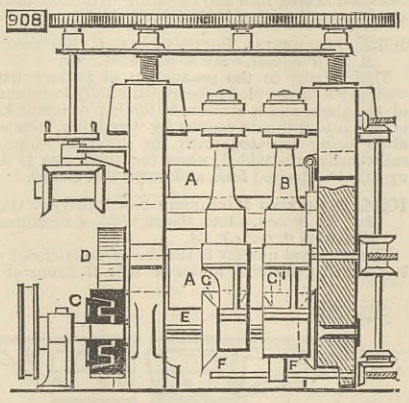
a cylinder by means of the combination of a mechanically moved slide valve and a separate shuttle valve working in a cavity with flat or inclined faces in the cylinder.

907. RESERVOIR OR FOUNTAIN PENHOLDER, *J. Jackson.*—*3rd March*, 1881.—(*Not proceeded with.*) 2*d.*

Within the stem of the penholder is a flexible tubular reservoir to receive the ink. One end of the tube is connected to that part of the holder adapted to receive the pen for use, which may be of the ordinary character, and this part is provided with a small hole or passage to conduct the fluid from the interior of the flexible tube to the pen. The other end of this flexible tube is connected at the upper end of the outer case to a plug capable of being progressively turned in the end of the outer case and of thereby putting a twist on the flexible tube by which to force out the fluid contained therein for the supply of the pen in use and as desired.

908. FINISHING ROLLING MILL, *L. A. Groth.*—*3rd March*, 1881.—(*A communication from E. von Zweigbergk.*) 8*d.*

The mill consists of two housing frames, between which are placed a pair of horizontal and a pair of vertical rollers. The horizontal rollers A receive rotary motion in the ordinary way, but the vertical rollers B



receive theirs through a special arrangement of wheel work D, friction clutch C, axle E, and the bevel wheels G F and G1 F1. The pair of rollers A determines the thickness and the other pair B the width of the iron to be rolled.

911. VELOCIPEDES, &c., *J. and C. E. Challis.*—*3rd March*, 1881. 6*d.*

This consists, First, in the steering head of a bicycle of the combination of cones and balls at the top or bottom, or both; Secondly, as a saddle spring, in the employment of a piece of sheet rubber stretched over the backbone underneath the saddle, and attached to springs or arms which are connected to the saddle and to the backbone; Thirdly, in a stop bell, of the employment of a metal tube provided with tongues or helical cross springs as a means of retaining the clapper and silencing the bell.

912. WINDOW SASHES, FANLIGHTS, &c., *R. Adams.*—*3rd March*, 1881. 6*d.*

In applying this invention to windows fitted with beads, the beads are made movable into grooves or otherwise by screws, links, excentrics, levers, wedges, pins, or other suitable arrangements. At or near the centre of gravity of each sash is provided a suitable support, on each side as working centres, upon which centres the sashes can be made to revolve or pivot and be kept in any desired position in the sash or frame, and also placed at any required height.

914. APPARATUS FOR MANUFACTURE OF MINERAL WATERS, *W. Whaley.*—*3rd March*, 1881.—(*Not proceeded with.*) 2*d.*

This consists of a circulating converter for charging water with carbonic acid or other gas.

915. BOXES OR CASES, *A. W. Rooke.*—*3rd March*, 1881.—(*A communication from W. G. Parry.*) 6*d.*

This consists in the use of a box or case having its sides lapping, and each side secured by fastenings entering it at a right angle to each other, or nearly so, or in other words, having nails or pegs passing through its thickness and others entering it in the direction of its length or breadth.

916. WORKING THE SLIDE VALVES OF ENGINES, *G. W. Handley.*—*3rd March*, 1881.—(*Not proceeded with.*) 2*d.*

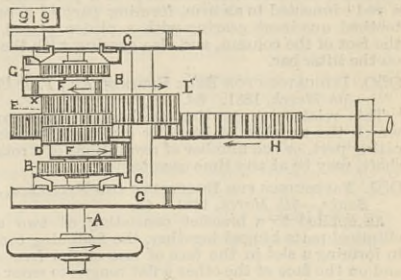
The valve rod is arranged parallel to the piston rod, and the tappets are secured thereon in any convenient manner. In front of each tappet and on the valve rod is mounted a coiled spring. The tappet finger, which slides loosely on the valve rod, is secured in any convenient manner to the piston rod. As this finger moves backwards and forwards with the piston rod it will compress the springs against the tappets, thereby storing up power for subsequently driving forward the tappets, and with them the valve rod.

917. OBTAINING MOTIVE POWER, *H. E. Newton.*—*3rd March*, 1881.—(*A communication from L. M. J. Genoud.*)—(*Not proceeded with.*) 2*d.*

This consists essentially in replacing the ordinary steam jacket by a liquid jacket, the liquid being such as will not boil except at a higher temperature than water.

919. MACHINES FOR CONVERTING RECIPROCATING MOTION INTO ROTARY MOTION, *E. Edmonds.*—*3rd March*, 1881.—(*A communication from F. B. Nichols and C. Thomson.*) 6*d.*

The machine consists of a shaft A turning freely in its bearings in the frame C; this shaft has two ratchet wheels B B, securely fastened to it; between these ratchet wheels are two cog-wheels D, X, separated by the space E. Each of these cog-wheels have pieces F fastened to them for the purpose of pivotting the pawls G in position to perform their functions; these cog-wheels with their pawl carriers F rotate freely on the shaft A; one of these cog-wheels D gears with the reciprocating toothed rack H, the other X runs clear of the rack H, but gears with one-half of the cog-wheel I, the other half of I gearing with the rack H, and in position not to engage with the teeth of the cog-wheel D; this intermediate cog-wheel I causes X to rotate in the opposite direction to the rotation of D; X moves in the same direction as the rack, whilst D and I move in the opposite direction to the rack; thus when the rack is pushed in the direction of the arrow shown below it, the cog-wheels D, X, and I,



each move in the direction of the arrows annexed to them. On reversing the direction of the rack the rotation of the cog-wheels will likewise be reversed.

920. PRESSING AND IRONING MACHINES, *J. F. M. Pollock.*—*3rd March*, 1881.—(*Not proceeded with.*) 2*d.*

When the iron is carried at the end of an overhanging radial arm, power is applied to replace the ordinary treadle motion.

922. GALVANISING IRON, *J. Elmore.*—*3rd March*, 1881. 4*d.*

This consists in the employment of powerful dynamo-electric machines and solutions of zinc salts to produce the galvanising result.

924. STRENGTHENING MASTS, SPARS, POLES, PILLARS, &c., *H. J. Harrison.*—*4th March*, 1881. 6*d.*

This consists in the manufacture of columns, masts, &c., of a metal exterior structure and a wooden core, the two being made to cohere, and being so thoroughly fastened together as not to move on each other under a heavy strain, thus making full use of the tensile strength of the wood.

926. DECORATING BRICKS, &c., *G. and A. Maw.*—*4th March*, 1881. 2*d.*

This consists in pressing the surface of the brick or tile with a mould taken from leaves, ferns, or other suitable articles; and also in producing mosaic tiles by filling up a mould formed with partitions between the different pieces, with clays of the required colours, and then backing it up and subjecting the whole to pressure, the backing being afterwards removed with the separate tesseræ attached.

927. LAMPS, *T. R. Dix.*—*4th March*, 1881.—(*Not proceeded with.*) 2*d.*

This relates to means for raising and lowering the wick, and consists of a wick carrier with an external screw working in a corresponding nut in the interior of the wick tube, which is capable of being revolved.

928. BALL VALVES, *A. E. Lucas.*—*4th March*, 1881.—(*Not proceeded with.*) 2*d.*

In a circular recessed chamber with a seat at the bottom fits a mushroom valve. A branch opens out from the chamber and through it the water enters. The ball lever is jointed near the bottom of the valve and the end is turned over so as to form a cam.

929. VELOCIPEDES, *J. Hopwood.*—*4th March*, 1881. 6*d.*

This relates to a machine to carry three persons, all or any one of whom can drive the machine. There are two pairs of wheels, one person sitting directly over and working treadles attached to cranks on the front axle, while the other two sit facing each other, one on either side of the rear axle, and can work treadles attached to cranks formed on the rear axle.

931. MEASURING, WEIGHING, SORTING AND DOUBLING SILK, &c., *W. Trafford.*—*4th March*, 1881.—(*Not proceeded with.*) 4*d.*

This relates to improvements on patents No. 4137, A.D. 1873, and No. 4, A.D. 1876, and it consists, First, in winding and measuring one or more threads of yarn on to rims, reels, or bobbins of equal weight before it receives any spin or twist; it is also applicable for the reeling and classifying of the silk yarn from cocoons; and Secondly, in an improved indicator to weigh and classify the silk yarn; and Thirdly, to means for stopping the receiver bobbin when the thread breaks or the bobbin is empty.

933. CUTTING AND REPRODUCING LETTERS AND DESIGNS ON WOOD, METAL, &c., *F. W. Ventris.*—*4th March*, 1881. 6*d.*

A frame supports a table with clamps to hold the pattern and the wood to be cut. Above the table are two vertical spindles, one forming a tracer to be guided along the pattern, ahd on the other is a driller or cutter. The tracer is fitted at the end of a lever connected by a second lever to a carriage on which are the bearings of the cutter spindle, such carriage sliding transversely in a light frame, itself sliding longitudinally in the main frame. The carriage carrying the cutter is connected by a third lever to a fourth lever working on a fixed stud.

936. UMBRELLA BOXES, *J. B. Seel.*—*4th March*, 1881. 2*d.*

One end of the box opens on a hinge, and near the opposite end is a partition with holes to receive the ferules on the bottom of the umbrellas, while near the top is a second partition, with holes large enough for the passage of the umbrellas.

937. HOLDING SUBSTANCES ON PLATES FOR BEING CUT UP INTO SLICES, &c., *G. S. Miller.*—*4th March*, 1881.—(*Not proceeded with.*) 2*d.*

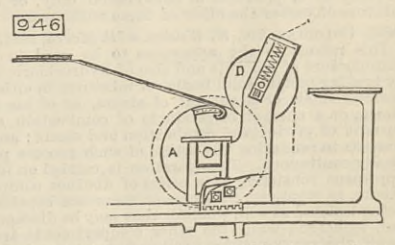
A fork is attached to standards to be clamped to the edge of the plate, and can be adjusted so as to hold the material to be cut firmly in position.

940. REED-ORGANS, &c., *W. R. Lake.*—*4th March*, 1881.—(*A communication from J. Morgan.*) 8*d.*

This relates to instruments adapted to be operated mechanically or manually, including devices for rendering the mechanical part inoperative; also mechanism for imparting motion to a music card which controls the mechanical part, and novel means for operating wind sound-producing devices.

946. PRINTING APPARATUS, *J. Imray.*—*5th March*, 1881.—(*A communication from F. Champenois and E. Missier.*) 6*d.*

This consists, First, in the method of indirect print-



ing by first taking from a lithographic stone or from a forme an impression on elastic material covering a primary cylinder, and then transferring the said impression to a sheet passed between the primary cylinder and a second or impression cylinder pressed against it; Secondly, in the combination in a lithographic or other press of a primary cylinder A, with its impressionable covering and a secondary impression cylinder D.

949. APPARATUS FOR LIFTING CARRIAGES, *F. Bell.*—*5th March*, 1881. 6*d.*

This relates to transmitting the power to lifting

rams so that it is applied to the upper and lower end at the same time. The power is first applied to one end of a lever fulcrummed to a bracket attached to the hollow standard. The other end of this lever carries a toothed segment gearing with a rack on the lifting bar. In the lever near the end where the power is applied a slot is formed, and in it is a pin attached to a rod connected to an arm, forming part of a second toothed quadrant gearing with a pinion placed near the foot of the column, and also gearing with the rack on the lifter bar.

950. Indicators for Beer Engines, &c., *F. J. Hoster.*—*5th March*, 1881. 6*d.*

This relates to counting mechanism, by means of which the number of beats or strokes of a reciprocating part, or the number of revolutions of a rotating shaft, may be at any time ascertained.

951. Fastenings for Bracelets and Necklets, *J. M. Banks.*—*5th March*, 1881. 6*d.*

As applied to a bracelet consisting of two semi-elliptical parts hinged together, the fastening consists in forming a slot in the face of one of the free ends, and on the face of the other a flat tongue to enter such slot. The tongue is hollow, and in it is a U-shaped spring which bears against two inclined teeth formed in one piece with pushers projecting from the edges of the bracelet, and by which the teeth are forced inwards so as to disengage them from the slot.

959. Producing Knitted and Crocheted Fabrics, *E. Whitehall.*—*7th March*, 1881. 1*s.*

The machine consists of two standards connected by two rails and a tie bar and forming bearings to carry a driving shaft with pulleys driven from a prime mover and a toothed wheel, an intermediate wheel to operate a wheel on the end of a cam shaft, provided at the opposite end with a bevel wheel gearing with a wheel on the lower end of a vertical shaft carrying a bevel wheel at its upper end gearing with a wheel on a second cam shaft above the standards. Below the vertical shaft is a horizontal shaft with a bevel wheel gearing with a wheel on the first cam shaft. The horizontal shaft carries cams which communicate to-and-fro movements to a rack which operates a double-ended toothed segment lever, the upper end of which gears with a spur wheel on the drawing shaft provided with grooved pulleys, round which chains are passed to effect a traverse one way of the thread carriers, the reverse traverse being effected by a similar apparatus operated by a double-ended toothed segment lever connected to the former. Between the standards is a fixed hook bar, and two movable hook bars, one movable point bar, and one movable presser point bar, andone movable jack bar, the whole moved by lever and links operated by the cams. Two hook bars are traversed to the right or left by levers and links operated by cams on the vertical shaft. A slotted inclined bar to which the drawing chains are attached is used to traverse the inclines for operating the jacks which lie in suitable sleys, one length of loop being drawn during one traverse, and a different length of loop being drawn the reverse traverse.

964. Manufacture of Chlorine, *W. Weldon.*—*7th March*, 1881. 4*d.*

This consists of mixing with manganite of magnesium the residual solution resulting from the manufacture of chlorine by the treatment by aqueous hydrochloric acid, of another portion of manganite of magnesium after the said solution has been suitably concentrated by evaporation, and forming the said mixture into small masses or lumps, such that when they are charged into a suitable apparatus air sent into that apparatus may be capable of passing into and through and among the interstices between them.

965. Manufacture of Chlorine, *W. Weldon.*—*7th March*, 1881. 4*d.*

This consists in the following operations, First, a portion of the residual product of the third operation described below is dissolved in hydrochloric acid. Chlorine is evolved, and there is at the same time produced a mixed solution of chloride of manganese and chloride of calcium. Secondly, the mixed solution produced in the first operation is evaporated to a high degree of concentration, and is then mixed with a portion of the solid residual product of the third operation, and the mixture is formed into cakes, balls, briquettes, or other small pieces or lumps, so that when charged into a suitable apparatus, air and other gases shall be able to penetrate into and pass through and among the interstices between them. Thirdly, the cakes, balls, or briquettes formed in the second operation are heated in contact with a current of air. Chloride is thereby driven off from them, and the solid product which remains consists of a compound of binoxide of manganese partly with lime and partly with manganese protoxide, or wholly with one or the other of these, mixed with some undecomposed chloride of calcium. A portion of this product is then used for a repetition of the first operation, and the other portion for a repetition of the latter part of the second operation.

966. Manufacture of Chlorine, *W. Weldon.*—*7th March*, 1881. 4*d.*

This consists in the following operations:—First, a portion of the solid residual product of the third operation described below is dissolved in hydrochloric acid. Chlorine is evolved, and there is at the same time produced a solution of chloride of manganese. Secondly, the solution of chloride of manganese produced in the first operation is evaporated to a high degree of concentration, and is then mixed with a portion of the solid residual product of the third operation, and the mixture is formed into cakes, balls, briquettes, or other small pieces, such that when charged into a suitable apparatus air and other gases shall be able to penetrate into and pass through the interstices between them. Thirdly, the cakes, balls, or briquettes formed in the second operation are heated in contact with a current of air. Chlorine is thereby driven off from them, and the solid product which remains consists of a compound of binoxide of manganese with manganese protoxide A portion of this product is then used for a repetition of the first operation, and the other portion for a repetition of the latter part of the second operation.

967. Manufacture of Hydrochloric Acid and Chlorine, *W. Weldon.*—*7th March*, 1881. 4*d.*

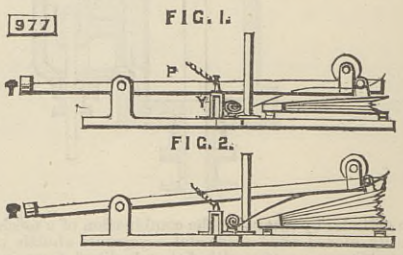
This consists in obtaining either vapour of hydrochloric acid only, or a mixture of vapour of hydrochloric acid and free chlorine from chloride of magnesium, by mixing solutions of the said chloride suitably concentrated with either magnesia, preferably from preceding operations, or with oxide of iron, and heating the resulting mixture in a current either of air only or of products of combustion only, or of a mixture of one or the other of these with steam.

968. Chlorine, &c., *W. Weldon.*—*7th March*, 1881. 6*d.*

This relates to the apparatus to be used in the manufacture of chlorine and also of hydrochloric acid by heating certain solid bodies or mixtures in either a current of air or a current of steam, or of air and steam, or a current of products of combustion, or a current of products of combustion and steam; and it consists in rendering the action of such process practically continuous. The operation is carried on in an apparatus consisting of a series of distinct compartments, so arranged that one or more are capable of being isolated at will, whereby they may be discharged and recharged while the other compartments are at work, the gas or vapours passing from one part of the apparatus at high temperature, and being employed to heat up those portions of the charge contained in other portions of the apparatus which have not yet attained that temperature.

977. Automatic Signalling Apparatus for use in the Block System and for Protecting Level Crossings on Railway and Tramway Lines, *E. de Pass.*—*8th March*, 1881.—(*A communication from H. Leblanc and E. V. A. Loiseau.*) 6*d.*

This invention consists in the combination of various apparatus which together serve as a means for electric and automatic signalling for operating signal discs on railways and tramways, and especially those discs on the Leblanc system. We shall confine ourselves to describing that portion of the apparatus which when actuated by a passing train transmits a signal. In the Figs. P is a pedal supported as shown, one end of which extends about two centimetres above the rail, whilst the other which is weighted bears upon a bellows; this bellows is provided with lugs carrying rollers, under which pass springs which raise it immediately the pedal leaves it. When in the position shown in Fig. 1, the pedal bears against a contact piece Y, and this contact piece when the rail end of the pedal is depressed touches a terminal connected with a current distributor in the signal apparatus, so that an electric current is sent into the latter. Fig. 1 shows the position before, and Fig. 2



after the passing of a train: in order to prevent a series of signals being sent the pedal is only allowed to rise very slowly after being depressed, and thus there is time for the whole train to pass. One of these pedals may be placed at every mile distance, which being in connection with a dial and pointer actuated by an electro-magnet, the pointer may be made to advance one division equal to every mile the train passes over. The remainder of the specification describes the application of this apparatus to the block system and to level crossings.

987. Watch Keys, *A. Walton.*—*8th March*, 1881. 6*d.*

This relates to the part of the key by which the swivelling is effected, and consists in forming a cylindrical or tapering stem on the top of the body of the key, and round it a groove. A tube is placed over the stem, and indentations are made so as to force part of the tube into the groove. The ends of the ring are then sprung into the indentations.

989. Fastenings for Bracelets, &c., *E. F. Griffin.*—*8th March*, 1881. 6*d*

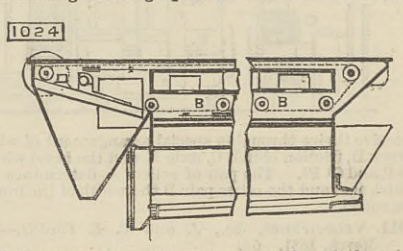
This consists essentially of two sliding hooked bolts projecting from the meeting face of one half of the bracelet, taking into and engaging with slots made in the face by the other half of the bracelet.

1013. Ornamental Potteryware, *C. Westwood and R. A. Windmill.*—*9th March*, 1881. 4*d.*

This relates to the production of pottery with a variegated or marbled appearance wholly independent of the glaze, and it consists in forcing different kinds of clay into intimate contact by "wedging," the operation being repeated until the different strata are sufficiently subdivided, when the substance is made up into the desired form and burnt and glazed.

1024. Purifying Machinery for Treating Grain, &c., *M. Benson.*—*10th March*, 1881.—(*A communication from O. Oexle.*) 6*d.*

The principal novelty is the use of an enclosed endless moving filtering apron or belt B made of any



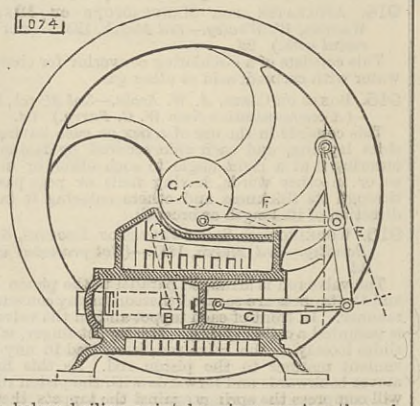
suitable material, consisting of woollen cloth, wire netting, or any other known suitable material that allows a free passage of purified air, and in the meantime retain the fine particles of dust, and also save space and dispense with the usual dust chamber for the exhaust air.

1056. Artificial Flowers, *W. Spence.*—*11th March*, 1881.—(*A communication from W. Hagelberg.*) 6*d.*

Discs of a circular form composed of webs or fabrics, paper, or other material suitable for the manufacture of artificial flowers, are, by means of a stamping machine, made in required number of circles or corollas, into which the single petals of the intended flowers are distributed.

1074. Gas Engines, *E. Bénier and A. Lamart.*—*12th March*, 1881. 6*d.*

The movement of the piston C is communicated to a connecting rod D, which acts on a lever arm E, which latter, by means of a second rod F, turns the driving shaft G. The jacket of the cylinder B encloses water



kept below boiling point by pipes passing through the water, and in which air is circulated by means of the natural draught produced by the heat of the water. The ignition of the charge is effected by a movable intermittent burner drawn along with the distributing slide valve by means of a cam on the driving shaft, and of a spring lever. The burner after each explosion is relighted at a permanent burner placed at the end of the slide valve.

1114. Launching Life-buoys and Attached Lights, *E. T. Jones.*—*15th March*, 1881. 6*d.*

The buoys are fitted with Holmes's self-lifting inextinguishable lights, each of which is in a cylindrical case having a central tube, the opposite ends of which have to be perforated when the light is to be used; and it consists in suspending the case between two pointed levers, which, when moved in one direction, pierce the tube, and on being moved in the opposite direction a key holding the buoy is withdrawn; the light case becomes detached, thus permitting the whole to fall into the water.

1204. Materials for Beverages, *R. Bull.*—*18th March*, 1881. 2*d.*

This consists in the employment of rye, either alone or in conjunction with figs, or in conjunction with prepared figs and coffee.

1480. Manufacture of Articles from Powdered Substances, *R. H. Brandon.*—*5th April*, 1881.—(*A communication from S. S. Hyatt.*) 6*d.*

This consists in immersing the dies containing the material in liquid contained in a vessel enclosed by a steam jacket, and applying pressure to the liquid, while heat is applied in the form of steam within the jacket surrounding the vessel.

1512. Spectacles or Eye-glasses, *W. R. Lake.*—*6th April*, 1881.—(*A communication from R. A. Carter.*) (*Complete.*) 6*d.*

This relates to frameless eye-glasses, and consists in forming the bridge piece and other metal parts so as to clip on to the glass without the use of screws or rivets. The parts which clip the glasses consist of two spring arms with projections near the ends, which enter recesses formed in the glasses.

1836. Hardware, *F. C. Glaser.*—*28th April*, 1881.—(*A communication from C. Haegele.*) 4*d.*

Copper-plated sheet iron is used for the manufacture of hardware instead of copper or its alloys, the copper being united to the iron by heating and rolling or hammering without the addition of a welding medium.

1967. Insoles of Boots and Shoes, *W. H. Stevens.*—*5th May*, 1881. 2*d.*

This consists in the manufacture of compound insoles for boots and shoes in which one thickness or layer of cork is cemented or attached to another thickness or layer of leather or its equivalent by a waterproof cement or solution.

2543. Soap, *A. J. Boult.*—*11th June*, 1881.—(*A communication from C. S. Higgins.*)—(*Complete.*) 4*d.*

This consists, First, in the manufacture of soap by the saponification of fats and resins, and the subsequent solidifying by stearic acid or stearine.

2548. Teapot, *J. A. Gilbert.*—*11th June*, 1881. 6*d.*

So as to concentrate the fine particles of tea in the teapot and prevent it flowing out through the spout, the water is poured into the pot through a box with a perforated bottom forming a rose under the lid, and over the opening to the spout a fine strainer is placed.

2566. Boot and Shoe Sole Edge Setting and Burnishing Machines, *C. H. Trask.*—*13th June*, 1881.—(*Complete.*) 6*d.*

A horizontal tilting frame is provided, having an adjustable counterbalance, and provided with suitable belt pulleys, which are journalled in hangers secured to the ceiling overhead, and one end of the frame is provided with smaller belt pulleys, which are journalled within a horizontal yoke-frame connected thereto by means of a swivel joint, and from the journals of said belt pulleys a yoke-frame is suspended, to which is connected a vertical tube, the lower end of which is provided with a ball-and-socket joint having a belt pulley and excentric journalled within the ball at or near the axial line thereof. Extending downwards from the said ball is a hollow operating handle having enclosed a centrally pivotted bar, the upper end being connected with the excentric and the lower end provided with one or more burnishers, which may be supplied with heat from a suitable gas jet or burner. Power and motion being communicated to the burnisher, it is guided by hand over the edge of the sole of the boot or shoe: the ball-and-socket joint thus arranged permits the free movement of the suspended reciprocating burnisher over the various curves and angles of the edge of the sole of a boot or shoe held in a suitable jack, so as to set and burnish the same with great rapidity.

2772. Cigar Lighters and Matches, *A. M. Clark.*—*24th June*, 1881.—(*A communication from W. W. Batchelder.*)—(*Complete.*) 6*d.*

This consists in a cigar lighter composed of a tube for holding a fibrous cord, another tube arranged in line with the same and containing a continuous match, and means for cutting and exploding the charge from the continuous match.

2776. Supplying or Distributing Steam, *A. M. Clark.*—*25th June*, 1881.—(*A communication from B. Holly.*)—(*Complete.*) 6*d.*

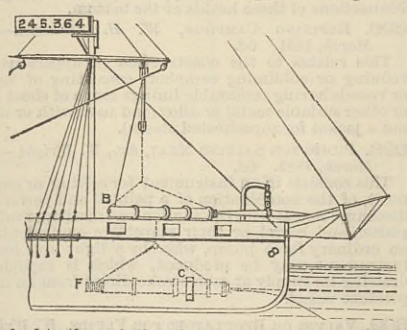
This consists in the combination of steam-supplying apparatus and a double system of underground mains, one supplying steam under high pressure for power purposes, and the other receiving the exhaust steam and supplying steam at low pressure for heating purposes.

SELECTED AMERICAN PATENTS.

From the United States Patent Office Official Gazette.

245,364. Means for Adapting Submarine Guns to Ships, *John Ericsson, New York, N.Y., assignor of one-half to Cornelius H. Delamater and George H. Robinson, both of same place.*—*Filed May 28th*, 1881.

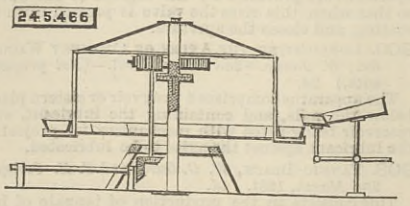
Claim.—(1) The combination, with a ship or other vessel and a gun, of a breech support B, containing an open seat F, adapted to receive within it the breech of the gun and to sustain the same against recoil, and an open muzzle support C, said supports being both



attached to the exterior of the vessel, substantially as herein described. (2) The combination, with a ship or other vessel and a gun provided with an eye in its breech, of a breech support secured to the outside of the vessel and containing an open seat for the breech of the gun, and a guide attached to the said breech support and adapted to pass through the said eye on the breech of the gun, substantially as herein described.

245,466. Treatment of Furnace Slag, *Alexander D. Elbers, Hoboken, N.J.*—*Filed March 26th*, 1881.

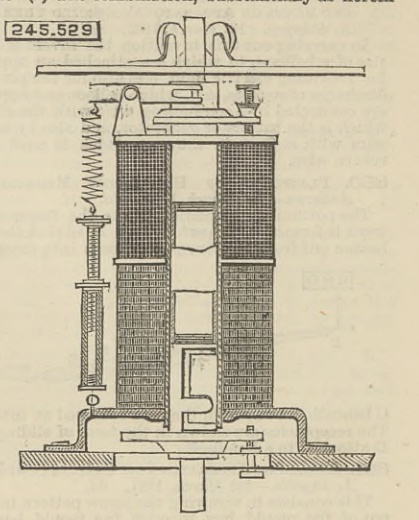
Claim.—The hereinbefore-described method of treat-



ing liquid slag, which consists in casting it in cumulative layers, substantially as specified.

245,529. Electric Light Regulator, *William H. Markland and Wyllis H. Markland, Brooklyn, assignors to the Empire Electric Light Company, New York, N.Y.*—*Filed May 10th*, 1881.

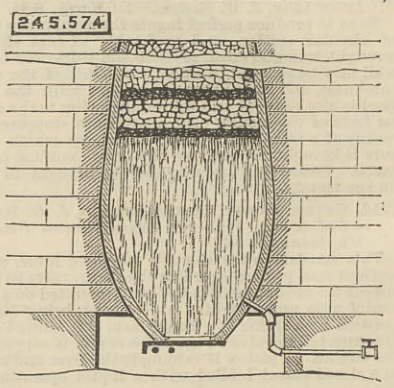
Brief.—The carbon passes through the hollow core of an electro-magnet. The lower end of said hollow core is split into two sections hinged together at one end. When a current passes these sections are so polarised that their free ends are of the same polarity and are mutually repelled, thereby gripping the carbon. *Claim.*—(1) The combination, substantially as hereinbefore set forth, of a hollow helix and a hollow core movable longitudinally within said helix, divided longitudinally into sections, which sections are united by a hinge. (2) The combination, substantially as herein-



before set forth, of a hollow helix, a hollow core divided longitudinally into sections, which are united by a hinge, and an electrode or rod for holding the same passing axially through the hollow core, which is clamped between the sections thereof when the helix is traversed by an electric current. (3) The combination, substantially as hereinbefore set forth, of a cylindrical carbon electrode, or a rod for holding the same, a longitudinal groove formed in one side of said electrode or rod, and a guiding wheel having a periphery of V-shaped section.

45,574. Treatment of Hydraulic Cement in the Kiln, *James M. Speed, Louisville, Ky.*—*Filed June 27th*, 1881.

Claim.—The herein-described process of treating hydraulic cement in the kiln in which it is burned, it



consisting in admitting steam to the mass after it has fallen below the point where it is burned, substantially as and for the purpose set forth.

CONTENTS.

The Engineer, October 7th, 1881.

South Kensington Museum.—Visitors during the week ending Oct. 1st, 1881:—On Monday, Tuesday, and Saturday, free, from 10 a.m. to 10 p.m., Museum, 11,874; mercantile marine, building materials, and other collections, 4681. On Wednesday, Thursday, and Friday, admission 6d., from 10 a.m. till 5 p.m., Museum, 1511; mercantile marine, building materials, and other collections, 516. Total, 18,582. Average of corresponding week in former years, 18,031. Total from the opening of the Museum, 20,396,077.