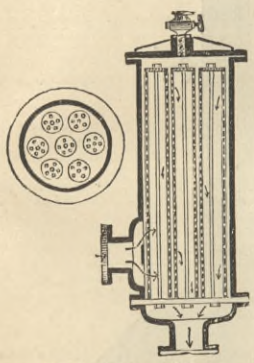
THE ENGINEERING AND METAL TRADES EXHIBITION.

No. II.

WE continue our report of this important exhibition opened last week. Messrs. S. Hodge and Co., Milwall, exhibit two boilers, one vertical of 16-horse power, with shell 9ft. 3in. high and 4ft. 6in. diameter, constructed for a working pressure of 60 lb. per square inch; and one of their patent return tubular type, which we illustrate by three views on page 24. The tubular boilers have been designed for the purpose of saving space and economising fuel, and consist of an external horizontal shell, having one or two furnace flues connected to a combustion chamber, which leads the products to a group of tubes placed at one side above the flues, through which they pass to the front, and are then returned to the back through a second group of tubes at the other side, and so on to the chimney. No brickwork setting is required. We understand that a large number of these boilers is in operation, and that they have given much satisfaction, both as regards their steam producing qualities and their endurance. The price per horse-power is a little above that of a Lancashire or Cornish boiler, but the evaporative efficiency is said to be considerably greater, in some cases having reached as much as 12½ lb. of water per pound of Welsh coal.

In connection with these boilers, Messrs. A. Haacke and Co., of Lime-street, E.C., show their fossil meal composition for covering boilers, steam pipes, cylinders, &c., to prevent loss from radiation of heat. This material is almost entirely composed of the shells of minute organisms (*Diatomacea*), which are extremely porous, and as they consist of pure silica, are quite indestructible under ordinary circumstances. To demonstrate the value of their covering, Messrs. Haacke and Co. have arranged a testing apparatus, which is shown in operation. Two ranges of cast iron steam pipes, each 5in. internal diameter and 40ft. long, are supplied with steam by a ¾in. pipe, the steam having been previously dried by passing through Dr. K. Moeller's patent filter. One set of pipes is bare, the other covered with 1in. thickness of the fossil meal, and as nothing but dry steam can enter, it is obvious that by collecting and measuring the water condensed in each in a given time, the amount of heat lost can be ascertained and the value of the non-conducting material determined. In the present case the results show that about seven times as much steam is condensed in the bare pipes as there is in those which are protected. The fossil meal is also applied to the vertical boiler exhibited by Messrs. Hodge and Sons, the covering being 1in. thick. A thermometer is fixed with the bulb resting on the hot shell plate, another being placed on the outside of the covering, and it is found that with an external temperature of 95 deg. Fah. the readings are 270 deg. and 103 deg. respectively, giving a difference of 167 deg., which is an exceptionally good result, and shows that a coating 1in. thick is an ample protection in all ordinary cases. The fossil meal is also made up into a rope to be applied by wrapping round the pipe or object to be protected, a system which is found fo be very convenient in cases when the covering has to be frequently removed, or when it is subjected to vibration. The steam filter referred to above as having been invented by Dr. K. Moeller, has been designed for separating the particles of water which are generally carried over in suspension by the steam, as well as grease and solid impurities. It is illustrated in section above, and consists of a cylindrical casing enclosing a bundle of bored, corrugated tubes, surrounded by several layers of fine wire gauze, the inlet and outlet passages being so arranged that the steam is compelled to pass through the gauze, which acts as a filter by removing the liquid and solid matters which would otherwise be carried along to the steam cylinder.



MOELLER'S FILTER.

A direct-acting hoist for steam, water, or compressed air is shown by Messrs. George Scott and Son, London. It is extremely simple, merely consisting of a pair of oscillating cylinders working directly on to a drum upon which the rope or chain is wound, and it can be used for warehouse purposes in connection with a swinging jib, or over a cathead or snatch block.

Tweddell's well-known hydraulic rivetting plant is exhibited by the makers, Messrs. Fielding and Platt, of Gloucester, who in addition have numerous samples of work showing the joints closed by their machines, in one case no less than 24 plates having been rivetted together.

The Harrison Patent Steam Steering Engine Company, Limited, Manchester, show several exceedingly well-finished steering gears, one of which we illustrate on page 25. The steam cylinders are mounted on a strong cast iron framework and actuate a shaft upon which is forged a worm, gearing into a worm-wheel on the drum shaft which is placed below with its axis parallel to the centre line of the engines. The starting and stopping arrangement is above the steam cylinders, and consists of a chest containing a flat circular slide, which being rotated in one direction or the other admits steam and starts the engines. Below this slide is another of similar construction, but the spindle, instead of being connected to the hand-gear, is taken through a stuffing-box on the bottom of the chest, and geared by a bevel wheel and quadrant to the drum shaft, in such a manner, that as soon as the engines cause the drum to revolve the slide is moved round and cuts off the steam sooner or later, according to the amount of travel given by the steersman to the starting valve. The advantages claimed for this gear are its extreme simplicity and noiselessness, and owing to the elongated form of the valve ports the engines are started gently without any shock or undue strain being brought upon any part. The construction is strong and the workmanship excellent, all wearing parts being provided with adjustments easily got at. A combined hand or steam gear for vessels up to 3000 tons is also exhibited, also an arrangement of brass column and wheel for steering from the upper bridge. Similar gear to that which we illustrate has been supplied to a great number of well-known vessels, and the new Inman steamer City of Chicago is about to be fitted with it.

A number of high-class machine tools are shown by Messrs. Kendall and Gent, Manchester. A 10in. self-acting, sliding, and surfacing lathe, with screw-cutting gear, is well worth inspection. It is exceptionally strong, and is one of a type designed to meet the demand for lathes of great strength and rigidity, for heavy cutting in wrought iron and steel. The bed is of very heavy section, and the fast headstock has a large steel spindle with hardened conical necks and bushes, adjustable for taking up wear, except in the larger lathes, which have parallel necks, with gun-metal step bearings. The excentric for throwing the back shaft out or in is fitted with an improved motion, which prevents the possibility of breaking teeth, for by a single movement of a hand lever the shaft is thrown out or fixed in gear. The carriage, with flush top and compound slide rest, has positive self-acting rack traverse, and a self-acting transverse slide, for surfacing, both being driven by back shaft and change wheels, and arranged for coarse traverses, friction cones in front of the carriage being provided for stopping and starting. The planing machine is also a very substantial and well-designed piece of work. The driving gear has been placed so as to permit of a large spur wheel being used for driving the table, instead of the usual small pinion, and it is kept back behind the frames, so as to allow the work being operated upon to overhang without interference. The feed gear is extremely neat and handy, for in place of having to alter the stroke of the pull so as to give one, two, or more teeth as may be required, an adjustable broad plate is provided at one side of the wheel, and by moving this in one direction or the other the feed can be altered while the machine is in operation, the pawl merely riding over the plate for a greater or less part of its travel, as shown on page 25. A screwing machine (Brown's patent) is also exhibited, but is too well known to require description. It is, however, provided with Dixon's patent gear for automatically opening and closing the dies, which would seem to be a very useful addition when it it is desired to screw a great number of bolts or studs to one length. The cutter-forming machine, which we illustrate on page 25, is a useful little tool which has been newly brought out by Messrs. Kendall and Gent. It is specially designed for making circular steel cutters of any desired section for milling and wheel cutting machines, and is so constructed that all the teeth of the cutter are made of precisely the same shape, and finished completely without requiring backing-off or filing. It is, in point of fact, a profiling machine, the action of the tool being controlled by a "former," of the same pattern as the cutter required. The blank, roughly turned, is fixed on a mandril provided with Mr. J. C. Scott's dividing arrangement, by which any number of teeth can be obtained without the use of change wheels.

Messrs. Exton and Co., Chippenham, show a great variety of wrought steel and other pipes and fittings made from best mild sheets, which are excellent examples of their kind. These pipes are now much used in place of cast iron for gas, water, and steam, and as they can be made from 5in. to 36in. diameter, in lengths from 9ft. to 12ft., and to stand pressures from 50 lb. to 500 lb. per square inch, it will be seen that they are applicable to a great variety of purposes.

On page 25 we illustrate a new rotary pump—Root's patent—which is exhibited by Messrs. Lewis Olrick and Co., Leadenhall-street, E.C. In construction it is much the same as the new form of Root's blower, and consists of two cast iron vanes revolving in opposite directions within a cast iron casing, the vanes being formed in such a manner that a kind of rolling contact is kept up between them, making a joint which is practically watertight. As each vane revolves, a vacuum is formed behind, between it and the outside casing, and as the motion is continued, the water flows into this space until the opposite end of the vane coming forward drives it before it, and forces it through the discharge pipe. The charging and discharging goes on continuously with each vane, twice in each revolution, so that a constant flow of water is maintained. It is stated that the makers, Messrs. Mather and Platt, made a great number of experiments with the rotary type of pump, and out of a large number tested, found that of Mr. Root to give the highest efficiency. Water may be drawn from a depth of 28ft. when running at even a moderate speed, and an efficiency of 60 per cent. is said to have been obtained. The Root pump is intended chiefly for discharging very large quantities of water at lifts from 50 to 100ft., and is driven either by a belt or by an engine directly attached to the shafts. It is especially recommended for use on board ship in case of leakage or other accident.

Messrs. Olrick and Co. also show samples of a new pattern of Herrmann's patent wire floor for malt kilns, in which the upper surface is quite flat, the wires being of a wedge section. The advantage of this form is that about 8 per cent. more air space is obtained in a given area than was possible before, and the strength is very great. Strips are supplied the exact length of the kiln; so that the trouble of jointing is avoided, and the laying down of the floor becomes a very simple matter. We illustrate this floor on page 24.

Messrs. Lane and Reynolds, London, show a number of very neatly designed and well-finished engines, self-contained on strong cast iron base plates. The bed-plate, bearings for crank shaft, guide, and front cylinder cover, are all cast in one piece, and the cylinder bolted up to the end in the manner which has now become so common in engines of this description. Great care has been exercised in providing adjustments to take up wear, and every part is readily accessible. The governor is of a new form, and consists of a pair of bars weighted at each end, and pivotted in the middle on pins projecting from each side of a horizontal spindle. When the engine is at rest these bars lie almost parallel with the spindle, being kept in position by a spiral spring, but as soon as the speed increases beyond a given rate the weights fly out, rotating the bars on their centre axis, and so acting on the throttle valve. It is claimed for the governor that it is exceedingly powerful and sensitive, and has the great advantage that all the working parts can be cleaned, oiled, and examined without taking anything asunder. It is also so placed that no heat is communicated to it from the cylinder.

Mr. Thomas Adams, Manchester, show a large collection of his patent spring safety valves for marine, stationary, and locomotive boilers, which are too well known to require description.

A new form of injector—Borland's patent—is exhibited by Messrs. Holden and Brooke, Manchester, the chief advantages of which appear to lie in the fewness of parts and small bulk of the apparatus. It is also arranged with one of the branches to swivel round in any direction so as avoid having to order special castings, and by a neat plan the greater part of the casing can be removed by a few turns with a screw key, exposing for examination the steam nozzle and the whole interior of the injector. Messrs. Holden and Brooke also show a new non-compression gas engine—the Reliance—which is claimed to be "the most mechanical small-power gas engine in the market," whatever that may mean. In any case it seems to work well, and is of strong, substantial design.

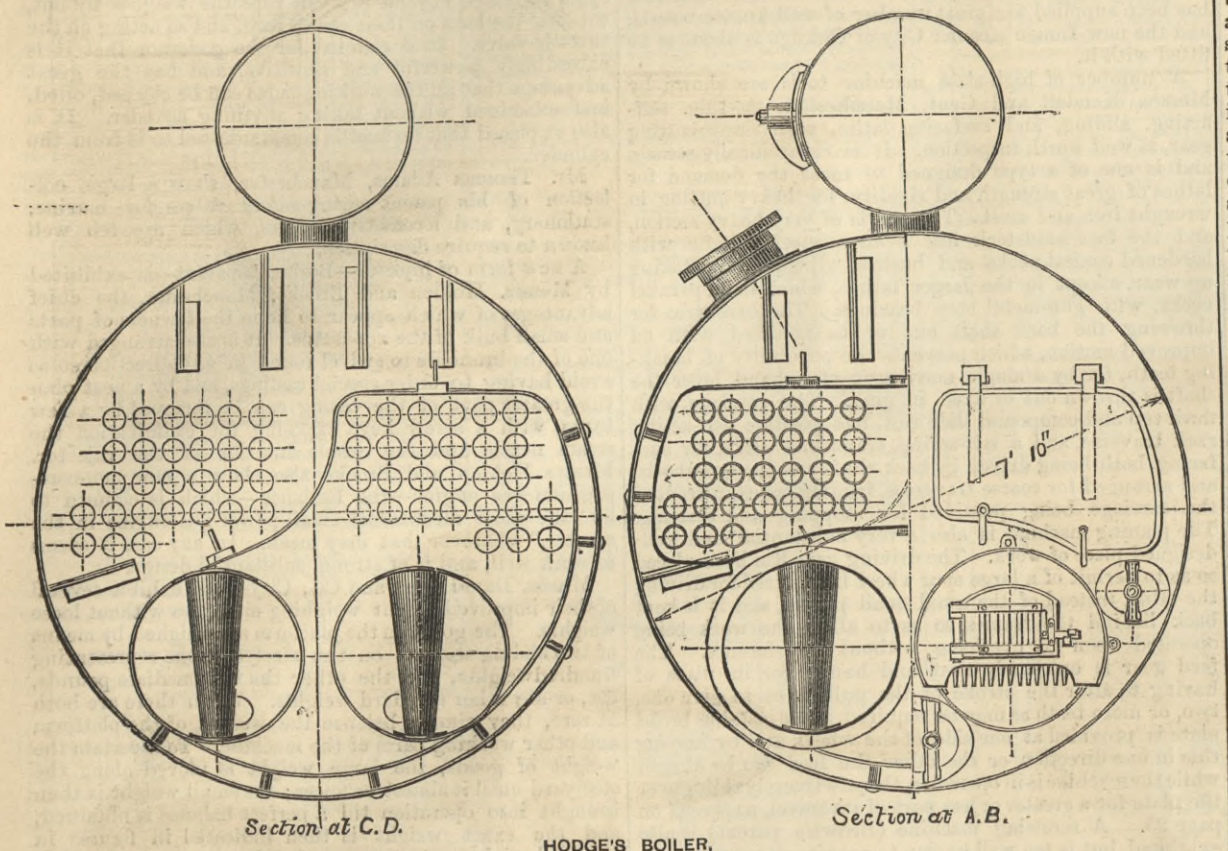
Messrs. David Hart and Co., City-road, exhibit several of their improved patent weighing machines without loose weights. The goods on the platform are weighed by means of two sliding weights on the steelyard, one representing hundredweights, and the other the intermediate pounds, &c., or any other standard weights. When these are both at zero, they simply balance the weight of the platform and other working parts of the machine. To ascertain the weight of goods, the large weight is moved along the steelyard until it almost balances; the small weight is then brought into operation till a perfect balance is obtained, and the exact weight is then indicated in figures in hundredweights, quarters, and pounds, or any other standard, on a plainly engraved scale. Two illustrations of this weighing machine are given on page 28.

Various portions of Kerr's patent portable railway are exhibited by Messrs. W. B. Dick and Co., Leadenhall-street, E.C., together with specimens of rolling stock and fittings. Like other portable railways, it has been designed for use on farms, plantations, iron mines, &c., and in all cases where simplicity and quick mounting and dismounting of the line is desired. The sleepers are all made perfect to gauge, securing accuracy in laying without having to resort to skilled labour, and the gauge can never vary unless the rails are absolutely torn away from the sleepers. The rolling stock comprises covered and open goods wagons, equilibrium and universal tipping wagons, and carriages for timber and sugar cane, as well as passenger cars; while among the fittings will be found points and crossings, switches, wheels and axles, and various types of fixed and portable turntables.

Messrs. Durham, Churchill, and Co., London, have a large display of their well-known marine governors, which are now made in two forms, viz., the "Velometer" and the "Universal," the difference being only in design, and consisting chiefly in the pivotting of the power cylinder of the "Universal" so that the rod may be led in the most direct manner to the throttle valve, while in the "Velometer" the cylinder is a fixture. There is also a difference in the brackets and framing, the Universal being arranged to bolt up to the thwartship or bunker bulkhead under the deck, upon the engine platform or columns, or wherever it is found most convenient for a fair lead for the driving rope. Upwards of 1400 steamers have now been fitted with these governors in one form or another, and we are told that the demand for them is still increasing. So many serious collisions have occurred between ships at sea that we are not surprised to find inventors giving their attention to providing some means of warning vessels of each other's approach. This is the object of the "Sonnebula," a little instrument shown by Messrs. Durham, Churchill, and Co., and which has been designed for automatically sounding the whistles of steamers in foggy weather. It consists of a small brass case, containing clockwork, which is set in operation by two or three turns with a key, and which, by means of trigger gear, periodically actuates a small valve admitting steam below a piston working in a cylinder, and provided with a rod and eye for connection to the whistle cock. Each rise and fall of the piston gives one blow of the whistle, the sound occurring after stated intervals, the duration of which is regulated by a fly governor in connection with the clockwork. After once starting by hand, the instrument is self-winding, each stroke of the piston acting on the drum of the main spring by a rack-and-pawl motion, so as to entirely obviate all chance of failure to sound the whistle through inattention. The machine is small and compact, and seems to us to thoroughly meet the requirements of the case.

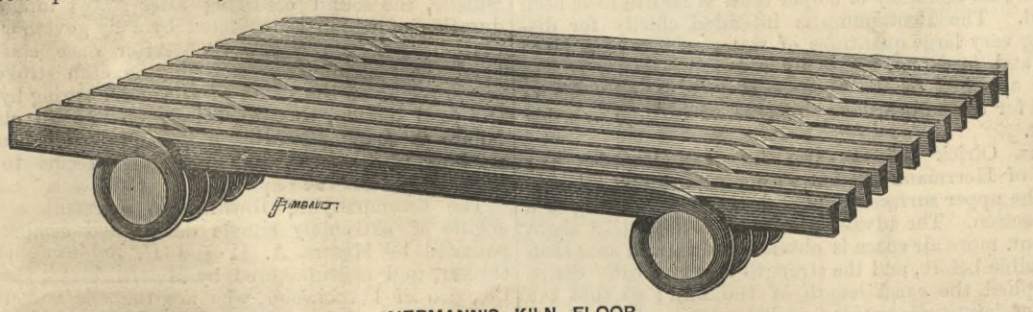
The accompanying illustrations represent a hot air engine of extremely simple design and compact form, patented by Messrs. A. E. and H. Robinson, of Manchester, and manufactured by Messrs. Frank Pearn and Co., also of Manchester, who are the sole makers. The action is derived from the alternate heating and cooling of air, and its consequent expansion and contraction, and the heat may be applied either from a gas burner, as shown in the engraving, or from the combustion of coal, oil, or other fuel. G^2 is a chamber or fire-box lined with a non-conductor of heat, G is the chimney, and G^1 a casing which forms a space leading to G^2, round the outside of the chimney. H is a Bunsen burner which can be withdrawn for lighting, and which is supplied with air previously heated by being passed down the space between G and G^1, thus utilising a considerable portion of the waste

heat and causing a more perfect combustion of the gas. The cylinder A is surrounded at one end by a water-jacket A^2, and has at its heated end a liner A^3, made of same material which is a bad conductor of heat, the object of the liner being to more effectually confine the heat within the cylinder so that it shall not be readily transferred to the metal and dissipated, and also to separate the heater B from the cooled part of the cylinder. The working piston is connected to the pin E^1 of a double throw crank, F being connected to the crank-pin E^2. When the engine is started the regenerator is moved from the heated to the cooled portion of the cylinder, and the air passing through it and over the heater is increased in temperature and expanded, driving the piston C before it. By the action of the crank the regenerator F is then moved from the cooled to the heated end, and the air being driven through, first imparts some of its heat to the regenerator, and is then further lowered in temperature by contact with the cooled portion of the cylinder, in consequence of which it contracts in volume and allows the piston to descend. An engine of this type is shown at work in the Machinery and Metal Trades' Exhibition, and runs with great ease and quickness. It is simple and compact, and gives a steady driving motion. Compactness has been secured by several well considered devices, among which we may specially mention the arrangement by which the heating and cooling surfaces are kept close together, without transmission of heat taking place between them, so permitting of a considerable difference in their temperatures.



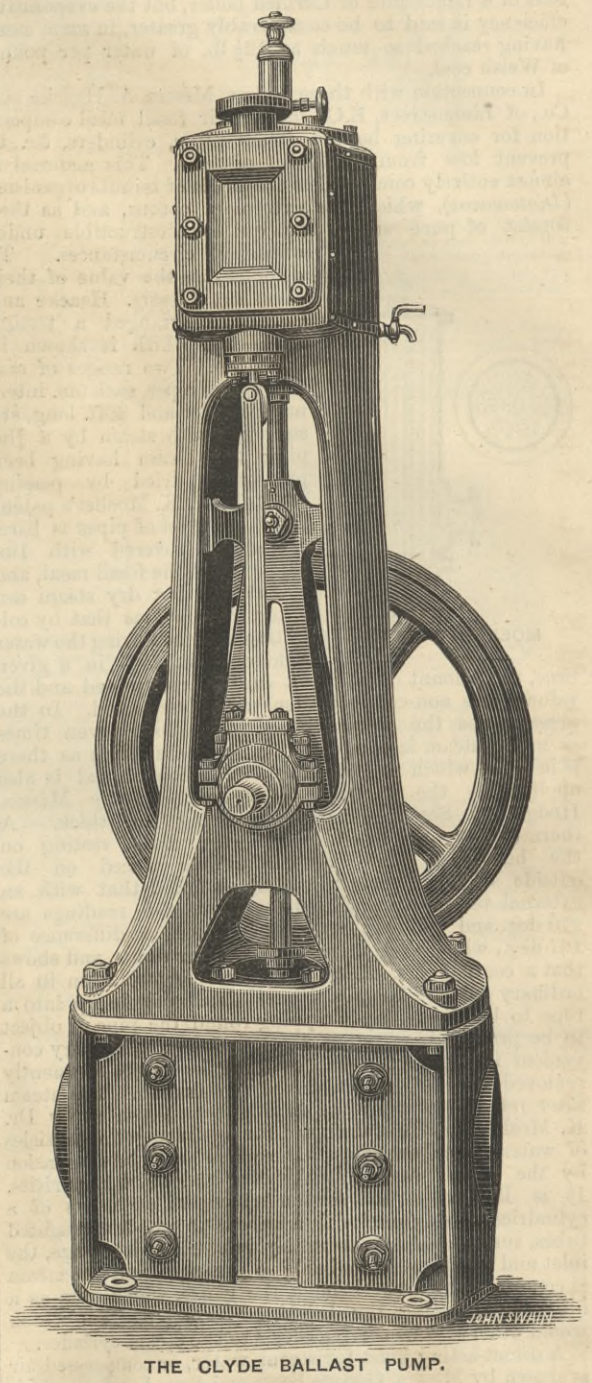
HODGE'S BOILER.

Messrs. Shanks and Co., Arbroath, exhibit a compound engine which we illustrate on page 25. The high and low pressure cylinders occupy opposite ends of a short bed plate, the crank shaft being between them, for the connecting-rod is substituted a dog link. The engine shown is very well made and substantial, and for moderate powers it ought to answer very well, one great point in its favour is the small space which it occupies. There is, we know, a strong prejudice against the use of dog links instead of connecting rods, but this is mainly due to the imperfect way in which they have been fitted up. Messrs. Shanks have provided ample wearing surfaces, and we have no reason to doubt the satisfactory working of the engine, which seems to be very suitable for driving dynamos.



HERMANN'S KILN FLOOR.

Mr. F. G. Bone exhibits one of his patent compound tubular Cornish boilers of 20-horse power, which we illustrate on page 25, by an end view, half in elevation and half in section. In this boiler the fire is placed below and the products of combustion after passing along the bottom and sides, return through the two sets of side tubes into a smoke-box fixed on the front of the boiler, and thence through the main central tube to the chimney. It will thus be seen that a very large amount of heating surface is made use of, and as the amount of brickwork flue is very small, there is little chance of heat being lost by conduction to the ground and radiation. In addition to its economy a great advantage of Mr. Bone's boiler is the smallness of space occupied, it being stated that 100-horse power will not take up more room than is required for 40-horse on the ordinary plan. The boiler is well-made and well-designed for convenience in repairing, all parts being readily accessible. It also has the advantage of not costing more per horse-power than a boiler of the Lancashire or Cornish type.



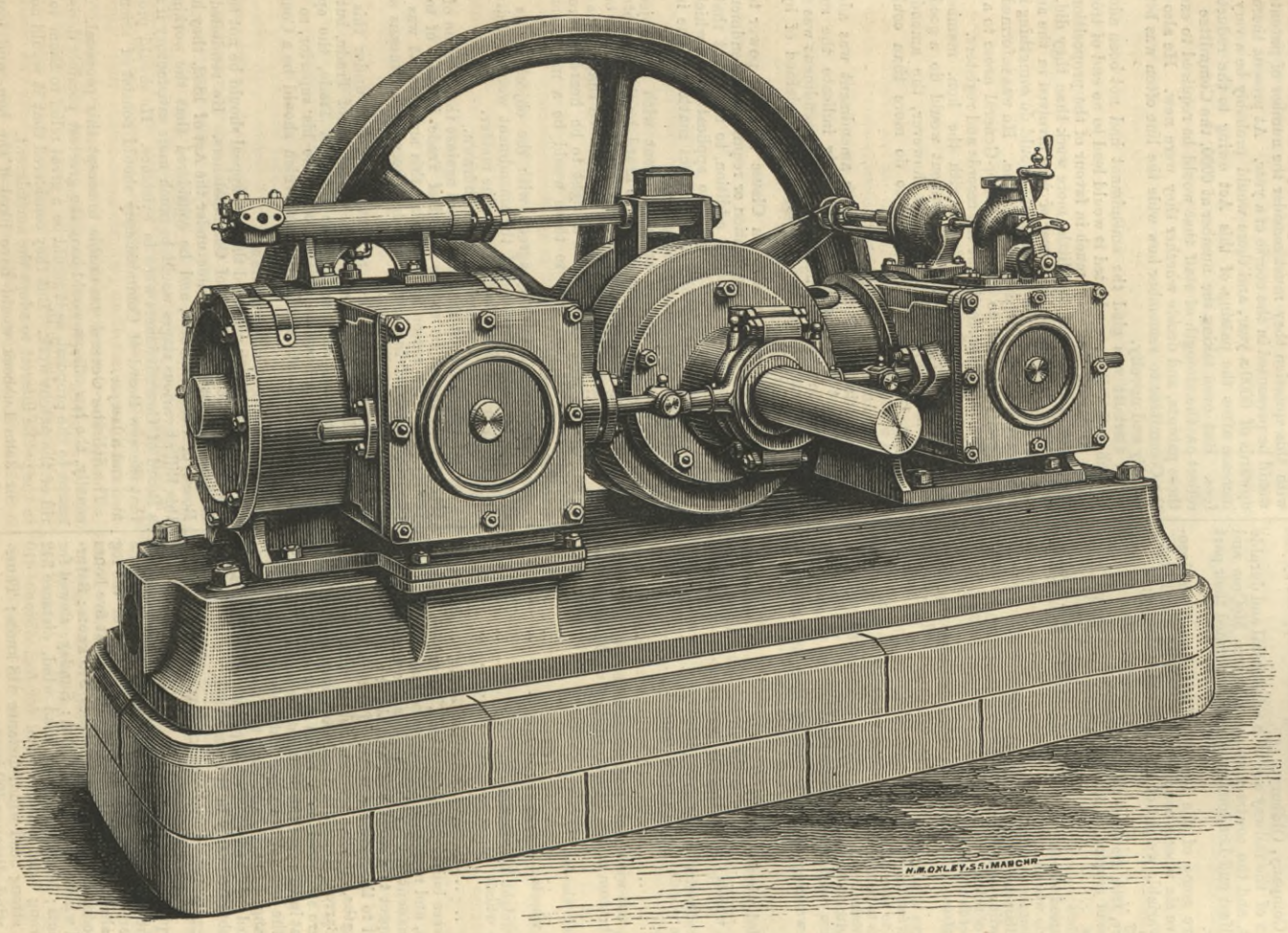
THE CLYDE BALLAST PUMP.

We illustrate above the Clyde ballast pump exhibited by Mr. John Cochrane, Grahamstown Foundry and Engine Works, Barrhead. This is a vertical engine with the cylinder set on a very strong frame standing on a species of box containing the pump. Two doors held by three bolts each give easy access to the valves. This is a well-designed and well-made steam pump. The same firm exhibit another form of steam pump, concerning which we shall have something to say in another impression.

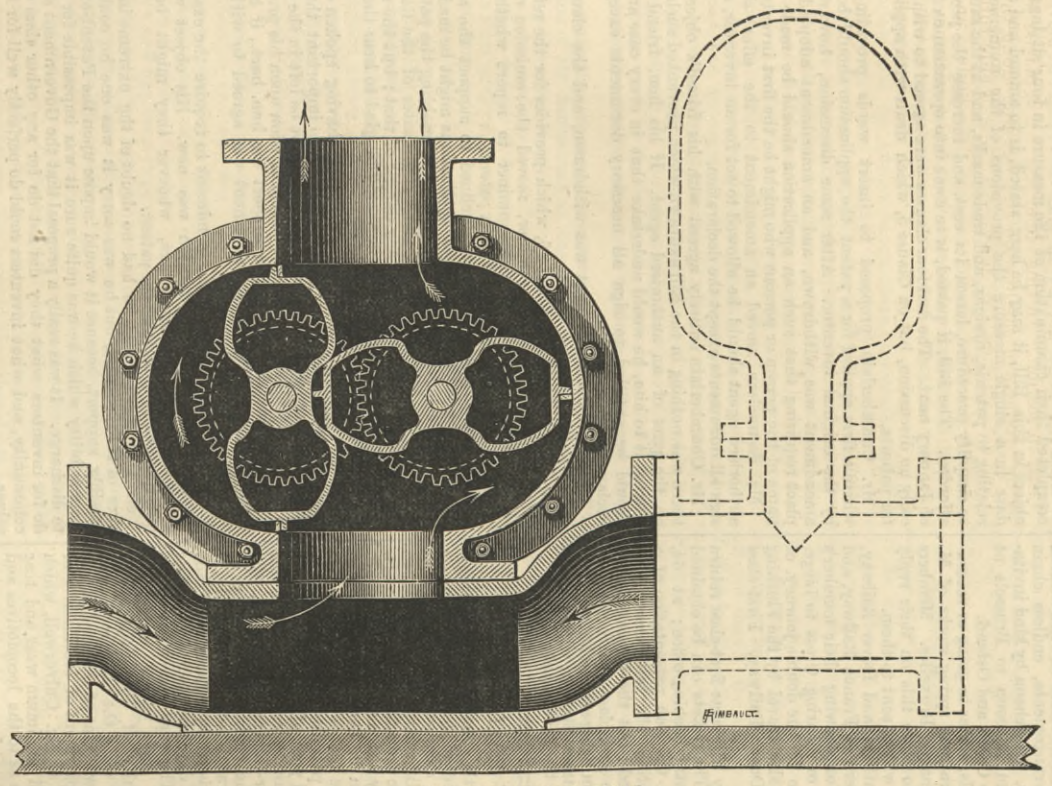
A useful form of lever punching and shearing machine is exhibited by Messrs. James Bennie and Co., of Glasgow, the chief feature of novelty being the angle iron cutters. Hitherto there has always been a difficulty in applying this cutter to lever machines, and when it has been done, it has generally been arranged to cut the bar with the corner down. This is unsuitable for shipbuilders, and for dealing with large angles that have been previously bent, and Messrs. Bennie have therefore designed the present plan, which we illustrate on page 28. A is the upper cutter, consisting of a steel lever, rocking on a fulcrum *f*, and worked by an excentric on the main shaft. The steel compression bar *b* has a universal joint at bottom, and is kept in gear at the top by a small steel block, which when withdrawn by the handle *h* stops the action of the cutter. The angle bar is cut with a flat side down, and as there is an opening right through the frame of the machine, a bar of any length can be cut without interfering with the work at the ends. Lever-punching machines are very often preferred by workmen, especially by those on piece, the pause in the action of the punch after every lift allowing more time to shift the plate between each stroke than is possible when an excentric is employed. This

EXHIBITS AT THE ENGINEERING AND METAL TRADES EXHIBITION.

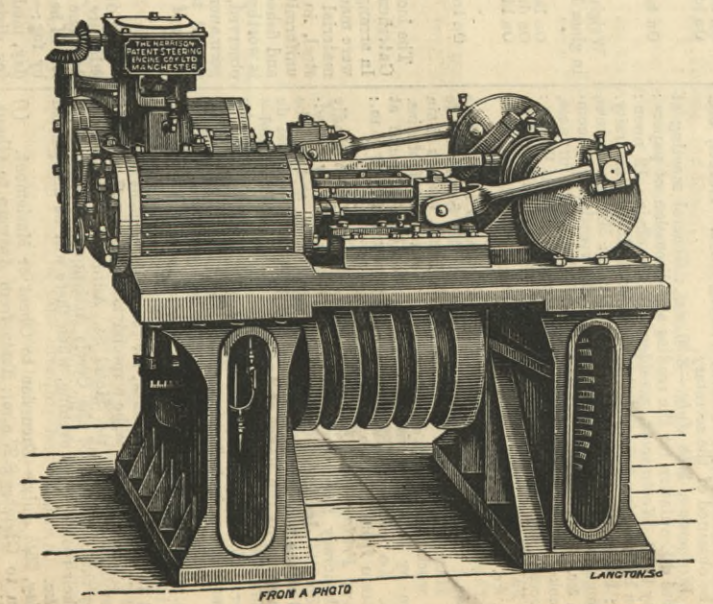
(*For description see page 23.*)



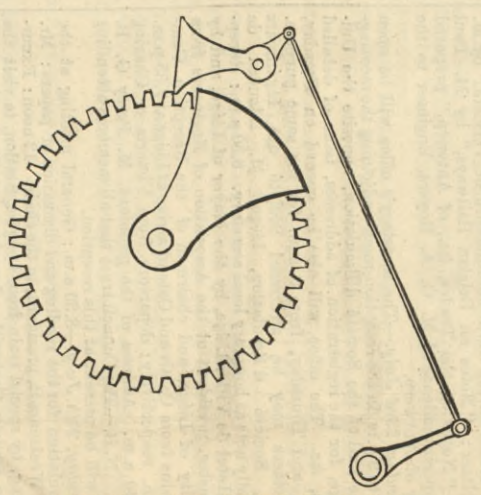
SHANKS'S COMPOUND ENGINE.



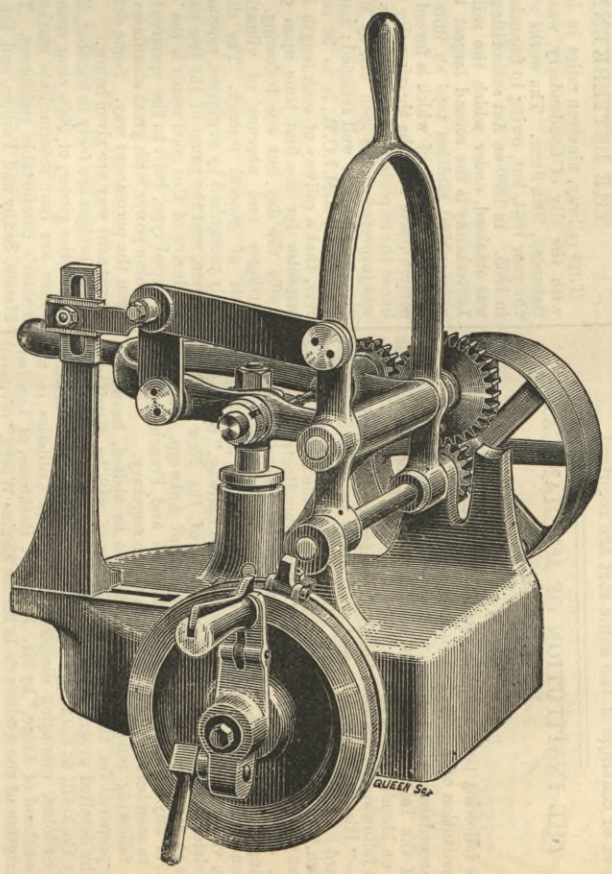
ROOT'S ROTARY PUMP.



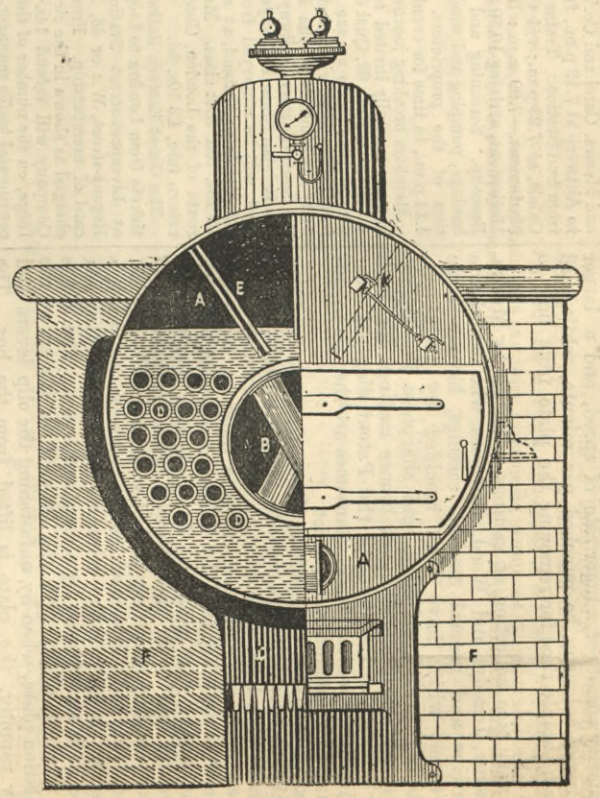
HARRISON'S STEERING GEAR.



KENDALL AND GENT'S FEED GEAR.



KENDALL AND GENT'S CUTTER MACHINE.



BONE'S BOILER.

peculiarity admits of a higer rate of speed, and a larger number of holes can be punched per minute, while still allowing ample time for removing the plate from hole to hole.

A very nice collection of castings is shown by Messrs. Ransome, Josselyn and Wood, Battersea, who in addition to engine and general machine castings, have a large assortment which have been moulded by machinery, exhibiting great perfection and sharpness in outline. There are also fine metal, and bronze castings for high class bearings, and a model of the Patent diagonal rocking fire-bar of which Messrs. Ransomes are the sole manufacturers for London and district.

Mr. H. Gibbons, Hungerford, shows a patent moulding machine in operation. It consists of two upright turned columns bolted to a foundation plate, in which work sleeves which carry the pattern plate, hung on trunnions at the ends and balanced by weights suspended by pitch chains passing over pulleys. The plate can, therefore, be moved up and down the columns with great ease and smoothness, the lift being perfectly vertical and accurate. In moulding with this machine the plate is run up to a convenient height on the columns, and the moulding box placed on it and clipped by a couple of levers. The box is then rammed, turned over and lowered till it rests on the foundation plate, when by unfastening the clip levers and gently rapping, the plate is lifted from the box. The machine seems well designed and well made, and would no doubt be a valuable appliance in a foundry where a great number of castings of the same sort are required.

THE INSTITUTION OF MECHANICAL ENGINEERS.

BELGIAN MEETING.

THE following programme has just been issued to the members of the Institution of Mechanical Engineers :—

In accordance with previous announcements, the summer meeting of the Institution will be held in Belgium, commencing at Liége on Monday, 23rd inst.

The following papers have been offered for reading and discussion :—"History of the Iron and Coal Trade in Belgium," by M. Edouard de Laveleye, of Liége; "On the Manufacture of Zinc in Belgium," by M. St. Paul de Sinçay, of the Vieille Montagne Zinc Company; "On the Manufacture of Sugar from Beetroot," by M. Mélin, of Wanze; "On the Application of Electricity to the Working of Coal Mines," by Mr. Alan C. Bagot, of London; "On Compound Locomotive Engines," by Mr. Francis W. Webb, of Crewe, vice-president; "On the St. Gothard Railway," by Herr E. Wendelstein, of Lucerne; "Description of the New Harbour Works at Antwerp," by M. G. A. Royers, of Antwerp. Advance copies of any of these papers—in English and French—will be issued to members applying for them to the secretary.

The following notices of works, &c., to be visited, have been kindly prepared for the use of members, and will be distributed with the detailed programme :—"Description of the Works of the Society Cockerill at Seraing," prepared under the superintendence of M. Sadoine, managing director; "Notes on Collieries in the neighbourhood of Liége," by Mr. Edgar P. Rathbone, of London; "Description of the Ateliers de la Meuse Engine Works," prepared by the proprietors; "Description of the Iron and Steel Works and Collieries at Ougrée," prepared by MM. Cheneux and Raze, managers; "Notes on the Cloth Manufacture of Verviers," by M. Edouard Peltzer; "Notes on Belgian Railways," by M. Paul Trasenster; "Notes on the Trades, &c., of Antwerp," prepared under the superintendence of M. G. A. Royers, Engineer to the Municipality of Antwerp.

Liége, Monday, 23rd July.—The secretary's office will be open from 3 p.m. to 9 p.m. in the reception-room—adjoining the meeting-room—at the hall of the Société d'Émulation, opposite the University, Liége, for the registration of addresses, issue of detailed programmes, &c. The office will also be opened on Tuesday, Wednesday, and Thursday, from 8 a.m. for the same purpose. Members' letters may be addressed Société des Ingénieurs Mécaniciens, Société d'Émulation, Liége. M. Édouard de Laveleye kindly acts as honorary local secretary. 8.30 p.m.: Reception at the Hotel de Ville, Liége, by the Mayor of Liége, and by M. L. Trasenster, president of the Association of Engineers from the University of Liége, and chairman of the Reception Committee. Trains from Calais and Ostend arrive at Liége at 7.35 p.m. and 7.11 p.m. respectively; departure from Victoria or Charing Cross at 7.40 a.m. Address of the president, M. Percy G. B. Westmacott. N.B.—The Council trust that all members attending the meeting will be present at this reception.

Liége, Tuesday, 24th July.—8.30 a.m.: General meeting at the Société d'Emulation for the reading and discussion of papers: Mr. Percy G. B. Westmacott, president, in the chair. 12 noon: Excursion to Seraing, by special train from Longdoz Station, to visit the works of the Society Cockerill. Luncheon at Seraing by kind invitation of M. Sadoine, managing director. 7.30 p.m.: Annual summer dinner of the Institution, evening dress. Tickets, 30s. each, to be obtained of the secretary.

Liége, Wednesday, 25th July.—8.30 a.m.: General meeting at the Société d'Émulation for the reading and discussion of papers: Mr. Percy G. B. Westmacott, president, in the chair. 12 noon: Luncheon by kind invitation of the engineers of Liége University. 2.0 p.m.: Excursions :—(*a*) Ateliers de la Meuse: Mining engines, marine engines, &c. Horloz Collieries: Goffin ventilator, air compressors, &c. (*b*) Ougrée Iron and Steel Works: Blast furnaces, Appolt coke ovens, coal-washing, &c. Angleur Steel Works: Basic process. (*c*) Val St. Lambert Glass Works. Marihaye Collieries: Fabry fan, air compressors, Smet coke ovens, coal-washing, &c.

Liége, Thursday, 26th July.—(*d*) Vieille Montagne Zinc Works at Chênée. Luncheon by kind invitation of M. St. Paul de Sinçay. Hasard Collieries: Screening arrangements, endless chain haulage, workmen's town. (*e*) Verviers Cloth Manufactories. Luncheon by kind invitation of the Chamber of Commerce at Verviers. La Gileppe Reservoir, great embankment. 8 p.m.: Special train from Liége to Antwerp, arriving 10 p.m.

Antwerp, Friday, 27th July.—Mr. A. W. W. Willmott kindly acts as honorary local secretary. Members' letters may be addressed Société des Ingénieurs Mécaniciens, Anvers, and will be delivered at the post-office. 9.0 a.m.: Reception at the Hotel de Ville, Antwerp, by the Mayor of Antwerp—M. Léopold de Wael—and the Municipality. Description of the new harbour works, by M. Royer. 10.0 a.m.: Visit to docks and new harbour works under construction, including excursion up and down the river by steamer. Quay wall built in lengths by floating cofferdam. 4.30 p.m.: Visit to diamond-cutting works and other places of interest in Antwerp. The Musée Plantin—printing apparatus, &c.—will be kept open till dusk, for the special benefit of members. At 7.0 p.m. there will be a special table d'hôte dinner—5f. —for members only, at the Hotel St. Antoine. Members are invited by the committee of the Cercle Artistique et Scientifique to visit their rooms in the evening, when there will be an open-air concert, &c.

Saturday, 28th July.—Excursion to Ghent or Mariemont. (*f*) Excursion to Ghent.—8.27 a.m.: Train from Antwerp to Ghent, Sud Station, arriving 10.9 a.m. Visit the cotton spinning and weaving works of Messrs. Parmentier Van Hoegarde and Co.; afterwards Mr. L. Van Houtte's nursery gardens at Gandbrugge; and Messrs. Carel and Co.'s locomotive works. Trains from Ghent to Antwerp at 7.19 p.m., from Pays de Waes Station, at 8.0 p.m. from Sud Station. Trains from Ghent to London, *viâ* Lille and Calais, at 7.23 p.m.; *viâ* Ostend at 6.46 p.m. (*g.*) Excursion to Mariemont.—7.29 a.m.: Train from Antwerp *viâ* Brussels to Mariemont, arriving 10.30 a.m. Visit collieries of Mariemont and Bascoup. Screening and washing arrangements, endless chain haulage, pumping and winding engines. Luncheon by kind invitation of the proprietors. Train from Bascoup to Brussels at 4.14 p.m., in time for evening trains to Calais and Ostend.

Members breaking journey at Brussels, either in going or returning, are specially invited to visit the railway spring works of M. Adhémar le Roy, 62, Quai des Charbonnages, Bruxelles. Members who propose to do so are requested to state this on their reply form, when a description of the works will be sent to them.

By the kindness of the London, Chatham, and Dover Railway, the South-Eastern Railway, the Northern of France Railway, and the Belgian State Railways, members, on showing their member's card, will be conveyed from Victoria or Charing Cross to Liége, *viâ* Calais or Ostend, at a single fare for the double journey, or £2 18s. 10d. first class. Members can also travel by the Flushing route of the London, Chatham, and Dover Railway. First-class return fare, £3 10s. 8d.

The Great Eastern Railway Company will issue first-class return tickets from London to Liége at 40s. The tickets can be obtained at Liverpool-street Station, continental booking-office; at 44, Regent-street, W.; or 48, Lime-street, City, on presentation of a card of membership. From other stations the full fares will be charged as shown in the circular enclosed; but the Great Eastern Company will refund 14s. 5d. on the first-class return fares to Liége, on the number of the ticket taken being sent to Mr. Gooday, continental traffic manager, Liverpool-street Station, with a statement that the applicant is a member of the Institution.

THE LETTERKENNY RAILWAY.

THIS railway, nineteen miles in length, connecting Letterkenny with the city of Londonderry, was opened for public traffic on Saturday, 30th June. The works were commenced as far back as the year 1864, but, owing to financial difficulties, were abandoned in 1865. In 1880 an Act authorising the reduction of gauge to 3ft. was obtained, under which the railway has now been completed. Letterkenny is the second largest town in Donegal, and from its geographical position taps an immense district—some 750 square miles—the traffic of which is forced to pass through it in order to communicate with the thriving city and port of Londonderry, and hence the importance of the railway can be estimated. The line was inspected on the 28th ult. by Major-General Hutchinson, who expressed himself well satisfied; and the engineer, Mr. George P. Culverwell, A.M.I.C.E., is to be congratulated, as it is rarely, if ever, that a railway of such length is visited by a Board of Trade inspector for the first time upon one day, and opened for public traffic the day but one following. The easy movement of the carriages and absence of vibration and jolting were subjects of general remark. The difficulty of obtaining this is fully recognised by engineers, especially when the rails are of light section, and the gauge of the line narrow. One of the chief means conducive of this good result is the employment of locomotives of a special type, built to the specification of Mr. Culverwell, which combine power with great steadiness and minimum wear and tear upon the permanent way. Some details as to the locomotives and permanent way are given below.

The bridges are forty in number, the largest being a wrought iron box lattice girder, of 90ft. clear span, over the Swilly tidal river. There are four intermediate stations, all of which have station master's comfortable residences. The signalling was erected by Messrs. Saxby and Farmer, and the rolling stock supplied by the Railway Carriage Company, Oldbury.

The whole works of the railway are of a substantial and durable nature throughout, and the contractors were Messrs. McCrea and McFarland, of Belfast and Londonderry, who performed their part most satisfactorily.

The following are some of the leading dimensions of the locomotives, which have six wheels coupled and a trailing Bissel bogie, which carries the variable weight of fuel and water supply :—

Gauge of railway	3ft.
Outside cylinders, 13in. diameter by 19in. stroke	
Fixed wheel-base of coupled wheels	9ft. 3in.
Total wheel-base	17ft.
Length over buffers	28ft. 4in.
Diameter of coupled wheels	3ft. 6in.
Diameter of bogie wheels	2ft. 3in.
Journals, 5in. diameter by 7in. long.	
Boiler, 3ft. 1in. diameter by 10ft. 4in. long.	
Thickness of Bowling barrel plates	$\frac{7}{16}$in.
Heating surface of tubes	543 sq. ft.
Heating surface of fire-box	49 sq. ft.
Total heating surface	592 sq. ft.
Grate area	8$\frac{1}{2}$ sq. ft.
Ratio of grate area to total H.S.	1 : 67·6 sq. ft.
Water space between tubes	$\frac{3}{4}$in.
Safety valves set to blow off at	140 lb.
Side fuel bunkers to hold	40 c. ft.
Rear tank to contain	500 gals.
Tractive power with 80 lb. mean cylinder pressure	6100 lb.
Minimum adhesive weight on coupled wheels	17 tons.

Weight in full working order, including men and all equipments :—

	tons	cwt.
On leading coupled wheels	5	14
On drivers	6	3
On hind coupled wheels	6	3
Maximum adhesive weight	18	0
On trailing bogie wheels	6	8
Total	24	8

Weight as above, but with tank and bunkers empty, and water in glass 1in. below bottom or 2in. below ordinary working limit:—

	tons	cwt.
On leading coupled wheels	5	10
On drivers	5	13
On hind coupled wheels	5	17
Minimum weight for adhesion	17	0
On trailing bogie wheels	3	14
Total	20	14

The locomotives were built by Messrs. Black, Hawthorn, and Co., Gateshead-on-Tyne, and none but the highest class materials used. In arranging a permanent way for the above engine the calculations were made with respect to a worn rail, and about a square inch of material then added to the head for wear. The rails are Bessemer steel, in 27ft. lengths, 40$\frac{1}{2}$ lb. section, rolled with very great uniformity by the Barrow Hematite Steel Company, and both rails and fished joints were subjected to a series of stringent tests. It is worthy of note that in this case the proper order seems to have been observed, namely, the locomotives were first designed and then the permanent way arranged to suit, and both together were then submitted to the Board of Trade. The approval of the Board of Trade of both was obtained early in the year 1881.

CITY OF ROME.—This vessel reached New York at 8 p.m. on the 8th July, making the passage from Fastnet to Fire Island in seven days one hour. From the accompanying cable abstract of the log it will be seen that she experienced head winds, and lost five hours by fog:—Friday, moderate head wind, distance 340 knots; Saturday, moderate head wind, distance 403 knots; Sunday, slowed for fog, distance 400 knots; Monday, strong head wind, distance 342 knots; Tuesday, strong head wind, slowed for fog, distance 410 knots; Wednesday, strong head wind, distance 418 knots; Thursday, moderate head wind, distance 402 knots.

THE PATENTS FOR INVENTIONS BILL.

THE Standing Committee on Trade, Commerce, and Manufactures, of which Sir Lyon Playfair was chairman, entered upon the discussion of the Patents for Inventions Bill on Friday week, and completed their examination of the measure in four sittings. The object in this Bill, it may be here stated, is to amend and consolidate in a single measure the provisions of the numerous laws relating to patents, designs, and trade marks, and at the same time to simplify procedure, lessen its cost, and increase the protection afforded. The Bill, if passed, is to come into operation on the 1st of January next. The first four clauses were agreed to with practically no discussion, but on Clause 5, which deals with applications for patents,

Mr. Chamberlain proposed to insert words providing that where a firm applied for a patent the application should be made by the original inventor. After some discussion, however, the amendment was withdrawn, and an amendment adopted in its place requiring that such an application should be made in the name of the person or persons who might be the first inventors.

Mr. Samuelson moved an amendment to the effect that an authorised agent should be allowed to act for an inventor, and to sign all documents except the declaration.

Mr. Chamberlain entirely agreed with his friend's object, but there was nothing in the Bill as drawn which prevented such action on the part of an authorised agent. If his hon. friend would entrust it to him, he would undertake that in every case an agent should be entitled to sign all necessary documents except the declaration.

Upon this the amendment was withdrawn, and the clause was agreed to.

Sir John Lubbock, on Clause 6, which provides for the reference of an application to an examiner, moved the omission of sub-section A, which required the examiner to report whether the invention was a proper subject for a patent.

Mr. Chamberlain said he was inclined to support the amendment, but he rather feared that applications might be made, not for *bonâ fide* patents, but with a view to enabling the patentees afterwards to levy black mail. The late Master of the Rolls, he knew, did not think there was any danger of that; but the matter was one of some difficulty, and he should be glad to hear the views of the Committee on the question.

Mr. Anderson and some other members having spoken on the motion, Sir John Lubbock said he felt it so important that the power conferred by the sub-section should not be left in the hands of the Comptroller that he must take a division upon his proposal.

Mr. Chamberlain promised to support the hon. bart., if he did divide, but eventually the amendment was agreed to without a division.

Mr. Wm. Fowler moved an amendment to require the examiner to report whether the invention was new. His object was to throw upon the Commissioners, whoever they might be, the question of the novelty of the patent.

Mr. Chamberlain said he had no doubt of the extreme importance of this proposal, but he was sorry it was one he could not possibly support, because it would impose upon the Patent-office a responsibility which he was quite sure it was impossible for them to discharge. It was really a proposal that the Government should do for inventors what they did not do for any other class of the community, and what inventors could do perfectly well for themselves.

Mr. Samuelson said if this proposal were adopted, it would be necessary to appoint men to do the work who had no experience of the business with which they would have to deal, and the result would be a state of confusion which would be felt to be intolerable.

The Solicitor-General for England pointed out that in dealing with this question they must consider the number of patents that would be presented in the course of a year. At present there were upwards of 6000 a year, and there would probably be a very large increase after the passing of this Act owing to the reduction of fees. But even taking the number at 6000, the Committee could reflect on the strength of staff that would be required to examine these patents, and decide whether they were new. He also asked the Committee to remember how wide the line often was between novelty and novelty.

Mr. Carbutt was glad the amendment had not been adopted. He believed if it were adopted it would lead to no end of trouble.

Mr. Anderson was very much in favour of the proposition that the Government should do a little more work than they did. He could never consent to the power of veto involved in the amendment, but he thought the Government should do something in the way of assisting and advising the patentee. He was informed that the difficulty referred to by the Solicitor-General arose to a large extent from the imperfection of the records and registers.

Sir John Lubbock quite agreed with the hon. member for Glasgow in hoping that the Government would do a good deal more for inventors. He was afraid, however, the amendment before the Committee asked them to do more than could be expected of them.

The amendment was withdrawn.

On the motion of Mr. Samuelson, an amendment was adopted providing that the title should sufficiently indicate the subject matter of the invention. The object of this amendment was to do something towards obviating the difficulty complained of by the hon. member for Glasgow.

Clause 6 was then adopted. On Clause 7, giving power to the Comptroller to refuse the application or require its amendment,

Mr. Chamberlain proposed an addition, to the effect that this power should be given with regard to applications in which the title did not sufficiently indicate the subject matter of the invention, and this amendment was agreed to.

Mr. Anderson submitted an amendment with the object of securing that the applicant should be heard by the Comptroller before his application was rejected. He wanted a little less of the law officer in the Bill than they had. He wished that at this early stage the applicant should have a right to be heard before the Comptroller. If that were so there would be a much smaller number of appeals.

Mr. Chamberlain entirely agreed with the object of his hon. friend, and would undertake, if the amendment were withdrawn, to bring up a new clause to deal with the matter.

The amendment was accordingly withdrawn.

Mr. Anderson moved that the appeal against the decision of the Comptroller should be to the Board of Trade instead of to the law officers. His reason for proposing this amendment was that the experience of the law officers had been by no means satisfactory.

Mr. Chamberlain said that, as a matter of fact under this Act, there would always be an appeal to the Board of Trade, but the Comptroller being an officer of the Board of Trade, the appeal would simply be from an inferior officer to his superior, so that they must have some outside tribunal which should be a Court of Appeal.

The amendment was withdrawn.

Mr. Hinde Palmer proposed that the appeal should be not to the law officers, but to a Board of Commissioners. He reminded the Committee that up to this time under the Act of 1852, they had a Board of Commissioners, and he considered that the working of this Bill at various stages would be much more satisfactory if such a Board of Commissioners were in existence. He should propose that the new Board of Commissioners should consist of scientific men and a lawyer.

The Solicitor-General was unable to accept this proposal. Personally, the law officers would have the greatest possible desire to assent to the proposal, as it would be a great relief to them to get rid of the patent work. But they considered that it would not be in the public interest to adopt the amendment.

Sir John Lubbock would have liked if the hon. and learned gentleman could have accepted the amendment, believing, as he

did, that the labours of a Commission under the Act would be most useful to the country.

Mr. Anderson thought it would be unfortunate if the Committee were to divide on this question at this late stage, most of the members of the Committee having gone, it now being half-past two o'clock.

The Committee accordingly adjourned.

On reassembling on the Monday following the Committee resumed the consideration of Mr. Hinde Palmer's amendment.

Mr. Anderson, in supporting the amendment, said it was his belief that the right way to get the Patent-office reformed was to put in three Commissioners to manage the office instead of one Comptroller as proposed.

Mr. Chamberlain said the scheme to substitute Commissioners for the Comptroller might be a very good one, but it was entirely different from the Government proposal. By that proposal they should have in future a department which would be responsible to Parliament for its work; they should have an officer responsible to the department, and the department responsible to Parliament. This larger question, however, was not raised by the comparatively limited amendment now before the Committee. It was a proposal that the appellate tribunal should be a commission, consisting of a lawyer, a chemist, and an engineer. But he would predict that this Bill would have the effect of enormously reducing the number of appeals, so that if they created a commission of highly-paid officers, it would probably be found that they would be kicking their heels, with no work to do, during the greater part of the time. Under these circumstances it seemed to him a very absurd proposal.

After some conversation the amendment was withdrawn.

On the motion of Mr. Samuelson, an amendment was agreed to, providing that in the event of applications for the patenting of the same invention being made by two different persons, notice of the fact should be given to both of them by the Comptroller.

Clause 7 was then adopted, as was also Clause 8, providing that if the applicant does not leave a complete specification with his application, he may leave it at any subsequent time within nine months from the date of the application, and that unless a complete specification is left within that time, the application shall be deemed to be abandoned.

Clause 9 was also agreed to with some amendments, one moved by Mr. Chamberlain giving power to the Comptroller to refuse a patent if the invention described in the complete specification was not substantially the same as that described in the provisional specification; and another proposed by Mr. Arnold for the protection of provisional specifications from publicity in the case of legal proceedings.

Clause 10 relates to the advertisement on the acceptance of the complete specification, and upon this

Mr. Anderson moved to leave out the words "and the application and specification or specifications, with the drawings—if any—should be open to public inspection." He said it was all very well to inform a new applicant that, after searching existing provisional specifications, it was found that there was such an application, but it was a very different thing to make known to him the nature of the provisional specification.

Mr. Chamberlain said what his hon. friend was anxious to do was to provide for the secrecy of the provisional specification, but what they were doing now had reference to the acceptance of the complete specification. Surely it was a monstrous thing to say that after the complete specification was accepted they should not publish it.

Sir John Lubbock said he had another amendment to the same effect. He wished to point out that after the acceptance of the complete specification, there was an intervening period during which opposition was allowable. As the Bill stood, they would disclose the whole circumstances to the world before they had concluded the patent. He agreed that after the period of opposition was passed, it was desirable that the public should have the fullest possible information.

The Solicitor-General said those who had had great practical experience in the matter were most anxious for the alteration that the Bill made.

Mr. Anderson remarked that there was no point which had been more strongly objected to than this. He held that the effect of the clause as it stood would be to invite litigation, and he should therefore take a vote on his amendment.

The Committee divided—

For the amendment	12
Against...	23
Majority against...	11

On the 11th clause, dealing with opposition to applications for patents, an amendment was agreed to providing that opposition should only be admitted on the ground that an applicant for a patent had obtained the invention from the person opposing. A second amendment was adopted, empowering the Comptroller instead of the law officers, and the clause was added to the Bill, together with Clause 12 without amendment.

Clause 13, which sets forth that every patent shall be dated and sealed as on the day of application, provided that no proceedings shall be taken in respect of an infringement committed before the publication of the completed specification, was adopted, with the following addition proposed by Mr. Chamberlain: — "Provided also, that in the case of more than one application for a patent for the same invention, the sealing of a patent for one of these applications shall not prevent the sealing of a patent for an earlier application."

The next three clauses were adopted, Clause 16 providing that every patent when sealed shall have effect throughout the United Kingdom, the Channel Islands, and the Isle of Man.

On Clause 17, fixing the term of the patent at fourteen years,

Mr. Anderson moved to extend the term to seventeen years. This, the hon. member observed, was one of the most important amendments they should have to consider. In supporting it he referred to the case of America, where a patent for seventeen years was granted for the moderate charge of 35 dols. or £7. This Bill proposed for a fourteen years' patent to charge £154. He was in hopes that they might be able to reduce that charge, but he had not the slightest hope of being able to reduce it to anything like the charge for which in America a patent was given for seventeen years, and that being the case, he thought the least thing they could do was to extend the term somewhat.

Mr. Broadhurst supported the amendment.

Mr. Chamberlain said he doubted if the adoption of this amendment would increase the chance of the Bill passing through the House of Commons. There was a very strong opinion in the House against any prolongation of the present term. It might be true that there was a unanimous feeling on the part of inventors in favour of the extension proposed, but they had to consider the interests of the public as well as those of the inventor. They wanted that the public should have the benefit of the inventions at the earliest possible date consistent with justice to the inventor, and with a due stimulus to invention. The case of the United States was always being flung in their teeth, but having carefully considered the United States system, he very much doubted its superiority. Taken all-in-all, he doubted whether the patent law of this country, with all its defects, had not done more to stimulate invention, and was not more fair to inventors than the American law. Where they had a system that had been in existence so long, they should see some very decided advantage before they adopted a change. They ought to have some proof that a real grievance had been experienced, and at present he could not see that any such grievance had been made out.

Mr. Samuelson was prepared to go so far as fifteen years, but would vote against any extension beyond that period.

Mr. Barran opposed, and Mr. Alderman Cotton supported, the amendment.

Mr. Howard was content with a term of fourteen years.

Sir J. J. Jenkins, speaking as a manufacturer, said he could not admit what had fallen from the hon. member for Stoke—Mr. Broadhurst—as to there being a consensus of opinion on the part of both capital and labour on this subject. The general feeling among manufacturers was certainly against any extension beyond fourteen years.

After some further conversation the Committee divided—

For the amendment	9
Against...	23
Majority against	14

In order to meet the case presented by an amendment in the name of Mr. Arnold,

Mr. Chamberlain said if the Committee desired, he should move an amendment providing that every patent should cease if the patentee failed to make the prescribed payments in the prescribed time. If, however, in any case, by accident, mistake, or inadvertence, the patentee failed to make any payment in the prescribed time, he might apply to the Comptroller for an enlargement of the time for making that payment, and the Comptroller might grant that enlarged time to the maximum period of six months. The total of £154 for the full term of fourteen years could not, in his opinion, be reduced; but he would bring up an amended schedule establishing the principle that after the first payment of £4, the payments might be made annually.

Amendments carrying out the right hon. gentleman's suggestions were adopted, and Clause 17 passed.

Clauses 18, 19, 20, and 21 were adopted, and on Clause 22, which authorises the Board of Trade to grant licences,

Mr. Thorold Rogers proposed an amendment to the effect that if it were proved to the Board of Trade that, by reason of the default of the patentee to grant licences on reasonable terms, any person was prevented from carrying on to the best advantage any manufacture or manufacturing process, the Board might order the patentee to grant licences.

Mr. Chamberlain pointed out that this amendment would make a great change in the law, and said he was not quite sure that it would not be going too far.

The Committee dividing, rejected the amendment by 26 to 4 votes, and clauses 22 and 23 were passed.

Clause 24 was under consideration when the Committee adjourned, and on the Committee reassembling on Friday last, this clause, together with all clauses up to 38, were speedily dealt with, and agreed to.

On Clause 37, providing that the Comptroller shall cause to be issued periodically an illustrated journal of patented inventions, as well as reports of patent cases decided by courts of law, and any other information that the Comptroller may deem generally useful or important,

Mr. Samuelson moved to insert words providing that the Comptroller should cause to be printed for sale, and should keep on sale, all patent specifications.

Mr. Chamberlain pointed out that if this amendment were adopted it would be necessary to print and keep on sale specifications from the time of Charles II., which meant that they should have to go to the expense of printing something like 6,000,000 copies. He was willing to meet his hon. friend, however, by making it imperative upon the Board to keep always in stock all living specifications.

The amendment was withdrawn, and another which stood in the name of Sir John Lubbock, having been adapted to Mr. Chamberlain's concession, the clause was agreed to.

The subsequent clauses up to Clause 49 were also agreed to, and the Committee again adjourned. When the Committee resumed for the fourth and last day clauses 49 to 53 were passed, but Clause 54—providing for a Manchester office—was struck out, it being understood that the arrangements for an office in that city will be made in another form.

On Clause 55, penalty for piracy of registered design, the penalty of £30 in the clause was raised to £50, at the suggestion of Mr. Grafton.

On Clause 58, application for registration, the following subsection was added, on the motion of Mr. Wills:—"The application must be accompanied by a statutory declaration by the applicant declaring that the trade mark which he is applying to register is not in use by any other person for the goods in respect of which registration is sought, to the best of the applicant's knowledge and belief, and further declaring the length of time, if any, during which the applicant has used the mark he is seeking to register."

On Clause 64—the intervening clauses having been adopted—dealing with the assignment and transmission of trade marks, an amendment, moved by Mr. Arnold, proposing that any proprietor of a registered trade mark should be at liberty to dispose of it, was opposed by Mr. Chamberlain and rejected on a division by 25 to 3.

On Clause 70 (no proceedings for infringement of unregistered trade marks),

Mr. Arnold moved to add:—"A person sued for the infringement of a trade mark which has been registered for a period of five years shall not be at liberty to defend the action on the ground that the mark to which the action relates is not a trade mark capable of being registered under this Act, or of an enactment repealed by this Act, or that the plaintiff is not entitled to the exclusive use of such mark; and the Court may grant an injunction, whether perpetual or otherwise, to restrain the infringement without prejudice to the right of the defendant to apply for the rectification of the register, as provided by the 82nd section of this Act." Mr. Arnold explained that these words would prevent a dishonest plea of never indebted.

Mr. Chamberlain said the amendment would lead to great abuses, and he must oppose it.

Mr. Arnold said the amendment met a real grievance, and he must press it.

After some discussion, Mr. Chamberlain said if an alteration could be made in the amendment he should be glad, but as it stood it would have the effect stated.

Mr. Arnold said, on behalf of the great traders of the country, that it was necessary to give the Court absolute power against rogues.

The amendment, in a slightly altered form, was agreed to.

In Clause 82, referring to the rectification of registers by the Court, Mr. Arnold also moved to insert that—"The Court shall not entertain an application under this section by a person other than the registered proprietor until such person shall have given security, in such manner and to such an amount as the Comptroller may require, for the costs which may be awarded to the registered proprietor in respect of such application."

The Solicitor-General opposed.

Mr. Arnold held that this security ought to be given for the protection of the honest opponents of trade-marks.

The Committee divided. For the amendment, 16; against, 18.

After a discussion upon Clause 91, the 1st of August was altered to the 1st of June as the date when the report of the Comptroller should be laid before Parliament.

Clauses up to 105 were assented to, and then

Sir John Lubbock moved a new clause dealing with the Crown as follows:—

"A patent shall have to all intents the like effect as against her Majesty the Queen, her heirs, and successors, as it has as against a subject.

"But the officers or authorities administering any department of the service of the Crown may, by themselves, their agents, contractors, or others, at any time after the application, use the invention for the services of the Crown on terms to be before or after the use thereof agreed on, with the approval of the Treasury, between those officers or authorities and the patentees, or, in default of such agreement, two arbitrators, one to be appointed by the Treasury and one by the patentee, or, in the event of difference, by an umpire to be appointed by the arbitrators before entering upon the reference."

Mr. Chamberlain said if the estimation of the value of the patent was to be left to outside authorities, there would be no limit to the claims made on the public purse. The question of remuneration ought to be left to the Treasury, which would not be a great departure from the present system. They must contemplate cases of individual injustice; and he must altogether oppose this clause or any similar proposal. He feared that the Committee had already acted too much in the interests of inventors.

Sir H. Holland contended, as against the assertion of Mr Chamberlain, that the Committee had held the balance very evenly between the public and the inventors. As to monstrous claims, he was not at all afraid of them in view of the precautions to be taken.

After some lengthy discussion, the amendment was withdrawn, and amalgamated with another suggested by Mr. Hinde Palmer, striking out the concluding words from "two arbitrators," and inserting "as may be settled by the Board of Trade after hearing all the parties interested." Thus altered, the clause was moved by Sir J. Lubbock.

The Solicitor-General opposed it, as calculated to involve patentees in litigation with the Crown.

Mr. Chamberlain also opposed it, and challenged a division, with the result that the clause was adopted by 30 to 6.

The Bill was then ordered to be reported to the House, and the Committee rose.

THE INSTITUTION OF CIVIL ENGINEERS.

PREMIUMS AWARDED.

SESSION 1882-83.

THE Council of the Institution of Civil Engineeers have awarded the following Premiums:—

FOR PAPERS READ AT THE ORDINARY MEETINGS.

1. A Telford Medal and a Telford Premium to Ralph Hart Tweddell, M. Inst. C.E., for his paper "On Machine-Tools, and other Labour-Saving Appliances, worked by Hydraulic Pressure."

2. A Telford Medal and a Telford Premium to William Anderson,* M. Inst. C.E., for his paper "On the Antwerp Waterworks."

3. A Telford Medal and a Telford Premium to Major Allan Joseph Champneys Cunningham, R.E., Assoc. Inst. C.E., for his paper "On Recent Hydraulic Experiments."

4. A Telford Medal and a Telford Premium to Alexander Leslie, M. Inst. C.E., for his paper "On the Edinburgh Waterworks."

5. A Telford Premium to John George Gamble,† M.A., M. Inst. C.E., for his paper "On the Waterworks of Port Elizabeth," South Africa.

6. A Telford Premium to Patrick O'Meara, M. Inst. C.E., for his paper "On the Introduction of Irrigation into New Countries, as illustrated in North-Eastern Colorado."

7. A Telford Premium to William Morris, M. Inst. C.E., of Deptford, for his paper "On Covered Service-Reservoirs."

8. A Telford Premium to John Fernie,‡ M. Inst. C.E., for his paper "On Mild Steel for the Fire-boxes of Locomotive Engines in the U.S.A."

9. A Telford Premium to John Daglish, M. Inst. C.E., for his paper "On the Sinking of two Shafts at Marsden for the Whitburn Coal Company."

10. The Manby Premium to Thomas Bell Lightfoot, M. Inst. C.E., and John Thomson, for their paper "On the Design and Construction of Repairing Slipways for Ships."

FOR PAPERS PRINTED IN THE "PROCEEDINGS" WITHOUT BEING DISCUSSED.

1. A Telford Medal and a Telford Premium to George Howard Darwin, M.A., F.R.S., for his paper "On the Horizontal Thrust of a Mass of Sand."

2. A Telford Premium to Professor Dr. James Weyrauch,§ for his paper "On Various Methods of Determining the Dimensions of Iron Structures."

3. A Telford Premium to Thomas Claxton Fidler, M. Inst. C.E., for his paper "On a Graphic Solution of the Strains in the Continuous Girder, with some Remarks on Continuous Girder Bridges."

4. A Telford Premium to Charles Henry Moberly,‖ M. Inst. C.E., for his "Account of some Further Tests of Rivetted Joints of Steel Plates for Boiler-Work."

5. A Telford Premium to John Standfield, M. Inst. C.E., for his paper "On the Raising of the Steamship Austral."

6. A Telford Premium to William Cawthorne Unwin,¶ B.Sc., M. Inst. C.E., for his paper "On Current-Meter Observations in the Thames."

7. A Telford Premium to Josiah Harding, M. Inst. C.E., for his paper "On Apparatus for Solar Distillation."

8. A Telford Premium to Carleton Fowell Tufnell, Assoc. M. Inst. C.E., for his paper "On Economical River Training in India."

FOR PAPERS READ AT THE SUPPLEMENTAL MEETINGS OF STUDENTS.

1. A Miller Prize to Henry John Eunson, Stud. Inst. C.E.. for his paper "On a Deep Boring at Northampton."

2. A Miller Prize to Percy Vavasseur Appleby, Stud. Inst. C.E., for his paper "On Iron and Steel in Tension, Compression, Bending, Torsion, and Shear."

3. A Miller Prize to Arthur Beckwith, Stud. Inst. C.E., for his paper "On Refrigerating Machinery."

4. A Miller Prize to Thomas Stephen Lacey, Stud. Inst. C.E., for his paper "On the Illuminating Power of Coal-Gas."

5. A Miller Prize to Henry Hollingworth Parkinson, Stud. Inst. C.E., for his paper "On the Transportation, Storage, and Shipment of Grain."

TENDERS.

EASTHAM WATER SUPPLY.

TENDERS for supplying and laying a 3in. cast iron water main from Bromborough to Eastham and Childer Thornton, together with the necessary meters, valves, hydrants, and other fittings. Charles H. Beloe, M. Inst. C.E., 13, Harrington-street, Liverpool, engineer. Quantities supplied.

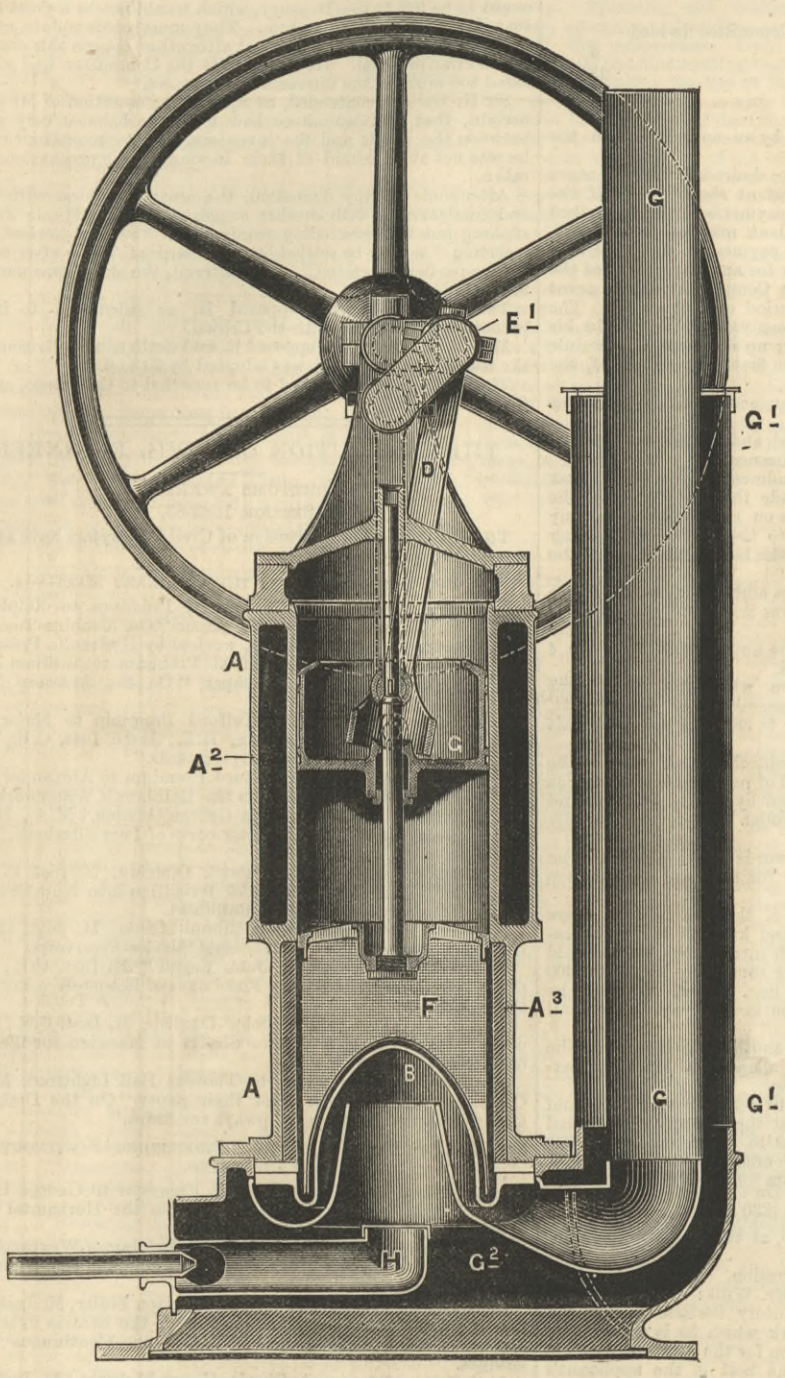
	£	s.	d.
Geo. Hall, Liverpool	1611	0	0
Lawrence Hardman, New Ferry	1457	0	3
Geo. Day, Liverpool	1450	0	0
Messrs. Williams and Co., Liverpool	1374	19	3
Messrs. Fawkes Bros., Birkdale	1265	7	8
R. B. Mackinnon, Liverpool	1172	9	11
Jackson, Neston	1165	0	0
E. Taylor, Hoylake	1132	16	0
William Winnard, Wigan—accepted	1070	4	8
Engineer's estimate	1246	0	0

ELECTRIC LIGHTING IN LEEDS.—At a meeting of the Sub-Electric Lighting Committee of the Leeds Town Council on the 10th, the Town Clerk reported that he had received from the Electric Construction and Maintenance Company, Limited, notice of its intention to apply to the Board of Trade in the session of Parliament 1883-4 for a Provisional Order authorising it to supply electricity within the borough of Leeds.

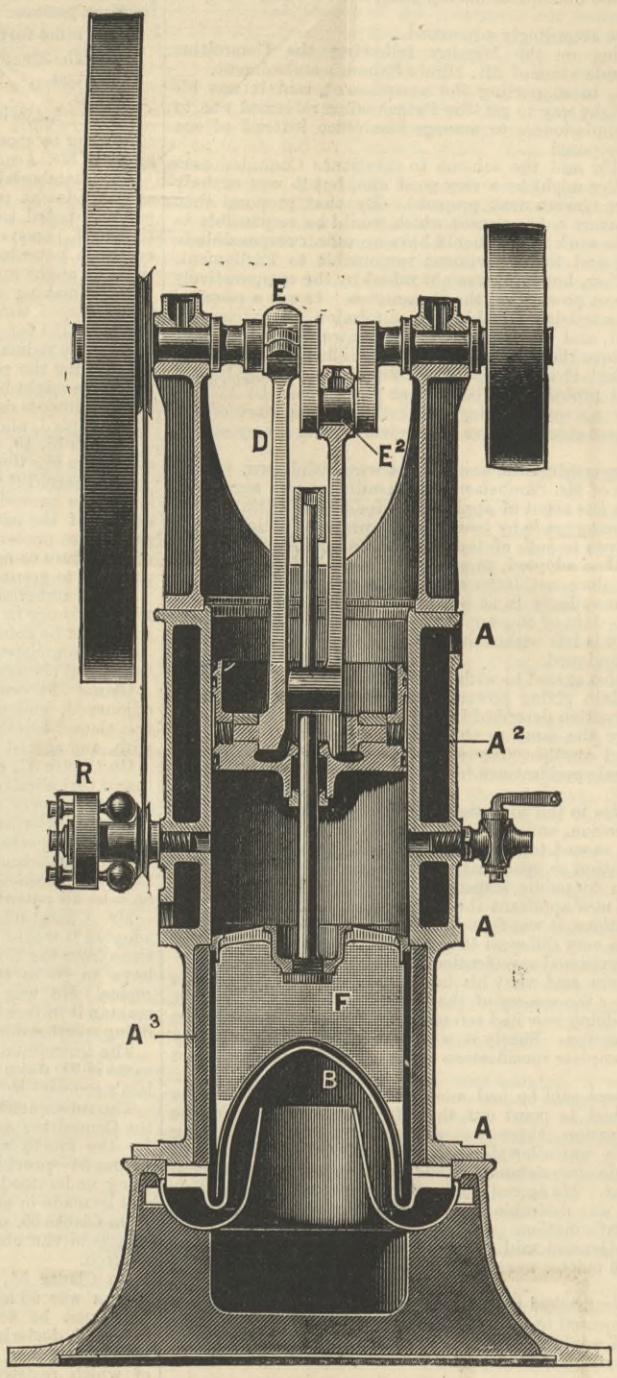
* Has previously received a Watt Medal and Telford Premiums.
† Has previously received a Telford Premium.
‡ Has previously received a Watt Medal and the Manby Premium.
§ Has previously received a Telford Medal and Telford Premium.
‖ Has previously received a Telford Premium.
¶ Has previously received a Telford Medal and Telford Premium.

EXHIBITS AT THE ENGINEERING & METAL TRADES EXHIBITION.

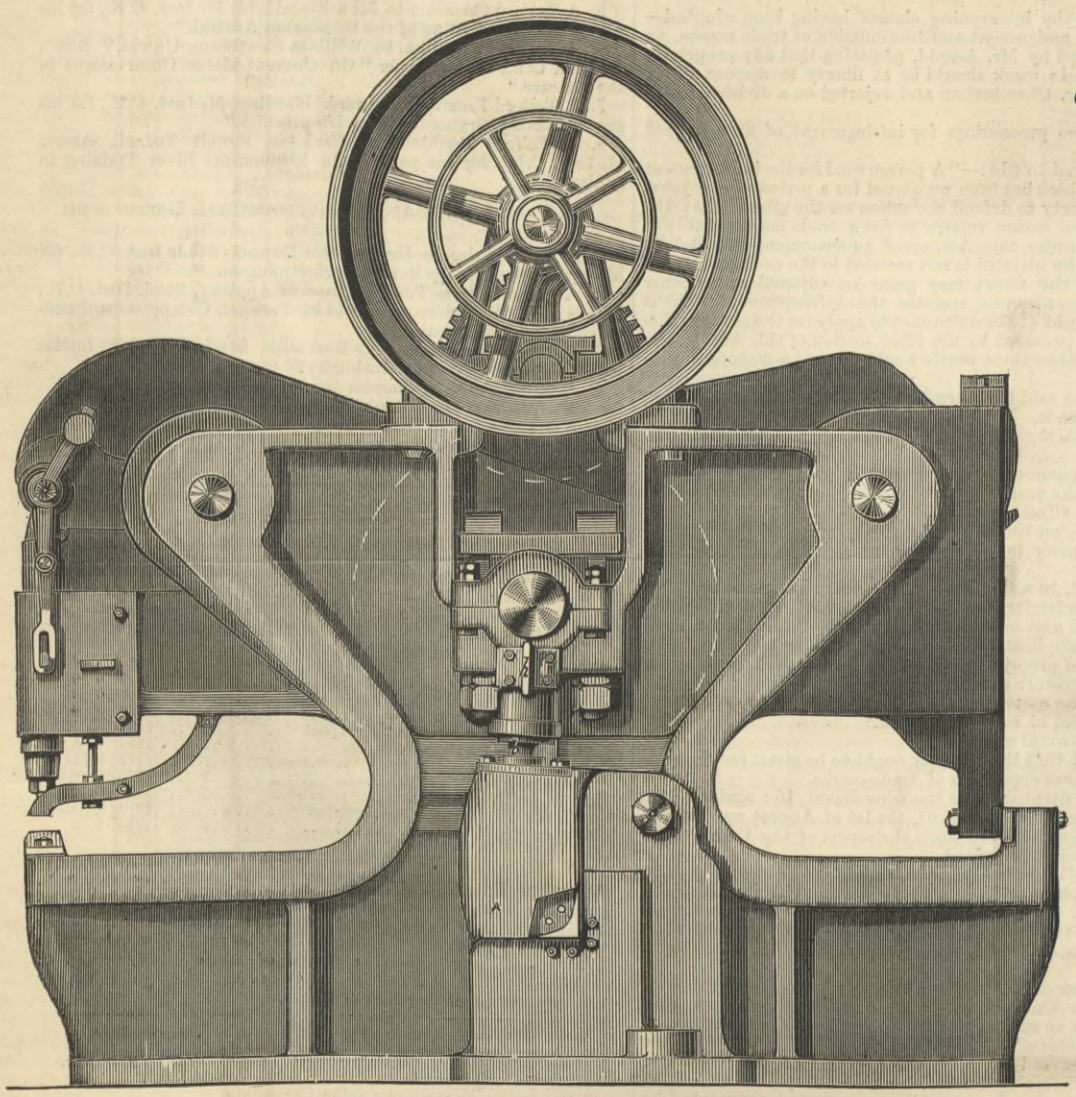
(*For description see page 23.*)



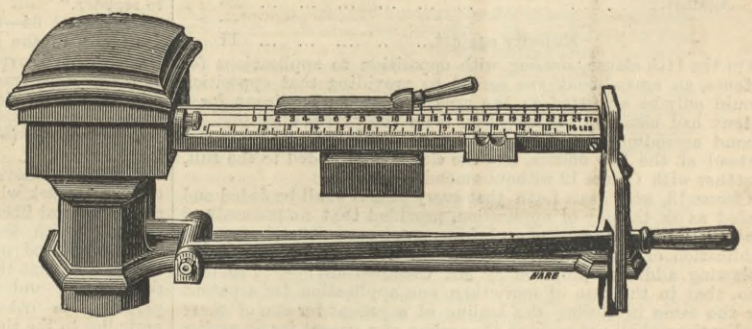
ROBINSON'S HOT AIR ENGINE.

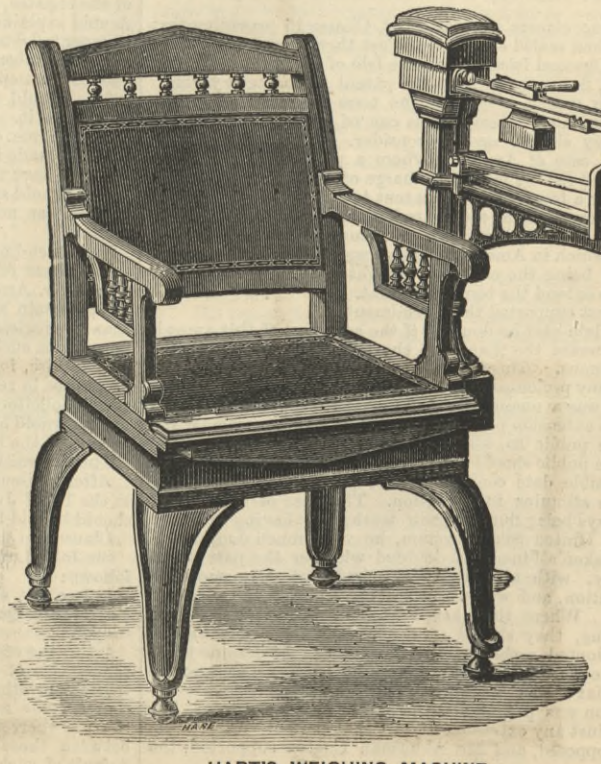


ROBINSON'S HOT AIR ENGINE.



BENNIE'S PUNCHING AND SHEARING MACHINE.



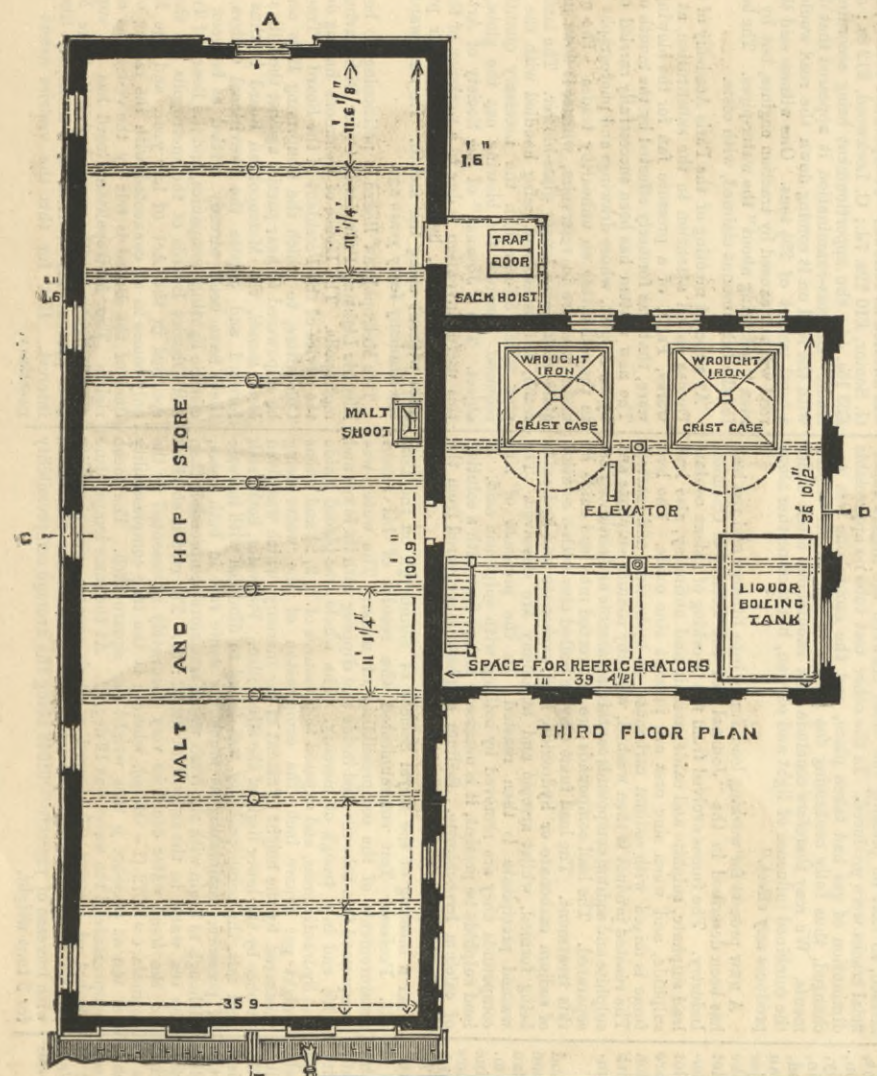


HART'S WEIGHING MACHINE

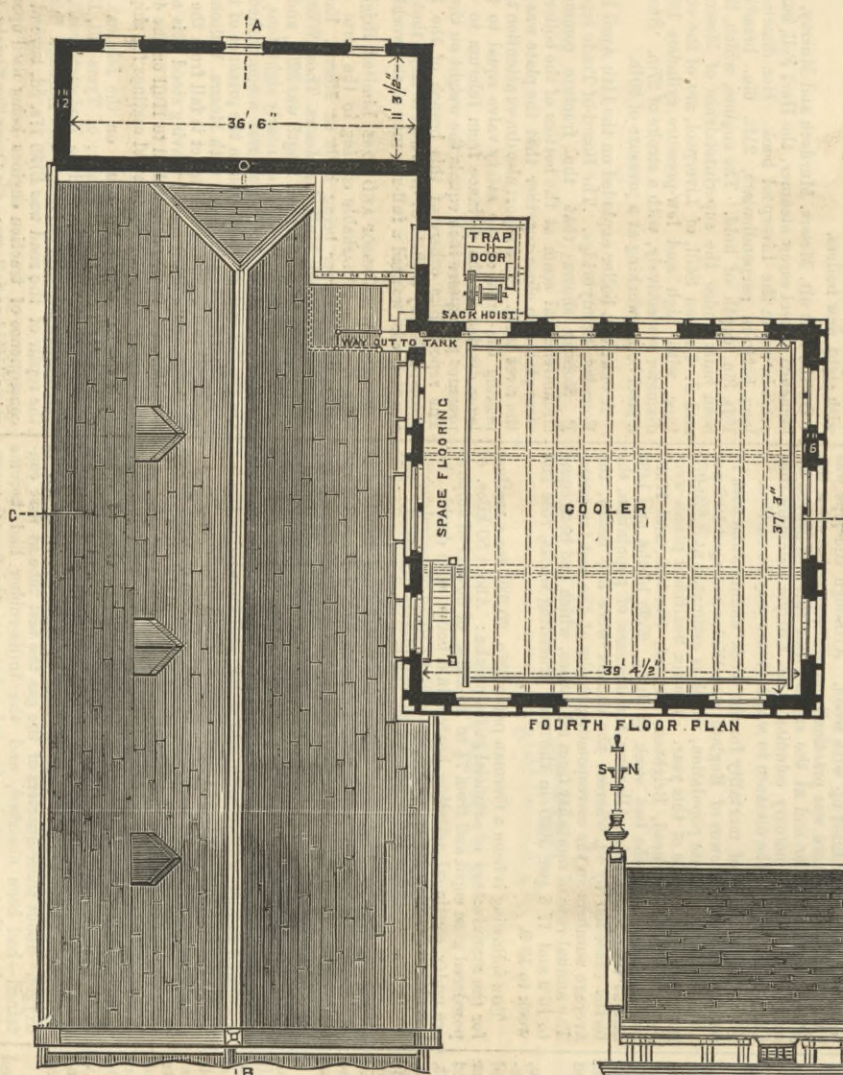
SWAN BREWERY, WALHAM GREEN.

MR. W. BRADFORD, LONDON, ENGINEER.

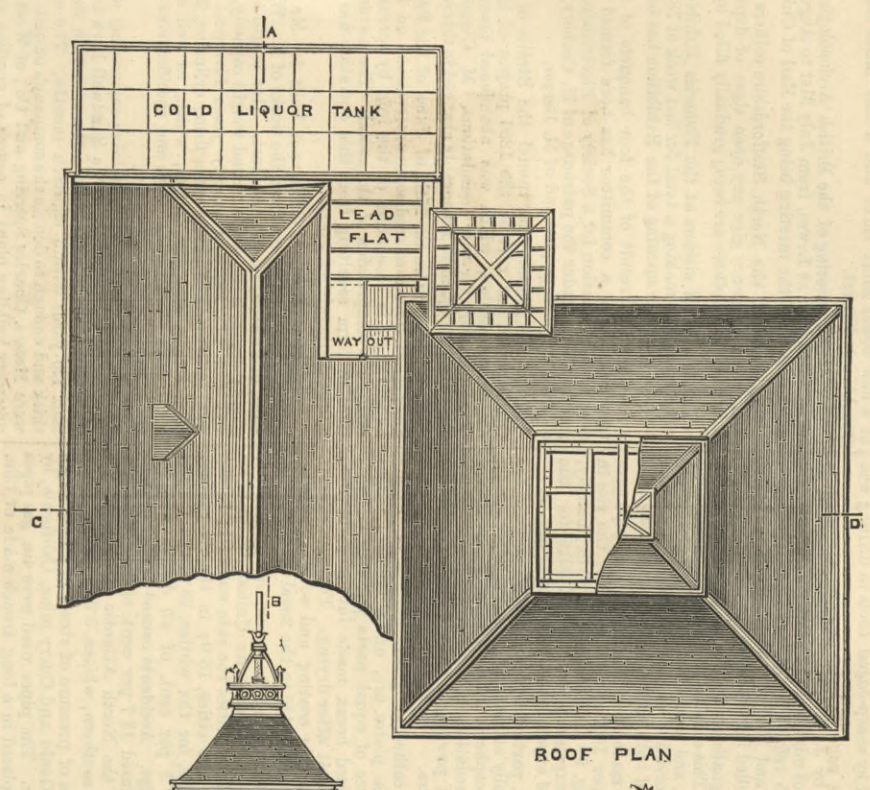
(*For description see page 36.*)



THIRD FLOOR PLAN



FOURTH FLOOR PLAN



ROOF PLAN

RAILWAY MATTERS.

THE railway up the Drachenfels has been completed, and the views which it offers to passengers are so charming that even its opponents are quite reconciled to it. The terminus is at the restaurant, leaving only a two minutes' climb on foot.

PAPER railway wheel bodies are in common use, and it is easily seen that paper for such a purpose may be better than some other substances. It is not, however, so easy to see that it can be successfully used instead of steel rails, although an American paper says the experiment is being tried.

IN New South Wales, the result of an application to the courts by the Commissioner of Railways has been a decision that the Tramways Act does not authorise the employment of steam motors upon them, and it will be necessary, therefore, for a special meeting of Parliament to be called to pass a special Bill.

A CORRESPONDENT writing from New York, speaking of his travelling there a few days ago, says, "Journey home from Chicago a perfect pandemonium; thermometer 100 deg.; soft coal engines, clouds of smoke and dust indescribable; ears and eyes full of cinders. At one point in Ohio we made engineer stop half-an hour while we bathed in a river, we all looked like niggers."

THE inquiry into the recent railway accident at Hawthorn, Victoria, has evoked some curious evidence, Mr. Bent, late Commissioner of Railways, having declared before the Board of Investigation that the Railway Department is in a state of utter disorganisation, owing to the want of proper understanding by its officers of their relative duties. The result, Mr. Bent asserts, to be that the Ministers can obtain no proper advice.

THE Great Eastern Railway Company's tourist guide to the Continent has just been published. This attractive and cheap guide, edited by Mr. Percy Lindley and illustrated by numerous woodcuts and sepia sketches by Francis Butler and Alfred Bryan, and a large map, has now reached its fifth annual issue. It has received material additions since last year, and is probably the cheapest, interesting, and useful guide ever published.

A TRAIN on the Rochester and Pittsburg Railroad in north-western Pennsylvania broke in two on a steep grade early on the 8th instant, and the front cars, rushing down, crushed a passenger coach at the rear, killing six and injuring ten. A *Times* telegram also says: A train on the Pittsburg and Fortwayne Railroad at Chicago on Sunday night ran into a street tramcar at a grade crossing, and crushed it, killing three passengers and wounding several.

THE permanent way on the Metropolitan Railway consists of 86 lb. bull-headed steel rails, in lengths of 21ft., fixed in cast iron chairs, that each weigh 48 lb., by oak keys placed outside the rails. The chairs are fastened to tranverse sleepers by two $\frac{3}{4}$in. fang bolts to each chair. The sleepers are of Baltic pine creosoted, 9ft. long by 12in. by 6in., placed 2ft. 8in. apart from centre to centre throughout. The fish-plates are 20in. long, and weigh 48 lb. per pair, fastened by four $\frac{3}{4}$in. bolts.

IN Western Australia the Government has been considering Colonel McMurdo's proposals for constructing a railway to Albany. Ten thousand acres of land are asked for every mile of railway to be made, in addition to the right of issue of mortgage bonds to the extent of £4000 per mile, the Government guaranteeing interest upon them to the extent of 3½ per cent. for thirty years. The syndicate propose to pay Government 10 per cent. of the net earnings, and in addition to introduce twenty immigrants for every mile of railway constructed. This proposal is but one of four now before the Colonial Government, and nothing can be decided respecting them until the Legislature meets.

IN giving evidence in a case of derailment on a ten chain curve, which lately occurred on the Metropolitan Railway, Mr. J. Tomlinson, jun., said: "A check-rail on the up line was not considered necessary inside the low rail, because the trains could not ever attain a high speed in running in that direction; any higher speed than ten or twelve miles an hour could not be attained at that spot, and the check-rail would also increase the hauling power required, and that would further reduce the speed and do immense damage to the wheels. The introduction of check-rails, which I have put in on the line, has very largely increased the wear and tear on the engine and carriage wheels. I think it possible that if there had been a check-rail inside the low rail, the leading wheels might not have mounted."

AN inspection of a length of 1400 yards of tramway just completed at Bootle by Mr. Nuttall, the road contractor to the Bootle Corporation, was made last week by Major-General Hutchinson on behalf of the Board of Trade. The extension is, like the remainder of the line, constructed on Mackinson's patent, with concrete foundation, and paved with Scotch granite setts. The line has been fitted with Scott's patent automatic and self-cleansing points, which are moved in any direction the driver of a tramcar wishes his vehicle to go by the action of the car, and which have a contrivance by which water and road *débris* are carried direct into the sewer by means of a gutter. An experimental point has been in use in Bootle for some months, with satisfactory results, and similar points, made by Messrs. Higginbottom and Stewart, Liverpool, have now been used throughout the new extension.

MAJOR MARINDIN'S report to the Board of Trade, dated May 31st, respecting the cause of the Lockerbie railway accident, has been issued. The responsibility for the accident, in his opinion, rests upon three following: First, the station master; secondly, the district inspector; thirdly, the driver of the Stranraer train, in having approached the junction at a dangerous rate of speed, without keeping a proper look-out for signals, so that he over-ran the home signal, where he ought to have stopped. Major Marindin proceeds to advert to the want of a continuous brake throughout the train, and to the inability of the driver of the pilot engine to utilise such brake power as the train possessed in consequence of the lack of any brake connection between the pilot engine and the rest of the train. That is, the engine drivers are blamed because they have bad tools to work with. The London and North-Western Company run some of the fastest trains with what is much worse than no continuous brake, namely, an untrustworthy one.

A REPORT to the Board of Trade has been made by Col. Yolland on the derailment that occurred on the 10th May, between Farringdon-street and Aldersgate-street stations of the Metropolitan Railway, to a Metropolitan District Railway Company's 10.30 p.m. passenger train. The four leading bogie wheels of the engine mounted the rails, and ran for a short distance off the rails before the train was stopped. The engine is an eight-wheeled bogie tank engine, and was running with the four bogie wheels in front. The diameters of these wheels are 3ft., and those of the driving and trailing wheels are 5ft. 9in. The distance between the centres of the driving and trailing wheels is 8ft. 10in., and 6ft. 11in. between the centres of the driving and rear bogie wheels, while the distance between the centres of the bogie wheels is 4ft., making up a total wheel base of 18ft. 9in. The weight on the four bogie wheels in front is 10 tons 7 cwt. 3 lb.; the weight on the driving wheels, 17 tons 15 cwt.; and that on the trailing wheels, 17 tons 2 cwt. 3 lb., a total of 45 tons 5 cwt. 2 lb. Col. Yolland is of opinion that the derailment was due, first, to the absence of a check-rail inside the left or lower rail on the sharp curve of ten chains radius; secondly, the worn state of the right rail where the engine mounted; and thirdly, the tightness of the gauge. He thinks that the Metropolitan Railway Company should insert check-rails on all their lines having a radius of ten chains or less, and not permit such curved lines to be laid tight to gauge, although Mr. Tomlinson gave evidence against check-rails in the part where the derailment occurred; the curve radius is ten chains. The case is one of some interest as bearing on the paper read on this subject by Mr. Mackenzie, before the Institute of Civil Engineers in April last, as referred to in our impression for the 4th May.

NOTES AND MEMORANDA.

AT a recent meeting of the Paris Academy of Sciences a study of the deformations produced by sharp-edged tools in drilling was read by M. Tresca.

BLASTING paper is made by J. Petry, Vienna, consisting of unsized paper coated with a hot mixture of 17 parts yellow prussiate of potash, 17 of charcoal, 35 refined saltpetre, 70 of potassium chlorate, 10 of wheat-starch, and 1500 of water. After drying it is cut into strips, which are rolled into cartridges.

ANOTHER process of impregnating wood for its preservation has been patented in Germany. This consists in first treating the wood with a solution of zinc vitriol, and then with a solution of chloride of calcium, so that the preservative coating is formed upon the wood by the chemical action of both substances on one another.

SOME experiments recently made on a length of steam pipe gave the increase of length 2in. per 100ft., or 2 in 1200, the rise in temperature being from 60 deg. to that of steam at 80 lb., namely, 325 deg. or 255 deg. The expansion was thus 0·0016 for the 255 deg., giving a coefficient of expansion 0·00000651 per deg. F.

THE surface disintegration, particularly noticeable on some red bricks, is not, it appears, wholly attributable, as has been usually supposed, to heat and to atmospheric influences, but, according to Mr. Parize, is due to the depredation of large quantities of small organisms by which the red powder is made. The microscope he used enlarged 300 diameters.

FOR the preparation of cathedral glass, flashed or wholly coloured, blown or cast glass plates are, under German patent 22,306, coated with a mixture of equal parts pulverised basalt, potash, salt petre, and calcined borax made into a paste with water and subjected to a red heat after drying. The temperature must be high enough to fuse the coating and soften the glass simultaneously. The cooling is effected in the usual manner.

THE death rate in New York during the week ending June 16, was 21·8 per 1000, the rate in twenty-nine United States cities being 20·8. In the North Atlantic cities the rate was 21·1; in the Eastern cities, 20·7; in the lake cities, 18·9; in the river cities, 15·8; and in the southern cities, for the whites, 28·4, and for the coloured, 46·3 per 1000; 37·5 per cent. of all deaths were of children under five years of age. Accidents caused 5·2 per cent. of all deaths. Consumption caused 13·7 per cent. of all deaths, the proportion being highest in the North Atlantic cities, 15·2 per cent., and lowest among the southern, whites, 8·3 per cent.

AN experiment on the loss of pressure of steam in a long steam pipe was lately made in the Gould and Curry mine, California, by Mr. R. G. Carlyle, engineer. The pipes used were 4in. gas pipes connected with flanges and placed in a long trough made of 12in. by 2in. planks, and thus 8in. square inside. The space between pipe and wood was filled up with wood. Although the pipe was 1341ft. in length, there was practically no difference between the pressure at the boiler and at the engine, and this was proved by several gauges and mercury columns. Mr. Carlyle concludes that there is no limit to the distance to which steam may be carried.

THE annual rate of mortality for the week ending June 30th in twenty-eight great towns of England and Wales averaged 19·3 per 1000 of their aggregate population, which is estimated at 8,620,975 persons in the middle of this year. The six healthiest places were Portsmouth, Birkenhead, Brighton, Bristol, Norwich, and Hull. In London during the last week of June, 2589 births and 1432 deaths were registered. Allowing for increase of population, the births exceeded by 49, whereas the deaths were five below, the average numbers in the corresponding weeks of the last ten years. The annual rate of mortality from all causes, which had been equal to 16·9 and 17 6 per 1000 in the two preceding weeks, rose last week to 18·9.

THE following is from a German patent No. 20,939, for a method for the manufacture of artificial gutta-percha: About 50 kilos. of powdered gum copal and from 7½ to 15 kilos. of flowers of sulphur are under continual agitation heated in a boiler with double the quantity of turpentine or with from 55 to 62 litres of petroleum to a temperature of 126 to 150 deg. C. till completely dissolved. The mixture is then allowed to cool down to about 38 deg. C., when a solution of 3 kilos. of caseine is added, the latter being dissolved in weak ammonia with the addition of a small quantity of alcohol and wood spirit. The mixture is now heated for a second time to the same temperature until it assumes the consistency of a thin fluid. It is then boiled with a solution containing from 15 to 25 per cent. of tannic acid—galls or catechu—to which ½ kilo. of ammonia has been added. After having been boiled for several hours the mass is allowed to cool, washed with cold water, and kneaded out in hot water. After this treatment it is rolled out and dried.

IN continuation of his experiments on the action of light and of oxygen on india-rubber tubes, Mr. Herbert McLeod writes to *Nature*:—That two pieces of caoutchouc tube, about 48 mm. long and 7 mm. wide, were introduced on January 23rd, 1883, into test tubes containing oxygen confined over mercury. One of these tubes was surrounded by a case of black paper, and both tubes were placed side by side in a north window. On June 27th the tubes were examined; in that exposed to light about 17 cc. of oxygen—about three-quarters of the gas the test tube at first contained—had been absorbed, and the india-rubber had become altered, so that on pressing the tubes between the fingers superficial cracks were produced. In the other test tube no appreciable diminution of gas had taken place, and the caoutchouc was unchanged, thus fully confirming the results of the former experiments. We may therefore conclude that caoutchouc alters under the combined influence of light and oxygen, but that neither alone produces any effect."

A NEW process for working lead fume into litharge and red lead has been described in the "Journal" of the Society of Chemical Industry. The fumes evolved from the working of galena contain lead sulphate, sulphite and oxide, arsenic and antimony, also lead sulphide, and when zinc ores are present zinc oxide. The lead fume is mixed with sodium carbonate or hydroxide, and roasted. The roasted product is then washed, whereby sodium sulphate and sulphite and sodium compounds containing arsenic and antimony are separated. The lead compounds are converted into lead oxide by this treatment. The lead fume may be boiled also with a solution of sodium carbonate or hydroxide, lead carbonate and hydroxide being formed, whilst arsenic and antimony are dissolved. The washed precipitate is then roasted. In the presence of zinc compounds they are removed by boiling with sulphuric acid. If lead sulphide be present, it is necessary to boil first with a solution of calcium hypochlorite. Sodium sulphate is recovered from the liquors after separating arsenic and antimony.

AT a meeting of the Royal Society of Edinburgh on the 18th ult. Professor Tait communicated the results of his recent measurements of the compressibility of water. The water was compressed in a tube silvered inside and dipping with its lower and open end in a trough of mercury. The whole was placed inside the hydraulic press, and exposed to pressures of 1, 2, 2½ and 3 tons weight per square inch, the compression of the water being measured by the height of ascent of the mercury, which was given at once by the lower limit of the silver film. For water, both fresh and salt, the compressibility was found to diminish with increase of pressure, diminishing at much the same rate in both cases, although to begin with the fresh water was more compressible than the sea water in the ratio of about 72: 67. The results obtained for the fresh water could be very accurately represented by the formula $c = ·0072\ (1 - ·043\ p)$, where c is the true compressibility per ton at pressure p tons weight per square inch. The mean temperature of the water was 12 deg. C. At the same temperature alcohol of density ·83 showed a much greater compressibility (·01202 for 1 ton weight per square inch), which also diminished with increase of pressure—·01043 being the average compressibility for 3 tons weight.

MISCELLANEA.

THE Birmingham Corporation have under hand the construction of a new sewer some three and a-half miles long to drain the Sparkbrook district.

THE annual meeting of the British Archæological Institute will be held this year at Lewes, from July 31st to August 6th inclusive, the president of the meeting being the Earl of Chichester.

THE strike of the North Staffordshire colliers continues. The men generally do not give any open signs of departing from their demands; their places are being gradually filled up by others.

THE number of visitors at the Fisheries Exhibition on Saturday last was 20,132, making a total for last week of 78,525. The total number from the opening of the Exhibition has been 688,278.

AS a practical result of the four banquets of the leading electricians in Paris, a committee has been formed to draw up the articles of association for a Society of Electricians, which it is proposed to place under the patronage of M. Cochery, French Minister of Posts and Telegraphs, and of M. Berger.

SINCE the proposal to tunnel the Straits of Messina M. A. Giambastiani has revived the 1866 project of M. Cotteran for a suspension bridge, which was abandoned because of the great depth necessary for pier foundations. M. Giambastiani does not show that things have favourably changed in this respect since then.

AT the meeting on the 25th of June of the French Academy of Science, M. Tresca offered some observations on forging, in which he said there is elongation of the iron by percussion, and at the same time compression of the metal. The nature of the alterations in form resulting from this operation was also pointed out by the distinguished *savant*.

A STEAMSHIP, the Plantaganet, built for Mr. John Bacon, of Liverpool, was launched from the works of Mr. William Allsup and Sons, of Preston, on the 6th inst. Her length is 175ft.; breadth, 25¼ft.; depth, hold, 13¼ft.; dead weight capacity, 900 tons. Class 100 A 1 Lloyd's, and twenty years Liverpool book. She has compound engines by the same firm; cylinders, 22in. and 41in. by 30in. stroke, and steel boiler, which, as well as the hull, was constructed from the drawings and specifications of Mr. Joseph R. Oldham.

A PIECE of quick work in mining engineering was completed on Monday on the premises of the Sandwell Park Colliery Company. They began to bore for thick coal on the 10th January, 1881, and sank 420 yards within eighteen months. The new seam is 26ft. thick and enough to double the company's output. The contractors were Messrs. Charles Sperring and Co., of West Bromwich. The necessary building plant in course of erection embraces a pair of winding engines of 250-horse power, by Messrs. Coupe, together with eight new boilers.

ON the 21st ult. Messrs. Murdoch and Murray, at Port Glasgow, launched a steel screw steamer, the Hart Fell, built to class twenty years in red in the Liverpool book. Her dimensions are:—139ft. long between perpendiculars, 21ft. 6in. breadth moulded, and 10ft. 3in. depth of hold. The engines, which, like the hull, have been built under the superintendence of Messrs. W. R. McKaig and J. Carlton Still, of Liverpool, are of the compound inverted type, with high and low-pressure cylinders 18in. and 34in. in diameter respectively, with a stroke of 27in. Steam is supplied by a steel boiler working at a pressure of 80 lb.

A VERTICAL boiler exploded on the 11th April last at Bonnymuir Foundry, Bonnybridge. The Board of Trade report on this by Mr. P. Samson shows that the fracture commenced along the circumferential seam at the bottom of the boiler, where the rivets were placed so close together that the plate was almost cut off by the rivet holes. The report also draws attention to the necessity for making the area of the safety valve equal to the length of the lever divided by the distance from fulcrum to valve, so that the pressure per square inch equals the weight on the end of the lever. The report, like others of this branch of the Board of Trade, is accompanied by a sheet of drawings so large that it reminds one of the man who wanted a full-size map of the world.

MESSRS. WM. JESSOP AND SONS, Limited, Brightside Steelworks, have made a remarkable casting in the form of a stern frame for a new steamer being built at Messrs. Earle's Shipbuilding Company, Limited, Hull, for Messrs. Thos. Wilson, Sons, and Co., of the same place. Its total length was 32ft., and along the bottom or scarp part 14ft.; it weighed nearly eight tons. It took 312 pots to cast it, and the operation was accomplished in 12½ minutes. On the 3rd inst. it was tested in the presence of the Board of Trade and Lloyds' surveyors, along with Messrs. Wilsons' engineers. The principal test required was to let it fall from the perpendicular on to the flat on a hard road. Having stood this and the other tests satisfactorily, it was despatched to Hull on the 4th. This is a new and important speciality in steel castings for ship purposes.

AT the Barnsley police-court on the 5th inst., the Corporation of Barnsley sued Joseph Senior, of Tyers-hill, Darfield, to recover £33 15s. 4d. damages caused to Dodworth-road, Barnsley, by the defendant's traction engines. The Borough Surveyor stated that the repair of the road was £139 17s. 5d. beyond an average cost in consequence of traction engines being used upon it. The damage was allotted as follows:—Co-Operative Society, £83 1s. 6d.; P. and G. Senior, £10 12s. 7d.; C. Lockwood, £12 8s.; and the defendant £33 15s. 4d., the apportionment being according to the journeys made. In cross-examination it appeared that defendant's engine with the load on it coming down the road would sometimes make a total weight of 29½ tons. One witness said the damage to the road was not caused by traction engines, but by the Corporation's men "pottering about" the water-pipes. The bench gave a verdict for the full amount claimed, with costs.

AT a recent meeting of the Paris Academy of Sciences Mr. J. B. Dumas called attention to the substitution, at M. Appert's glass-works, Paris, of a pressure fan for the blowing into hollow glass ware, that was formerly effected by the mouth of the glass-blower. The new system has been successfully carried out on a large scale by M. Appert, whose drawings and photographs have been referred to the committee on unhealthy trades. The molten glass is kept under pressure in reservoirs, whence it flows in channels to each glass-worker—no longer glass-blower. The latter has within easy reach, and capable of being handled with the greatest facility, a pipe which affords him the necessary quantity of air at the required pressure for blowing out the globe, bottle, or other object. The "Journal" of the Society of Arts says the germ of this useful invention is due to a workmen of the famous Baccarat Glass-works, who, by means of a rude air pump, blew out his glass without using the mouth. He was awarded with a prize by the Academy forty years ago.

THE Metropolitan Board is petitioning to be heard against all Electric Lighting Provisional Order Bills having reference to the metropolis. The House of Commons having decided, contrary to the advice of the President of the Board of Trade, that the hybrid Committee, to which the Confirming Bills are referred, should be empowered to hear parties against the Bills irrespective of their *locus standi*, the Metropolitan Board is thus enabled to come forward and oppose the Provisional Orders, notwithstanding, these have been already settled as between the vestries, the electric lighting companies, and the Board of Trade. The vestries and District Boards of the metropolis are the local authorities specified in the Act of last year, and the Metropolitan Board only comes in as connected with the raising of loans. The conduct of the Board is felt by the vestries as an invasion of their rights. The Metropolitan Board has no superintendence over electric lighting. The avowed object of the Metropolitan Board is to prevent the creation of a monopoly like that of the gas interest. But for this the vestries assert that help is not necessary.

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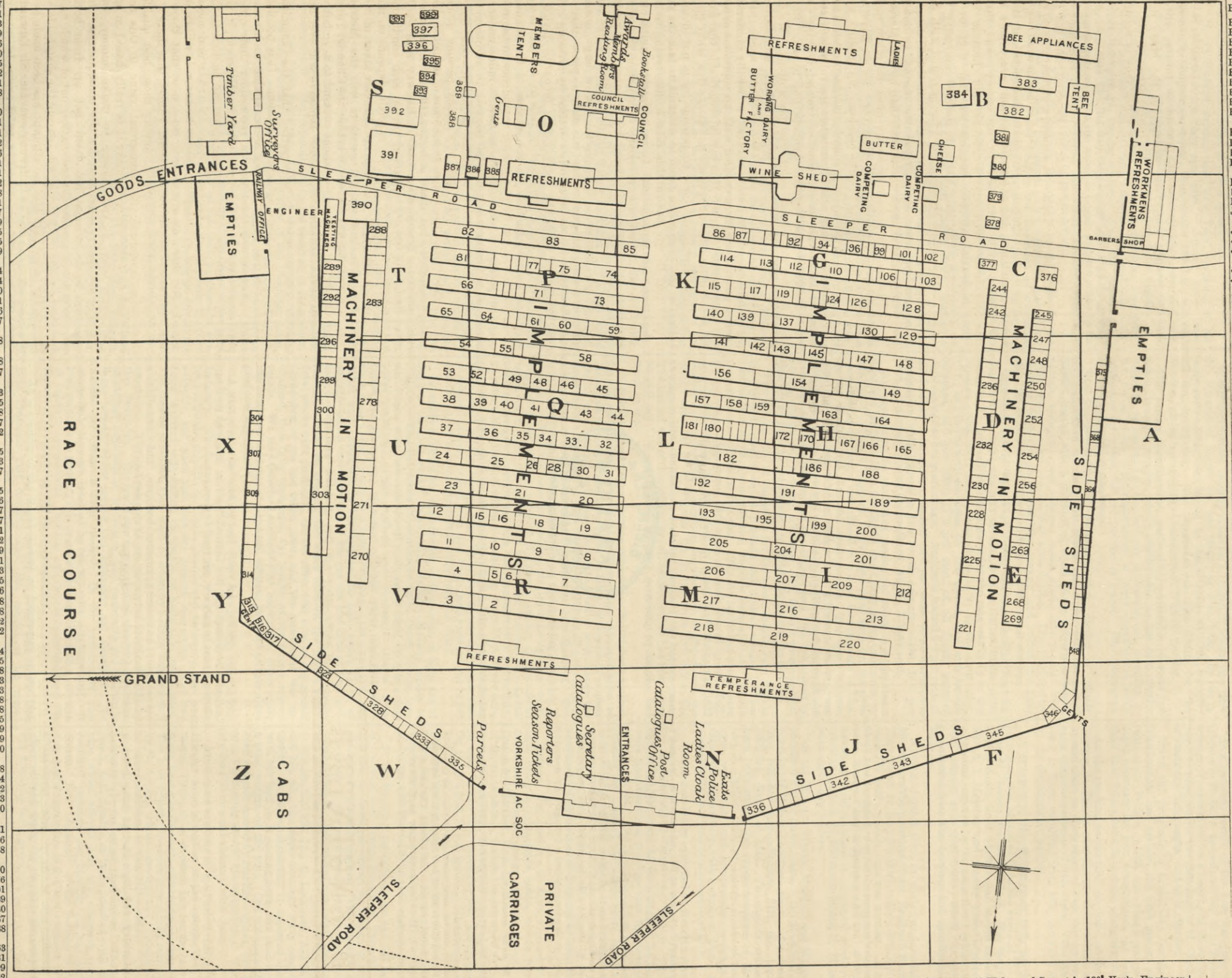

Exhibitor.	Block	No
Atmospheric Churn Co. ..	K	88
Arnold and Sons	A	363
Aveling & Porter	V	3
Andrews, J. E. H., and Co. ..	E	266
Allan, J. D., and Sons	R	17
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Aylesbury Dy. Co	U	275
Antitropic Co...	K	86
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Atkinson, Jos...	G	127
Ackroyd, Wm., and Bros.	Q	26
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Burlingham, Innes, and Paternoster	K	140
Bligh Bros. ..	G	130
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Bailey, W. H., and Co.	L	179
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Bust, F. & J. S.	E	259
Burrell and Sons	Q	45
Braggins, G. F., and Co.	E	257
Bruce, A. K.	D	230
Bristol Wgn. Co.	P	77
Burney and Co.	T	289
Baker, Thomas	M	206
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Baker, W. B. ..	D	188
Barford and Perkins ..	I	233
Bushell, H. A., and Co.	Q	189
Benison Bros. ..	G	231
Bellas, William	C	244
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Bayliss, Jones, and Bayliss ..	M	195
Bradford, T., and Co. ..	U	296
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Clayton & Shuttleworth	E	258
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Christy, T., & Co.	M	218
Crowley, J., and Co. ..	E	264
Cadle, Cornelius	G	112
	D	129
	D	240
	P	69

Exhibitor.	Block	No
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Crump, H. S. ..	H	161
Cochran and Co.	T	293
Cooke, John ..	Q	19
Canadian Govt.	N	336
Constantine ..	T	290
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Corbett and Son	U	272
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Davis, J., & Co.	U	360
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Down and Co. ..	A	366
Dixon, E. P. ..	N	337
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Green, J. W. ..	G	125
Gilkes and Co.	T	288
Glover and Sons	M	193
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Guy & Stevens	Q	38
Gardner, W. ..	T	285
Gower and Sons	Q	49
Hunt & Tawell	R	9
Humphries, E.	U	300
Hayward Tyler, and Co.	D	248
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Hillerns & Co...	T	123
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Hetley, A. ..	J	199
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Hopkinson, C...	T	283
Hancock & Co...	G	95
Harrison, M'Gregor, and Co. ..	Q	58
Hull Wagon Co.	H	191

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Hempsted & Co.	D	254
Hill & Smith	T	82
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Horner & Mason	S	393
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Langley & Son	P	76
Lankester & Co.	Q	46
Lloyd, Lawrence and Co.	G	94
Live Stock Condiment Co.	Y	319
Llewellin & Son	G	93
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Lister and Co...	G	101
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Murray and Co.	R	18
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Mattinson & Co.	K	114
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Major and Co...	S	394
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Marsden, H. R.	D	249
Mather, G. R. ..	L	276
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Nalder & Nalder	X	295
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Newton, Chambers, and Co.	T	291
Norris and Co...	E	352

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Northallerton Co	E	355
Nicholson and Son	I	200
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Oakshott & Co.	J	342
Oates and Green	H	146
Oliver and Co. ..	E	260
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Piygott and Co.	E	263
Priestman Bros.	T	390
Penney and Co.	L	142
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Watson & Haig	D	252
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HYDRAULIC MACHINES FOR PRESSING ZINC WIRE.

(To the Editor of The Engineer.)

SIR,—Can any of your readers favour me with the names of makers of hydraulic machines for pressing zinc wire? H. O.
London, July 5th.

BLUM'S PATENT.

(To the Editor of The Engineer.)

SIR,—We observe in your issue of the 6th inst., p. 21, that you describe a patent of Mr. Blum, No. 5294, as "Not proceeded with." This patent was duly sealed and specified, and the erroneous note attached in your Abstract of Specifications is calculated to put him and us in a false position. If you could insert a correction of this in your next issue we should be greatly obliged. NEWTON AND SON.
66, Chancery-lane, W.C., July 7th.

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THE ENGINEER.

JULY 13, 1883.

A SECOND SUEZ CANAL.

IN THE ENGINEER for September 29th 1882, we advocated the construction of a second Suez Canal, pointing out the nature of the demand which existed for one, and glancing at its value as a speculation. The concluding words of our article ran—"However audacious the idea of constructing such a canal may appear at first sight, it will be found to be well worth that careful examination which we trust it will receive from our readers." We are now in a position to add that the scheme has received careful consideration, and with satisfactory results. It has long been known that the Suez Canal is inadequate to supply the demands made upon it as the great waterway between Western Europe and the East, and shipowners complain, not only of the delay of sending their vessels through the canal, but also of the heavy toll, 10 francs a ton, and a poll tax on passengers. M. de Lesseps, however, would not hear of the construction of a second canal, claiming that his company had obtained a concession which gave it until well into the next century, what is virtually a monopoly of the construction of ship canals in Egypt. Pressure was put on him, however, and then he consented to widen and deepen the existing canal; but this scheme gave very little satisfaction—it is not enough. For some time back negotiations have been in progress concerning which but little has been heard. On Wednesday, however, Mr. Gladstone was able to make an authoritative statement, from which we learn that the construction of a second canal is to be begun forthwith, the necessary funds being supplied by the English Government at 3½ per cent. per annum, the sum to be advanced being £8,000,000.

Mr. Childers on Wednesday laid on the table of the House a paper containing the heads of a provisional agreement made between Mr. Rivers Wilson and M. de Lesseps, from which it appears that the existing Suez Canal Company is to construct a new canal as far as possible parallel to the present canal, of width and depth sufficient to meet the requirements of maritime construction settled in agreement with the English directors. The second canal to be completed, if possible, by the end of 1888. Not only is there to be a second canal. The tariff is to be reduced from 1st January, 1884, ships in ballast to pay 2½f. per ton less than ships with cargoes. After the profits—interest and dividend—have been distributed at the rate of 21 per cent., half the pilotage dues to be remitted from the following 1st January. After the profits as above are 23 per cent., the rest of the pilotage dues to be similarly remitted. After the profits as above are 25 per cent., the transit dues of 10f. per ton to be reduced by 50 centimes to 9f. 50 centimes. After the profits as above are 27½ per cent., a further 50 centimes to be taken off. After the profits as above are 30 per cent., a further 50 centimes to be taken off. For every additional 3 per cent. distributed profits, 50 centimes to be taken off to a minimum of 5f. per ton. No two reductions of pilotage or transit dues are, however, to take place in the same year; and on the other hand, if the distributed profits should fall off, an increase of transit dues to take place according to the same scale; but no two increases to take place in one year. On the first occasion of a vacancy, one of the English directors to be nominated by the president for election as vice-president, and thereafter one of the English directors to be always a vice-president. The English director now acting as hon. member of the committee of direction to become a regular member when vacancies permit, and thereafter one of the English members to be always a member of the committee. Two of the English directors to be always members of the Commission des Finances. An English officer, selected by her Majesty's Government, to be appointed by the board "Inspecteur de la Navigation." His functions to be determined in agreement with the English directors. The company to engage in future a fair proportion of English pilots.

There are other conditions with which we need not trouble ourselves, as they refer to financial arrangements. To a certain point all the conditions and stipulations appear to be satisfactory; but English shipowners hold, and we think properly hold, that the rates are too high under the new tariffs. It will be seen that the company incurs little or no risk, and is put to little or no trouble. No financial expenses will be piled up, nor is there any promotion money to be paid. The English Government finds the requisite funds in the first instance; and repayment by a sinking fund in fifty years, and 3½ per cent. interest cannot be regarded as exorbitant. Why under the circumstances the company should be permitted to make a profit of 25 per cent. we cannot see. If the maximum profit was fixed at 10 per cent., a £100 share would be worth at least £220. It may be said that to limit profits would be to interfere with the right of the company to sell in the dearest market. If the company found the money and secured no privileges, this argument might be true; but the company does not find the money, receives important concessions, and will enjoy special privileges, and no legitimate right would be infringed if our Government stipulated for a substantial reduction in the tariffs. Indeed, it is not easy to see what good purpose the Suez Canal Company serves in the matter. We are as competent to supply engineers as to supply the money. The company will get all the benefits, and this appears to be hard on British trade We presume that it was deemed best to avoid political trouble to suffer M. de Lesseps to take a hand in the work, but it is quite possible that we are going to pay a great deal too much for peace and quietness. It may be said that the company never can make 25 per cent. If this be so, then the proposed reduction of tariffs is simply nonsense, and all the reduction stipulations we have quoted ought to be struck out. When the vote for the £8,000,000 comes to be taken, we trust that a means will be found of providing for the interests of those most concerned—British traders. The Suez Canal Company is entitled to fair play, but not, so far as we can see, to unparalleled favours.

THE CHANNEL TUNNEL.

BOTH the Channel Tunnel Bills have met their fate. Nothing more will be heard of them this year. The joint committee of Lords and Commons has terminated its labours with a result which is only satisfactory in an indirect sense. In other words, after an elaborate and protracted inquiry, the Committee has come to no conclusion whatever as a Committee. Its members are in the position of a jury which cannot pronounce a verdict. A very lame and impotent conclusion, no doubt. The members of the Committee are ten in number; and no fewer than six reports have been prepared by them. The Committee met on Tuesday to settle which of the six should be adopted. One of the reports—that by Lord Lansdowne—is in favour of the project; the other five are all opposed to it. This is so far satisfactory; but unfortunately no two of the five antagonistic reports agree as to the grounds of opposition. The Committee divided on Lord Lansdowne's report, which was rejected by six to four. The minority consisted of Lord Lansdowne, Mr. Baxter, Lord Aberdare, and Mr. Peel; and the majority of Lord Devon, Lord Camperdown, Lord Barrington, Sir M. Lopes, Sir H. Vivian, and Mr. Harcourt. The Committee then proceeded to consider the remaining reports, but they found it impossible to agree with any one of them to the extent necessary to secure its adoption. Those opposed to the tunnel quite sympathised with those who voted against it, but they could not agree on a common ground of opposition. What one man regarded as quite a sufficient reason why the tunnel should not be constructed, was as foolishness in the eyes of another. It was once said of a well-known judge that his judgments were always right, but that his reasons for them were invariably wrong. Each member of the Committee thought like this of his fellow. One man, it seems, was opposed to the construction of the tunnel on military grounds, while another did not like it because it would interfere with our commercial position; each was glad that the other opposed the tunnel; each was satisfied that the reason why he opposed it was erroneous. The outside public may or may not laugh at the Committee, but they will be glad that the tunnel is not to be made in the immediate future.

The action of the Committee may be taken as setting forth the views of the English nation. The idea of constructing such a tunnel has caused an uneasy feeling, the true nature of which it is not perhaps easy to define. The national instincts are against it. It is quite possible that no two of those who are opposed to it may be quite agreed on the soundness of the arguments which they can urge or have heard urged against it. They are, however, none the less satisfied that it ought not to be made. In point of fact, such a tunnel must be a national work; and its construction involves enormous issues. Whether the idea that an invasion through it is possible, is or is not well founded, is now quite a secondary consideration. What any Government, present or future, will have to deal with is not the reality, but the idea; it matters nothing at all whether the danger exists or not. So long as the people of this country think that it exists, so long will Governments be compelled to act as if it did exist; and this fact would unquestionably entail an enormous outlay on permanent forts and a standing army in little. The national instincts would force Government to effect an insurance, so to speak, on England; and the premium would be very high. We spend a colossal sum on our Navy every year; one-half that would suffice, or even less, if we did not dread invasion. We have constructed, at the outlay of millions, magnificent forts near every port which is likely to be attacked by an enemy; and these have all been called into existence, not because we have been attacked, but because we fear that we may be attacked. So long as it is deemed necessary that the Thames or the Mersey should be provided with defensive works, so long will it be held that the Channel Tunnel must be defended; only, as we should be much more vulnerable through the tunnel than by the Mersey or the Thames, the protective works must be much more complete, satisfactory, and expensive. As we have said, the apprehension may be quite baseless. No attempt worth the name at invading these islands has been made during the present century, and if we reject the ridiculous enterprise of the French on the coast of Ireland, nothing has been done since the Spanish Armada put to sea. But we do not for this reason relax our precautions. We dare not. So when the tunnel is made and doubled—as the Suez Canal will be—and doubled again until the influence of the "silver streak" is wholly obliterated, we shall find ourselves saddled with an enormous expenditure on naval defences. It is surely remarkable that intelligent politicians should entirely fail to see that what the British Government will have to provide for is not invasion, but the fear of invasion; and to attempt to talk the public of Great Britain out of this fear is like trying to stop the tide with a pitchfork. It is perfectly tangible; it exists now and it will always exist. The notion that the public apprehension can be allayed by promises that precautions will be taken for the speedy destruction of the tunnel, is simply fatuous. The placing of a large quantity of dynamite or gunpowder in such a place that it can be exploded at a minute's notice by pressing a button, and thus ruin the tunnel, is a favourite device. The author of this scheme totally fails to see that it would, if carried out, be fatal to the success of the tunnel. The public will not have too much confidence to begin with in the safety of a hole bored for twenty miles under the sea. Let the travelling public be assured, in addition, that the pressing of a button by malice or design would hurry them all to a cruel death, and how many persons would avail themselves of the tunnel as a means of transit? Let it be announced that there is a quantity of dynamite stored under the Metropolitan District Railway, near St. James's Park, and that it is stored under such conditions that whether it does or does not explode depends on the absolute purity of the material, and the care taken of it by two men, and how many passengers will the Metropolitan District Railway have? Whether the Channel Tunnel will or will not be made we cannot pretend to say; but we can say that no dynamite or other explosive will ever be stored near it to blow it in.

It is, we think, to be regretted that the Committee has not come to some definite conclusion. It is not flattering to the majority that they were unable to hit on some *modus vivendi*, some way of reconciling their differences and pronouncing a definite verdict. However, it is something to know that nothing more can be done in the way of making a Channel Tunnel in 1883; and meanwhile the nation will have time for reflection. It will be enabled to see more clearly than it does now that there is no universal demand for a Channel Tunnel; that there is a very large difference of opinion among those best qualified to judge concerning its commercial value to this country, and that the desire to make it is really based on nothing more than a keen desire to make money, without the smallest consideration for the consequences. In fact the whole scheme has been got up from beginning to end as a commercial speculation, out of which money is to be made by all concerned—except the shareholders; and so far as we have seen no attempt has been made to prove that these can make a halfpenny out of it. Sir Edward Watkin's wild estimates of traffic may of course be entirely disregarded. Sir John Hawkshaw is the only one who has thought it worth while to show that the tunnel can be ventilated, if made, sufficiently to allow a few trains to be run each way in the day. If the country at large wants the tunnel it will be made if practicable; but so long as it does not, speculators should be warned that there are yet left some things which they must not touch, and among these are our national defences.

THE LOCKERBIE ACCIDENT.

How far a railway company is liable to pay compensation, when an accident occurs as a result of neglect of precautions which ought to be taken to secure the safety of passengers, is a point usually settled in a court of justice; a great deal turning on the value of the precautions said to have been neglected. When, moreover, we find the

officials of the Board of Trade condemning a company after taking evidence, it would seem that little more is to be said. It appears that the London and North-Western Railway Company is just in this predicament, for Major Marindin has condemned the action of that company in almost as strong terms as are consistent with official dignity. On the 14th of May a disastrous collision occurred at Lockerbie Station on the Caledonian Railway. Major Marindin investigated the circumstances, but although his report was completed on the 31st May, it has only been made public within the last few days. The circumstances under which the accident took place were very simple. Lockerbie is a junction, and on the day named a train from Stranraer ran into it at 8.40 p.m. Without going into minute details which we could not make clear without a diagram, it must suffice to say that, instead of keeping the Stranraer train on a road to itself, as is usually done, and as was intended to be done at Lockerbie, a practice had grown up of permitting the Stranraer train to run along the wrong line from the loop points to the branch. It waited on the down line for the arrival of the main line train, when the through carriages were drawn ahead through a cross over road and backed on to the main line train. This was in itself a dangerous practice, and as such is condemned by Major Marindin; but worse than this, it entailed the systematic neglect of signals on the part of the driver. The signals and points were so connected that he could not cross the road as he did save in the face of the permanent signals, and accordingly he was signalled through by hand. On the night in question, he, in the usual way, neglected the signals, without making himself certain that the line was clear, and he ran into a goods train on the down line. He was moving slowly, and saw the goods train about sixty yards ahead of him. He did what he could to stop, with the result that the collision was only slight. The corner of the buffer beam, and one buffer of his engine, were destroyed, and that was all; but unfortunately a wagon was knocked off the down line and fouled the up line, and this at a moment when the up Scotch mail was close to Lockerbie. This train could not be stopped in time, and ran into the wagon. The mail train was drawn by two engines, and consisted of a luggage van, a brake van, a third-class carriage, two saloon sleeping coaches, a composite sleeping carriage, a composite carriage, a brake van, three more composite carriages, a third-class carriage, and a brake van, or fourteen vehicles in all, exclusive of the engines and tenders. This train seems to have been but 350 yards away when the up line was fouled. The leading engine was thrown off the rails and tore up the platform, but rolled out of the way. The train engine also left the rails, but ran along the sleepers nearly 200 yards; owing to this, and the great strength of the vehicles, there was no telescoping, but the sides were ripped out of the vehicles as they passed the goods train. The driver and fireman of the leading engine were killed on the spot. Four passengers were killed, eight injured seriously, and fifteen slightly, while thirty others sent in claims to the company.

It is evident that the original cause of the accident must be sought in the system of working the Stranraer train. If it had been properly worked it would not have run into the goods train, and it appears that the system was entirely irregular, and had been adopted by the station master on his own responsibility, and without acquainting those in authority over him. The circumstance came to the knowledge of an inspector, but he seems to have contented himself by saying that the practice was wrong, taking no decided steps to put an end to it. But it is also clear that if the driver of the Stranraer train had been provided with sufficient brake power he would not have run into the goods train. George Easton, the driver, after detailing the particulars, said, "I did not get any white lamp signal from the signalman. When I shut off steam at the home signal, I put the blower on to blow the smoke off, and then I went to the corner of the cab for my ticket, and then I leaned over the side to where the pointsman was to give him the ticket. I then saw him showing me a red light. I shouted 'woa!' to my mate, and reversed my engine at once. My mate got the brake on. I think we had reduced the speed to four or five miles an hour, when I struck the goods train." It seems that when he saw the red lamp he was no less than 121 yards from the point where he struck the goods train. Major Marindin states that his train was probably running far slower than twenty miles an hour at the time, as he was going to draw up at the platform; but assuming that it was twenty miles an hour, he would require 12·5 seconds to travel the 121 yards. If he had succeeded in stopping in close proximity to the goods train he would have required 25 seconds to run the distance. His train consisted of engine and tender, brake van, two fish trucks, one sleeping and two ordinary composite carriages, and one third-class carriage with a brake compartment. Such a train running at twenty miles an hour could have been stopped by a Westinghouse brake in about 6 seconds, and, of course, long before it reached the goods train.

Turning now to the mail, we find that before the collision occurred, a boy named Ross, in the signal cabin assisting the pointsman, the instant he saw the line fouled, threw the home signal to danger. He thought the mail was then 100 yards beyond it. There is no doubt that the driver of the pilot engine saw it, and reversed his engine. It seems that the mail was then about 300 yards off; it was running at a great pace—perhaps nearer sixty miles an hour than fifty, the speed stated in Major Marindin's report. At sixty miles an hour it would travel 300 yards in a little over ten seconds. If the train had been fitted throughout with the Westinghouse brake, two seconds would have put it on throughout the train, leaving eight in which it would operate to check the velocity of the train. But the moment the brake came into action the speed would be reduced, and the time available would be prolonged. If the train was running at but fifty miles an hour, and the brake had been applied 900ft. from the fouled point, it is possible that there might have been no collision at all; but without going so far as this, the fact remains that the velocity of the train would have been reduced so much that very little damage might have been done.

But the train had no continuous brake. The leading engine had only the ordinary hand brake; and the train engine was fitted with the Westinghouse brake, because it was a Caledonian engine. The Caledonian Railway Company has adopted the Westinghouse brake, and is fitting it throughout its rolling stock. The train, however, was the property of the London and North-Western Company, and was fitted with Clark and Webb's notorious emergency brake, which has perhaps more accidents to answer for than all the other railway brakes in the world put together. This was fitted to the second, third, and fourth vehicles of the train, and the driver could apply it to about 22 tons of rolling stock, by pulling a cord. At the further end of the train another section was made up, to which the chain brake could be applied by the rear guard. In all, much less than half the weight was braked. The leading driver, having no continuous brake under his control, was completely powerless. The driver of the train engine seems to have known nothing of the obstruction until he felt the leading engine reversed, when he also shut off steam and reversed. Major Marindin says: "As a matter of fact, he applied neither brake, having barely time to shut off steam and reverse his engine; but he was not in such a good position as the driver of the leading engine to see the home signal thrown up to danger; and it is more than probable that if this poor fellow, who was killed, had had at his command a quickly acting continuous brake throughout the whole train, he might have done much to reduce the speed before the collision took place." It is not remarkable that the train engineman did not apply a brake. The three operations of reversing, then putting the Westinghouse brake on his engine, and hauling at the cord of the chain brake would take time, and he had no time to take. How different the case would have been if he had only to drop his hand on a tap, and almost as quickly as the eye can wink have every wheel in his train all but skidding. Whether steam was turned off or not would be a secondary matter, for it is well known that the pull of a locomotive makes very little difference indeed in the distance which a train will run; and this is one of the great features of the Westinghouse brake, that in case of emergency, the act of a moment will suffice to apply it, and no thought need be given to it; no adjustment, or consideration or hard pulling is required; all that need be done can be done on the spur of the moment, instinctively, almost involuntarily. However, as we have said, the train was not fitted with the Westinghouse brake, and this is what Major Marindin in his official capacity has written on the subject:—"It is not the general practice to fit tender engines so that, when two are attached in front of a train, the driver of the leading engine shall have command over the continuous brake; but as this driver is the one who has the best chance of seeing a sudden danger, where every second of time may be of incalculable importance, it is manifest that he is the one who ought to have the power of applying at once whatever brake the train may be fitted with; and seeing that a few additional feet of brake piping on each engine is all that would be necessary to effect this desirable improvement, I trust that no time will be lost in so fitting all engines. In this particular instance, however, there are other points to be considered. The Caledonian Railway Company have adopted the Westinghouse continuous brake, and are rapidly bringing it into use all over their system; but as the London and North-Western Railway Company do not approve of this particular form of brake, the absurd anomaly presents itself of the most important trains upon a railway which has adopted a good continuous brake being run without this brake throughout the train, because another railway in connection with it belongs to a company which have not yet adopted any continuous brake fulfilling the requirements of the Board of Trade, and are now experimenting with a third form of brake. If the two west coast companies cannot agree upon the same continuous brake, it is not too much to ask that the whole of the stock composing these important through trains should be so fitted that the passengers may have the protection of an efficient continuous brake, no matter which company's engines are attached."

It is some small satisfaction to know that the chain brake, which Mr. Moon, the chairman of the London and North-Western Railway, some time since publicly stated to be the best brake in use, has been at last condemned by himself and Mr. Webb. The latter gentleman is now in search of a good brake. There is a story told of a man who, coming to London for the first time, was told that the streets were paved with gold. He had scarcely passed through Temple Bar when he found a guinea, but he would not stoop to pick it up, remarking that while gold paving stones were to be had a little further on it was not worth while to pick up a single sovereign. We commend the story to the directors of the London and North-Western Railway. They would act more prudently in picking up the guinea ready to their hand than in hunting for a chimerical golden paving stone in the shape of the perfect brake of which Mr. Webb dreams. Whatever is done in the matter ought at all events to be done quickly—that is to say, before any more passengers are killed.

THE BEHAVIOUR OF THE NITROGEN OF COAL DURING DESTRUCTIVE DISTILLATION.

WHEN coal is submitted to destructive distillation in close vessels ammonia gas and other products are evolved. Roscoe writes that "coal contains about 2 per cent. of nitrogen, which, when coal is heated in close vessels, mostly comes off in combination with the hydrogen of the coal as ammonia." This question has been inquired into by Mr. William Foster, M.A., Lecturer on Chemistry at the Middlesex Hospital, and a paper has been published by him on his results in a recent number of the "Journal" of the Chemical Society. He finds that only a small portion of the whole quantity of nitrogen is obtained as ammonia. Some nitrogen appears as cyanogen; some is presumably present in the coal-gas in the elementary condition, while a considerable portion remains behind in the coke. One particular sample of Durham coal was employed in the experiments—a kind in favour with certain metropolitan gas engineers, who are fairly well acquainted with its ammonia-producing capabilities. In this coal nitrogen, amounting to 1·73 per cent., was found to be present, and of volatile matter 25·54 per cent., and of coke 74·46 per cent. In estimating the total nitrogen in the coal three methods were employed: (1) By heating with excess of soda lime; (2) by heating with excess of copper oxide in an atmosphere of carbonic anhydride; and (3) by heating with an excess of copper oxide *in vacuo*. By the first and last processes numbers varying from 1·696 to 1·763 per cent. were obtained. To estimate the amount of nitrogen which is evolved as ammonia during destructive distillation, the process of coal gas distillation was carried on on a small scale, and the gas evolved was well washed with hydrochloric acid; the chloride was carefully collected and turned into the platinum salt and weighed. The percentage of nitrogen was found to be 0·251, or one-quarter of a per cent., so that only a small portion goes away in the gas. To estimate the amount of nitrogen which is evolved as cyanogen during destructive distillation, the gas, after it has been washed with acid, was passed through a glass tube containing slacked lime at a high temperature, and the ammonia thus formed was collected and determined as before. Thus, 0·027 per cent. of ammonia was obtained. Then there remains to estimate the amount of nitrogen which is present in the coke, and which forms by far the largest part. The coke was ground to a fine powder in an agate mortar and treated (1) by the soda-lime process, and (2) by the copper-oxide process in vacuo, and numbers varying from 1·165 to 1·099 per cent. were obtained. Having regard to the coal, the mean of the results of the soda-lime process is 1·696, and with copper oxide *in vacuo* the mean is 1·763. He takes 1·730 as the percentage of nitrogen in the coal. The experiments on the coke with soda-lime furnish a mean of 1·165, and with copper oxide *in vacuo* a mean of 1·099; he takes 1·132 as the nitrogen percentage of the coke. The relations of the percentages on 100 parts of nitrogen is presented more intelligently in the following way:—

Nitrogen of coal evolved as ammonia	14·50
Nitrogen of coal evolved as cyanogen	1·56
Nitrogen of coal present in the coal gas in the elementary condition	35·26
Nitrogen of coal remaining behind in the coke	48·68
	100·00

No experiments were made on the amount of nitrogen retained by the tar. It is supposed to be very small in amount. As regards the period of maximum yield of ammonia, during the destructive distillation of coal it appears that the coal gas is richest in ammonia during the middle of the period and poorest towards the close. In fact the poverty of coal gas—so far as ammonia is concerned—at the close of the process of distillation is very marked.

THE PRESIDENCY OF THE ROYAL SOCIETY.

THE election of President of the Royal Society, which in the ordinary course of things would have taken place in November, came before a special meeting of the Council which was called last week, and the vacancy caused by the death of Mr. Spottiswoode was filled up by the calling Mr. Huxley to the vacant chair. The name of Professor Owen had been mentioned, but owing to the advanced age of that gentleman, another leader in the scientific world was chosen. Sir John Lubbock was also mentioned in influential scientific quarters for the presidency; and the claims of Professor Tyndall and Professor Huxley were also discussed. The choice of the Council will we feel sure be hailed with very lively satisfaction both by the scientific and the general public. His marked eminence in his own line as a physiologist is beyond dispute, and the services that he has rendered as the militant expounder of new truth amply entitle him to this high recognition. To England especially belongs the development of the views of evolution, and no one has more clearly and more popularly given expression to the new doctrine than the new president. One may say of Mr. Huxley, moreover, what is not true of every man of genius, that whatever line of life he might have chosen he was sure to have distinguished himself in it, so great is his general capability, so distinct is he in vision and judgment, and so ready in his aptitude for divers subjects. And the President of the Royal Society should also be a good man of business. This, too, is among Mr. Huxley's qualifications, and the affairs of the Society, already well known to him as secretary, will not suffer in the hands of a man whose strong practical common sense and the knowledge of men and the world are not among the least conspicuous of his claims. Although Mr. Huxley is a master in his own special subjects, and in more than his special subjects, his name is not as yet associated with any of the great discoveries or large generalisations which make an era in the development of any one science or in general knowledge. There is not, so far as we are aware, any great doctrine of which he can claim the origination—any latent law which he has brought to light. But Mr. Huxley more perfectly, perhaps, than any of his scientific contemporaries, embodies the general scientific tendencies of the age, especially in relation to those controversies in which science becomes philosophy. He has been the expositor of Hume and Berkeley, as well as of Darwin. The perfect form which Mr. Huxley is capable of giving to his writings assigns him a place as a man of letters, scarcely inferior to that which he occupies in science and philosophy. His election as President of the Royal Society is remarkable as recognising the claims of science, unaided by the adventitious recommendations of rank and wealth, to the post of highest honour known among scientific men. Some former presidents of the Royal Society have been little more than hosts and patrons of science. Mr. Huxley represents science only, or science associated with a private and personal character which has won the respect and regard even of opponents, with an intelligence enlarged by a culture more than merely scientific and with a penetrating and wide-reaching interest in all that bears on human welfare.

REALISED PRICE OF IRON.

THE return under the sliding scale of the price of pig iron during the past quarter shows that a good number of the old contracts for pig at prices considerably above those of the market rate have passed away. The price as returned to the ironmasters of Cleveland and Durham is for the past three months a fraction over £2 0s. 1d. per ton—the rate for the previous quarter being £2 2s. 0¼d. It is evident that the profits of the ironmasters must have been reduced, but they are now to have some compensation. The ascertainment will give a reduction in the rate of wages of both the ironminers and of some of the workers at the blast furnaces, and there will also be a reduction in the rates of the carriage of minerals for the manufacture of crude iron. The owners of blast furnaces and of mines will benefit considerable, but the loss to the workmen will be slight so far as the individuals are concerned. Hence the employers will be better able to produce at the lower prices that are current in the market. The realised price has now fallen to something like

that that is so current, and as at the same time there has been a considerable fall in the stocks of pig iron in the district, it is possible that there will be a turn in the tide of the trade. Meantime it is clear that the production of pig iron from imported ores is being slightly reduced in the North of England, and that from the local ores is increasing. This may be due in part to the enlarged use of the basic process in the Cleveland district. It does not affect the average price realised by the ironmasters, because that is attained by ascertaining the prices of No. 3 Cleveland pig, sold by certain makers. The price so obtained includes iron sold on long contracts, and thus it is that the realised price lags behind the market rate, both in a rising and a falling market. In the latter the men obtain the advantage as they have in the Cleveland and Durham district for the past six months. They still have an advantage, but it is not great, and if the price should rise now there would be a corresponding benefit to the employers.

THE IRONWORKERS' STRIKE.

QUITE anomalous appears to be the state of things which now prevails throughout the iron trade labour market in this country. In the North of England we have the acknowledged leader of the men complaining that there are "thousands" of ironworkers there, in Scotland, and in the Midlands, wholly without work; and so despairing is he of their ever again being able to find employment in their old vocation that he recommends them to get out of the trade with all practicable speed—in short, to get a crust where and how they best may, to the abjuring, once and for all, of the forge and the mill. Yet, in a portion of the area embraced in Mr. Trow's survey, there are literally many thousands of ironworkers who have for a whole fortnight been declining to accept a rate of wages which the fairest method that has hitherto been devised for assessing the remuneration of such labour asserts to be the rate to which they are entitled. The reports last week and this, from our correspondent in the Birmingham district, tell of the circumstances surrounding the almost total cessation of the supply of rolled iron in Staffordshire. To those friends of labour who had been hopeful of its progress towards reasonableness in its demands, these statements of what is going on cannot be pleasant reading. There should, however, be no despair. What is happening is only a temporary revolt of the insubordinate elements against a method of adjusting with automatic regularity difficulties that heretofore afforded that element one of its most cherished occasions of harmful self-assertion. The Staffordshire ironmasters are not the men we take them to be if they do not avail themselves of this passing trouble to lay broader and deeper the foundations of a system which is wholly in harmony in such matters with the spirit of the age.

CONSUMPTION OF FOREIGN IRON IN THE UNITED STATES OF AMERICA.

A SUMMARY statement lately issued by the Statistical Department at Washington conveys information of some importance to us. Roughly estimating, the tonnage of all descriptions of iron, including tin-plates, shipped to the United States of America, has averaged about 20 per cent. of the total exports from Great Britain during a period of at least five-and-twenty years. Another estimate, dealing with British exports to the United States of America, has a tendency to show that Great Britain has, within a small percentage, enjoyed the monopoly of supply in the American markets. Latterly, pig iron in small lots and an immense quantity of scrap and old rails has been gathered up, even as far as Constantinople and St. Petersburg, and the percentage in our favour, as far as tonnage goes, has been perhaps less favourable. From the statement of the Statistical Bureau, however, we have a clear statement showing the value of foreign iron and steel entered for consumption in the United States for a period of fifteen years; in addition thereto the amount of duty in totals, and the distribution per head of population. The following statement shows the values of foreign iron and steel entered for consumption during a period of fifteen years—1867-1881. The dollar reduced at the rate of 4s.:—

	Value of total consumption.		Duties paid.	
	£	Per capita. s. d.	Total. £	Per capita. s. d.
1867	4,999,255	2 10½	2,284,167	
1868	4,504,278	2 6½	2,162,658	1 2⅝
1869	5,615,494	3 1	2,763,654	1 6½
1870	6,497,840	3 6	3,025,102	1 7⅝
1871	8,651,224	4 6	3,721,736	1 11½
1872	10.578,090	5 5	4,384,424	2 3
1873	13,466,631	5 8¾	3,647,476	1 10
1874	6,541,868	3 4½	2,184,084	1 0¾
1875	4,094,848	1 11	1,362,840	0 7¾
1876	2,574,276	1 2½	932,178	0 5¼
1877	2,044,444	0 5¼	753,169	0 4
1878	1,705,708	0 8⅝	656.128	0 3⅜
1879	1,938,872	0 9¾	736,218	0 3¾
1880	9,093,396	3 9¼	3,836,125	1 7⅞
1881	10,290,914	4 1¾	4,294,500	1 8¾

Eliminating the year 1867, and taking two periods, *i.e.*, seven years, as a basis of comparison, it is made clear that the values for seven years, 1868 to 1874, amounted to an aggregate of £35,655,425, while in the succeeding period, 1875-81, the values summed up to no more than £31,742,462; thus, we have a difference of £3,912,960 in favour of consumption. Thereto, an additional source of economy meets the consumer in the payment of duties, which in the second period, 1875-81, shows a diminution of £9,330,111. The total saving, therefore, comes to a total of £13,743,000, benefiting, as will be seen, the consumer. The rate of duty paid was, *ad valorem*, equal to 45·90 per cent. in the year 1867. It rose to 49·20 in 1869; after then, the rate gradually fell and stood at 31·36 per cent. in 1874, from then it fluctuated from 36 to 38 per cent. In the following three years the ratio of duties paid ranged thus:—

	1879.	1880.	1881.
Average per cent. on value..	37·97	42·19	41·71

The information imparted by this compilation is at once interesting and instructive in many ways.

MAP OF THE ROYAL AGRICULTURAL SHOW.

WE publish this week, in accordance with our annual custom, a map of the implement portion of the Royal Agricultural Society's showyard at York. This map is printed without type at the back, and is intended to be taken out of the paper and transferred to the pocket of the visitor to the showyard, for whose guidance in finding exhibitors and their stands it is specially intended. The map is divided into squares, and by referring to the letterpress accompanying it, the number of any exhibitor's stand will be found, while the capital letters indicate the section of the yard in which the stand is, as marked out by the lettered squares.

THE MANCHESTER SHIP CANAL.

THE Committee of the House of Commons, presided over by Sir Jos. Bailey, completed their protracted inquiry into the Manchester Ship Canal Bill on Friday last, after sitting forty days, and taking an enormous amount of evidence. The concluding evidence was mainly upon commercial considerations and individual interests, and Mr. Pember, having replied upon the whole case on Wednesday, the room was cleared for private deliberation by the Committee.

On the public being admitted after the lapse of about a quarter of an hour,

The Chairman said:—The Committee do not think it necessary in considering the question of the preamble to deal with the cases of the various petitioners who have come before us except those concerned in the estuary. The smaller matters—the Manchester Racecourse Company, Mr. Hargreaves, Sir H. de Trafford—although I do not say that his is a very small case—and the larger cases of the railway companies, all seem to the committee to be matters of clauses. If these various interests go on, presuming that the promoters go on after they have heard the conditions the Committee consider necessary, then they will be matters for clauses. Perhaps some of those petitioners will reserve themselves, if the Bill goes on, for the House of Lords, and then, I suppose, we should not insert the clauses for them here. As condition precedent to the proof of the preamble, the promoters must insert in the Bill the following provisos:—(1) The canal shall be divided into two sections, the lower section to include the works authorised in the Bill below, and including Walton Dock; the upper section to commence at Walton and include all works up to that point. (2) The company shall be restrained from proceeding with any of the works authorised by the Bill unless, and until, they shall have obtained the necessary proviso to construct the estuary works. (3) The company shall apply to Parliament to sanction the details of any scheme on which they may have agreed with the Mersey conservators for the construction of the works in the estuary. (4) The company shall be restrained from proceeding with the upper section above Walton lock until the estuary works have been so far completed as to show to the satisfaction of the Board of Trade whether or not they are likely to injure the estuary or the approaches thereto, and until a certificate shall have been obtained from the Board of Trade that in the opinion of that department and of the Mersey Conservators the works will not be injurious, and can be permitted to remain. This is what we indicated before, but we have inserted "the Board of Trade" with the Mersey Conservators, and left out the obligation to make a certain depth of water. (5) The company shall bind themselves to discontinue, alter, or remove, at their own cost, the said estuary works if directed to do so by the Mersey Conservators, and in such way as may be directed by them. (6) The company shall give such security as the Board of Trade may from time to time direct, to ensure the observance of the foregoing stipulations. (7) The company shall be restrained making the railway deviations No. 1 and No. 2 until the above-mentioned certificate as to the satisfactory nature of the works has been obtained from the Board of Trade. (8) The promoters must bring up a series of paragraphs to be added to the preamble, giving a history of the case as regards the estuary works and the bearing thereof on the other works. You will see that, generally speaking, the Bill, bearing upon another Bill that has to be afterwards passed, is irregular, and should not be passed; but this is an anomalous case, and the preamble should therefore explain by a proper recital what has led the Committee to pass an irregular Bill. These paragraphs must, of course, be submitted to the Committee before they are brought up."

It was arranged that the new clauses should be brought up for decision on the following day, and the Committee adjourned. On Thursday it was intimated that the London and North-Western and the Great Western companies, and the Cheshire Lines Committee, would not appear further now, but would continue their opposition in the House of Lords. Some hours were occupied in considering the new clauses, and further clauses proposed in the interest of various private petitioners, and another adjournment took place. But a brief sittting on Friday sufficed to dispose of all these questions, and the Bill was ordered to be reported to the House. The following is the report of the Committee to the House of Commons: — That the main object of the Bill is to incorporate a company, and to enable that company to make a canal navigable for ocean steamers and ships of large burthen from the River Mersey at or near Runcorn to Manchester, and in connection therewith, and as incidental thereto, to divert certain railways which cross the line of the proposed canal, and to make a short junction railway. That, in accordance with the resolution of the House of the 2nd of March, the committee have struck out of Clause 26 of the Bill the powers contained in that clause for dredging, scouring, &c., and othewise widening and improving so much of the bed of the River Mersey as lies between an imaginary straight line drawn across that river from the Eastham Ferry Slip to a point on the north-east bank of that river distant twenty chains measured along that bank in a south-easterly direction from the lighthouse at Garston and a point in the township and parish of Runcorn, in the county of Chester, on the left bank of that river, about forty-eight chains east of the western end of the north pier of the Old Quay Dock, measured along that bank, and the powers for making a low-water channel within the said limits. That, in accordance with the instruction of the House on the 7th of May, the Committee have inquired and considered whether the powers respecting the canal could be properly granted, regard being had to the question whether to make the canal effective a low-water channel in the estuary of the Mersey was necessary, and whether the formation and maintenance of such a channel was reasonably practicable, and the Committee, having so inquired, are of opinion—that the estuary works formed an integral part of the scheme—that the promoters assumed that they had powers under existing Acts to make those works—that it was doubtful whether the promoters of the Bill had powers under existing Acts to carry out those works without further legislation—that having regard to the interests affected, those works ought not to be undertaken without the express sanction of Parliament—that if the scheme could be carried out with due regard to existing interests it would afford valuable facilities to the trade of Lancashire, and ought to be sanctioned; but that as they considered it inexpedient that a vast expenditure of money should be incurred and important interests interfered with while the estuary works were still unauthorised, and before it was ascertained whether they were of a satisfactory character and would be allowed to remain, they have inserted special restrictions and provisions in the Bill with respect to works. That a report from the Board of Trade in pursuance of Standing Order No. 145A was laid before the Committee stating that the circumstances of different docks and navigations and the rates charged in them differ so widely, and in this case the undertaking is so exceptional, that it is almost impossible to refer such charges to any standard, and quite impossible to criticise them to any good purpose; but the committee, having taken evidence on the subject and considering the circumstances of the case, are of opinion that the tolls, rates, and charges proposed by the Bill are not excessive and may be sanctioned. That with respect to Standing Orders Nos. 184 and 185, the compulsory powers of the Bill extend over more than fifteen houses in one parish occupied by persons belonging to the labouring classes, and the Bill contains a clause requiring the promoters to procure sufficient accommodation for such persons before exercising the said powers. That the Bill contained powers enabling certain corporations and local authorities to subscribe to the proposed undertaking; but the Committee, having considered the subject and also a report from the Local Government Board on the same matter which had been referred to the Committee, and which recommended that those powers should not be granted, they have amended the Bill by striking out the said powers therefrom. That with respect to the time proposed for the completion of the railways authorised by the Bill, the Committee are of opinion that, inasmuch as the said railways are incidental to the construction of the proposed canal, the restriction imposed by Standing Order No. 158 (Section D) need not be enforced. That it is not intended that any of the said railways should cross on the level any other railway. That it is intended that Deviation Railway No. 3 should cross on the level the public carriage road specified in the Appendix hereto. That a report from an officer of the railway department of the Board of Trade was laid before the Committee, recommending that the proposed level crossing should not be allowed, with the reasons and facts upon which his opinion is founded, but the Committee, having received evidence on the subject, recommend, for the reasons stated in the said Appendix, that the proposed level crossing may be allowed. That there are no other circumstances of which, in the opinion of the Committee, it is desirable that the House should be informed. Sir Joseph Bailey further reported from the Committee: That they had examined the allegations contained in the preamble of the Bill, and had amended the same by the insertion of recitals as to the expediency of the construction of certain of the works being postponed until certain further works in the estuary of the river Mersey had been approved and sanctioned by the Board of Trade, and the Mersey Commissioners, and authorised by Parliament, and had further amended the preamble to make it consistent with the provisions of the Bill as passed by the Committee, and found the same as amended to be true, and had gone through the Bill, and made amendments thereunto.

THE SOCIETY OF ENGINEERS.

VISIT TO SWINDON WORKS.

ON the 28th ult. a number of the members of the Society of Engineers visited the Swindon Works of the Great Western Railway Company. After lunch on arrival they were conducted over the works by several of the managing staff, Mr. W. Dean, the locomotive superintendent, being represented by Mr. Holden, assistant locomotive superintendent. Mr. Carlton, manager, and Mr. Haydon, assistant manager, and Mr. Churchward, of the carriage department, explained the various things of interest to the members, assisted by the foremen in the different departments, namely, Mr. Dingley, in the locomotive erecting shop; Mr. Dyer, boiler and bridge; Mr. Harbie, carriage finishing shop; and Mr. Watson, turnery; similar assistance being given in the foundry.

One of the first things which attracted their attention was the old broad-gauge locomotive Queen. It is No. 329, and was built in 1852, by Messrs. E. B. Wilson and Co., of Leeds. It runs on four wheels of the same size, and the boiler is so small for the wide frame that there is a lot of space in which inside cranks may be placed with less inconvenience than they could on the outside. The engine is in tolerably good condition, and is now an object of interest, though not so much so as the boiler of an older engine, which was afterwards seen. This boiler was that of an engine built in 1841 by Messrs. Stothert and Co., and was named the "Assagai." It ran from 1841 to 1875, and made 631,674 miles. At the end of that time the boiler was fixed at Oxford, and worked as a stationary boiler until 1882. The same fire-box had been in all this time, and the remarkable thing is that this box is corrugated, in the sides, ends, and top, the corrugations having a pitch of about 4in., and a depth of about 1¾in. The box has several patches upon it, but the boiler, which is of the large size for broad gauge, is in a very good state, and we believe is to be preserved.

A steel fire-box just taken out of a goods engine boiler was seen in the repairing shops. It had been in twenty-two months, and had cracked vertically at the lower part of tube plate. It was coated with a thin coating of very hard incrustation almost as hard as an enamel, which comes it seems from the Swindon water. This is taken from the neighbouring hills, and contains a great deal of magnesia as well as sulphate of lime. The plates of this box were about 0·43in. in thickness, the tube plate being somewhat thicker. If there is any real force in the arguments which have been adduced in our pages on the steel box question, there is no doubt that these plates were much too thick, especially with bad water. Mr. Howell, of the Brookes Steel Works, who was one of the visitors, said that steel boxes, made from high priced steel, had been introduced into engines on the Scottish Central Railway, under Mr. Allen, in 1860, and ran from then until 1872, and some after that date, showing that steel boxes may be made to do their work. These plates were thinner than those mentioned above, and cost about £40 per ton.

In walking through the machine shops it was noticed that solid cranks were being slotted with Whitworth's 1842 machines, and one tool only, instead of two cutting two slots at a time, was being used, presumably because the machines would not stand the work. In these days, too, of high speed twist drills, it is rather grating to see locomotive work being drilled with the old-fashioned slow speed drills, especially when those drills are not exceedingly well ground, and long straight holes are required. Nuts, too, were being faced by fixing them on mandrils, which allowed the unfaced surface to screw up against a true face, with the result, of course, that the nuts were never true to the tapped hole unless they happened to be forged so from the first. Nuts need to be turned on a mandril that will make the facing true with the hole, or the facing is little use for many purposes. Though the nut turning was not satisfactory, some fine nut tapping machines, by Messrs. Smith and Coventry, and by Messrs. Hulse and Co., are employed.

In the foundry a good deal of machine or plate moulding is being done. The cupolas are supplied with blast by a rotary blower by Elliss. It seems to have been there a good many years, and those concerned are pleased with its working, although it gives a double pulsation to every revolution. A pressure of 13in. water, or a little over 7oz. per square inch, is employed. The cupolas are 3ft. 6in. in diameter and 15ft. in height from sole to feeding mouth, which is rather high; but the results are very good, the average of months of work being 2 cwt. of coke per ton of iron melted, the coke being Rhondda Valley and the iron of various kinds. A ton of some irons has been melted when the furnaces are in good trim and hot for a little over 1½ cwt. of coke, but the average is as above. In the fettling shop an application of the sand blast process was seen in action, steam being used, however, instead of air under pressure for cleaning the surface of axle brasses which have to be tinned. By this means every trace of sand and oxide are cleaned off, and tin or bearing metal adheres as well as if the brass casting were scraped.

When passing through the rolling mills an attempt was being made to roll a very long rail; but the billet had got a little cool and the engine was not quite powerful enough. It was asked by several whether it could pay the Great Western Company to roll rails at Swindon. In the smiths' shops it was noticed that small coke was everywhere used; and in the carriage shops the visitors saw an iron passenger carriage in course of construction—a return to the old practice of the Great Western Company, which has long been successfully followed all over Germany.

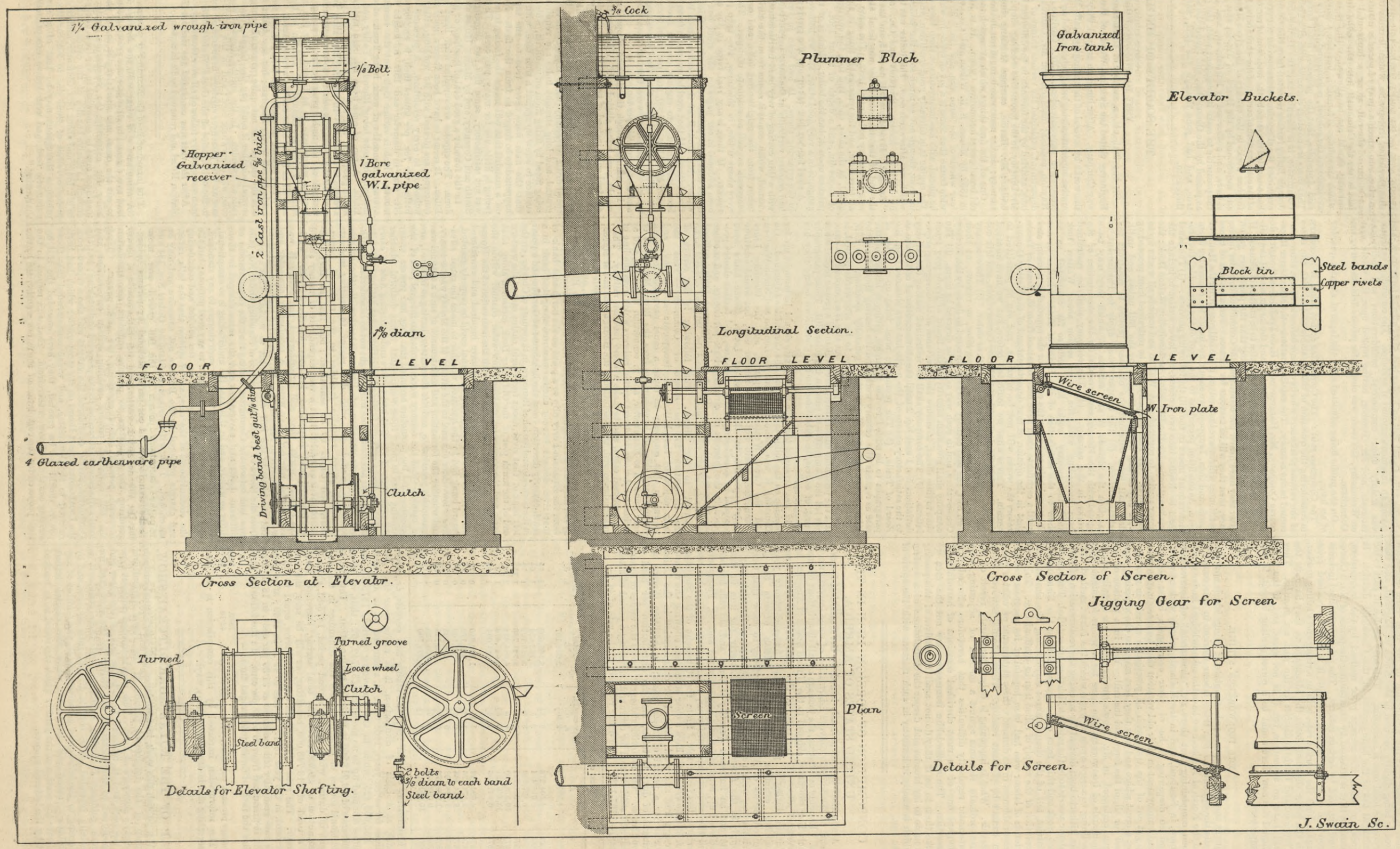
After the visit was concluded the visitors dined together at the Station Hotel and returned to Paddington.

THE introduction of the Ekman-Fry process, whatever that is, in the manufacture of sugar will, the *British Trade Journal* says, lead to a demand in all sugar-cane growing countries for a machine to cut the canes into short lengths to be placed in the vessel or boiler for extracting the saccharine matter. "These cutting machines must be somewhat in the form of chaff cutters; but large enough to receive bundles of the canes, each of which is from 5ft. to 8ft. long, and about 1½in. diameter, and to cut them rapidly into pieces or slices of from ½in. to 3in. or 4in. in thickness. The principle throughout may be that of a chaff cutter, with an automatic feed, and with knives exceptionally strong, and self-sharpening."

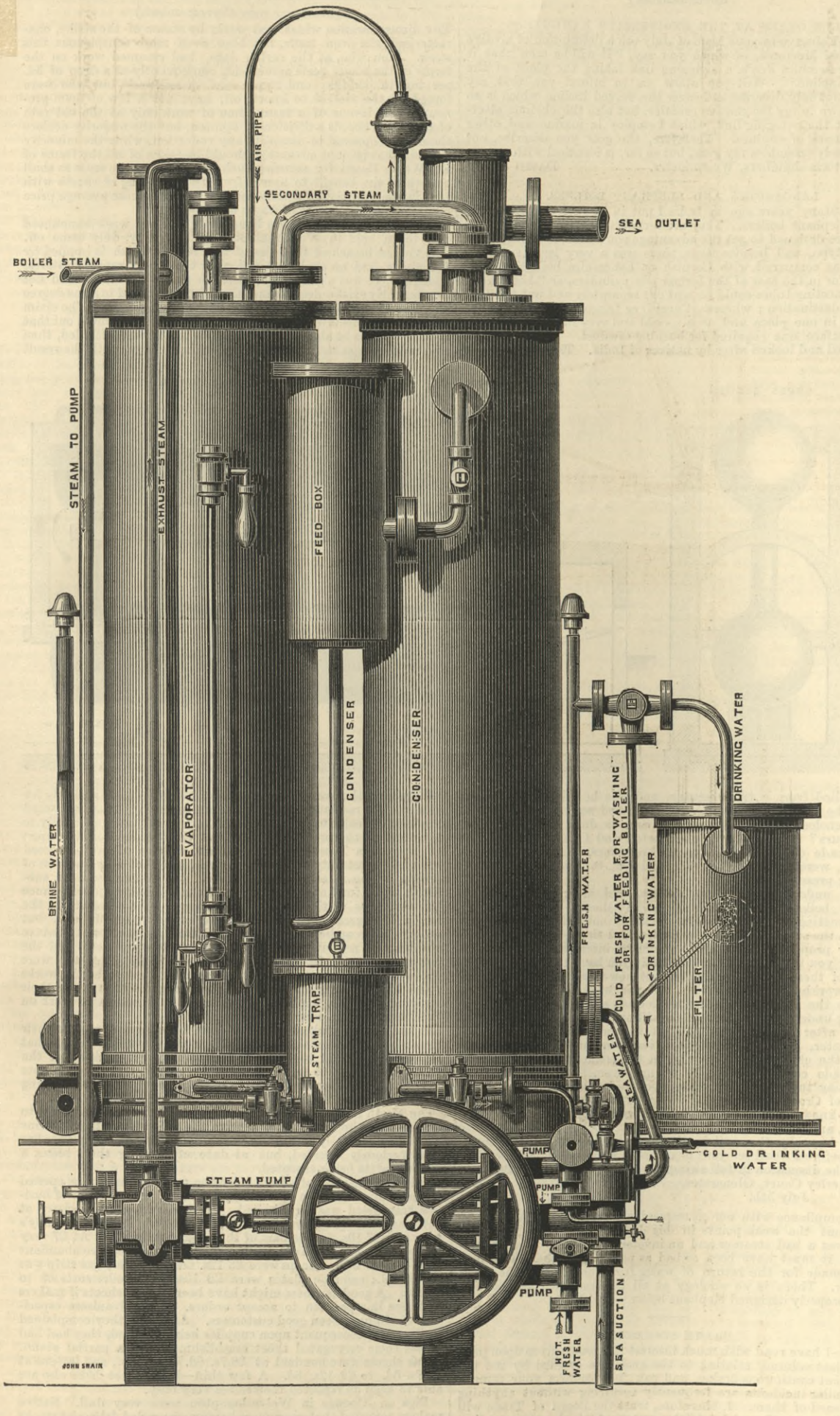
LIME HOIST, SALFORD SEWAGE WORKS.

MR. A. JACOB, M.I.C.E., ENGINEER, SALFORD.

(For description see page 35.)



NORMANDY'S DISTILLER FOR TORPEDO BOATS.



Normandy's Patent Marine Aërated Fresh Water Company, Limited, show in the Engineering and Metal Trades Exhibition, several Normandy's distilling apparatus for producing cold drinking water from sea water — a compact arrangement of apparatus occupying a space of 40in. by 22in, and of the size generally supplied for torpedo boats for converting sea water into good, cold drinking water, and at the same time producing hot fresh water for feeding the boilers, so as to replace that used for distilling purposes, is illustrated in elevation above. It yields 175 lb. of fresh water for every 100 lb. of boiler steam used, the extra 75 lb. being gained by secondary evaporation of the sea water used for condensing. The apparatus is shown in operation with sea water, producing two streams of fresh water, the hot one being the condensed boiler steam and the cold one, equal to 75 per cent. of the other, being the fresh water for drinking purposes, or for supplying to the boilers to make up the loss from leakage, in place of using sea water. The construction will be readily understood by reference to the engraving. The condensing sea water is pumped into the condenser and surrounds the cooling tubes, but instead of going to waste, part of it passes through a self-acting feed box into the evaporator, where it condenses the exhaust steam from the pump, so giving the hot water for feed purposes. In condensing the steam, the sea water itself becomes heated to such an extent that considerable distillation takes place, and this secondary steam continually passes into the condenser from which it issues as fresh cold water, having been condensed by the cold sea water surrounding the cooling tubes. The steam pumps are three in number, one for circulating the condensing water, one for forcing the hot fresh water into the boiler or hot well of the engine, and one for delivering the cold, fresh water into the tanks or wherever it is required. Provision is made for aerating the drinking water, and for the automatic discharge of the concentrated brine, and also for mixing, when desired, the hot and cold fresh water. A larger machine of the same kind, such as is used by the Royal Mail Steam Packet Co., is also exhibited, as well as smaller apparatus for producing drinking water only.

SALFORD SEWAGE WORKS.

No. II.

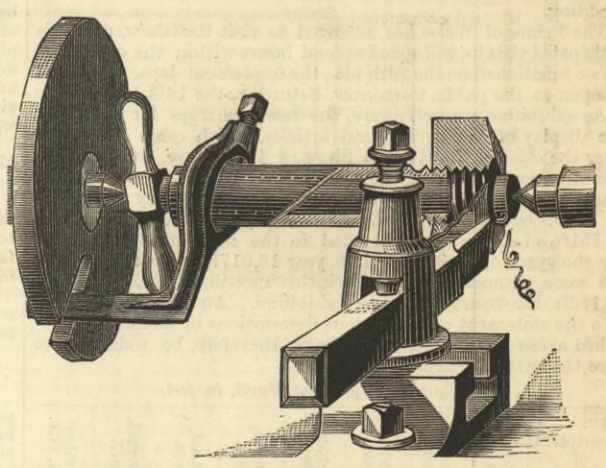
There is nothing very novel in the actual process of mixing at the new Salford Sewage Works, but the method of proportioning the lime, or whatever dry material may be hereafter employed is worthy of notice. The whole of the mixing machinery, illustrated on page 34, is contained in a house 78ft. 6in. by 33ft., and adjoining the mixing tower. A portion of this house is partitioned off, so that the nuisance and discomfort arising from the powdered lime may be localised and kept under control. Outside the partition, or in the lime room, there is fixed a hoist for measuring the lime, in order that the exact proportion to the volume of the sewage shall always be maintained. The hoist consists of a wooden casing 4ft. 6in. by 3ft., terminating below the floor line in a hopper. At the top and bottom of the casing there works on a horizontal axis a drum over which a pair of steel endless bands pass. To these bands are attached, at intervals, horizontal pieces or straps of iron, to which are rivetted tin buckets of suitable form. As the pulleys and the bands revolve the buckets pick up the lime from the bottom of the hopper, which is made semicircular in section, and carry it to the top. When passing over the top pulley the buckets drop the dry lime into a funnel-shaped receptacle which terminates below in a cast iron pipe, into which a spray of water continually plays and washes the lime before it along a horizontal cast iron pipe, which passes through the wall into the adjoining room and is connected with the mixing pans, where the lime is intimately incorporated with the requisite quantity of water for mixture with the crude sewage. Close to the bottom of the lime hoist there is an opening in the floor of the lime house, through which the lime is shovelled into the hopper, but it is here arrested by an inclined screen which is agitated by a simple connection with the shafting. As the screen moves, the finer portion of the lime passes through into the hopper, and whatever clinker there is rolls off into an adjoining cavity under the floors, from which it can easily be removed. We have already mentioned that the hoist and mixing pans are driven by a pair of turbines which are outside the building, and are worked by the effluent water from the tanks, and there are two horizontal pumps, as shown on the engraving, which are also driven by the turbines. One of these raises water from the turbine wells to the tank at the top of the tower, from which it is again drawn, to slake the lime and mix with it in the pans. The other pump draws the cream of lime from the mixing pans, and raises it to the tank at the base of the tower, where it is poured out in a continuous stream to mingle with the sewage as it surges up out of the mouth of the delivery pipes from the engine house. As the lime pump at first showed a tendency to clog after a few hours' work by a deposit of finely divided lime forming above the valves when the water comes to comparative rest, the simple expedient has been adopted of connecting the suction pipe to the clean water pipe leading to the tank at the top of the tower. By this alteration the pump and valves can be completely washed out into the reservoir at the base of the tower.

The arrangement of the mixers is so simple that it is only necessary to refer to the engravings at page 15 of our last issue to make the details clear. The speed at which the vertical arms move in the pan is a matter which must not be neglected. If it is too slow the whole mass of the water and lime moves round with the arms and the lime does not become uniformly distributed through the water, but at a speed of eight revolutions a minute the whole becomes agitated and passes to the pump in a proper condition for admixture with the sewage.

As a large volume of sewage runs direct into the tanks by gravitation from the Pendleton district, and does not pass through the tower, a special arrangement has been made for treating it with lime. It would probably be sufficient to add an excess of lime to the sewage which passes from the engine house, and to allow the two discharges to mingle at the head of the tanks, but a separate connection is made from the tower to the high level intercepting sewer, by which lime is added directly to the sewage as it passes along in the open channel to the head of the tanks.

IMPROVED NUT MANDRIL.

The useful tool shown in the engraving, which we take from the *Scientific American*, consists of a rod with centres in the ends to fit in the lathe centres, and a sleeve surrounding the rod the greater portion of its length, the rod and sleeve each having part of the screw threads upon which the nuts to be faced are screwed. The threads of one part may be shifted with respect to the threads of the other part after the nut is screwed on, so



that one will check against the other, and thus hold the nuts to be faced by the threads alone. This will insure the facing of nuts true to the screw threads, and will avoid the imperfect work that results from the sides of the nuts being screwed against a shoulder of the mandril when not true to begin with. This mandril has been patented in the States by Mr. P. Duffy, New Bedford, Mass.

THE ROYAL AGRICULTURAL SHOW AT YORK.

Of the novelties promised for this exhibition, attention may now be directed to two or three of those which are likely to excite interest. Mr. Chas. Catley, of York, intends to show a four-furrow steam-turning plough, priced at £150, by means of which he claims to have succeeded in overcoming the difficulties connected with balance ploughs. In a recent trial on a farm at Acaster, good straight work was effected, the driver being assisted by a guide running along the edge of the land side of the furrow. On reaching the headland the plough turns round quickly and easily preparatory to commencing the return journey. The construction is designed to prevent tilting out of the ground, irrespective of the travelling speed, and it is noteworthy that good work can be, and has been, done by it at the rate of seven miles an hour. The implement may be briefly described as follows :—On each of two sides of a V-shaped frame is a set of ploughs, the number of which can be varied in the construction. The framing is carried by a cranked axle on a pair of travelling wheels, so that it can be raised or lowered according to the position of the crank. Another part of the frame rests upon a front steering wheel, connected with powerful and easily manipulated steering apparatus. On each sloping side of the frame are fixed bearings carrying spindles, on which are fixed skives carrying the shares. By turning the shaft in one direction or the other the ploughshares are raised or lowered. A pawl on the frame catches in a notch, and the spindles or shafts are securely held in position. The elevated ploughs do not act as a counterpoise, and the ploughs in work receive no tendency to jerk or draw out of the ground. The plough can be converted into a cultivator by

removing the share shafts and inserting the cultivating tines in hole for that purpose in the frame.

Several new appliances for drying hay and corn in the stack will be exhibited. One of these will be shown by Mr. Francis Walker, of Tithby, Bingham, and another by the Agricultural and Horticultural Association, Limited. A new 8-horse power agricultural steam engine will be shown, and a steam draining machine is likely to find a place in the showyard, and in that case will doubtless prove a centre of attraction to many. We understand that a number of other novelties will be introduced by exhibitors, so that there is hope that some of them will be thought worthy of a trial. In the event of this proving satisfactory they will become entitled to silver medals, of which ten are, as usual, at the disposal of the judges and stewards.

According to the regulations all machinery, implements, and other articles, except carriages, and seeds, roots, models, and samples of manures and feeding stuffs, should have reached the showyard and be arranged in complete order before five o'clock in the evening of Wednesday, July 11th, and carriages, seeds, models, &c., by Saturday, July 14th, before 5 p.m., but exhibitors and railway officials were busy until a late hour on Wednesday evening. To-day the judges will commence their inspection, which will probably not be concluded until Monday evening, as there is a large number of novelties, or things so-called, entered in the catalogue. They will visit each of the 401 stands in the numerical order, and at the close of each day's inspection will place on the notice boards the number of the stand at which they will commence on the following morning. Exhibitors will, therefore, do well to be in attendance, in order to direct attention to their goods. All the judges and stewards have now been appointed and have received instructions as to their official duties. There are ten silver medals, which may be awarded by the judges in cases of sufficient merit in new implements exhibited at the York Show, *i.e.*, implements new either as regards principle or improvement; but no exhibit capable of trial can receive any reward until it has been tested in such manner as the stewards may direct. The judges are also empowered, as in several previous years, to make special awards of medals for efficient modes of guarding or shielding dangerous machinery. The following are the two entries for the £25 prize offered for the most efficient portable straw-compressing and binding machine, to be worked in conjunction with a threshing machine :—

James and Frederick Howard, Britannia Ironworks, Bedford : Straw trussing machine worked in combination with a thrashing machine ; manufactured by the exhibitors. Price, including a 5ft. finishing thrashing machine, £205. Price of the straw trussing machine, only £45. This machine binds the straw into trusses as delivered by the thrashing machine. Each truss is bound with two bands of hemp or other cord.

John H. Ladd and Co., of 116, Queen Victoria-street, London : Straw compressing machine manufactured by the exhibitors. Price £230. 14in. by 18in., variable length, extra strength, iron lined, No. 1 extra belt, perpetual press, mounted on wheels for travelling. Also portable engine for working the press.

The two working dairies, entered for competition, by Mr. Eduard Ahlborn, and Messrs. T. Bradford and Co., will be hereafter described. In the meantime it need only be said that they will undoubtedly prove a source of great attraction and instruction to thousands of visitors. All the entries in the implement department of the showyard closed as far back as April 1st, and it is stated that if the applications for space which have since been made could have been complied with, not less than twenty more acres would have been covered by the additional shedding.

The Prince of Wales has arranged to visit the Show, and it is anticipated that he will spend several hours within the enclosure. As we mentioned on the 29th ult., the implement department will be open to the public to-morrow, Saturday, the 14th inst.

As exhibitors are well aware, the heavy charges for space for the display of non-agricultural articles, which came into force after the close of the Kilburn Show of 1879, have continued in operation for the York Show with some slight modifications. These high fees resulted in a greatly diminished entry at Carlisle in 1880, but at Derby the following year a total length of 12,751ft. of shedding was devoted to the implement section of the showyard. At Reading last year 13,017ft. were occupied in the same manner, while at York this month, a total length of 13,156ft. has been allotted to exhibitors. An inaccuracy crept into the statement of the various descriptions of shedding, published a few weeks ago, and it may, therefore, be well to give here the authentic figures, as under :—

Shedding in Implement Yard, in feet.

Description of shedding.	York, 1883.	Reading, 1882.	Derby, 1881.	Carlisle, 1880.	London, 1879.	Bristol, 1878.	Liverpool, 1877.	Birmingham, 1876.
	ft.	ft.	ft	ft.	ft.	ft.	ft.	ft.
Ordinary ..	9,569	9,326	9,138	6,662	16,000	11,735	12,183	11,304
Machinery in motion	1,949	2,289	2,102	2,060	4,683	2,847	2,733	2,492
Side sheds..	1,618	1,402	1,511	1,059	2,220	964	880	886
Total ..	13,136	13,017	12,751	9,781	22,903	15,546	15,796	14,682

This year's show makes the fourth visit of the Royal Agricultural Society to Yorkshire. The city of York was visited in 1848, and resulted in a loss of £2826; in 1861 the Leeds show took place, was attended by 145,000 visitors, and yielded a gain to the Society of £4471; while the Hull show of 1873 left £413 as balance of expenditure in excess of receipts. Below we give in tabular form a statement of the extent of the implement department at each "Royal" show from 1869 :—

Year.	Place of meeting.	Number of stands.	Number of exhibits.
1869	Manchester	395	7,724
1870	Oxford..	406	7,851
1871	Wolverhampton ..	363	7,650
1872	Cardiff	308	5,843
1873	Hull	329	5,634
1874	Bedford	361	5,931
1875	Taunton	284	4,214
1876	Birmingham	420	6,414
1877	Liverpool	428	6,930
1878	Bristol	435	6,837
1879	London	704	11,878
1880	Carlisle	288	4,196
1881	Derby	293	5,960
1882	Reading	391	6,102
1883	York	401	6,058

SWAN BREWERY, WALHAM-GREEN.

On page 29 we publish a west elevation and plans of Messrs. Stansfeld and Co.'s brewery, Walham-green. A full description of this brewery appeared in our last impression, page 8. The engraving we now publish completes our series illustrating this fine brewery.

LETTERS TO THE EDITOR.

[We do not hold ourselves responsible for the opinions of our correspondents.]

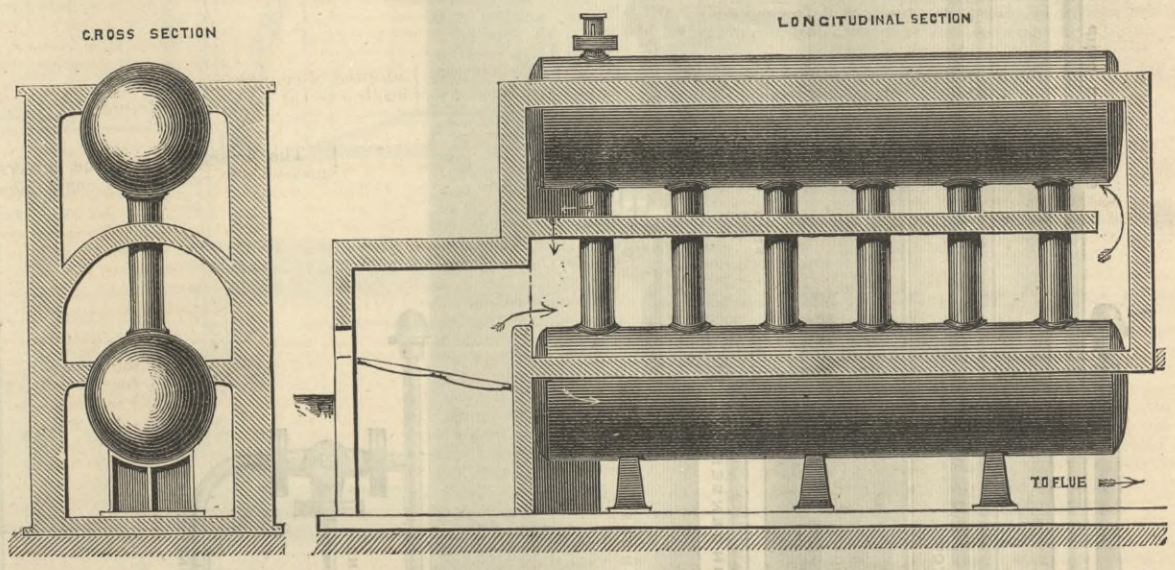
VALVE GEARS AT THE ENGINEERING EXHIBITION.

Sir,—I observe in your issue of July 6th a description of a valve gear called Morton's, of which you say, "It will be seen that it closely resembles Joy's, a swinging link taking the place of the curved incline." Will you allow me to inform you that my patents not only describe and cover the curved incline which is so well known in my locomotive practice, but also the obvious alternative of the swinging link, which I employ in marine and other large classes of engines. Therefore, the gear you describe, not only closely resembles my gear, but so far, is identical with it.

8, Victoria-chambers, Westminster. David Joy.

LANCASHIRE AND ELEPHANT BOILERS.

Sir,—Many years ago in India I put in what, I think, may be called elephant boilers. They are certainly of the same type, and they were designed to get the advantage you point out as belonging to the type, and besides these there was a very large saving in freight as compared with Cornish or Lancashire boilers of equal power, for in the case of the former the cylinders, or "bouileurs," and connecting tubes could be sent out separately and put together at their destination; whereas, Cornish or Lancashire could only be shipped in one piece and at a special and very high rate. Large grate surface was required for burning sawdust. The boilers had to be fired and looked after by natives of India. The water was to be supplied from a tidal estuary, and was heavily charged with silt. The boilers I refer to were made and seated as per rough sketch enclosed, which I have not time to draw to scale. The "bouileurs" were 3ft. 6in. in diameter, and I think about 18ft. long, made of steel. The connecting tubes, eight to ten in number, were about 3ft. 6in. long and 10in. to 12in. in diameter—working pressure, 80 lb.



Now, under similar circumstances, and after my experience of the boilers above referred to, I should not think of again putting in such boilers—certainly not before I get more light on the subject. I shall be glad, and, I think, for the purpose of your proposed discussion it would be interesting in the first place if you will let us hear what fault you have to find with the design of these boilers, and point out how these faults would tell on the working, and I will then tell you wherein they failed to give me the same satisfaction as Cornish and Lancashire boilers working under exactly the same conditions.

Soon after these boilers were set to work Messrs. Crossley, of Manchester, I think, advertised very similar boilers in your paper, the chief difference being in the connecting tubes, which they made conical—no doubt an improvement on the parallel connecting tubes. I have often wondered what satisfaction these boilers of Crossley's gave, and how it is that they have ceased—as far as I know—to advertise them. Have they given up the manufacture, and if so, why?

As I leave by the mail for the East to-morrow, it will be some weeks before I shall see your next issue; when I do I shall be glad to see the discussion in full swing. Teak.

Hatherley Court, Gloucester,
July 5th.

[In compliance with our correspondent's request, that we should point out the weak points in his design, we assume that the boiler was a bad steamer and an inveterate primer. The circulation in it must have been as bad as possible, for there is no provision made for the return of water from the upper to the lower cylinder. There is no analogy at all between such an abortion and a properly designed elephant boiler.—Ed. E.]

BRAKE SUCCESSES.

Sir,—I have read with much interest the details given upon page 477 of last volume, relating to the accidents avoided by the use of efficient continuous brakes, and can fully confirm your remark that similar incidents are frequently occurring without anything being heard of them. I, therefore, trust the Board of Trade will adopt the suggestion and publish a return of "brake successes."

The three following cases will prove of interest :—On the 28th May a collision took place on the Midland Railway at Leicester station between a Midland pilot engine, No. 63, and the rear of a London and North-Western Company's passenger train, in consequence of an error of judgment on the part of the driver. This man did not see the danger in time to prevent the accident, but the application of the Westinghouse brake at the last moment rendered what would have been a serious collision practically harmless, and avoided all telescoping of the carriages.

On the 26th June a heavy express train was running at full speed near Tilburg station, on the Dutch State Railway, when a steam tramway engine, through an error on the part of its driver, ran through the crossing gates and obstructed the main line. The driver of the express saw the danger, and by the instantaneous application of the Westinghouse brake he was able to stop just clear of the tramway engine, and thus avoided the accident.

Last week another instance took place upon the same railway at Hertogenbosch station, where up and down express trains were due to arrive at the same time; by some error the facing points at the end of the station had been left open, the result being that a collision between the two trains was imminent. Very fortunately both trains were fitted with the Westinghouse brake, and its instantaneous application brought both trains to rest with the leading buffers of the two engines only a few feet apart, thus preventing what would otherwise have been a fearful disaster.

40, Saxe Coburg-street, Clement E. Stretton.
Leicester, July 7th.

Naval Engineer Appointments.—The following appointments have been made at the Admiralty:—William G. Stribling, engineer, to the Zephyr, vice Welch; William Sharp, engineer, to the Indus, additional, for the Bellerophon, vice Stribling.

THE IRON, COAL, AND GENERAL TRADES OF BIRMINGHAM, WOLVERHAMPTON, AND OTHER DISTRICTS.

(*From our own Correspondent.*)

The disorganisation which last week, by reason of the strike, characterised the iron trade, has been even more conspicuous this week. Men who, at the earlier date, had resumed work on the terms of the wages scale agreement, consequently at a drop of 3d. per ton in puddling and 2½ per cent. in millwork, but who were forced by the rioters to knock off, have not a few of them pronounced in favour of a resumption of work only at the old rate of wages. There is a division of opinion, but the majority declare themselves opposed to accepting any reduction, while the minority propose that prompt advantage should be taken of all the forms of the Wages Board for securing such a revision of the scale as shall give them the benefit to accrue from the including of sheets with bars in the selection of denominations of iron whose average price shall determine the rate of wages to be paid.

The meeting of the Wages Board, which I last week announced was to be held in Wolverhampton on Saturday, duly came off. The violent breach of the rules of the Board, which is implied by the strike, had no apologists amongst the men's representatives, though there was a general concurrence that the Board could not permanently exist unless the men should be conceded in some degree the profits which the masters are realising upon sheets. The claim of the men to sheets was stoutly contested, and it was pointed out that if bars were to be abandoned and sheets in any way included, then nail rods and gas strip must likewise be brought in, with the result that probably the average will not come out any more favourably for the men. The resolution ultimately come to was : (1) That this Board unanimously calls upon the ironworkers to adhere honourably to the award of the president. (2) That the various works be open not later than Tuesday morning next, to give all well-disposed men the opportunity of resuming work, and that any question of revision of the rules or amendment of the sliding scale be submitted to the further consideration of the president, in accordance with the rules of the Board. Mr. Capper, the secretary to the men, held a great meeting in Wolverhampton on Monday, but he spoke to an audience so unfriendly that he could not venture to submit a resolution in the spirit of his utterances, and the meeting broke up in confusion. Subsequently delegates were appointed to quietly ascertain the views of the men at the works in the Wolverhampton district. The delegates have made their inquiries, and the result is unfavourable to a return to work on other than the old terms.

At the Round Oak Works the men have agreed to ask their acknowledged representatives to inform the district meeting that they were prepared to abide honourably by the decision of the Wages Board, and to return to work next week, and give a proper month's notice to terminate the existing agreement, so as to bring about a change in the scale.

The North Staffordshire men have had an offer made to them to commence at the drop, but to receive the difference if better terms should be ultimately secured in South Staffordshire. The offer has been variously received, but at date of writing there seems a prospect of its being acccpted.

This was the state of affairs when the quarterly meetings opened by the Wolverhampton gathering yesterday. The amount of business transacted was very limited. Marked iron was redeclared at last quarter's quotations, namely, £8 2s. 6d. for Earl Dudley's bars, and £7 10s. for the bars of the other list houses. At £7 very capital bars were to be obtained, and common bars were abundant at £6 10s. to £6 5s.; hoops were £6 12s. 6d to £6 15s.; gas strip was £6 7s. 6d.; common plates were £8 10s.; and boiler sorts £9 to £9 10s. A good business might have been done in sheets if makers had been in a position to accept orders. The galvanisers especially would have been good customers. As it was they complained loudly that, consequent upon supplies being stopped, they had had to put their corrugated sheet establishments to a partial stand. Black sheets were nominal at £8 7s. 6d. to £8 10s., and lattens at £9 7s. 6d. to £9 12s. 6d. A few thin—best—sheet firms who are able to keep on reported themselves very busy.

Pigs on 'Change in Wolverhampton were very dull. Native makers reported that consumers having suspended deliveries stocks were accumulating at the furnaces. Agents of foreign makers were unable to induce consumers to buy foward. Staffordshire all-mines were easier in actual business by 2s. 6d. upon the quarter, the 65s. of last quarter-day having now become 62s. 6d. to 65s. easy for hot blast sorts; cold blast were 82s. 6d. to 85s.; part-mines were 47s. 6d. to 45s.; and common pigs, 40s.

The proprietors of the Spring Vale furnaces, Bilston, who are the largest pig makers in South Staffordshire, declared their nominal quotations as—hydrates, 60s.; mine, 52s. 6d.; and common, 42s. 6d.

Some Lancashire hematites were 5s. down on the quarter. Ulverston brand was quoted 60s., and Tredegar—South Wales—65s. per ton strong. Derbyshire and Northampton pigs were worth less by a good 1s. 3d. to 1s. 6d. on the quarter. Derbyshires were quoted 47s. 6d. to 48s. 9d. nominal, and Northamptons, 46s. 3d. upwards. Thorncliffe—South Yorkshire—were 60s.

In Birmingham to-day the prices announced at Wolverhampton were confirmed. The galvanised sheet makers announced that in the present disorganised condition of trade they could not arrive at any fixed prices. The galvanisers meeting pledged itself to do its utmost to meet the convenience of ironmasters touching contracts to enable them to resist the men's demands. The Welsh tin plate makers announced prices at 16s. to 17s. per box for cokes and 20s. to 22s. for charcoals. The wrought iron tube makers resolved to maintain present prices for the ensuing quarter.

The ironworkers' delegates sent by the strikers had an interview with the leading masters. The employers were firm, and said the men must resume at the drop. The delegates thanked the masters for their reception, and said they would report to their constituents. The general opinion on 'Change was that the strike will now soon terminate.

Coal was a drug at 10s. to 9s. for furnace sorts, 8s. 6d. to 7s. 6d. for mill qualities, and 7s. 6d. to 6s. 3d. for forge sorts. Cokes

were: Rhondda foundry sorts, 20s. to 21s. delivered; Derbyshire foundry sorts, 19s. 6d.; and South Yorkshire furnace sorts, 16s. 6d. delivered. Northampton ironstone was quoted 5s. 6d. to 6s., delivered according to locality.

In Darlaston many nut and bolt makers are, as an effect of the strike, thrown out of employment, in consequence of being unable to procure "breezes;" and at Wednesbury the coach axle makers are fearing that they shall be compelled to stop for a similar reason.

The operative nut and bolt makers are moving for a revision of the wages scale, and with this object are counselling organisation. The trade has so developed that whilst in 1872 the "list" contained 300 articles, it contains now something like 1000.

Colonial and Indian orders continue the mainstay of business in the hardware trades, and satisfaction is expressed at the character of the trade news received by cable from Sydney. Light safes are going pretty well at date to Sydney, and Melbourne, Madras, and Calcutta; and South America is also buying, but not to a great extent. For no class of hardwares does the demand from the Cape show improvement.

As 'Change closed to-day a report was circulated that the colliers on Cannock Chase have come out on strike against a drop in wages of 1¼d. per stint just declared under the sliding scale which regulates wages. It is not believed, however, that the strike will assume serious proportions.

NOTES FROM LANCASHIRE.

(From our own Correspondents.)

Manchester.—There has not been more than a moderate amount of business doing in the iron trade of this district during the past week, but the market continues very firm, and makers both of pig and manufactured iron hold for their full rates. So far as the finished iron trade is concerned, the unexpected strike in Staffordshire has tended somewhat to unsettle the market, but it has had no material effect upon prices. A very strong feeling is expressed with regard to the unjustifiable action of the men, and if they wished to drive their trade into the hands of the steel makers, who are already sufficiently keen competitors, they could scarcely pursue a course more likely to secure this end. The Manchester market on Tuesday was firmly attended, but business was quiet.

For Lancashire pig iron delivered equal to Manchester makers are firm at 45s. for forge, and 45s. 6d. for foundry, less 2½ per cent., and in district brands, the lowest price at which orders could be placed was 44s. 10d. to 45s. 10d., less 2½, for forge and foundry Lincolnshire delivered here, but some of the makers are asking 1s. per ton above this. There is rather more business stirring in hematites, and a few sales have been made on the basis of about 60s., less 2½, for good foundry brands delivered into this district.

The near approach of the quarterly meetings has had some effect in keeping back orders for finished iron during the past week, and on the other hand the Staffordshire strike has brought a few extra orders for quick delivery into the hands of local makers. Previously hesitating buyers have also in some cases been induced to place out their specifications, and generally the strike has had the effect of strengthening the contention of makers that prices have touched their lowest point. The business done has, however, been at late rates, the average basis of prices being still £6 2s. 6d. to £6 5s. per ton for local bars delivered into the Manchester district. Orders for early delivery have been more difficult to place, but even Staffordshire houses have not been unwilling to book, without specified delivery, at current rates.

Although wages in this district are regulated by the Staffordshire Board, no action has yet been taken by the Lancashire finished iron-makers in the direction of enforcing the reduction here. Under ordinary circumstances the reduction, following Staffordshire, would have come into operation this week, but the strike has caused the Lancashire finished iron-makers to suspend any action for the present, and the men show no sign as to what course they would pursue. The forges in this district, consequently, continue at work at the old rate of wages, and the general feeling is to keep to the present basis until a settlement is arrived at in Staffordshire.

Except that some special branches of engineering continue busy, reports as to the condition of trade are not of a very satisfactory character, and generally there appears to be a lessening quantity of new work coming forward.

In the coal trade the demand continues quiet, but the absence of requirements is the natural result of the season of the year, and does not represent any exceptional depression in trade. Prices as a rule are fairly steady; temporary concessions are made for special sales for prompt delivery, but a very strong feeling is maintained with regard to the future, and colliery proprietors only quote for forward contracts at advanced rates. At the pit mouth prices remain about as under :—Best coal, 9s.; seconds, 7s.; common, 5s. 6d. to 6s.; burgy, 4s. 6d. to 5s.; common slack, 3s. to 3s. 3d.; and best sorts, 4s. to 4s. 3d. per ton.

Barrow.—The hematite pig iron trade has seen little improvement during the past week. Makers are in receipt of a few orders, and the weight of metal changing hands is not greater than is represented by the output of the works, consequently the stocks, which are very large, are not reduced. The business in makers' hand is almost solely on account of the requirements of makers of steel, who remain very busily employed. The production of steel is an industry which is making good headway in this district, so that the consumption of iron on this account is increasing. The varieties of steel made in this district are extending, especially in mild steels in bars, plates, &c., for the lighter class of goods. The deliveries for inland towns have lately seen an improvement, and when the new plant which is being put down is in operation, the output will be far greater. Rails are in fair demand, and ordinary heavy sections are being disposed of at £4 15s. to £5 per ton. Hematite pig iron is being offered at from 49s. 6d. to 50s. per ton. The improved state of trade on American account, which was noticed last week, has not been maintained, nor have makers been able to dispose of large quantities at the advance of 2s., which was offered for prompt shipments. Shipbuilders are busily employed. Iron ore is in poor request, and still remains at 9s. to 11s. per ton. Shipping well employed. Coal in fair demand.

THE SHEFFIELD DISTRICT.

(From our own Correspondent.)

BY a very narrow majority—30 to 27 votes—it has been decided that there shall be no strike of ironworkers in the Sheffield district. The wages here are ruled by those current in South Staffordshire, and it was early felt here that some action would follow the agitation and disturbances at headquarters. Messrs. John Brown and Co., Limited, Atlas Steel and Ironworks, and Messrs. Charles Cammell and Co., Limited, Cyclops Steel and Ironworks, have usually worked together in all matters of this sort. The men employed at the Atlas Works, joined by others, agreed on Friday to accept the terms offered by Mr. J. D. Ellis, chairman of John Brown and Co. These terms were to the effect that the men should continue at work at the old prices, and that whatever decision was arrived at in Staffordshire, should take effect in Sheffield as from July 2nd.

Another meeting was held on Monday last, and from this meeting an adjournment took place with the view of ascertaining the views of Messrs. Charles Cammell and Co. A deputation sent to see Mr. Collins, the manager, reported that Mr. Collins—who had previously discussed the matter with Mr. George Wilson, the chairman and managing director—was prepared, on behalf of the Cyclops Company, to abide by any terms Messrs. J. Brown and Co. made, but that they would have nothing to do with other firms. The two companies had worked hand-in-hand together for some years, and Messrs. Cammell and Co. were prepared to continue that policy. A strong opinion was expressed against any reduction, but the feeling of the meeting was generally sensible. An amendment was proposed in favour of the men going out with the South Staffordshire ironworkers, but the original motion — that the Cyclops men should go to work on the same terms as those of Messrs. John Brown and Co.'s—was carried by 30 to 27. The deputation was instructed to convey the decision of the men to the masters. Work was therefore resumed on Tuesday morning.

The Board of Trade returns for June show a considerable falling off in the items in which Sheffield is chiefly interested. The total for the month is £297,716, as compared with £352,831 for the corresponding month of 1882. For the six months ending June the falling-off is not so perceptible, the values being £1,902,239 and £2,031,172 respectively. During June last the decreasing markets have been Russia, to which we have only sent £6141 worth, as compared with £12,047; Germany, £12,258; Holland, £6605; France, £13,909; Spain and Canaries, £9135; Brazil, £19,277; Argentine Republic, £8764; British North America, £13,709; British Possessions in South Africa decreased from £16,652 to £6267; Australasia, £64,078. The only increasing markets are the United States and British East Indies. The first is purely nominal, from £35,262 to £35,366; the second is more tangible, being from £19,171 to £25,422.

In steel rails there is a slight increase on the month, the values for June, 1882 and 1883, being respectively £466,414 and £470,172. Russia, which took a value of £15,244 in June last year, has had none last month, and Germany, of course, shows the usual blank. Sweden and Norway have increased from £13,007 to £14,219; Spain having advanced from £6000 to £13,476; Brazil from £16,312 to £17,959; while British East Indies has jumped from £37,224 to £80,982, and Australia from £42,846 to £85,355. The returns to "other countries" show also a great improvement—from £46,794 to £147,293. These gratifying results, however, are almost entirely counterbalanced by the extraordinary falling off in three markets. The United States, to which we sent £140,463 in June, 1882, took last month a value of only £30,291, while British North America fell from £107,077 to £55,263. Chili, too, weakened even by its victories, dropped from £6972 to £1526.

THE NORTH OF ENGLAND.

(From our own Correspondent.)

THE quarterly meeting of the Cleveland iron market was held at Middlesbrough on Tuesday last. The attendance was very large, and included a goodly number of visitors from other districts. Amongst the articles exhibited were specimens of bar iron, made at the Dinsdale Rolling Mills, near Darlington, from best scrap, and said to be equal in quality to Staffordshire marked bars. Samples of coke produced by the Jameson process and oils obtained from the coke ovens were also shown.

Not much business in pig iron was done, but the tone of the market was firm and buoyant. Merchants were in some cases taking 39s. 3d. per ton for small lots of No. 3 g.m.b. for prompt delivery; but not less than 39s. 4½d. per ton was generally accepted. Some makers quoted 39s. 6d. for No. 3, but those who were well supplied with orders were firm at 40s. per ton.

The prospect is now a little brighter for warrant holders, and prices are firmer than they were. Most holders ask 39s. 3d. for No. 3 warrants.

The stock of Cleveland iron in Messrs. Connal's Middlesbrough store again shows a decrease, the quantity held on Monday being 147 tons less than a week previously.

The shipments of pig iron from the Tees are not nearly so good this month as they were last, but are somewhat better than in July, 1882. The quantities are as follows:—To the 9th of this month, 26,775 tons; to 9th of June, 34,596 tons; and to 9th of July, 1882, 21,260 tons.

In the manufactured iron trade dulness still prevails, and very few fresh orders are forthcoming. Makers are, however, for the most part busy and able to hold firmly to the prices they have recently been quoting. It is reported that a Stockton firm of plate makers has been booking contracts at a price which will leave them less than £5 15s. at works. The general quotations for finished iron remain about the same as last week, viz.: —Ship plate, £6 to £6 5s.; angles for shipbuilding purposes, £5 12s. 6d. to £5 15s.; and common bars, £5 15s. to £6; all cash 10th, less 2½ per cent. at makers' works.

The Cleveland ironmasters' returns for June were issued on the 4th inst. They show that there are 117 furnaces in blast, being one less than at the end of May. The number of furnaces making Cleveland iron is 84, and the remainder are working other kinds of iron. The total make of iron of all kinds was 225,981 tons, of which 152,697 tons was Cleveland iron, and 73,284 tons hematite, spiegel, and basic iron. The quantity of iron in stocks and stores combined amounted to 275,094 tons, being a reduction of 12,713 tons since the beginning of June.

The accountant's certificate just issued under the Cleveland miners and blast furnacemen's sliding scale shows that the net average invoice price of No. 3 Cleveland pig iron for the quarter ending June 30th was 40s. 1·01d. per ton, against 42s. 0·25d. for the previous quarter. Miners' wages will be reduced nearly 5 per cent., and blast furnacemen will be lowered 3½ per cent.

The mechanics employed by Messrs. Westgarth, English, and Co., at their marine engine works, Middlesbrough, are to have their wages advanced 1s. 6d. per week all round, equal to about 5 per cent.

The Seaton Carew Iron Company at West Hartlepool hopes to be able to start its second blast furnace about the middle of this month. The output of pig iron will then be 1200 tons per week.

Nothing further has been settled in respect of the strike of engineers at Sunderland. The men say they are determined to stay out until their masters concede the advance they demand. The Amalgamated Society of Engineers have voted £150 to the non-society men to assist them until the dispute is settled.

The ironworkers' strike now in progress in Staffordshire is naturally watched with interest by all connected with the northern iron trade. Should it continue, a great accession of work to the Cleveland manufacturers must ensue. So far, however, it seems to have had but little effect, except a somewhat increased briskness in the demand for boiler and bridge plates. The opinion of those most competent to judge is, that it is too wide spread, and has so far been too violent to last long.

Mr. Coleman's award upon the Eston dispute has been very disappointing to the employers. Two and a-half per cent. reduction is, in their opinion, scarcely worth the trouble of arbitration; not to mention the loss occasioned by the four weeks' strike preceding. The steel trade continues in a very depressed condition, and certainly needs every possible assistance to prevent wholesale stoppage of works.

NOTES FROM SCOTLAND.

(From our own Correspondent.)

A LARGE speculative business has been done in the warrant market in the course of the past week, and the feeling has been more cheerful than of late. The shipments are well maintained for the season, although some merchants report that they are not receiving very encouraging accounts from the United States. In point of fact the deliveries for shipment both to the States and Canada are considerably short of expectation. The amount of business is likely to be affected during the next fortnight by the fair holidays, which commenced this week. The increase in the stocks in Connal's warrant stores has only been about 120 tons for the week.

Business was done in the warrant market on Friday forenoon at from 47s. 10d. to 47s. 8d. cash and 48s. to 47s. 9½d. one month, the afternoon quotations being 47s. 7d. to 47s. 6½d. cash and 47s. 9½d. to 47s. 7½d. one month. On Monday morning business was done at 47s. 7d., 47s. 6d., and 47s. 7½d. cash, also 47s. 9d. to 47s. 8½d. and 47s. 9½d. one month; while the same afternoon transactions occurred at 47s. 8d. to 47s. 6d. cash and 47s. 10d. to 47s. 8½d. one month. At Tuesday's market the quotations were 47s. 7d. to 47s. 9d. cash and 47s. 9d. to 47s. 11d. one month. Business was done on Wednesday between 47s. 9½d. and 47s. 10½d. cash, and to-day—Thursday—the market was quiet at 47s. 9d. to 47s. 8d. cash and 47s. 10d. one month.

The values of makers' iron are decidedly firmer, as follows :—Gartsherrie, f.o.b. at Glasgow, per ton, No. 1, 57s. 3d.; No. 3, 53s. 3d.; Coltness, 61s. and 53s. 6d.; Langloan, 60s. and 53s. 6d.; Summerlee, 57s. 6d. and 51s.; Chapelhall, 57s. and 54s.; Calder, 58s. and 50s. 6d.; Carnbroe, 55s. and 49s.; Clyde, 51s. and 48s. 9d.; Monkland, 49s. and 47s.; Quarter, 48s. and 46s.; Govan, at Broomielaw, 49s. and 47s.; Shotts, at Leith, 59s. 6d. and 55s.; Carron, at Grangemouth, 48s. 6d. (specially selected, 54s. 6d.) and 47s.; Kinneil, at Bo'ness, 49s. 6d. and 48s.; Glengarnock, at Ardrossan, 55s. and 48s.; Eglinton, 48s. 6d. and 46s.; and Dalmellington, 50s. and 49s.

At a meeting of shareholders of the Monkland Iron Company, Limited, held in Glasgow on Monday, a proposal that the business be disposed of as soon as possible was defeated by a large majority, and a motion by Mr. Reid, the chairman, to carry on the works was agreed to. Operations were carried on in a very spirited manner at the ironworks in the early portion of the week, the object being to have all work of a pressing description cleared off before the holidays.

The condition of the coal trade is in all respects satisfactory. During the past week a number of fresh contracts have been entered into by Lanarkshire coalmasters, and in almost every instance they have been arranged at an advance in prices, as compared with those which have been current for several years. In the Glasgow and adjacent districts work is being considerably interrupted by the holidays; and the stocks, where these exist at all, are becoming very small in consequence. Among the cargoes despatched from Glasgow in the course of the week were 770 tons for Stockholme, 1580 for Cronstadt, 1050 for Naples, 1970 for Bordeaux, 420 for Barcelona, 600 for Rio de Janeiro, 600 for Quebec, 1400 for Montreal, 270 for Newfoundland, 2650 for steamers' use, and 6095 tons coastward.

Reports from the outlying districts of Lanarkshire are to the effect that so great has been the demand for all descriptions of coal for shipment that the surplus of the household sorts is being taken up, and the summer is gliding past without the usual dulness in household qualities being felt. There has also been an excellent inquiry for steam and furnace coal. In Fifeshire orders are very numerous at all the collieries, and the recent advances in price are being fully maintained, fine sorts being quoted f.o.b. at Burntisland as high as 8s. 3d. per ton. A fair shipping business has been done at Leith. The shipments for the week at Grangemouth were unusually heavy, amounting to 9544 tons.

The shipments of gunpowder from the Clyde during the six months ending with June amounted to 585,820 lb., as against 951,693 and 644,850 in the corresponding half-year of 1882 and 1881 respectively.

WALES AND ADJOINING COUNTIES

(From our own Correspondent.)

I AM glad to note increased hopefulness in the tin-plate trade. By the end of the month four of the old-established works which had been stopped will be in action again, all necessary preliminaries, sales, and transfer having been completed. Prices are very firm for ordinary coke and best, with an upward tendency. Coke tin wasters are advanced to 15s.; ordinary coke, 16s. 6d. Large consignments are now leaving Swansea and the Monmouthshire districts for Liverpool, and there is a confident expectation that this will be steadily increased.

The coal and iron industries continue satisfactory, but a slight falling off is to be noted in the Cardiff coal exports, while Swansea and Newport exhibit a corresponding increase. Cardiff foreign coal exports last week amounted to 128,112 tons; Newport, 37,325 tons; and Swansea, 18,346 tons. In coastwise, Newport also figured well, sending 19,248 tons, while Cardiff only sent 16,255, and Swansea but 4835 tons. The old quotations are well retained both for best steam and house, and small steam is advancing, 5s. being obtained without difficulty.

A new pit has been commenced at Cwm Clydach, Rhondda. The owners are Perch and Co., and their endeavour is to win the well-known Abergorky seam.

I note that discontent prevails in Monmouthshire, principally at Cwmtillery, about what is called the imposition of safety lamps, instead of permitting naked lights to be used. The objectors, who are petitioning the Home Secretary, plead that more accidents will now happen, and cite the fact that since the safety lamps have been in use—three months—two accidents have happened, while in the previous twelve months none took place. It appears unreasonable, after the careful scientific inquiry made, that these complaints should occur. At all events, three months are too little for any basis of argument. But for the safety lamps, we might have had a great explosion, costing thirty lives! At the end of the year the colliers will be in a better position to judge.

Considerable local feeling has been aroused at Neath by the failure of its opposition to the Swansea Bay and Rhondda Railway. A strong opinion prevails now that it was an injudicious movement and that its ill success should be remembered when certain plans for the improvement of Neath are brought forward, as they will be shortly. I have high authority for the assertion that there is no reason why Neath river should not be utilised in a large degree, and Neath have its ample docks as well as iron industries. The conversion of the canal into a railway and the working of five large collieries form features of the plan, which will shortly be placed before the public, I hear.

An inquiry has been opened at Cardiff before Mr. T. Chitton as arbitrator, and Mr. Meadows White as legal assessor, with respect to Sir A. Mackworth's claim for compensation in reference to ten and a-half acres of land near the proposed Custom Dock. The land is estimated at £24,715. After lengthy evidence had been heard, the umpire and assessor adjourned, time being necessary before giving their award.

Moderate activity characterises the iron and steel trade, and tolerable orders are held for Canada and Spain. There is, however, it must be admitted, some degree of dulness, and new business is somewhat dilatory in coming to hand. The iron ore trade is bad.

I am glad to see that the iron and coal trades in North Wales are looking up. The Staffordshire disturbances have resulted in this. Collieries only working of late three days a week are now in full action.

DORKING SEWERAGE WORKS.—A Local Government Board inquiry was held by Mr. Arnold Taylor at Dorking, on Tuesday, the 19th inst., with regard to the application of the Dorking Local Board to borrow £12,000 for works of sewerage. Mr. P. L. Marten, the clerk to the Board, detailed the various stages this matter had passed through, extending over a period of several years. Mr. Urban A. Smith, C.E.—Smith and Austin, engineers to the Board —described the general features of the scheme of sewerage designed by his firm, and explained the manner in which it was proposed to deal with the sewers under the very steep roads of the district, and the arrangements made for utilising the sharp gradients by obtaining automatic sewage flushings for the main intercepting sewers. Mr. Smith also explained, at the request of the Inspector, the means to be adopted for effecting the thorough ventilation of the system. Mr. John Hanson described his process of chemical purification—known as "Hanson's patent process"—which the Board proposes to adopt for treating the sewage at the outfall, and the Inspector expressed an opinion that the arrangements for purifying the sewage should be somewhat increased in capacity. The Inspector having remarked that the Board was in the hands of engineers of very wide experience, who were not experimenting on Dorking, but advocating accepted principles which had been extensively carried out by them at other places, the inquiry terminated, a vote of thanks to the Inspector having been passed.

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 the 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.

3rd July, 1883.

3278. ELECTRICAL CONDUCTORS, H. H. Lake.—(*T. H. Dunham, Boston, U.S.*)
3279. COATING, &c., METALLIC PLATES, C. Stuart, Fenny Stratford.
3280. GAS ENGINES, W. Foulis, Giasgow.
3281. MOULDS for CASTING, J. McLaren, Stenhousemuir.
3282. TRANSPORTING BOXES of FISH, J. Scott, Granton.
3283. SAFETY VALVES, A. Turnbull, Glasgow.
3284. VESSELS for DYEING, &c., J. Woodcock, Huddersfield, and J. Coulter, Batley.
3285. STOPPERING BOTTLES, A. Kempson, Tunbridge Wells.
3286. SPINNING FIBROUS SUBSTANCES, J. H. Clapham, T. R. Whitehead, and T. W. Wheelwright, Bradford.
3287. BOILER for CHEMICAL OPERATIONS, G. Knowles, London.
3288. BUSK FASTENINGS, H. A. Lyman.—(*W. A. Nettleton, Bridgeport, U.S.*)
3289. PERSPECTIVE DRAWING APPARATUS, H. J. Haddan.—(*W. S. Worden, Nebraska, U.S.*)
3290. CAPS for AXLE-BOXES, E. Dugdale, Liverpool.
3291. ARSENIATE of SODA, F. C. Blythe, Accrington.
3292. MARINE DANGER SIGNALS, M. Porter, Boston, U.S
3293. SELF-ACTING PNEUMATIC INDICATOR, F. G. G. Lines and J. Kendall, London.
3294. PACKING for STUFFING-BOXES, C. Schnerzel, Berlin.
3295. PACKING, &c., FATS, W. McDonnell, Limerick.
3296. WINDOW FASTENINGS, E. M. Loe, London.—(*W. C. Loe, Paris.*)
3297. FORGING RAILWAY SPIKES, &c., C. D. Abel.—(*A. Urban und Söhne, Vienna.*)
3298. SIGNALLING DEVICES for BAROMETERS, H. O. Christensen, West Cowes.
3299. PRESERVING ENSILAGE, W. R. Lake.—(*S. M. Colcord, Dover, U.S.*)
3300. SPRINGS, W. R Lake.—(*C. Mace, U.S.*)
3301. FURNACE DOORS, W. Douglass, Blaydon-on-Tyne.
3302. TELEPHONIC APPARATUS, W. Lake.—(*H. Clay, U.S*)
3303. BINDING BOOKS, H. J. Haddan.—(*A. Brehmer, Leipzig.*)

4th July, 1883.

3304. SPINNING and DOUBLING, J. Farran, Manchester.
3305. FOG-HORNS, F. G Fleury & T. J. Noakes, London
3306. THEODOLITES, A. L'E. H. Holmes, Bengal.
3307. EFFERVESCING DRINKS, A. Baumgarten, London.
3308. AUTOMATIC SWITCH for ELECTRIC LIGHTING, C. F. Pollak, London.
3309. PREVENTING WASTE of WATER, A. Tylor, London.
3310. CUTTING by CIRCULAR SAWS, A. W. McMurdo, Scotby, near Cardiff.
3311. FLUSHING APPARATUS, D. G. Cameron, London.
3312. VELOCIPEDES, J. White and J. Asbury, Coventry, and F. G. Francis, Folkestone.
3313. COUNTING APPARATUS for TILLS, J. Imray.—(*H. Pottin, Paris*)
3314. WADS for CARTRIDGES, C. Günther, Berlin.
3315. FIRE-GRATES, W. Wade, Crewe.
3316. SHAPING the ENDS of BOLTS, W. R. Lake.—(*G. W. Bruce, New York.*)
3317. SEPARATING IMPURITIES from CHINA CLAY, &c., A. S. Chinnock, London.
3318. HORSE GIRTHS, J. C. Odell, Coventry.
3319. SAVING LIFE at SEA, J. H. Johnson.—(*P. T. Ramakers and F. X. Nyer, Paris*)
3320. ANTI-FOULING PAINTS, A. M. Clark.—(*C. Dubois, Marseilles.*)
3321. FERMENTING WINE, &c., F. Wirth.—(*A. Reihlen, Stuttgart, Germany.*)
3322. ROTARY ENGINES, G. W. von Nawrocki.—(*L. d'André, Riga, and L. Loewe and Co, Berlin.*)
3323. CUTTING CORKS, J. Hix, Battersea.

5th July, 1883.

3324. RAILWAY SIGNALLING APPARATUS, R. Chidley, Wood Green.
3325. TRACTION ENGINES, R. H. Abbott, Dewsbury.
3326. GARMENT called "DRAWERS," G. Macaulay-Cruikshank.—(*W. B. Sons, Stuttgart.*)
3327. TOY PISTOL, A. C. Henderson.—(*E. Barbé, Paris.*)
3328. PRESERVING the EDGES of BOOKS, A. C. Henderson.—(*H. T. Brunet and J. C. Devèze, Paris.*)
3329. BORING COAL, G. E. Vaughan.—(*J. Werndl, Steyr, Austria.*)
3330. TRICYCLES, J. Cornforth, Birmingham.
3331. RAILWAY KEYS, R. D Sanders. Glasgow.
3332. FOLDING COTS, &c., G. H Needham, New Wandsworth.
3333. ELECTRIC ARC LAMPS, A. L. Lineff, London.
3334. ROCK PERFORATING MACHINES, M. Macdermott and W. Glover, London.
3335. COLLECTING VAPOURS, C. Burghardt, Manchester.
3336. GAS MOTORS, H. Holden, Manchester.
3337. HORSESHOES, T. H. Heard, Sheffield.
3338. PURIFYING WATER, A. Goldthorpe, Wakefield.
3339. AUTOMATIC FEED for ROLLERS, J. Shackelton, Blackburn.
3340. ELECTRICAL ACCUMULATORS, W. R. Lake.—(*C. Dion, Montreal, Canada.*)
3341. METAL CASKS, A. Dunn and A. Liddell, London.
3342. EXTRACTING FERRO-CYANIDES, Dr. H. Kunheim, and H. Zimmermann, Wesseling.
3343. ARTIFICIAL FERTILISERS, T. W. B. Mumford, Victoria Docks.
3344. VENTILATING CASEMENTS, A. J. Boult.—(*Messrs. Bouquet and Bulle, France*)
3345. BOOTS and SHOES, J. B. Rogers, Leicester.
3346. HOLDERS for KNIFE BLADES, J. H. Johnson.—(*J. Reckendorfer, New York.*)
3347. DIFFERENTIAL VALVE GEAR, H. Lawrence and R. M. Ogle, Durham.

6th July, 1883.

3348. LOOMS, R. L. Hattersley and J. Hill, Keighley.
3349. CUTTING PAPER, T. G. and J. Dawson, Otley.
3350. TREATMENT of TIN DROSS, T. Lloyd, Aberdylais.
3351. BLEACHING KIERS, J. K. J. Foster, Bolton.
3352. SMALLWARE LOOMS, T. Hirst, Manchester.
3353. REELS for SHIPS' HAWSERS, H. Cheesman, Hartlepool.
3354. AUTOMATICALLY PREVENTING WASTE of GAS, N. Stevenson, London.
3355. MIRROR, &c., GLASS, W. P. Thompson.—(*Baron F. del Marmol, Bruxelles.*)
3356. JOINTS for CORNERS of SCHOOL SLATES, E. M. Owen, Festiniog, Wales.
3357. GROOVING CYLINDRICAL SURFACES, W. Robertson, Johnstone, N.B.
3358. PISTONS, J. Elliot, J. S. Jeffery, and T. Kerman, Cardiff.
3359. CARBURETTING GAS, J. Thomas, London.
3360. WORKING RAILWAY POINTS and SIGNALS, S. Pitt.—(*J. Prince, Paris.*)
3361. COOLING TUBES, S. Pitt.—(*H. Harmet, France.*)
3362. PRODUCING PLATES by PHOTOGRAPHY, F. Wirth.—(*Benecke and Fischer, St. Louis, U.S., and J. Frank, Frankfort-on-the-Main.*)
3363. COFFEE POTS, E. Boyes, London.
3364. BOOTS and SHOES, I. Drakeford, Northampton.
3365. CUTTING-OUT STAYS, &c., A. Whitehorn, London.
3366. DOOR LOCKS, W. R. Lake.—(*E. Chameroy, Paris.*)
3367. LIFE BELTS, M. Bauer.—(*A. Harivel, France.*)
3368. SEPARATING GRAIN, C. Cadle.—(*J. T. La Du, U.S.*)
3369. MOWING MACHINES, J. Whitaker, J. E. Powell, and R. J. Powell, Wrexham.
3370. GETTING COAL, W. F. Hall and W. Low, Haswell.
3371. CHILLED IRON ROLLERS, T. Miller, Edinburgh.

7th July, 1883.

3372. SEGMENT and STAR TEMPLES, F. Oddy, Bradford.
3373. CARPETS, T. Tempest-Radford, Kidderminster.
3374. TIP WAGONS, A. G. Margetson and W. S. Hek, Bristol.
3375. JOINTING LEAD PIPES, T. P. Wilson.—(*F. Coney, Antwerp.*)
3376. ELECTRICAL CONDUCTORS, H. E. Upton, London.
3377. RAILWAY SLEEPERS, &c., J. Imray.—(*J. Monier, Paris*)
3378. FEED APPARATUS for BOILERS, J. Imray.—(*Count A. D. G. T. Bouton and C. Trépardoux, Paris.*)
3379. EARTHENWARE TILES, G. Maw, Broseley.
3380. TELEGRAPHIC APPARATUS, D. Sinclair, Glasgow.
3381. FOLDING LIFE RAFTS, G. F. Redfern.—(*E. A. Hayes, New York.*)
3382. COOLING HAY RICKS, W. H. Baylies, Welford.
3383. GAS ENGINES, W. R. Lake.—(*C. F. Gardie, Paris.*)
3384. BOOTS, W. R. Lake.—(*P. M. Torrisani, Paris.*)

9th July, 1883.

3385. RAILWAY SLEEPERS, G. Gilchrist, Glasgow.
3386. NAIL PLATES, T. Stanford and H. Payne, Birmingham.
3387. BAKING by STEAM, H. E. Newton.—(*E. Yäger, Plauen, Saxony.*)
3388. COMPOUNDS of ALUMINA, T. L G. Bell, Stratford.
3389. MOUNTING, &c., SPINDLES, J. Marsh, Ashton-under-Lyne.
3390. COUNTING NEWSPAPERS, J. E. Taylor, P. Allen, and C. P. Scott, Manchester.
3391. CARURETTERS, H. J. Haddan.—(*W. Jackson, U.S.*)
3392. ELECTRIC ARC LAMPS, F. M. Newton, Belfast.
3393. GASEOUS HYDROCHLORIC ACID, C. D. Abel.—(*R. Hasenclever, Prussia.*)
3394. WOOD-WORKING MACHINERY, A. A. Cook, Eastbourne.
3395. PREVENTING INCRUSTATION in BOILERS, S. Pitt.—(*A. A. Rosenberg, Olga, and K. Hoberg and V. V. Zoubkoff, St. Petersburg.*)
3396. DOOR SPRINGS, D. and S. Timings, Birmingham.
3397. DEFECATING SACCHARINE LIQUORS, H. H. Lake.—(*H. A. Hughes, Camden, U.S.*)

Inventions Protected for Six Months on Deposit of Complete Specifications.

3289. PERSPECTIVE DRAWING APPARATUS, H. J. Haddan, Kensington, London.—A communication from W. S. Worden.—*3rd July*, 1883.
3292. MARINE DANGER SIGNALS, M. D. Porter, Boston, Suffolk, U S.—*3rd July*, 1883.
3299. PRESERVING ENSILAGE, W. R. Lake, Southampton-buildings, London.—A communication from S. M. Colcord, Dover, Massachusetts, U.S.—*3rd July*, 1883.
3302. TELEPHONIC APPARATUS, W. R Lake, Southampton-buildings, London.—A communication from H. Clay, Philadelphia, U.S.—*3rd July*, 1883.
3303. STITCHING or BINDING BOOKS, H. J. Haddan, Kensington, London.—A communication from A. Brehmer, Leipzig.—*3rd July*, 1883.

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

2704. TRIMMING SHIPS' CARGOES, W. S. Brice, Liverpool.—*2nd July*, 1880.
2734. SECURING ARMOUR upon SHIPS' TURRETS, G. Wilson, Sheffield.—*3rd July*, 1880.
2757. OBTAINING COLOURS on COTTON, T. Holliday and R. Holliday, Huddersfield.—*6th July*, 1880.
2743. MECHANICALLY CUTTING GLASSES, E. Edmonds, London.—*5th July*, 1880.
2747. MOISTENING, &c., OIL SEEDS, H Holt, Hull.—*5th July*, 1880.
2769. EYELETS, &c., W. Bodill, Birmingham.—*6th July*, 1880.
2895. PRESERVING FOOD, J. H. Johnson, London.—*13th July*, 1880.
2952. AUTOMATIC LUMINOUS BUOYS, N. F. D. Barbier, Paris.—*17th July*, 1880.
2738. TANNING HIDES, C. D. Abel, London.—*5th July*, 1880.
2964. DISTILLING AMMONIACAL LIQUOR, J. Imray, London.—*19th July*, 1880.
2765. AUTOMATIC CUT-OFF VALVES, G. Fletcher, Derby.—*6th July*, 1880.
2775. EXPLOSIVE MATTER, A. Hellhoff, Mayence.—*7th July*, 1880.
2811. CAP for SHIP'S MASTS, A. A. Rickaby, Sunderland.—*8th July*, 1880.
2819. GRINDING GRITS, J. H. Johnson, London.—*9th July*, 1880.
2831. TREATMENT of VEGETABLE OILS, T. H. Gray, Deptford.—*9th July*, 1880.
2845. STEAM WHISTLES, J. Miller and I. Smith, Nottingham.—*10th July*, 1880.
2851. SCREW PUMPS. W. Anderson and W. Airy, London.—*10th July*, 1880.
2932. STEAM GENERATORS, L. Mills, Tynemouth.—*16th July*, 1880.
2771. BRICK MACHINES, W. L. Gregg, Philadelphia.—*6th July*, 1880.
2785. REGULATOR for SPINNING ENGINES, M. Bauer, Paris.—*7th July*, 1880.
2809 RAILWAY SWITCHES, J. Hough, Castleton.—*8th July*, 1880.
2815. BRACKETS for WINDOW BLIND RODS, R. B. Evered, London.—*8th July*, 1880.
2838. CUTTING GROOVES of PULLEYS, W. R. Lake, London.—*9th July*, 1880.
3043. PLATING IRON, &c, F. C. Glaser, Berlin.—*24th July*, 1880.
1053. REGULATING the SUPPLY of AIR to FURNACES, T. S. Prideaux, Brockley.—*11th March*, 1880.
2824. PUMPING, &c., AIR, M. Kennedy and J. Eastwood, Ulverston.—*9th July*, 1880.
2855. FEEDING PAPER to PRINTING MACHINES, J. H. R. Dinsmore, Liverpool, and F. Hoyer, Waterloo.—*13th July*, 1880.
2956. PREVENTING EXCESSIVE HEATING of the BARRELS of MACHINE GUNS, H. H. Lake, London.—*17th July*, 1880.
3037. STEAM BOILERS, W. Keable, Hull.—*23rd July*, 1880.

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

2758. LIGHTING, HEATING, &c., J. Lewtas, Manchester.—*6th July*, 1876.
2734. PAPER-CUTTING MACHINERY, W. R. Lake, London.—*4th July*, 1876.
2752. DRIVING CHAINS, W. R. Lake, London.—*5th July*, 1876.
2794. PNEUMATIC HAMMERS, D. Longworth, Birmingham.—*8th July*, 1876.
2818. DRESSING FLOUR, R. W. Thompson, Wolverhampton, and C. Lampitt, Warwick.—*11th July*, 1876.
2764. TREATMENT of STABLE MANURE, W. F. Nast, London.—*6th July*, 1876.
2890. MOWING, &c., MACHINES, R. Hornsby, J. Innocent, and G. T. Rutter, Grantham.—*14th July*, 1876.
2952. PROJECTILES, W. Morgan-Brown, London.—*20th July*, 1876.
2777. REVOLVING CYLINDER PISTOLS, W. R. Lake, London.—*7th July*, 1876.
2892. WATCH KEYS, T. Morgan, London.—*14th July*, 1876.

Notices of Intention to Proceed with Applications.

(*Last day for filing opposition*, *27th July*, 1883.)

715. EXTRACTING AMMONIA from SOLUTIONS, L. Mond, Northwich.—*9th February*, 1883.
1113. ELECTRIC GENERATORS, R. D. Bowman, Leytonstone, and J. E. L. and W. J. K. Clark, London.—*1st March*, 1883.
1125. STAMPING, &c., LAMPS, E. Sturge, London.—*2nd March*, 1883.
1129. VELOCIPEDES, J. D. Ellison, Coventry.—*2nd March*, 1883.
1132. TOOLS for SCREWING OFF METALS, &c., W. and J. Maiden and E. F. Cowley, Hyde.—*2nd March*, 1883.
1139. INDICATING the FLOW of ELECTRIC CURRENTS, P. R. Allen, London.—*2nd March*, 1883.
1141. FASTENINGS for BRACELETS, J. Hirst, London.—*3rd March*, 1883.
1142. GROOVED TIRES for WHEELS, G. Davies, Manchester.—*3rd March*, 1883.
1145. UTILISING EXHAUST STEAM of STEAM ENGINES, H. J. Haddan, London.—A communication from A. Zalm.—*3rd March*, 1883.
1146. RIDGE PLOUGHS, H. J. Haddan, London.—A communication from B. Laniozelet.—*3rd March*, 1883.
1148. DRESSING STIFF NET, G. Marwitz, Penge.—Com. from G. H. Cruner.—*3rd March*, 1883.
1150. PUTTING on BOOTS or SHOES, A. J. Boult, London.—Com. from G. N. Vallery.—*3rd March*, 1883.
1151. HOISTS or LIFTS, J., J., T., and D. Barker, Oldham.—*3rd March*, 1883.
1152. GENERATING GOVERNORS, R. Hallewell, Blackburn.—*3rd March*, 1883.
1153. ATTACHING DOOR KNOBS to HANDLES, A. Varah, Sheffield.—*3rd March*, 1883.
1158. DATE INDICATOR, G. H. T. Hawley, Bromley.—*5th March*, 1883.
1167. BOILER FURNACES, H. J. Haddan, London.—Com. from E. W. Van Duzen.—*5th March*, 1883.
1171. ELECTRIC LAMPS, H. H. Lake, London.—A communication from E Weston.—*5th March*, 1883.
1182. ELECTRIC ARC LAMPS, J. E. L. Clark and W. J. K. Clark, London, and R. D. Bowman, Leytonstone.—*5th March*, 1883.
1183. JOINTS of PERAMBULATOR, &c., HOOD, J. Collett, Olton.—*5th March*, 1883.
1184. REGULATING the SPEED of ENGINES, P. W. Willans, Thames Ditton.—*5th March*, 1883.
1186. GOVERNORS for STEAM, &c., MACHINERY, W. Mellor, Oldham.—*6th March*, 1883.
1205. TREATING STARCHY SUBSTANCES, W. Lawrence, London.—*6th March*, 1883.
1237. LOCOMOTIVE STEAM ENGINES, J. H. Johnson, London.—A communication from T. Ricour.—*7th March*, 1883.
1203. PRODUCING LETTERS, &c., on METAL, W. P. Thompson, London.—A communication from E. E. Wood, jun.—*12th March*, 1883.
1358. OPENING CLOSED PACKAGES, F. C. Glaser, Berlin.—Com. from F. H. Arnd.—*14th March*, 1883.
1704. CONDUCTING, &c., ELECTRIC CURRENTS, J. M. M. Munro, Glasgow.—*5th April*, 1883.
1789. SIFTING AGRICULTURAL PRODUCE, B. Page, Tolleshunt d'Arcy.—*9th April*, 1883.
1936. CENTRIFUGAL MACHINES, A. G. Brookes, London. Com. from D. McC. Weston.—*17th April*, 1883.
1937. CENTRIFUGAL MACHINES, A. G. Brookes, London. Com. from D. McC. Weston.—*17th April*, 1883.
2122. EXTRACTING GOLD from AURIFEROUS PYRITES, &c., T. Bowen and J. Napier, Swansea.—*26th April*, 1883.
2434. PRODUCING, &c, ELECTRICITY for LIGHTING, E. L. Voice, London.—*15th May*, 1883.
2674. RAILWAY BUFFERS, H. H. Lake, London.—A communication from G. Turton.—*29th May*, 1883.
2690. OIL-CANS, G. A. J. Schott, Bradford, and G. Robinson, Sheffield.—*30th May*, 1883.
2799. PREPARING METAL SURFACES for ETCHING, &c., J. J. Sachs, London.—*5th June*, 1883.
2814. LOOMS for WEAVING CLOTHS, H. J. Haddan, London.—Com. from J. MacFarlane.—*6th June*, 1883.
2816. SOLUBLE BLACK, T. W. Appleyard, jun., and W. K. Appleyard, Leeds, and J. Longshaw, Manchester.—*6th June*, 1883.
2817. ELECTRICAL SIGNALLING, C. Hodgson, London.—*6th June*, 1883.
2846. FELT CARPETS, J. Barcroft, Waterfoot.—*7th June*, 1883.
2847. TUMBLERS, &c, J. T. H. Richardson, Hatton.—*7th June*, 1883.
2882. SUPPLYING AIR to the INTERIOR of TORPEDO BOATS, A. H. Arnold, Landport.—*9th June*, 1883.
2914. RAILWAY WHEELS, A. Longsdon, London.—A communication from A. Krupp.—*12th June*, 1883.
2923. CARRIAGE for HEAVY ORDNANCE, W. Anderson, London.—*12th June*, 1883.
2928. MOULDING PLASTIC MATERIALS, W. R. Lake, London.—Com. from O. R. Chase.—*12th June*, 1883.
3096. PREPARING FOOD for INFANTS, H. J. Haddan, London.—Com. from W. Horlick.—*21st June*, 1883.

(*Last day for filing opposition*, *31st July*, 1883.)

1162. BICYCLES, J. H. Adams, London.—*5th March*, 1883.
1166. APPARATUS upon to which HANG COATS, A. Elliot, London.—*5th March*, 1883.
1173. HEATING STEAM BOILERS, W. H. Thompson, L. Hardaker, and G. M. Porter, London.—*5th March*, 1883.
1190. SECONDARY BATTERIES, T. Rowan, London.—*6th March*, 1883.
1222. IMPARTING HEAT to WATER, &c., J. Jameson, Newcastle-on-Tyne.—*7th March*, 1883
1243. HURDLES, A. E. Maudslay, Littlebourne.—*7th March*, 1883.
1250. AUTOMATIC COUPLINGS, S. Gilbert, jun, Wansford.—*8th March*, 1883.
1259. MAKING VELVET, &c., J. Imray, London.—A communication from A. Duquesne.—*8th March*, 1883.
1260. EXTRACTING SOLUBLE MATTERS, C. D. Abel, London.—A communication from H. L. J. Parenty.—*8th March*, 1883.
1273. FASTENINGS for SCARVES, E. Hewitt, London.—*9th March*, 1883.
1276. LIGHTING VEHICLES, H. J. Haddan, London.—Com. from E. S. Pieper.—*10th March*, 1883.
1277. ATMOSPHERIC AIR MOTOR, H J. Haddan, London.—Com. from B. J. Forster.—*10th March*, 1883.
1281. LOOMS, G. H. Hodgson, Bradford.—*10th March*, 1883.
1316. CUTTING BEANS, &c., G. Clayforth, Kent.—*12th March*, 1883.
1350. ENVELOPES for the PROJECTILES of RIFLED SMALL-ARMS, S. Pitt, Sutton.—A communication from G. V. Fosbery and H. Pieper.—*13th March*, 1883.
1351. ROLLING on EDGE SPIRAL BANDS of STEEL, R. H. Brandon, Paris.—A communication from L. Poilvache and A. Nagelmackers.—*13th March*, 1883.
1384. FASTENINGS for BOTTLE STOPPERS, J. Murray and L. Spring, Kingston-upon-Hull.—*15th March*, 1883.
1391. LATCHES, &c., E. R. Wethered, Woolwich.—*15th March*, 1883.
1510. ASCERTAINING the TEMPERATURE within CLOSED VESSELS, H. Stopes and W. Crockford, London.—*22nd March*, 1883.
1521. STEAM LUBRICATORS, P. Jensen, London.—Com. from J. Rudolph.—*22nd March*, 1883.
1524. ATTACHING SHANKS to BUTTONS, J. H. Johnson, London.—A communication from J. F. Bapterosses.—*22nd March*, 1883.
1690. LAVATORIES, F. P. Preston, J. T. Prestige, and E. J. Preston, Deptford, and E. W. de Rusett, Anerley.—*4th April*, 1883.
1892. PREPARING AERATED WATERS, F. Bennett, London.—*13th April*, 1883.
1903. BREECH-LOADING FIRE-ARMS, E. Harrison and F. Beesley, London.—*14th April*, 1883.
2307. REGULATING FEED of WATER into STEAM BOILERS, W. White, London.—*7th May*, 1883.
2514. MAKING STEEL, A. Davy, Sheffield.—*19th May*, 1883.
2575. ELECTRICALLY INDICATING the MOVEMENTS of TRAINS, E. C. Warburton and R. Hooper, London.—*23rd May*, 1883.
2691. ARTIFICIAL FERTILISERS, J. R. Young, Norfolk, U.S.—*30th May*, 1883.
2701. APPLYING POWER for PUNCHING, &c., A. Higginson, Liverpool.—*31st May*, 1883.
2703. STARCH, J. Polson and J. M. Harley, Paisley.—*31st May*, 1883.
2755. PREPARING ROADS, H. F. Williams, London.—*2nd June*, 1883.
2785. MAKING CIGARS, C. Morris, London.—*5th June*, 1883.
2822. PUTTING INSTRUMENTS CONNECTED with a CENTRAL TELEPHONE STATION into COMMUNICATION with each other, W. R. Lake, London.—A communication from G. A. Cardwell.—*6th June*, 1883.
2841. SAFETY SADDLE BARS, Sir T. Dancer, Malmesbury.—*7th June*, 1883.
2850. ELECTRIC INCANDESCENT LAMPS, W. J. L. Hamilton, London.—*7th June*, 1883.
2854. SECURING BAGS, &c., E. Hawker, Lee.—*7th June*, 1883.
2963. METAL FENCING, &c., A. Whitgrove, Worcester.—*14th June*, 1883.
2973. BARBED FENCE WIRE, A. M. Clark, London.—A communication from A Cary and E. A. Moen.—*15th June*, 1883.
3016. WELDLESS CHAINS, J. Imray, London.—A communication from M. L. A. de Briery.—*18th June*, 1883.

Patents Sealed.

(*List of Letters Patent which passed the Great Seal on the 6th July*, 1883.)

5938. BOXES and SAFES, W. R. Lake, London.—*12th December*, 1882.
102. FACILITATING ACTION of SPRING ROLLERS for WINDOW BLINDS, G. D. Peters, London.—*8th January*, 1883.
107. PORTABLE ALARM SIGNALLING APPARATUS, W. J. Brewer, London.—*8th January*, 1883.
108. PRIMARY VOLTAIC BATTERIES, G. G. André, Dorking.—*8th January*, 1883.
109. PLOUGHS, T. Sheldrake, Ipswich.—*8th January*, 1883.
125. ELECTRICAL FIRE-ARMS, &c., E. A. Monfort, New York, U.S.—*9th January*, 1883.
135. CALCINING LIMESTONE, J. Brocklehurst, Stockport.—*10th January*, 1883.
144. WASHING CLAY, L. A. Groth, London.—*10th January*, 1883.
147. WOVEN FABRICS, J. Crabtree, Heckmondwike.—*10th January*, 1883.
154. CARS, &c., S. Andrews, Cardiff.—*10th January*, 1883.
155. FOUNTAIN PENHOLDERS, G. S. Rayson, Balham.—*10th January*, 1883.
179. TELEPHONIC TRANSMITTERS, H. Alabaster, South Croydon, and T. E. Gatehouse, Camberwell.—*11th January*, 1883.
180. INCANDESCENT ELECTRIC LAMPS, T. E. Gatehouse, Camberwell, and H. Alabaster, South Croydon.—*11th January*, 1883.
181. ELECTRICALLY CONTROLLING SPEED of ENGINES, J. Richardson, Lincoln.—*11th January*, 1883.
222. GRINDING CORN, &c., W. L. Wise, London.—*5th January*, 1883.
257. FILTERING SACCHARINE, &c., E. P. Alexander, London.—*16th January*, 1883.
260. CENTRE BOARD VESSELS, P. M. Justice, London.—*16th January*, 1883.
310. CRUSHING CEMENT, &c., H. H. Lake, London.—*18th January*, 1883.
318. HURRICANE LANTERNS, H. J. Haddan, London.—*19th January*, 1883.
390. FLOUR DRESSING MACHINES, M. Lyon, London.—*24th January*, 1883.
423. FELT HATS, C. Vero and J. Everitt, Atherstone.—*25th January*, 1883.
439. STRIKING MECHANISM for ALARUMS, &c., A. M. Clark, London.—*26th January*, 1883.
440. VELOCIPEDES, W. T. Shaw, Surbiton, and W. Sydenham, London.—*26th January*, 1883.
693. TAKING, &c., LEVELS, F. Low, London.—*8th February*, 1883.
771. SCREWS, H. H. Lake, London.—*12th February*, 1883.
836. GAS MOTOR ENGINES, J. Imray, London.—*15th February*, 1883.
1245. GOVERNORS, W. Murdoch, Glasgow.—*8th March*, 1883.
1730. COVERING IRON with LEAD, &c., W. H. Spence, London.—*6th April*, 1883.
1812. ELECTRIC LAMPS, H. Edmunds, jun., New York, U.S.—*10th April*, 1883.
1942. STOPPERS for BOTTLES, &c., N. Thompson, London.—*17th April*, 1883.
2006. FRICTION CLUTCHES, H. Simon, Manchester.—*20th April*, 1883.
2022. LEVER CORKSCREWS, R. Dolberg, Rostock.—*20th April*, 1883.
2026. BOOTS and SHOES, J. Leighton, Netherfield.—*21st April*, 1883.
2102. PROCESS for EXTRACTING OILS, J. Imray, London.—*25th April*, 1883.
2144. FINISHING TEXTILE FABRICS, W. P. Thompson, Liverpool.—*27th April*, 1883.
2145. SEWING MACHINES, A. J. Boult, London.—*27th April*, 1883.
2174. ROLLING CYLINDERS of IRON and STEEL, B. Walker, Leeds.—*30th April*, 1883.
2176. STOPPERING BOTTLES, R. J. Sankey, South Hill.—*30th April*, 1883.
2178. BUTTONS, W. Willeringhaus, London.—*30th April*, 1883.
2218. WARPING, &c., YARN, W. R. Lake, London.—*1st May*, 1883.
2314. SHIPS' SIGNALLING APPARATUS, M. D. Porter, Boston, U.S.—*7th May*, 1883.

(*List of Letters Patent which passed the Great Seal on the 10th July*, 1883.)

4732. LUMINOUS PAINTS, H. J. Haddan, London.—*4th October*, 1882.
162. INDICATING the PRESENCE of WATER in CISTERNS, J. Shaw and F. Milan, Lockwood.—*11th January*, 1883.
168. TOOLS for SHEARING, &c., T. Perkins, Hitchin, and S. Gilbert, jun., Wansford.—*11th January*, 1883.
175. KNITTING MACHINERY, F. J. Drewry, Burton-on-Trent.—*11th January*, 1883.
176. LUBRICATING STEAM CYLINDERS, W. P. Thompson, Liverpool.—*11th January*, 1883.
178. HOEING MACHINE, E. Edwards, London.—*11th January*, 1883.
198. ETCHING on ROLLERS, C. J. Appleton, Salford, and D. Appleton, Manchester.—*12th January*, 1883.
200. MAKING STEEL, R. Hadfield, Sheffield.—*12th January*, 1883.
207. DRAWING CORKS from BOTTLES, F. H. F. Engel, Hamburg.—*13th January*, 1883.
220. CHIMNEY COWLS, G. Davies, Aberystwith, W. Jones, Llannon, and R. Girdwood, Edinburgh.—*15th January*, 1883.
230. DAMP-PROOF SOCKS, R. J. Baggaley, Nottingham.—*15th January*, 1883.
241. REDUCING METALLIC ORES, S. H. Emmens, London.—*15th January*, 1883.
273. STOPPERING BOTTLES, J. Sceats, Norbiton.—*17th January*, 1883.
277. CARTS, S. Clarkson and J. Ross, Hull.—*17th January*, 1883.
312. TYPE-WRITERS, J. J. Raggett, Aston.—*18th January*, 1883.
317. SECONDARY BATTERIES, H. J. Haddan, London.—*19th January*, 1883.
334. HANSOMS, H. Brockelbank, London.—*20th January*, 1883.
344. SIZING MACHINES, E. Tweedale and A. Hitchson, Accrington.—*20th January*, 1883.
349. TELEPHONIC APPARATUS, C. A. Teske, Wandsworth.—*22nd January*, 1883.
350. BASCULES, H. J. T. Piercy, Birmingham.—*22nd January*, 1883.
352. FIRE-RESISTING DOORS, J. M. Hart, London.—*22nd January*, 1883.
353. LOCKS, &c., J. M. Hart, London.—*22nd January*, 1883.
366. BRACELETS, A. Watson, Willesden.—*23rd January*, 1883.
367. REMOVING VEGETABLE IMPURITIES from WOOL, H. J. Haddan, London.—*23rd January*, 1883.

369. GAS-BURNER APPARATUS, G. S. Grimston, Brockley and A. S. Bower, St. Neots.—23*rd January*, 1883.
378. SPRING MOTOR APPARATUS, W. R. Lake, London. —23*rd January*, 1883.
407. OPERATING TRAMWAY POINTS F. A. Abeleven, London.—25*th January*, 1883.
455. HOLDING TICKETS, &c., T. H. Harper, Redditch.— 27*th January*, 1883.
463. AXLE-BOXES, F. Wirth, Frankfort-on-the-Main.— 27*th January*, 1883.
533. KNITTING MACHINES, H. B. Barlow, Manchester. —31*st January*, 1883.
596. PRESSURE REGULATORS for GAS, J. Imray, London. —3*rd February*, 1883.
660. COMBUSTIBLE COMPOUND, W. R. Lake, London.— 6*th February*, 1883.
755. PREPARING COTTON-SEED, F. S. Fish, London.— 10*th February*, 1883.
763. TREATING TEXTILE VEGETABLE FIBRES, J. Imray, London.—12*th February*, 1883.
854. SCREW PROPELLERS, R. M. Steele, London.—16*th February*, 1883.
922. FORMING CONTINUOUS PIPES, C. A. Day, London. —20*th February*, 1883.
925. BUTTON FASTENINGS, J. Imray, London.—20*th February*, 1883.
981. LIFTS or HOISTS, A. B. Dansken, Glasgow.—23*rd February*, 1883.
1004. TREATING VEGETABLE FIBROUS SUBSTANCES, C. Court, Rotherhithe.—24*th February*, 1883.
1548. MORDANTING FABRICS, &c., C. F. Cross and E. J. Bevan, London.—27*th March*, 1883.
2028. GENERATING ELECTRIC CURRENTS, Sir W. Thomson, Glasgow.—21*st April*, 1883.
2068. SELF-LEVELLING BERTHS, P. M. Justice, London. —24*th April*, 1883.
2087. MEMBRANES for ELIMINATING MICRO-ORGANISMS from LIQUIDS, &c., C. D. Abel, London.—24*th April*, 1883.
2142. CUTTING APPARATUS, H. Davidson, Tottenham.— 27*th April*, 1883.
2177. BOOT SOLE PROTECTING PLATES, J. Borrett, London.—30*th April*, 1883.
2341. VULCANISING CAOUTCHOUC, &c., H. H. Lake, London.—8*th May*, 1883.
2475. WINDOW SASHES, A. Rudolph, California, U.S.— 17*th May*, 1883.

List of Specifications published during the week ending July 7th, 1883.

55,* 4d.; 4824, 2d.; 4902, 2d.; 5045, 4d.; 5292, 6d.; 5299, 6d.; 5322, 6d; 5330, 6d.; 5393, 8d.; 5397, 4d.; 5400, 2d.; 5403, 6d.; 5439, 2d.; 5442, 6d.; 5450, 2d.; 5451, 4d.; 5453, 2d.; 5455, 2d.; 5460, 2d.; 5461, 2d.; 5474, 10d.; 5476, 6d.; 5477, 2d.; 5481, 2d.; 5485, 6d.; 5488, 2d.; 5489, 2d.; 5490, 2d.; 5495, 6d.; 5496, 2d.; 5497, 6d.; 5498, 4d.; 5501, 6d.; 5502, 2d.; 5503, 4d.; 5504, 6d.; 5506, 6d; 5507, 2d.; 5508, 4d.; 5509, 2d.; 5510, 10d; 5512, 4d.; 5514, 6d.; 5515, 6d.; 5516, 4d.; 5518, 6d.; 5519, 6d.; 5520, 6d.; 5521, 2d.; 5522, 2d.; 5525, 6d.; 5527, 2d.; 5528, 2d.; 5529, 2d.; 5530, 6d.; 5531, 4d.; 5532, 8d.; 5533, 6d.; 5536, 6d.; 5537, 6d.; 5538, 6d.; 5539, 10d.; 5540, 2d.; 5541, 6d.; 5542, 2d.; 5643, 6d.; 5545, 4d.; 5547, 6d.; 5548, 4d.; 5549, 4d.; 5554, 4d.; 5555, 6d.; 5556, 6d.; 5557, 8d.; 5559, 6d.; 5561, 6d.; 5562, 6d.; 5563, 6d.; 5565, 4d.; 5566, 4d.; 5567, 8d.; 5569, 6d.; 5570, 8d.; 5571, 8d.; 5572, 4d.; 5575, 4d.; 5581, 6d.; 5582, 6d.; 5587, 6d.; 5599, 6d.; 5618, 4d.; 5664, 6d.; 5665, 6d.; 5745, 8d.; 5798, 10d.; 1357, 6d.; 1448, 4d.; 1608, 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.*

5421. THERMO-ELECTRIC GENERATORS, *H. Woodward, Shepherd's Bush.*—14*th November*, 1882.—(*Not proceeded with.*) 2*d.*

This relates to improvements in thermo-electric generators, whereby they are rendered more efficient, compact, and durable.

4902. COMPOUND WELDED STEEL AND IRON PLATES, BARS, RODS, &c., *A. L. S. Leighs, London.*—14*th October*, 1882.—(*Not proceeded with.*) 2*d.*

As applied to armour plates the invention consists in welding a steel plate to an iron plate, and then removing the steel until the iron plate has only a thin facing of steel, which is extremely hard and tough, owing to its proximity to the weld; and as applied to bars, rods, &c., one half is made of steel and the other half of iron, and the two halves welded together, so that the strain will be borne by the weld.

5045. BRUSHES FOR PAINTING, DISTEMPERING, &c., *J. Culmer, London.*—23*rd October*, 1882. 4*d.*

The tenon on the handle is formed with a longitudinal cut, into which a metal piece is inserted, and is formed with ears projecting at the ends, so as to prevent the binding which secures the bristles to the tenon from slipping forward.

5292. CENTRIFUGAL SEPARATING MACHINES, &c., *F. H. F. Engel, Hamburg.*—6*th November*, 1882.—(*A communication from H. Petersen, Hamburg.*) 6*d.*

The apparatus consists of a tube furnished in front with a cutting edge and supported by an arm, in which it can be turned upon its own axis, as well as moved backward and forward. The sharp edge of the tube is advanced against the rotating ring of liquid that has to be removed out of the centrifugal vessel, and skims off such liquid, which runs through the tube.

5299. FINISHING THE INTERIOR OF HOLLOW WARE, *J. V. Hope, Wednesbury.*—6*th November*, 1882. 6*d.*

Cast hollow ware as cast is usually too rough for tinning or enamelling and is generally turned. The invention consists in grinding the interior of hollow ware by placing coarse corundum or other hard abrasive material in the vessel and causing a set of stirrers to rotate rapidly therein.

5322. COMPOUND PLATES OF HARD AND SOFT HOMOGENEOUS METALS, *S. and S. R. Chatwood, Bolton.*— 7*th November*, 1882. 6*d.*

Vertical partitions are placed in an ingot mould so as to divide it into three or more compartments, into the centre one of which homogeneous metal is run, which when heated to redness and plunged into cold water will be hard and brittle, and into the outer ones homogeneous metal is run which will remain ductile and capable of being bent without fracture when so treated. The two metals are run in at the same time, and the ingots produced are hammered or rolled into slabs or plates and hardened.

5330. BLEACHING, DUNGING, AND SOAPING TEXTILE FABRICS, &c., *J. Gibson, jun., Chester, and J. Platt, Manchester.*—8*th November*, 1882. 6*d.*

This relates to machines containing liquid, through which fabrics are passed during or subsequent to bleaching, dunging, soaping, dyeing, and other operations. The object when applied to soaping is to get rid of the thickening used to carry the colour or mordant, and when applied to dyeing to cause the colouring matter to thoroughly impregnate the fabric, and it consists in the use of beaters with flexible flaps which revolve and strike the fabric as it passes over rollers.

5354. FINISHING MACHINERY FOR STRETCHING AND "WINDING-ON" TEXTILE FABRICS, *J. Littlewood, near Huddersfield.*—9*th November*, 1882. 8*d.*

This relates to finishing machines employed in winding woven fabrics on to rollers for the purpose of removing the milling creases; and it consists in combining with such machine apparatus for stretching the fabric both in length and width previous to being wound upon the roller. Unparallel endless travelling chains serve to stretch the cloth in width, discs of larger diameter than the chain wheels being employed to lift the fabric off the pins of the endless chain. A swinging framework supports the chains, so as to allow for the increasing diameter of the "winding-on" roller. A frictional brake roller serves to stretch the fabric in length by retarding the unwinding.

5359. INSULATING ELECTRIC WIRES, *W. J. Temple and T. F. Hobbs, Bristol.*—10*th November*, 1882.—(*Not proceeded with.*) 2*d.*

The wires are laid in grooved strips or mouldings of slate.

5360. "HOOKING" AND CUTTING CLOTH, *W. Lee, Manchester.*—10*th November*, 1882. 6*d.*

This relates to apparatus used by clothiers for preparing and cutting fabrics to be made into garments, and it consists in fitting a hooking frame on the edge of the table and pivotting the latter on a frame, so that it may be placed in a vertical or horizontal position, instead of using a separate hooking frame as hitherto.

5361. WASHING, WRINGING, AND MANGLING MACHINES, &c., *J. P. Rothwell, Lytham, Lancashire.*—10*th November*, 1882. 8*d.*

To impart rotary motion to rollers of wringing and mangling machines a foot lever and connecting rod and crank are used, instead of the usual hand-wheel and gear. The invention further relates to the use of friction gear for rotating such rollers; to a washing machine, consisting of a reciprocating upright rod with a number of horizontal dolly pegs or perforated discs, and which can be readily mounted upon and removed from the washing vessel; also to anti-friction roller bearings for wringing and mangling rollers; to means for regulating pressure on the top roller; to the construction of the rollers, and to means for delivering the articles in front of the machine.

5362. LAMPS, *J. Ungar, London.*—10*th November*, 1882. 6*d.*

This consists, First, in forming the bars or ribs carrying the roof lights or glasses of double T or H section, the outer flanges being extended and bent over to carry the framework of the ventilator to which they are attached, and the inner flanges are extended to carry the dome holder to which they are attached; Secondly, in fitting the glasses without the use of putty by passing them between the flanges of the bars; Thirdly, in supporting the dome by rods passing through the framework at each side, the upper lip of the dome resting on the rods; Fourthly, preventing draught by the use of discs or flaps, one mounted inside over the air hole, and the other similarly placed outside. Talc may be used instead of glass.

5363. TREATMENT, DISTRIBUTION, AND APPLICATION OF COMPRESSED AIR FOR MOTIVE POWER, &c., *T. A. English and J. Sturgeon, Westminster.*—10*th November*, 1882.—(*Partly a communication from C. J. T. Hanssen, Germany.*) 1*s.*

The object is to provide pure compressed air at a central station and distribute it for motive power where required. The air is purified by passing in a finely-divided state in contact with water, and is then dried by passing through some spongy absorbent substance. The air is then compressed and distributed through mains to the required places. A meter in the form of a "Beales" exhauster is employed for measuring the quantity supplied.

5364. TRICYCLES AND OTHER VELOCIPEDES, *H. S. S. Watkin, Waltham Abbey.*—10*th November*, 1882.—(*Not proceeded with.*) 2*d.*

The object is to make use of the back action of the pedals for actuating increased power-driving gear.

5371. MANUFACTURE OF GAS, *B. Russ, London.*—10*th November*, 1882.—(*Not proceeded with.*) 4*d.*

A metal receptacle is used consisting of two chambers one within the other, the larger one being connected to a retort and containing two decomposing or generating coils of different dimensions, the outlet of the smaller being connected to the inlet of the larger, while the inlet of the small coil is connected to a force pump to deliver chemicals from suitable tanks. A special retort and other improvements are also described.

5372. FOUNTAIN PENS, *W. R. Lake, London.*—10*th November*, 1882.—(*A communication from C. W. Livermore, Providence, U.S.*)—(*Not proceeded with.*) 2*d.*

This relates to fountain pens with an ink chamber within the handle, a tapering writing point perforated by the ink passage, and a needle in the perforation, and it consists in the general construction so as to simplify such pens.

5373. ELECTRIC LAMPS, &c., *J. M. Boullon, Golden-square, I. Probert, Walworth-road, and A. W. Soward, Serjeants'-inn.*—10*th November*, 1882. 6*d.*

This relates to the manufacture of carbon filaments for incandescent lamps. The inventors decompose any suitable gas in a glass chamber, fitted with two metal electrodes, connected in circuit with an electric generator, by causing electric sparks to pass through it from one electrode to the other. The action of the spark causes carbon to be deposited on one of the electrodes, which deposit becomes gradually enlarged until it bridges over the space between the two electrodes. The glass vessel is then exhausted, and the lamp ready for use.

5374. FRAMES FOR PICTURES, LOOKING-GLASSES, &c., *J. Fisher and T. Wolstencroft, London.*—11*th November*, 1882.—(*Not proceeded with.*) 2*d.*

The waste cuttings of straw boards are built up so as to form the frame, which is then covered with a veneer of wood or other suitable material.

5375. FOLDING POCKET SCISSORS, *A. J. Boult, London.* —11*th November*, 1882.—(*A communication from Bontgeu and Sabine, Germany.*) 6*d.*

The blades are of the same form and jointed together in the usual manner, but where the bows commence only short extensions of the blades are formed, and to each of which a shell or case is hinged so as to be capable of being turned to enclose the blades.

5376 GUARDS FOR CIRCULAR SAWS, *J. Wetter, New Wandsworth.*—11*th November*, 1882.—(*A communition from Gretschel and Heinemann, Leipzig.*) 6*d.*

This consists in securing to an adjustable horizontal shaft two movable guards, one in front and the other at the back of the saw, the front guard being composed of two perforated vertical plates placed right and left of the saw-blade and guided by two sleeves, which are movable along the horizontal shaft and can be fixed in any suitable position, while the back guard comprises also a moveable sleeve secured to the said horizontal shaft and carrying two vertical spring bolts, one right and one left of the saw blade, each of which bolts carries at the bottom a roller pressed on the block of wood by means of a spring, so as to prevent the block of wood from accidentally slanting upward while being sawed.

5377. BALLS FOR PLAYING GAMES, *J. Wetter, New Wandsworth.*—11*th November*, 1882.—(*A communication from Gretschel and Heinemann, Leipzig.*) 4*d.*

This relates to the formation of coloured balls which will not alter by dampness or other causes, and consists in letting into the balls panels or pins of coloured glass flush with the outer surface of the ball.

5383. APPARATUS AND ARRANGEMENTS FOR THE WATER SUPPLY OF WATER-CLOSETS, BATHS, AND URINALS, AND PREVENTING WASTE, &c, *J. J. Tylor, London.* —11*th November*, 1882. 6*d.*

The object is to effect an automatic flushing out action by means of syphon arrangements in connection with a supply cistern, and it consists in passing the longer leg of a flushing syphon through the bottom of a supply cistern, such leg being of the well-known *vena contracta* nozzle form, while the shorter leg is in the form of a dome placed over the upper open end of the longer leg. The lower end of the latter passes into an S-shaped trap fixed to the bottom of the supply cistern, and provided with a small internal starting syphon, the shorter leg of which passes down into the liquid in the trap, and the longer leg into the down pipe leading from the trap. A small stand pipe is connected at its lower end with the trap, and is carried up in the cistern to about the height of the liquid before the action of the apparatus begins.

5385. RAISING SUNKEN VESSELS, *A. M. Clark, London.* —11*th November*, 1882.—(*A communication from P Oriolle, France.*) 4*d.*

This relates to the apparatus and mode of raising sunken vessels by extracting the water from the hold through openings made for this purpose in the hull, and at the same time admitting air at a pressure less than that of the column of water above deck, whereby a partial vacuum is produced which renders the leaks more easy of closure from the outside.

5386. SHEARING AND PUNCHING METAL PLATES, &c., *A. J. Lehmann, West Hartlepool.*—11*th November*, 1882.—(*Void.*) 2*d.*

This relates to apparatus for shearing and punching; and consists in the use of rotating discs with overlapping edges, which shear the material between them, a suitable apparatus for punching being combined with and driven by the same machine.

5387. APPARATUS FOR REGULATING AND CONTROLLING ELECTRICAL CURRENTS, *P. R. Allen, Lambeth.*—11*th November*, 1882. 6*d.*

This invention consists of a tap for turning current on to incandescent lamps, which tap contains carbon resistance pieces, so arranged that the current can be sent through them, and the light given by the lamp proportionately decreased.

5388. MANUFACTURE OF COMPOUNDS OF INDIA-RUBBER, &c., FOR INSULATING ELECTRICAL CONDUCTORS, *A. Parkes, Bexley, Kent.*—11*th November*, 1882. 4*d.*

The inventor prepares india-rubber, gutta-percha, or oxidised castor or other seed oils in such manner that either of them, or combinations of them, will be rendered incombustible, by mixing them with phosphate of zinc, or phosphate of lead, oxychloride of zinc, or lead, &c.

5390. OBTAINING ZINC AND COPPER FROM ORES, &c., *W. R. Lake, London.*—11*th November*, 1882.—(*A communication from L. L. C. Krafft and J. E. Schischkar.*) 8*d.*

This comprises two principal series of operation. First, the dissolving of the oxides or carbonates of zinc or copper in ammoniacal liquor, the washing and separation of the gangues, and the filtration of the liquid containing the metal in solution; and Secondly, the precipitation of the dissolved oxides or carbonates by the expulsion of the ammoniacal gas from its solution, the washing and separation of the said oxides and carbonates, the filtration and cooling of the liquid still containing a certain quantity of ammonia; and finally, the regeneration of the concentrated ammoniacal liquid designed to be employed in subsequent operations. Special apparatus is described.

5391. APPARATUS FOR INDICATING OR TELEGRAPHING THE "SCORE" FOR ATHLETIC OR OTHER GAMES, &c., *C. Green, Ashton-under-Lyne.*—13*th November*, 1882. 6*d.*

This relates to a method of indicating numbers, letters, words, or figures by using or causing to revolve in front of a casing provided with windows or openings and over square or other flat-sided sections, certain flat plates or links (preferably made of sheet metal) hinged together so as to form a chain or band, in which each plate or link is of the same size as one side of the block or section over which it revolves, and is marked with a number, letter, word or figure, or left blank or unnumbered as it may be required.

5392. RECEPTACLES FOR BISCUITS, &c., *J. Hall, Sheffield.*—13*th November*, 1882. 6*d.*

This relates particularly to the means of automatically opening or closing the lids or bodies.

5393. JOINTS OF DRAINAGE PIPES, &c., *W. N. Hutchinson, near Bideford.*—13*th November*, 1882. 8*d.*

The inventor claims the method of rendering the joints of drainage and other pipes gas and watertight by employing a screw to make the spigot end of one pipe compress a gasket lying within the socket end of another pipe.

5395. ORNAMENTING TERRA-COTTA PLAQUES, *A. Tuck, London.*—13*th November*, 1882. 4*d.*

This consists in decorating the surface of terra-cotta plaques and articles of terra-cotta of an ornamental character, by preparing and attaching to them sheets of gelatine or paper, on which is lithographed or printed decorative matter.

5397. INJECTORS FOR RAISING, HEATING, FEEDING, AND FORCING WATER INTO STEAM BOILERS, &c., *C. Nelson, Vauxhall.*—13*th November*, 1882.—(*Not proceeded with.*) 2*d.*

A strong steam-tight vessel is arranged in combination with the boiler, and is preferably of about one-third its size; and such vessel is connected by pipes both to the steam space and water space of the boiler. A check valve is applied to the steam pipe, and also a high-pressure valve, and high-pressure and check valves are fitted to the pipe connected with the water space. The pipes are connected to the injector vessel by screw unions, and a pipe passes from the screw union of the steam pipe three parts down the inside of the injector. The injector is first filled with steam and then cut-off so as to form a vacuum, when the overflow high-pressure valve is opened and water drawn in. The steam valve is again opened so as to heat the water, and by turning off the overflow pipe valve and turning on the steam and water valves, the water flows into the boiler.

5399. METALLIC ALLOYS, *A. K. Huntington, Strand.*— 13*th November*, 1882. 2*d.*

This consists in the manufacture of alloys of the kinds of bronze, brass, gun-metal, and the like, by admixture of the usual ingredients with silicious iron.

5403. SEPARATING LIQUIDS FROM WASTE PRODUCTS OF CHEMICAL WORKS, *G. H. Bolton and J. R. Wylde, Widnes*—13*th November*, 1882. 6*d.*

In the cauticising of solution of carbonate of soda or of potash to make sodium or potassium hydrate, a voluminous precipitate of carbonate of lime is formed in order to remove the caustic solution, from which it is placed in a centrifugal machine through which water is caused to flow so as to take the place of the caustic liquor. The invention further relates to the separation of chloride of manganese solution from the deposit in the settlers of the Weldon process and other solutions from slimy materials, by mixing the deposit with a granular material and passing it through a centrifugal machine with or without extra washing in the machine by a stream of steam or water.

5496. STOVES, *S. Slater, Oldham.*—18*th November*, 1882. —(*Not proceeded with.*) 2*d.*

An outer case of thin metal is provided with a base and cover, and connected with a pipe leading to a chimney. Within this case is a perforated shell containing the fuel, and the bottom of which is adjustable. A pipe leads through the shell and communicates with an air inlet in the base.

5409. APPARATUS FOR ELECTRIC LIGHTING, *J. Muirhead, Westminster, and T. M. Collett, Mornington-crescent.*—13*th November*, 1882.—(*A communication from G. A. Grindle, Bombay, India.*) 6*d.*

This relates to a switch capable of shunting a heavy current without sparking at the points of contact, and without any period of total extinction in the circuits between which it is placed.

5411. FURNACES FOR HEATING IRON, &c., *W. Felton, near Stourport.*—13*th November*, 1882. 6*d.*

This consists in providing for the generation of the gas in the actual working furnace, and also for practically the immediate stoppage of combustion at any moment.

5413. CIRCULAR SHUTTLES WITH INSERTED SPOOL FOR SEWING MACHINES, &c., *F. O. Schmidt, Berlin.*—13*th November*, 1882. 8*d.*

This relates, First, to improvements on circular shuttles with free inserted spool for sewing machines. Secondly, to improvements on mechanisms for operating such said shuttle and other movable parts of the said sewing machine.

5414. APPARATUS FOR REGULATING AND CONTROLLING ELECTRICAL CURRENTS, *P. R. Allen, Lambeth.*—13*th November*, 1882. 10*d.*

This relates to improvements in variable resistances, consisting of a number of plates or blocks of carbon, the amount of pressure on which can be regulated by a differential screw, other differential screws being used, so that a large amount of motion may be given to the hand wheel, and only a small amount of pressure to the plates, the result being a fine adjustment of resistance.

5417. BOLTS AND NUTS, *R. Howarth, Wolverhampton.*— 14*th November*, 1882. 6*d.*

This relates to a differentially-screwed bolt, with a nut at each end thereof, in combination with means for screwing up such bolt and preventing such nuts from turning thereon when the bolt is screwed up.

5422. SECONDARY BATTERIES, *H. Woodward, Shepherd's Bush.*—14*th November*, 1882.—(*Not proceeded with.*) 2*d.*

Relates to the manufacture of plates for secondary batteries.

5426. LAMPS FOR RAILWAYS, &c., *J. Thomas, Holloway.*—14*th November*, 1882. 6*d.*

This relates partly to the mode or method of introducing the air.

5427. TRICYCLES, &c., *W. J. George, Birmingham.*— 14*th November*, 1882.—(*Not proceeded with.*) 2*d.*

This consists partly in improvements in the driving mechanism and partly in improvements in the frames.

5431. FRAMES FOR PICTURES, &c., *A. J. Boult, London.*—14*th November*, 1882.—(*A communication from C. G. Grandjean, France.*)—(*Provisional protection not allowed.*) 2*d.*

This relates to the general construction of the frames.

5432. MUSICAL INSTRUMENTS, *W. Booth, Rochdale.*— 14*th November*, 1882. 4*d.*

This relates to brass and other wind instruments, the object being to prevent the accumulation of moisture—caused by the breath of the performer—in the slides or tubes of the instrument.

5433. LIQUID OR SOLUTION FOR WASHING WEARING APPAREL, &c., *S. Hulme, Manchester.*—14*th November*, 1882. 2*d.*

For manufacturing purposes it is preferred to use a soap composed of potash, cottonseed oil, and tallow; but for domestic purposes it should be composed of potash, cotton-seed oil, palm oil, and cocoa-nut oil.

5435. APPARATUS FOR HEATING AND VENTILATING, &c., *C. R. Stevens, Lewisham.*—14*th November*, 1882. 6*d.*

This relates to several improvements in the general construction of the apparatus.

5438. APPARATUS FOR THE CONDUCTION AND DISTRIBUTION OF ELECTRIC CURRENTS, *R. E. B. Crompton, Queen Victoria-street.*—15*th November*, 1882. 4*d.*

This relates to improvements on the inventor's patent, No. 5080, 21st November, 1880, and to a means for insulating copper conductors of large size. This is effected by winding the conductor with a spiral strip of india-rubber in a longitudinal direction, the edges of the strip being afterwards united by heat. After vulcanising this coating the conductor is placed within a sheathing tube, and the whole subjected to a high temperature for some time.

5440. SELF-EMPTYING CENTRIFUGAL MACHINES WITH CONTINUOUS MOVEMENT, *E. A. Brydges, Berlin.*— 15*th November*, 1882.—(*A communication from O. S. Andersen and T. Hansen, Copenhagen.*) 6*d.*

This relates to improvements in the general construction of the apparatus.

5441. STONES FOR LITHOGRAPHIC PURPOSES, *P. Stuart, Edinburgh.*—15*th November*, 1882. 6*d.*

The inventor claims backing slabs of lithographic stone with artificial stone, having when set a higher breaking strain than the compositions or plasters hitherto used for that purpose, such artificial stone being composed of ground granite, sand, or like material, and cement, with or without the insertion of metal rods, wires, T, or angle irons in the composition.

5442. EXTRACTION AND SEPARATION OF SALT, &c., FROM FLUIDS, *J. Mayne, Manchester.*—15*th November*, 1882. 6*d.*

The brine is placed in a reservoir, from which the surface condenser of a steam engine is supplied, and on passing through which its temperature is raised to about 100 deg., when it passes to the salt pans, which are enclosed and surrounded by hot air chambers heated by the gases of combustion from a furnace. The pan itself is divided by a horizontal plate, shaped so as to facilitate circulation. Beneath the plate are a number of steam boxes or pipes surrounding the pan. The vapour from the enclosed salt pan is conveyed to a cylinder, and compressed so as to raise the temperature, when it is supplied to the steam boxes or pipes beneath the fan.

5443. MANUFACTURE OF CIGARETTES, *J. Clarkson, Yorkshire.*—15*th November*, 1882. 4*d.*

The inventor claims providing for the entry into the body of a cigarette of a current or currents of cold air to mix with the heated tobacco smoke during its passage through the cigarette to the smoker's mouth, such air being admitted by a minute orifice or orifices so situated in the cover of the cigarette that when one end of the latter is in the smoker's mouth such orifice or orifices will be near but outside of his lips.

5444. APPARATUS FOR WEB PRINTING AND FOLDING MACHINES FOR DELIVERING AND COUNTING NEWSPAPERS, &c., *T. Sowler and W. Pattison, Manchester.*—15*th November*, 1882. 6*d.*

This relates to the construction of that part of a web printing and folding machine which delivers the printed and folded papers, whereby they are counted into dozens as they are delivered.

5445. ORNAMENTAL TILES OR BLOCKS OF EARTHENWARE, *J. Wetter, New Wandsworth.*—15*th November*, 1882.—(*A communication from J. B. Boulenger, France.*) 4*d.*

This relates to the process of producing tiles or blocks of ceramic ware, having incrustations through their entire thickness.

5446. APPARATUS FOR DEODORISING AND DISINFECTING PURPOSES, *F. J. Austin, Hounslow.*—15*th November*, 1882. 6*d.*

This relates to the arrangement of an antiseptic cistern, and to the mechanism connected therewith.

5447. SLIDING GASALIERS AND CHANDELIERS, *G. and E. Atkins, Birmingham.*—15*th November*, 1882.—(*Not proceeded with.*) 2*d.*

This relates to means for dispensing with the water joint and balance weights.

5448. ANCHORS, *J. H. Kidd, Wrexham.*—15*th November*, 1882. 6*d.*

The anchor is constructed of several pieces of cast steel or other metal.

5449. ROLLING MILLS, *F. Asthöwer and T. Bicheroux, Westphalia.*—15*th November*, 1882. 6*d.*

The inventors claim in rolling mills with the pairs of rollers arranged one behind the other, the combination of guiding rollers with a receiving funnel.

5450. FILTERING, *W. P. Thompson, Liverpool.*—15*th November*, 1882.—(*A communication from A. H. Horsnell and W. Murphy, Montreal.*)—(*Not proceeded with.*) 2*d.*

The object is to provide a tap with a permanent filtering apparatus, which, however, will allow unfiltered water to be drawn off when desired.

5451. SEWING MACHINES, *W. R. Lake, London.*—15*th November*, 1882.—(*A communication from E. A. Wilkinson, New York.*)—(*Not proceeded with.*) 2*d.*

This comprises various improvements in the vertical and horizontal shuttle and feed levers, the shuttle and

the feed, and the actuating cam and driving shaft; also the combination with a horizontal shuttle-carrying lever, to give the shuttle backward and forward motions, and the feed, upward, forward, downward, and backward motions by cam action alone, by means of vertical devices, and without the intervention of a bell-crank or a spring. Other improvements are also described.

5452. PREVENTING THE DISPLACEMENT OF KEYS OR WEDGES USED IN SECURING RAILS IN THEIR CHAIRS, &c., *L. Williams and D. Edwards, Cardiff.*—15*th November*, 1882. 6*d.*

This relates to the method of preventing the displacement of the keys of railway chairs by forming a projection or projections on the chair over which the key can be driven, or the alternative method of indentations in the chair and projections on the key.

5453. RAILWAYS, *E. N. Molesworth-Hepworth, Manchester.*—16*th November*, 1882.—(*Provisional protection not allowed.*) 2*d.*

The object is to enable railways to cross rivers or canals without raising the level of the permanent way above the height of an ordinary bridge, and still not interfering with the passage of vessels, and it consists in forming two loop lines across the river, enclosing a basin between them, and providing a swing part in each loop for the passage of the vessels.

5454. MACHINERY FOR PULVERISING SAND, ORES, METALS, &c., *J. Nicholas, Cornwall.*—16*th November*, 1882 6*d.*

This relates partly to the method of forming the barrel of a pulverising machine by joining together a series of inclined planes.

5455. VALVES FOR CONTROLLING THE FLOW OF STEAM AND FOR SEPARATING STEAM FROM WATER, &c., *J. Wetter, New Wandsworth.*—16*th November*, 1882.—(*A communication from J. J. Godet, Paris*)—(*Not proceeded with.*) 2*d.*

In front of the inlet opening a screen is placed, and a deep pocket is formed at the side of the valve seat, so that the fluid is deflected, and deposits its impurities in such pocket. An expansible receptacle is fitted to the top of the valve, and contains a suitable fluid, so that when the valve-box contains chiefly water the receptacle contracts, and lifts the valve, allowing the water and air to escape, while if steam arrives, the temperature rises, the receptacle expands, and closes the valve.

5456 HAMMOCKS, *A. Pratt, New York.*—16*th November*, 1882. 4*d.*

The inventor claims a hammock, being a combination of two, having a single body, in shape of two elongated hexagonal figures, placed side by side, with rope running through and supporting the centre thereof, provided with rings, rope edge, and stretchers.

5457. HYDRAULIC PRESSURE VALVES, *H. Berry, Gloucester.*—16*th November*, 1882.

The inventor claims as the chief and principal part of his invention the use and application of oblique leathers and passages, in the construction of hydraulic pressure valves and stops valves for water and other fluids.

5458. AUTOMATIC DOOR FASTENER FOR RAILWAY CARRIAGES, &c., *T. Scourfield, Bow.*—16*th November*, 1882. 6*d.*

This relates to the construction of mortice locks with a latch and trip bolt, operating together with the striking plate to indicate "closed" or safety position of the door handle.

5459. SOUNDING OR FINDING THE DEPTH OF THE SEA, *W. J. Mackenzie, Glasgow.*—16*th November*, 1882. 6*d.*

The object of this invention is to obtain continuous soundings while the ship is under way, and to have a constant record on board the ship by means of a galvanometer in an electric circuit, which is completed by a sounding cylinder. This cylinder contains two plates of metal or carbon, the water space between which decreases as the pressure of water on the cylinder becomes greater, the resistance in the circuit becomes less, and the galvanometer is subject to a greater deflection.

5460. CHAIRS, *W. Keen, Shoreditch.*—16*th November*, 1882.—(*Not proceeded with.*) 2*d.*

This relates to means for converting children's high chairs into low chairs when desired.

5461. PENCIL CASES, *W. R. Lake, London.*—16*th November*. 1882.—(*A communication from C. W. Livermore, Providence, U.S.*)—(*Not proceeded with.*) 2*d.*

The object is to throw the lead forward for use and retract it within the point of the case when not in use, by means of grasping jaws, formed on the end of an inner sliding tube, and actuated by coming in contact with a contracted portion of the outer case.

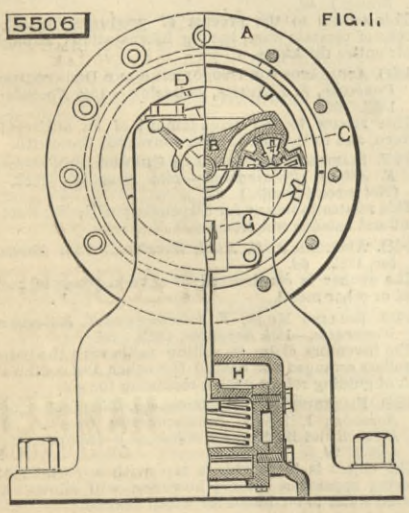
5501. SELF-ACTING BUCKETS, GRABS, OR SKEPS FOR RAISING AND DISCHARGING GRAIN, &c., *G. M. Key and J. Lowrie, Limehouse.*—18*th November*, 1882. 6*d.*

The grab, bucket, or skep opens and closes automatically, so as to be self-filling and discharging by the act of raising and lowering. The bucket is hemispherical and in two parts, connected by and pivotted to a frame. It is suspended and worked by a single chain, the opening and closing being effected by two sets of connections, so attached to the two parts of the bucket that an upward strain on one set opens and on the other set closes the bucket. The two sets of connections are respectively attached to the crossheads or slides capable of independent vertical movement, and situated one above the other. The lower one is attached to the lower end of a pair of guide rods, upon which the upper crosshead can slide, and one of the other set of connections is made to support the weight of the bucket at required moments by a self-acting tumbler, by which the bucket is connected to the chain.

5506. ROTARY GAS OR EXPLOSION ENGINE, *J. C. Mewburn, London.*—20*th November*, 1882.—(*A communication from C. D. Goubet, Paris.*) 6*d.*

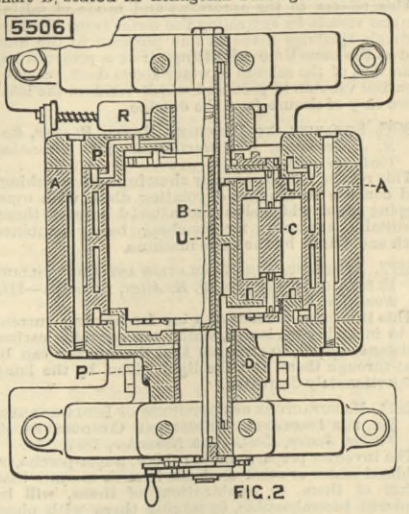
This relates to a rotary engine worked by the force produced by successive explosions of any explosive agent, such as gas, nitro-glycerine, dynamite, &c.

5506 FIG. 1.



The engine is composed of a cylinder A, in the heads of which are spaces for ensuring the circulation of water necessary for the proper working of the engine, and within which the cylinder wings are formed. The heads P have arms connecting them with a central boss, in which are holes communicating with the arms, which are hollow, and are in connection with circular spaces in the heads. One head has an excentric D, which works a pressure pump, by means of rod G and piston H, while the other carries a sliding weight R, the centrifugal action of which regulates the introduction of the explosive agent. The cylinder is supported on a shaft B, seated in hexagonal bearing in the frame,

5506 FIG. 2



and which between the heads carries the pistons C. The shaft is hollow and carries a cock U, through which the explosive mixture passes to the explosion compartments. The wing, by displacing the piston, causes the chamber in contact with it to pass before the mixture orifice of the shaft. The mixture enters the chamber and is exploded.

5507 PREPARING ASBESTOS FOR SPINNING, &c., *J. C. Mewburn, London.*—20*th November*, 1882.—(*A communication from E. Deffrennes Bettremieux, France*)—(*Not proceeded with.*) 2*d.*

This consists in submitting asbestos to the action of a carding engine of spherical construction.

5508. PRODUCING ARCHITECTURAL ORNAMENTS, &c., FROM WOOD OR OTHER FIBROUS PULP, *L. A. Groth, London.*—20*th November*, 1882.—(*A communication from C. G. Mineur, Stockholm.*) 4*d.*

This relates to improvements on patent No. 158, A.D. 1881, and consists in mixing fibrous pulp with hot water to form a fluid that will flow freely, and which is poured into a mould and a piece of muslin placed over it, a sponge being then used to absorb the water and compress the pulp, which is poured in in successive layers. The mould is then nearly dried and the pulp further compressed by hand, when a backing of thin strong paper is applied and the drying completed.

5509. PRODUCTION OF MAGNESIUM, ALUMINIUM, &c., *L. A. Groth, London.*—20*th November*, 1882.—(*A communication from R. Gratzer, Hanover.*) 2*d.*

This consists in the electrolytical decomposition of the chloride or fluoride of magnesium, aluminium, and other metals of the alkaline earths by means of dynamo-electrical machines, and comprises, First, the simultaneous employment and conduction of reducing gases, such as lighting gas; Secondly, the employment of crucibles in which the chlorides or fluorides are melted and electrolytically decomposed, such crucibles being made of metal such as iron for magnesium, and copper or iron for aluminium; and Thirdly, in the case of melting vessels made of graphite, fire-clay, or porcelain, the use of tube or other suitable shaped projections, composed of that metal which is found most suitable for the electrolytical decomposition of the metal to be thrown down.

5510. GAS MOTOR ENGINES, *J. Maynes, Manchester.*—20*th November*, 1882. 10*d.*

This relates, First, to means for maintaining the working part of the cylinder sufficiently cool to protect the lubricating material; Secondly, to avoid the loss of heat and pressure due to use of water jackets; Thirdly, to maintaining the frictional or sealing surfaces of the cylinder proper at equally proportionate measures in accordance to the pressure actuating the piston at each and every part of the stroke; Fourthly, to constructing the cylinder of any size within practical limits, according to power required; Fifthly, to introducing at the proper time the quantity of compressed cool air for combining with the gas, and form the charge, without affecting such charge by the heat of the cylinder; Sixthly, to determining and ensuring with each stroke the supply of the required amount of gas for combining the air necessary for the charge, which is raised to the temperature to give the pressure and impulse required for maintaining the motor at a uniform speed; Seventhly, to use heat abstracted during emission of previous charge for heating new charge; Eighthly, to increasing and making more uniform the power of the engine by the use of an auxiliary cylinder worked in a similar manner to an ordinary condensing steam engine cylinder; Ninthly, to enabling the engine to run in either direction by the use of a counter-shaft. Other improvements are also described.

5516. HANDLES OR HOLDERS FOR USE IN CARVING MEAT, &c., *H. H. Lake, London.*—20*th November*, 1882.—(*A communication from P. J. Carmien, near Paris.*)—(*Not proceeded with.*) 4*d.*

The handle is formed with branches to be placed over the bone of the joint and surrounded by a band of metal wound in the form of a spring, one end of which is connected to one of the branches, while the other can be moved so as to grasp the branches and hold them well against the bone.

5519. INTEGRATING APPARATUS, *J. Imray, London.*—20*th November*, 1882.—(*A communication from B. Abdank-Abakanowicz and C. Roosevelt, Paris.*) 6*d.*

This relates to apparatus in which integrating mechanism, consisting of a rotatable cylinder and an inclined disc bearing against it, is applied, either alone or in combination with reinforcing mechanism for regulating mechanical or electrical power and registering its expenditure or for measuring curvilinear areas. In its simplest form a cylinder is mounted on a horizontal axis, and against it bears the head of a disc mounted so that it can swivel on a slide or carriage moved along parallel to the cylinder axis. The disc being turned on its swivel, so that its plane lies at various degrees of inclination to the cylinder axis, when its slide is moved, the cylinder is caused to turn, and such movement communicated by gear to a counter, and thereby effect a registration of the integral, or communicated to a regulator and govern the expenditure of energy. The application of the apparatus for regulating the carbons of electric lamps is described

5520. AFFIXING FLEXIBLE TUBING TO COUPLINGS, &c., *J. Hunt and T. B. Mitton, Birmingham.*—21*st November*, 1883. 6*d.*

The coupling consists of a cased body of brass, the inner part having a bulge or swell at its end, while over it is a cap screwed to the inner body and having a central hole for the passage of the tube, so that when the cap is screwed home the tube is gripped between it and the swell on the inner part.

5522. TAPS FOR APPLICATION TO BOTTLES CONTAINING AERATED LIQUID, *P. Yates, Oldham.*—21*st November*, 1882.—(*Not proceeded with.*) 2*d.*

The hollow screw of taps used for bottles containing aërated liquids is provided with an elastic plug and a bridle jointed to a spring clip adapted to clasp the bottle below the shoulder, and is applied to such bottles when the cork has been withdrawn.

5528. REMOVING THE SUPERFLUOUS "BODY" AND GLAZE OFF ENAMELLED BRICKS, *E. B. Brooke, Huddersfield.*—21*st November*, 1882.—(*Not proceeded with.*) 2*d.*

A revolving face plate works on a horizontal shaft and is grooved and covered over with a sheet of sieveing or other wire work. The bricks are placed on a table, so as to be in contact with the revolving face plate.

5529. WINDING APPARATUS, *J. Farrar, Halifax.*—21*st November*, 1882. (*Not proceeded with.*) 2*d.*

This relates to machinery for winding fibrous material on to bobbins, spools, or pirns, and conical layers to form cops, such material being single or two, three, or more folds, so that it may be afterwards doubled or twisted. The object is to stop the spindle in the event of a thread breaking, to facilitate the removal of the cop, and ensure the equal winding of the two or more threads.

5532. LITHOGRAPHIC PRESSES, *H. J. Haddan, Kensington.*—21*st November*, 1882.—(*A communication from E. Lapeyre, Paris.*) 8*d.*

The object is to construct a rapidly-working press with perpendicularly-applied pressure and automatic moistener. A frame carries in its centre a cylinder, and at its front end is a pulley, over which passes a rope fixed at one end to the front of the carriage, and from which a weight is suspended provided with a pulley, while the other end is attached to the front beam or traverse. The rear end of each frame has a bearing for a disc or drum with a bobbin in centre, on which a band is wound, and serves to move the carriage. The moistener consists of a part to moisten the stone, a part to lift it, and a part to move it forward.

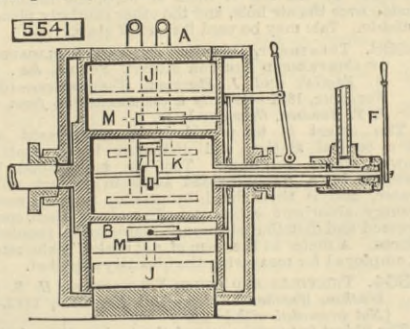
5533. WIRE FOR FENCES, *W. Friedlaender, London.*—21*st November*, 1882.—(*A communication from H. Honour and M. Friedlaender, New Zealand.*) 6*d.*

This consists in barbs or spurs formed of metal with any desired number of points, and having a central hole for threading them upon a single wire, along which they are prevented from moving by distributing the wire on each side of each barb or spur.

5541. ROTARY ENGINES, *A. M. Clark, London.*—21*st November*, 1882.—(*A communication from G. W. Wade and J. W. Wardell, Michigan, U.S.*) 6*d.*

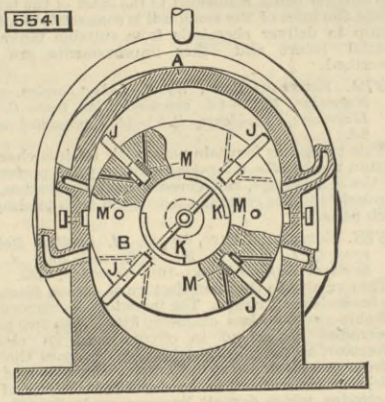
This relates to the arrangement of reversing valves and means for operating the same to change the direction of motion by admitting steam to opposite sides of the pistons, of which there are four, and also in

5541



the combination with the revolving cylinder and its radially sliding pistons or valves and passages therefor, of circular cut-off valves having their axes of motion coincident with that of the cylinder for working the engine under different degrees of expansion. In the drawing A is the case, and B the revolving cylinder forming a central steam chest, to which steam is

5541

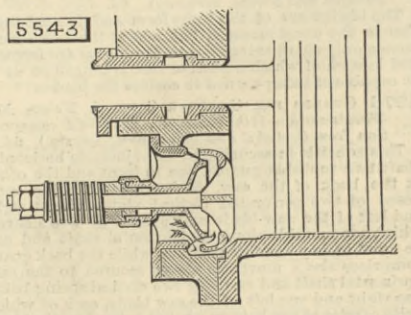


admitted by pipe C. J are the radially sliding valves or pistons, and K the circular cut off valves controlled by hand lever F. The slots in which the pistons work connect on their opposite sides with chambers fitted with reversing valves M for each piston.

5543. VALVES FOR AIR COMPRESSORS, *C. Pilkington and J. Forrest, Haydock, Lancashire.*—22*nd November*, 1882. 6*d.*

This relates to the admission and emission valves of apparatus in which air or aeriform fluids, such as gases are compressed by a pump or like appliance, the object

5543



being to enable such valves to open and close freely without shock, and to give a large area for the passage of the fluid, without undue pressure on the valves in opening or closing. For this purpose the valve is formed with inner and outer faces, which seat on two seats, as shown in the drawing.

5585. ATTACHING LAMPS TO CARRIAGES, &c., *R. J. Dobbs and F. Davies, Birmingham.*—23*rd November*, 1882. 6*d.*

According to one arrangement a taper dovetail recess is formed at the bottom of the lamp body and engages with a corresponding dovetail on the lamp iron. The upper end of the candle tube screws into the upper part of the lamp ring, and secures the lamp in position.

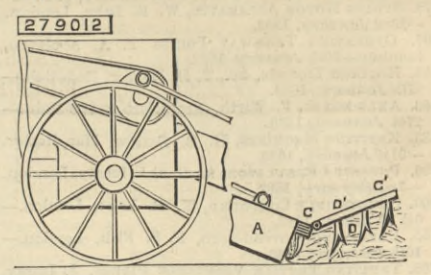
SELECTED AMERICAN PATENTS.

From the United States' Patent Office Official Gazette.

279,012. FEEDING STRAW AS FUEL TO FURNACES, *William S. Prosser, Auburn, Cal.*—*Filed September 8th*, 1882.

Claim.—The combination, with a straw feed-box A and one or more reciprocating bars C, having pivotted tines D, of a flexible rear continuation C^1, of said bar

279012

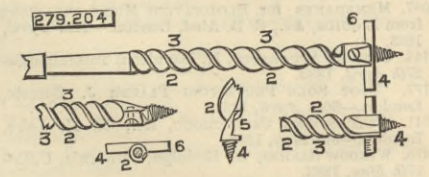


provided with teeth D^1, essentially as and for the purpose herein described.

279,204. AUGER, *Jas. Swan, Seymour, Conn.*—*Filed March 9th*, 1883.

Claim.—(1) As an improved article of manufacture, an expansion bit or auger, it comprehending a twisted body provided with a cutting lip at the lower end of one of its twists or grooves, a leading screw, an adjustable cutter, a seat for the same, and a clamp to hold the cutter in adjusted position, all substantially as described. (2) In an expansion bit or auger, the twisted body provided at its lower end with the leading screw, and having a transverse seat 5, located above the floor 4, combined with the adjustable cutter, and clamp to hold the said cutter in the seat, substantially as described, the grooves of the body acting to remove from the hole the chips made by the said cutter, substantially as set forth. (3) In an expansion bit or auger, the combination, as shown and described, of the twisted body, the leading screw at the lower end thereof, the transverse seat 5, arranged in the lower end of the body, above the floor 4 thereof, an adjustable cutter fitted in said seat, and means to hold said cutter in its seat.

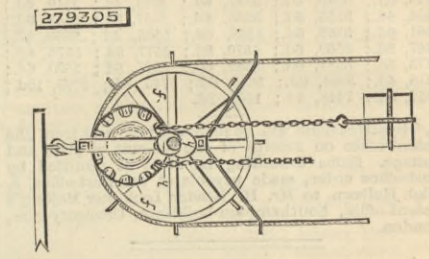
279.204



279,305. HOISTING APPARATUS, *William W. Wythe, Red Bank, N.J.*—*Filed November 6th*, 1882.

Claim.—(1) In hoisting apparatus, the combination of the toothed wheels *f f*, fixed upon one shaft, and the two cams *h h* upon a second shaft, and in the plane of the toothed wheels for engagement therewith,

279305



substantially as shown and described. (2) In hoisting apparatus, the combination of the two toothed wheels *f f* upon the chain wheel shaft and the cams *h* upon the operating shaft, placed for engagement alternately with the toothed wheels, substantially as shown and described.

CONTENTS.

THE ENGINEER, July 13th, 1883. PAGE

SOUTH KENSINGTON MUSEUM.—Visitors during the week ending July 7th, 1883:—On Monday, Tuesday, and Saturday, free from 10 a.m. to 10 p.m., Museum, 8605; mercantile marine, Indian section, and other collections, 3777. On Wednesday, Thursday, and Friday, admission 6d., from 10 a.m. to 6 p.m., Museum, 1920; mercantile marine, Indian section, and other collections, 1008. Total, 15,310. Average of corresponding week in former years, 18 709. Total from the opening of the Museum, 22,163,882.