THE MADRID EXHIBITION.

This Exhibition, the official title of which is Exposicion Nacional de Mineria, Artes Metalurgicas, Ceramia, Cristaleria y Aguas Minerales, has been re-opened. It was first opened on the 29th of last May; but was closed again on July 14th on account of the hot weather, remaining closed throughout the summer months, during which, as the popular saying goes, only dogs and Englishman are to be seen in the streets. On the 8th of September it was re-opened for the autumn. At its opening in the spring it attracted but little notice; but has been far more successful this autumn, being well attended, and articles calling public attention to it having appeared in several of the leading Madrid newspapers. The object of the Exhibition has been officially declared to be "the forwarding of the interest of mining and metallurgical industries," the Government wishing it to be looked upon "not so much as a vain display of wealth, but rather as a demonstration valuable to capitalists of the immense future and enormous opening there is in Spain for the complete development of mining, and as a most useful lesson to miners, enabling them to study the best methods of improving and perfecting their processes so as to obtain economical and remunerative results."

For the execution of this project a portion of the public park of Madrid has been enclosed, and in this enclosure, measuring about 450 metres by 350, a number of pavilions have been erected, in which the various exhibits are displayed. On entering the Exhibition grounds we have immediately facing us the grand pavilion. This handsome structure, which, unlike the minor edifices, is to be permanent, is devoted to a miscellaneous collection of exhibits. In the central space is a handsome trophy composed of finished brassware of all kinds, shown by the establishment San Juan de Alcaraz, Albacete. This exhibit is a flagrant example of a practice but too prevalent throughout this Exhibition, and which has been justly censured by the Madrid press, namely, that of admitting almost indiscriminately any exhibits that will look well and fill up space, even if they be only in the remotest way connected with mining or metallurgy. In this case more especially is the incongruity striking, when the central and most prominent exhibit in the grand pavilion of a mining and metallurgical Exhibition is seen to consist of brass bedsteads and candlesticks. Tasteful and well-arranged as the display unquestionably is, it ought, if admitted at all, to have been relegated to some subordinate position; and the place of honour assigned to an exhibit bearing more directly on the objects of the Exhibition. Immediately to the right are several similar exhibits on a much smaller scale, as also some excellent examples of malleable iron castings made by Messrs. Sagardin and Sons, of Bilbao; some of the castings are shown simply rumbled, others finished and nickel-plated, whilst the amount of twisting, &c., that some of these objects have undergone without fracture shows that the art of producing malleable castings has here been carried to a high degree of perfection. Further down we come to the capital exhibit of Messrs. Hadfield and Co., of Sheffield, who show a number of their excellent cast steel products, such as bevel and spur wheels, spanners, tram and mine wheels, railway crossings, &c., some of the castings being drawn out under the hammer to show the high quality of the steel. This is undoubtedly one of the most creditable of the English exhibits here. Next to it are a couple of table cases containing a collection of Spanish minerals shown by the Spanish Natural History Museum. Of it we can only say that it is very far from doing justice to its subject, being notably imperfect and not well arranged. Indeed, it may be remarked that in the whole Exhibition there has nowhere been any attempt made to illustrate the mineralogical as distinct from the mineral wealth of Spain. We find, of course, tons of lead ore, but the beautiful series of crystallised lead minerals for which Spain is famous are here barely represented, some characteristic species, *e.g.*, Linarite, being altogether absent. This exhibit, indeed, falls very far short of what one might fairly have expected to find under the actual circumstances. Near these cases, in the south-west wing of the building, the important Sociedad General de Fosgatos show a very complete series of minerals—phosphate of lime—and country rock from their mines at Caceres. This company, which was only incorporated in 1876, is now working six mines at Caceres, and producing monthly from four to five thousand tons of crystalline phosphate of lime of various qualities. The bulk of their production is, we believe, shipped to England *viâ* Lisbon, for conversion into superphosphate.

In the opposite wing, the Compania de Ferro-carriles de Madrid a Saragosa y Alicante call attention to the extent of their coal mining operations with a well-executed model of the poppet heads and winding engines at the mouth of one of their pits, and a handsome and tasteful trophy built of bricks moulded of crushed coal, and show also samples of their round coal, coke, and a collection of fossils found in the course of their operations. Like most Spanish railway companies owning coal mines, they prefer to burn these bricks of artificial fuel in their locomotives—thus using up their slack—and to dispose of their round coal and coke to consumers. In the nave of the pavilion the Sandycroft Foundry Company are poorly represented by a couple of small models, one of an Elephant stamp of an improved type, and the other of a ten-stamp Californian gravitation battery of antiquated design. Near this is a small display of Cardowan fire-bricks, lumps, &c. A handsome trophy, consisting of roll, cake, and flowers of sulphur, shown by the Sociedad Espanola de Azufre, Bilbao, is worthy of notice.

Two metallurgical processes illustrated here deserve a word, principally on account of their somewhat unsubstantial claims to be considered novelties. The first is the so-called Dupuy system of obtaining malleable iron direct from the ore; in it, the ground ore mixed with a certain proportion of iron and clay is formed into hollow bricks in a special mould, and then reduced by cementation in a gas furnace, there being thus little in the process to distinguish it from the Chenot and dozens of similar abortive attempts to do away with the necessity of producing pig iron in the first instance. It is said, however, to be working successfully in the United States. The other process is that of Sor Manhés, which is worked by the Sociedad Anonyma de Metallurgia del Cobre at their mines in Corduba. The process consists in first smelting the ore for regulus in the usual way, and then "blowing" the molten matte in a converter closely resembling the Bessemer converter, the only difference being that the Manhés converter has its tuyeres horizontal and a short distance above the bottom. This process, it will be seen, is just about the same thing as the Hollway process, which was brought so prominently before the notice of metallurgists some four or five years ago.

Leaving the grand pavilion and keeping to the right through the grounds, we come first to the exhibit of the famous Almaden mines. In a small pavilion built and decorated in the Moorish style are displayed a complete series of the various grades of mercurial ore that are here worked, together with plans and models of the mines and furnaces. In the centre of the floor is a small cast iron fountain sending up a jet of mercury. Near to this exhibit is that of the Morgan Crucible Company, who show their well-known graphite and fire-clay crucibles, muffles, and furnaces. The next exhibit of importance is the so-called German collection. This is in a light iron edifice constructed by a Berlin firm and containing examples of machinery exhibited by a number of German firms. H. Grüson, of Bruckau, near Magdeburg, shows an extensive collection of chilled iron castings, such as mine and tramway wheels, anvil blocks and railway crossings, some broken to show the depth and nature of the chill. He also exhibits stone breakers of the Blake type, a good set of Cornish crushing rolls, and some disintegrating mills for the softer classes of minerals; the chilled castings produced by this firm appear to be of excellent quality. Körting Brothers, of Hanover, also display a good deal of miscellaneous mining machinery, the most notable being a pulsometer closely resembling the well-known English type. Among the other exhibits in the German section are fire-bricks, gas retorts, and other refractory material from Stettin, blasting and gunpowder from Rottweil, Hamburg, steel cables and wire from W. Schulze, of Wellinghausen, and other articles of minor interest. The so-called Machinery Gallery, which we come to next, is conspicuous chiefly by its poverty, the principal exhibit here being steam engines of various types. The Maguinista Terrestre y Maritima, of Barcelona, show a highly finished stationary horizontal engine of 100-horse power, with an improved Corliss valve motion, as also several smaller engines; the exhibits of this company are remarkable for their good designs and high-class workmanship. Robey and Co. show several steam engines, among them a very neat semi-portable engine, complete with boiler, &c., and with the cylinders beneath the boiler; this engine is frequently in motion, working a rotary pump of the same makers. The Pulsometer Engineering Company, Limited, London, also exhibit here a number of their pulsometers. The next building, the so-called annexe to the grand pavilion, contains a number of minor exhibits, principally specimens of minerals from various mines of very secondary importance.

A small kiosque near the last shows the lead ores, and the metallurgical products obtained therefrom, of the famous mines of Linares, known as the Arraganes; this is one of the mines which belong to the State, but are farmed out to private individuals.

The Real Compania Asturiana make a magnificent show of mineral wealth in a most gracefully designed and well-executed ornamental pavilion, built entirely of sheet zinc. The minerals here displayed comprise coal of good quality from the Arnas mine—Asturias—blende, calamine, galena, copper pyrites, fluorspar, spathic and specular iron ore, &c. They also show specimens of zinc and lead in ingots, tubes, and sheets, and some machinery for the production of these articles. Moreover they have a narrow gauge—55 centimetres—engine and car, the former built by Marcinelle and Couillet, Belgium, running on a circular track and through a tunnel constructed by the Orbo Coal Mining Company, in order to give the general public an idea of the appearance presented by one of the main levels in a well kept coal mine. The Real Compania Asturiana produced in 1882, 30,400 tons of zinc, in ingots, sheets, &c, 13,000 tons of lead, and 9400 kilogrammes of fine silver.

The next exhibit is the very important one of the Rio Tinto Mining Company. The handsome wooden pavilion dedicated to their mines and their various products was made and ready for shipment to Spain within twenty days after the receipt of the order for it by Messrs. W. H. Lascelles and Co., of London, and reflects great credit on that firm. The centre of the floor is taken up by a large model of the workings at Rio Tinto, the character of the ore deposit being moreover fully explained by various geological and other maps and plans. There are also plans and models of the various machinery and the wharves employed in getting, preparing, and shipping the mineral. Round the walls are cases containing an excellent series of specimens illustrating the process of kernel roasting, specimens of cement copper, and other cupriferous products obtained from the ore; samples of iron and steel manufactured in great part or entirely from the roasted ore—"Blue Billy"—after the sulphur and copper have been removed; these are contributed by Messrs. Cammel and Co., of Sheffield. The Runcorn Soap and Alkali Works show a series of chemical products, whose manufacture is based on the employment of the sulphuric acid obtained from Rio Tinto pyrites; and Messrs. Jas. Gibbs and Co. show artificial fertilisers, produced by the aid of the same acid. This exhibit of Rio Tinto ores and the secondary products obtained from it is one of the most instructive and elegant in the Exhibition, and moreover, teaches a very suggestive lesson as to the value of foreign enterprise in turning to account the great mineral wealth of Spain. As long as the Rio Tinto mines were in the hands of the Spanish Government, they were practically unproductive. English capital and enterprise were set to work, and have produced the splendid results demonstrated in this excellent exhibit.

Continuing our round, we come to a small shed, in which the Osnabrück Iron and Steel Company show samples of girders, beams, and rails of Bessemer steel, as also examples of their systems of sleepers of the same material for rail and tramways. The sleeper consists practically of an inverted light channel beam. The excellent quality of their material is shown by rail ends that have been drawn out under the hammer, and worked into all manner of grotesque forms; notable are two ends of their railroad sleepers, each of which has been forged out into a tolerably well-shaped miner's hat.

An English firm in Madrid, acting as agent for several well-known English manufacturers, has made a rather pretentious display, which it has thought fit to entitle the pavilion of "Maquinaria Inglesa." The main attraction here consists of a full-sized pit, 3 metres by 2 metres in section and 13 metres deep. This little shaft has been bricked to hold the sides up, and is furnished with ladderway and a set of force pumps; also with a pair of iron kibbles and the corresponding poppet heads, all worked by a 10-horse power horizontal Tangye's engine. So far the exhibit, though, of course, devoid of anything like novelty as far as the machinery goes, is calculated to give a fair idea of the appearance of a pit's mouth in active operation, and is well adapted to catch the attention of the unscientific public. This is all very well, and no fault can be found with it; but, unfortunately, it has been considered necessary to add to it, and work by the same engine, a pair of miserably constructed Cornish rolls with revolving riddle and a bucket wheel of a most antiquated type of construction, the rollers being raised up on a frame about 10ft. high, and pressed together by the old-fashioned and clumsy bucket counterpoise.

In striking contrast to this arrangement, and as though designed to make its defects more apparent, we have close to it the elegant exhibit of ore-crushing and concentrating machinery shown by the Humboldt Manufacturing Company, of Kalk, near Cologne, which is, perhaps, the only one in the whole Exhibition deserving of careful study by a mining engineer. This firm show a first-class floor of ore-dressing machinery of modern type, designed to treat 25 tons of ore per day, the apparatus for the treatment of the slimes alone being wanting. The machinery consists of:—(1) A 15-horse power horizontal engine with vertical boiler, which, though well adapted for its purpose, is certainly not equal to the engines shown by some English firms. (2) A strongly constructed ore breaker of the Blake type, but clumsier, and apparently less efficient than the best English models. (3) From the ore breaker the broken mineral passes to the Cornish rolls. These are of a very neat and compact design. The rolls are constructed with renewable rings of good chilled iron, and are furnished with solid rubber springs carefully protected from grease and oil. The distance apart of the rolls can be regulated at will, and a hopper with automatic feeding gear is added. (4) The crushed ore is lifted by an endless belt, furnished with light wrought iron buckets, to the uppermost of a set of four sizing drums set on a wrought iron frame, the mesh of the largest riddle being 4 mm., and of the smallest 1½ mm. (5) The product from each drum passes to a continuous acting jig, with fixed sieves and movable pistons, of the well-known Rittenger type. Each jig is set in a wrought iron case. For the two smaller sizes the concentrated mineral passes through the sieves; for the two larger ones there are delivery gates for each class of minerals, none passing through the sieve. In either case the result is the same, the products from each jig being concentrated ore, deads, and an intermediate product which consists of such particles as are composed partly of ore and partly of gangue. This intermediate product has to be again crushed before being further treated. The crushing is effected in a simple disintegrating mill, known as the Heberle Mill. In an iron case revolve a pair of discs face to face, a little excentric in their positions as regards each other; the distance apart of these discs, which are made of cast iron chilled on their inner faces, can be regulated by means of a screw. After being crushed in this mill the fine ore is returned to the jigs. By means of this dressing machinery it is claimed that the most intimately mixed ores can be completely separated from each other and from their veinstuff. At the time of our visit it was working very well, but the ore under treatment was one that offered no difficulty whatever, being a rather coarse-grained galena in a calcareous gangue. It has the advantage of being very compact and of using a very small quantity indeed of water. It is to be noted that this latter is a most important desideratum in any machinery intended for use in Spain.

The next important exhibit is the very neat structure representing Swedish mining and metallurgy. Its leading features are the air compressors and rock drills on the Schramm system, some horizontal engines by the Atlas Company, steel bars, and machine, and mining tools from some of the principal Swedish manufacturers, and chilled cast iron wheels from the Arboga Company's foundries. Thalen's magnetometer for investigating the magnetism of minerals is also shown here, together with various other scientific instruments. The entire Swedish exhibit, which has been entrusted to the care of Professor Nordenström, is very neatly arranged, and makes a most favourable impression upon the visitor, testifying to the very advanced state of the mining and metallurgical industries of that country.

Near the Swedish pavilion we note the exhibit of the Sociedad Hullera y Metalurgica de Belmez, who show two tall pyramids of artificial fuel—bricks of compressed coal-dust—also much good-looking round coal, lead ores, pig lead, &c. In connection with this exhibit may be noted a deficiency for which, with a very few exceptions, nearly all exhibitors may be blamed. We refer to the great dearth of analyses of the minerals exhibited, and notably, in the case of coals and iron ores, an exhibition of the mineral without stating its composition is of but little practical use.

Close to this last exhibit again is the tasteful structure erected by three of the most important companies in Bilbao, namely, the Orcanera Iron Ore Company, La Société Francobelge des Mines de Somorrostro, and La

Sociedad de los Altos Hornos y Fabricas de Hierro y Acero de Bilbao—Sores Ybana y Cia. The first of the above-named companies exhibit a splendid pyramid and several large masses of their magnificent iron ore, plans of their mines and inclined planes, wharves, &c., and an excellent series of models showing their different methods of loading, carrying, transferring, and discharging their iron ore on its way from the mine to the ship's hold.

The Société Francobelge have an exhibit very similar to the above. They show beautiful specimens of their fine brown hematite, together with their other ores, maps, plans, &c., and an excellent model of their inclined planes, and of their arrangements for transferring the mineral from the mine cars to the railway trucks. These two are the principal mining companies of the Bilbao districts, and between them shipped last year about a million tons of ore, the total export from Bilbao having been four millions of tons.

These two exhibits occupy the two sides of the pavilion, in the middle being that of Messrs. Ybana and Co., who show, besides models of their three blast furnaces, samples of their pig and bar iron of various sections; also some very good castings. We have it on the best authority that this enterprising firm are about to increase largely their blast furnace capacity, and to lay down a complete blast furnace plant, which will be the first of its kind in Spain.

The Compania de Mines y fundiciones de Santander y Quiros show in a large wooden structure a number of bars and beams of iron of various sections; also samples of coal, iron ore, and calamine mined by them. Similar are the exhibits of the Sociedad Anonima Fabrica de Mieres, the first firm that succeeded in making coke iron in Spain, and also that of the Sociedad Duro y Compania.

The province of Asturias, one of the richest in mineral wealth of all Spain, has shown in a large pavilion samples of its various mineral products, including ores of iron, copper, antimony, mercury, cobalt, nickel, zinc, manganese, and lead, also peat, lignite, several varieties of bituminous coal and anthracite, and a large collection of rocks suitable for building materials.

The above brief description will serve to give a general idea of the character of this important Exhibition; there are, in addition to those already enumerated, various exhibits of raw ores, crude metallurgical products, mineral waters, china, glass, and earthenware, &c., which we have not thought worthy of individual mention. The general impression which the Exhibition produces is that of the enormous mineral wealth of Spain. Spain has at least six separate and large coalfields, in most of which the coal is close to the surface and can be readily got. On every side in this Exhibition may be seen large blocks of splendid looking coal, not to speak of other fuel, such as lignite, &c. Spain has within its own limits fuel sufficient to supply the wants of an indefinite number of manufacturing industries, certainly far more than sufficient to produce anything it can possibly need for its own consumption; yet not only are nearly all the manufactured goods it consumes imported, but more than half even of the fuel it uses is imported from abroad. No stronger proof of the want of Spanish enterprise, and of the magnificent field open to the employment of foreign capital, could possibly be adduced. The same may be said of the Spanish iron trade. Spain exported last year close on five million tons of iron ore, and imported two-thirds of the iron it consumed, the total consumption having been only 170,000 tons in round numbers. The greater part of this import was from England; yet in Spain better ore than the best Middlesbrough ore is being every day rejected as refuse. It is but just to add that Spain has made great advances in metallurgical matters in the last half-dozen years.

Whilst the display of native mineral products in this Exhibition is most interesting and instructive both as regards their variety and economic importance, that of mining machinery, principally, of course, derived from foreign sources, is notably inferior. It is true that none of the best English or American houses have exhibited, and that only Germany and Sweden, among foreign nations, have made even a pretence of showing any good mining machinery. Such an important trade as the Spanish ought not, however, to be neglected by English manufacturers; whilst German houses have on the other hand carefully studied the requirements of the Spanish mining industry, and are therefore justly esteemed there. It is probably to such facts as these that the opinion is due which we have heard more than once expressed in Madrid, namely, that England cannot compete with other nations in the manufacture of ore-dressing machinery. We may add, and the circumstance may have some significance in this connection, that the mining schools of nearly all European States are represented by maps, drawings, scientific works, &c. Our own geological survey is represented, but it is almost superfluous to add, we are not represented by any national School of Mines.

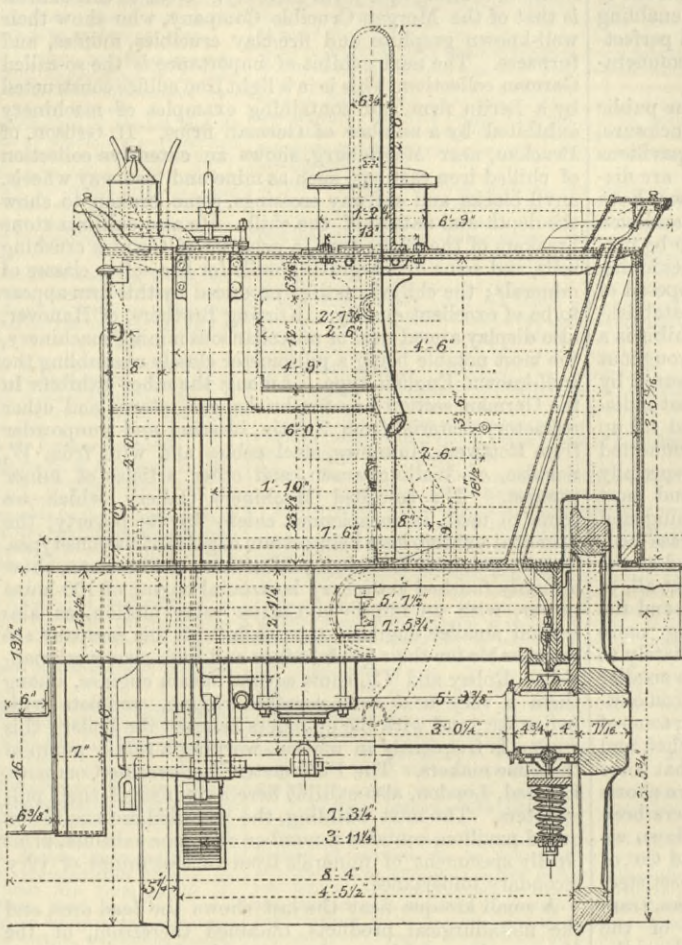
The Panama Canal.—According to a statement by M. Dingler, director-general of the Panama Canal work, the amount of earthwork will be 100 millions, instead of 80 millions as previously estimated. These, however, it is now said, will cost less than 80 millions would have done had the rock expected been met with. It is now affirmed that the very hard rock does not exist, and even the hard rock is much less thick than a survey had indicated. The soil being thus much less refractory than was originally supposed, the mode of cutting has been changed. The embankments of the canal, which in the rocky part would have been almost like vertical walls, will be flatter, involving the removal of more cubic metres. This accounts for the total of 100 million metres instead of 80. But the first excavations, according to the engineers, would have cost 10f. a metre, whereas the new work will only cost on an average a-third of this sum. The 100 millions of cubic metres to be removed, with the accessory labour, expenses of administration —in short, with everything included, may be expected to cost in all 500,000,000f. With 100,000,000f. for meeting the unforeseen, a total of 600,000,000f. is the expenditure indicated by M. de Lesseps for the completion of the canal, provided, of course, there is no new miscalculation. In was believed at the outset that the canal might be ready in 1888, viz., five years. Last year this calculation became a certainty. The unexpected fact is reported that at some sections whither machines had been brought to perform the excavations, the negro workmen hired in great numbers merely as hodmen, asked to be allowed to do the excavating themselves, and have, in fact, succeeded in doing it cheaper. The machines were, therefore, conveyed to another yard.

THE "GLADSTONE" EXPRESS LOCOMOTIVE—L. B. & S. C. RAILWAY.

No. II.

In our last impression we described the Gladstone in general terms. We have now to call attention to certain characteristics of the engine which deserve particular attention.

The boiler contains a great deal of heating surface in proportion to its weight and its size. The tubes being very small, very numerous, and closely set, it would not be possible to work such a boiler satisfactorily unless certain precautions were taken to supply it with very clean and pure feed-water. It is well-known that if water is heated it throws down lime salts, and the use of hot feed-water economises fuel and spares the boiler many strains due to the forcing in of cold water. Mr. Stroudley has for several years heated his feed-water by carrying a portion of the exhaust steam back into the tender. This system also allows the exhaust of the Westinghouse pump to be utilised, as this is turned into the bottom of the tank through a check or non-return valve; it also softens the blast and permits the waste cock from the steam chest to discharge into the water instead of blowing all over the station—a very serious matter in crowded London stations in the winter. To use hot water, however, a pump must be employed; and if our readers will turn to the supplement we published last week they will see that the pump is of peculiar construction. It has three inlet and three outlet valves, and an air chamber placed quite close over the outlet valves; the pump ram is a steel tube with an internal rod welded to it at the back end, so that it is elastic, and free to follow the spring of the frames and twist of the engine. Such pumps give less trouble and cost less to maintain than injectors. In the suction pipe two small snifting valves are fitted; these take in air at every stroke, and so soften the working of the pumps, and keep the air vessels supplied. When the water, however, gets very low in the tender and very hot, these valves do not work; and a small cock is provided on the Westinghouse main pipe, which allows a little air to escape into the pump, keeping it perfectly quiet, as when the water is colder. By using this system, in preference to injectors, the boiler is also kept cleaner, and of course makes steam better. The large goods engines on the Brighton Railway ran 300,000 miles before the tubes were taken out, and they were then quite clean. A point well worth notice is that the tubes are all bent upwards by an amount equal to their own diameter, namely, 1½in. This permits expansion and contraction to take place without starting the tube ends in the plates, the tubes hogging up or straightening themselves as the case may be. This bending is done very quickly and accurately across a horse by the boiler makers. The tubes so bent never leak or give trouble in any way.

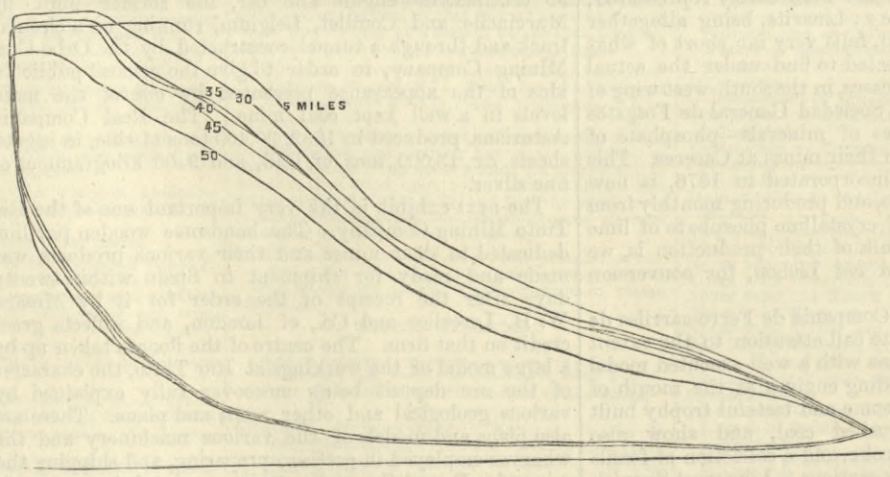


CROSS SECTION OF TENDER.

The crown of the fire-box is supported by solid roof stays; these are forged, and the water spaces cut out, the bosses being afterwards rounded in a drilling machine and tapped. This admits of the stay being reduced in thickness and kept well above the crown plate, the space being actually 2in. These stays lap well over the ends of the vertical plates on which they rest, and are provided at the back ends with bosses into which copper stays are tapped in the same manner as in the other parts of the fire-box. There are no longitudinal or through stays. The stays are attached to the crown of the outer shell by heavy angle bars which are carried well down into the water space and thinned off towards the ends, to prevent local action by the deflection of the crown. The holes are made $\frac{5}{16}$in. oval to permit the fire-box to rise when the steam is being got up. It is now more than twenty-five years since Mr. Stroudley first adopted this practice. We may mention here that he has for some time past been using the direct stay introduced by Mr. Stirling, of the Great Northern Railway. This was first applied in the small "Terrier" engines, where it works admirably, giving no trouble whatever; but it is found that the expansion in a large fire-box is so great that it does not answer, causing the tube plates to crack and the top to bend down; and the stays also sometimes break. For a long time past Mr. Stroudley has not built any engines other than on the present system introduced some sixteen years ago. Roof stays have been generally made flat on the underside, and a ferrule put between the stay and the crown of the box; but as this is not in metallic contact with the stay bolt, the latter becomes heated and the head burns off and gives trouble. This does not take place when the stay bolt is screwed into the roof stay close down to the plate, as the cooling surface of the stay is so great as to protect the stay bolt.

The fire-door was designed by Mr. Stroudley many years ago. Its construction is clearly shown in our supplement; it consists of two parts, the upper worked by a lever, and a lower, which is merely a light iron flap. This door is very satisfactory in its action and easy to maintain. The cast iron deflector, which forms the door, is separate from the hinge, and can be replaced in a few minutes; they generally last from three to four years without renewal. The old wrought iron deflectors formerly employed were very costly, wearing out in a short time, especially if not carefully used. The advantage of this form of fire-door is that it prevents the cold air obtaining access to the tubes, and it allows the driver to work the door when firing is going on, without taking his eyes off the signals and without looking into the fire; which, of course, has a bad effect upon the eyes at night time.

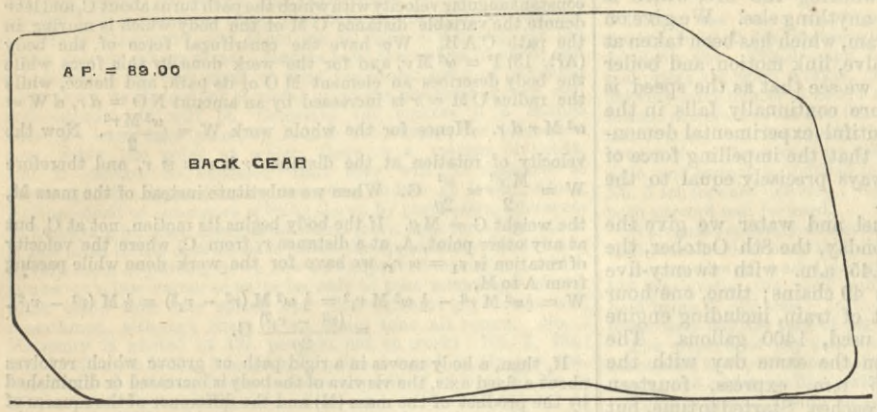
The whistle was designed some twenty years ago by Mr. Stroudley. He tried a number of experiments before adopting the proportions now used, so as to obtain a powerful note, and at the same time one that would give as little offence to the ear as possible. He found that the particular dimensions adopted give a soft note, which carries much better than the shrill whistle, which, though ear-piercing when close to, cannot be heard at a distance; indeed, it cannot be heard so far as a signalman can see the steam. It was pointed out to him by a signalman many years ago, that he could see the engines whistle without hearing them; but, of course, this was only useful in the daytime, hence the alteration. The valve is so arranged that the driver, by taking hold of the handle, causes the whistle to speak instantly, no matter which way he moves the handle, and this quickness is of value in the case of platelayers and others, who are frequently on the line in front of the engine, and require very prompt notice.



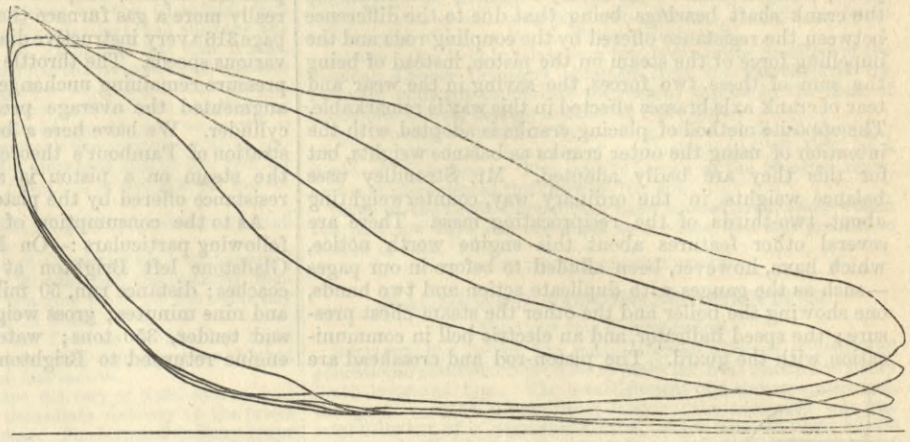
Cut off, 27 per cent.; boiler pressure, 125-140 lb.; steam chest pressure, 120-130 lb.; speed, 25 to 50 miles per hour; gradient, 1 in 264 up; number of carriages, 13; approximate weight of train and passengers, 118 tons 18 cwt.

The arrangement of the reversing gear is extremely ingenious, and in so far as we know, almost the only successful automatic reversing gear in use in this country. The reversing wheel and screw can be worked by hand, but the compressed air from the Westinghouse brake reservoir is employed to do all the heavy work. Mr. Stroudley, in designing a large goods engine in 1870, made an arrangement of steam and hydraulic gear for reversing, providing a by-pass cock, however, to the hydraulic arrangement, so that the usual hand lever could be used should anything go wrong with the steam apparatus. Fearing, however, to introduce any complication at the time, he let this stand over, but steam and hydraulic gear has, on exactly the same plan, but without the hand lever, been since applied

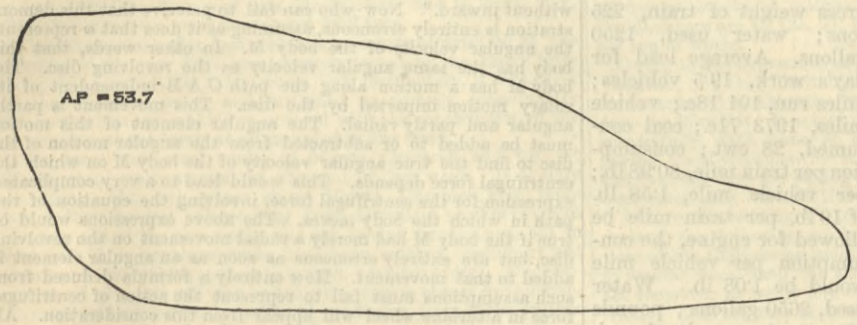
on many railways. It, however, has this disadvantage—that the engine cannot be reversed unless steam is put on, and should anything fail in the apparatus it could not be reversed at all. In 1873 he introduced the direct screw to the reversing rod, doing away with the quadrant lever and multiple joints, making a very simple arrangement, and fitted to the "D" class engines on the Brighton line. He was, however, obliged to retain the reversing lever for the goods engines, owing to the great amount of shunting which they had to do, and as this reversing lever demands very severe labour on the part of the driver, he has since contrived the screw gear adopted for the Gladstone. A cylinder 4½in. diameter is fitted with a piston and rod attached to the nut of the reversing screw, and a small three-way cock allows the air from the Westinghouse main reservoir to pass in behind the piston. This forces the engine into back gear, and the screw has merely to be used to regulate the movement. By allowing the air to escape, the weight of the valve motion will put the engine into forward gear. There are no balance-weights. This apparatus leaves all the hand gear exactly the same as before, but takes away the whole of the labour required for reversing. A child could reverse the largest engine when running at full speed with its full load. This reversing gear is simple, elegant, and satisfactory in the highest degree. This is not the only use made of the Westinghouse fittings by Mr. Stroudley. Engines fitted with pumps alone will get into trouble if they are compelled to stop for any time with a heavy fire on, no means existing of getting water into the boiler. To obviate this difficulty Mr. Stroudley puts an auxiliary feed-pump under the air cylinder of the Westinghouse engine, and he provides a valve by which air is permitted to circulate in the air-pump instead of being forced into the receiver. The Westinghouse engine being then put in motion will feed the boiler with water at a sufficient rate to avoid all risk while the locomotive is standing. The auxiliary pump is capable of throwing about one-half as much water as one of the normal feed-pumps. The



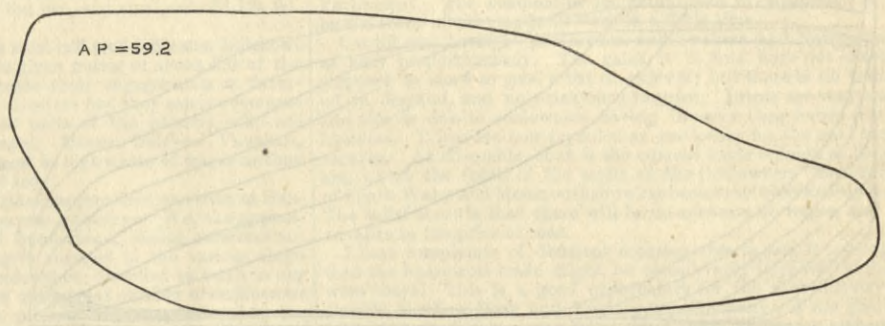
Cut-off 75 per cent.; boiler pressure, 110 lb.; steam chest pressure, 110 lb.; speed, 9 miles per hour = 39 revolutions per minute; gradient, 1 in 313 up; number of carriages, 13; approximate weight of train and passengers, 118 tons 18 cwt.; total indicated horse-power = 238·4.



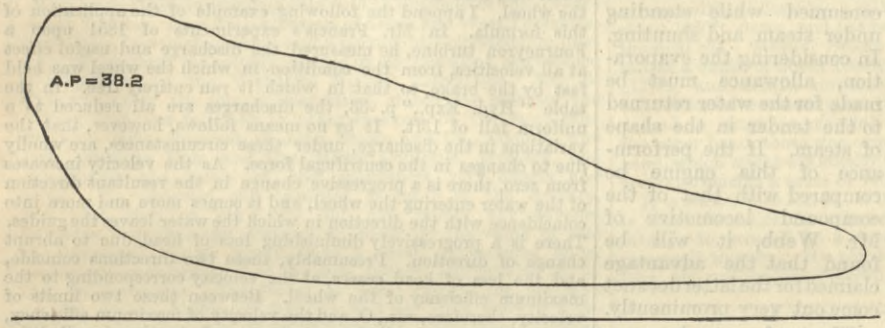
Cut-off, 17 to 50 per cent.; boiler pressure, 135 lb.; steam chest pressure, 130 to 110 lb.; speed, 50 to 51 miles per hour; gradient, 1 in 264 up; number of carriages, 10; approximate weight of train and passengers, 91 tons 6 cwt.



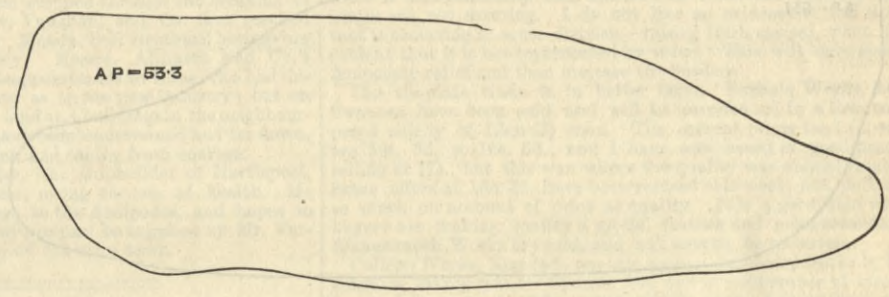
Cut-off, 58 per cent.; boiler pressure, 125 lb; steam chest pressure, 100 lb.; speed, 56 miles per hour = 242·66 revolutions per minute; gradient, 1 in 660 down; number of carriages, 18; approximate weight of train and passengers, 173 tons 12 cwt.; total indicated horse-power = 1040·88.



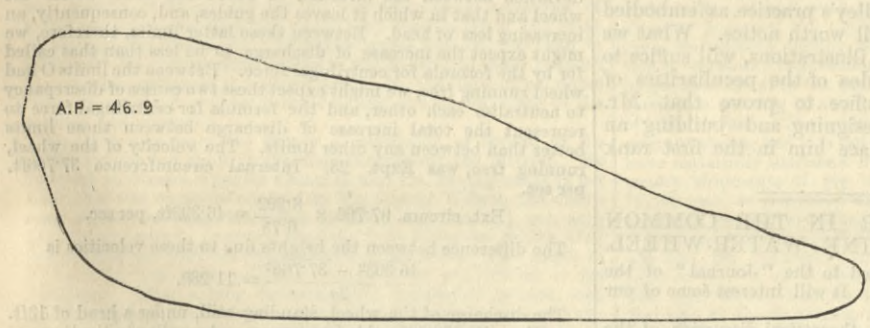
Cut-off, 62 per cent.; boiler pressure, 130 lb; steam chest pressure, 100 lb.; speed, 53 miles per hour = 229·6 revolutions per minute; gradient, 1 in 264 down; number of carriages, 16; approximate weight of train and passengers, 146 tons 6 cwt.; total indicated horse-power = 933 6.



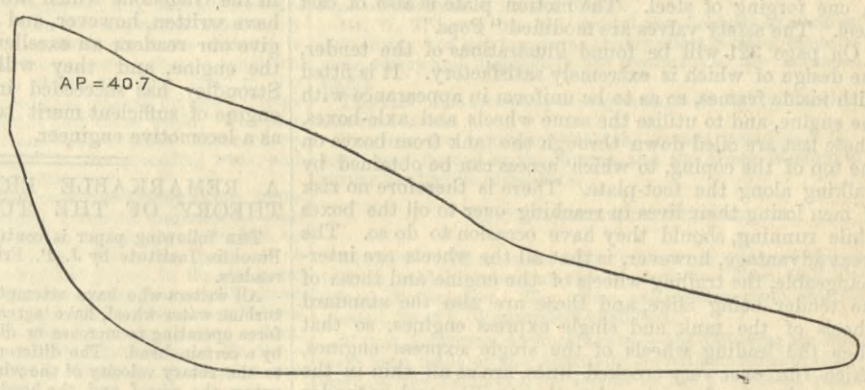
Cut-off, 50 per cent.; boiler pressure, 110 lb.; steam chest pressure, 110 lb.; speed, 65 miles per hour = 281½ revolutions per minute; gradient, 1 in 660 down; number of carriages, 16; approximate weight of train and passengers, 143 tons 3 cwt.; total indicated horse-power = 738·94.



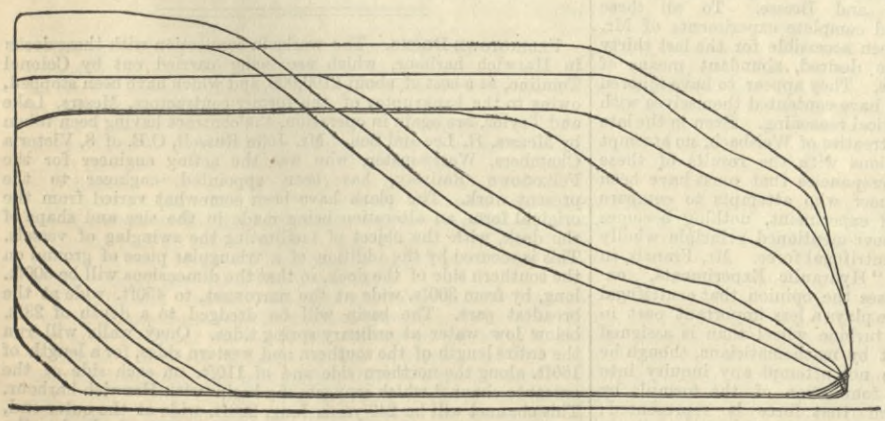
Cut-off, 6³ per cent; boiler pressure, 115 lb.; steam chest pressure, 100 lb.; speed, 60 miles per hour = 260 revolutions per minute; gradient, 1 in 264 down; number of carriages, 25; approximate weight of train and passengers, 305 tons 11 cwt.; total indicated horse-power, 951·6.



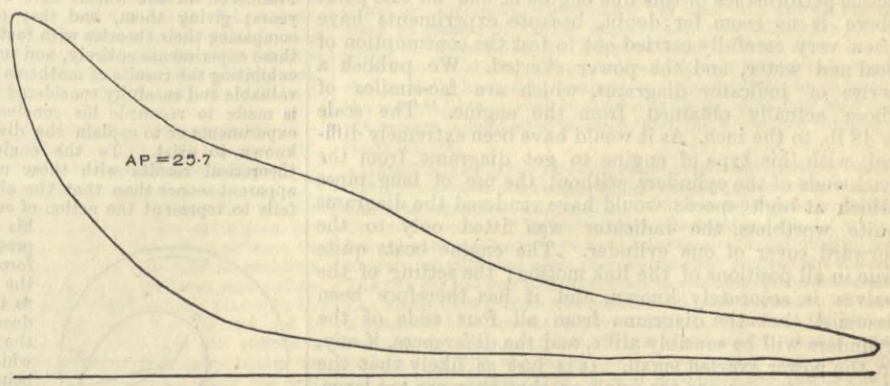
Cut-off, 50 per cent.; boiler pressure, 125 lb.; steam chest pressure, 125 lb.: speed, 65 miles per hour = 281½ revolutions per minute; gradient, 1 in 264 down; number of carriages, 16; approximate weight of train and passengers, 143 tons 3 cwt.; total indicated horse-power = 906.



Cut-off, 50 per cent.; boiler pressure, 125 lb.; steam chest pressure, 120 lb.; speed, 65 miles per hour = 281½ revolutions per minute; gradient, 1 in 264 down; number of carriages, 16; approximate weight of train and passengers, 145 tons 5 cwt. total indicated horse-power = 787·2.



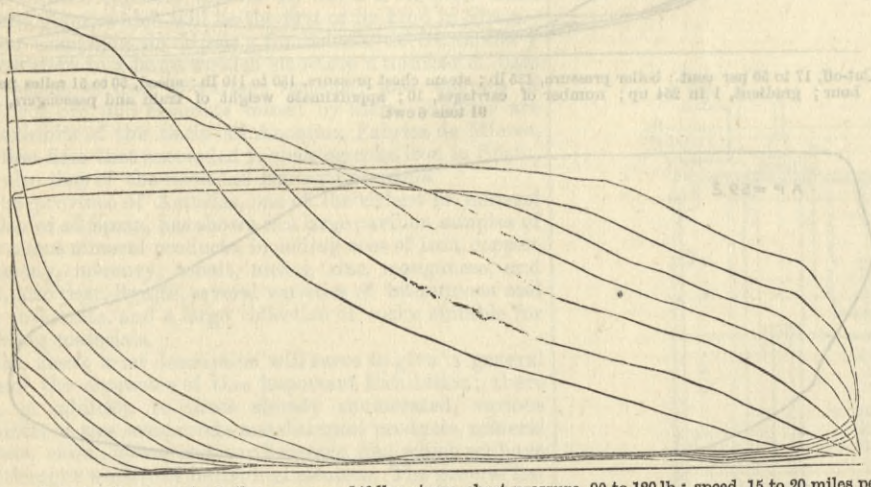
Cut-off, 75 to 33 per cent.; boiler pressure, 115 lb.; steam chest pressure, 105 lb.; speed, from 0 to 30 miles per hour; gradient. 1 in 313 down; number of carriages, 8; approximate weight of train and passengers, 64 tons 8 cwt.



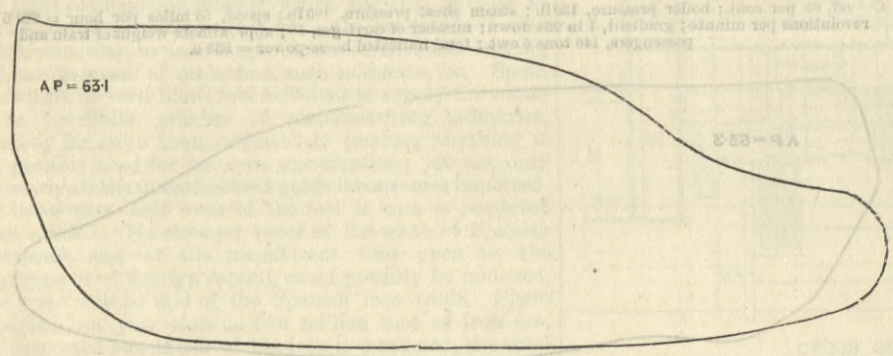
Cut-off 33 per cent; boiler pressure, 110 lb.; steam chest pressure, 105 lb.; speed, 67 miles per hour = 290·3 revolutions per minute; gradient, 1 in 264 down; number of carriages, 25; approximate weight of train and passengers, 305 tons 11 cwt.; total indicated horse-power = 512·4.

arrangement for applying the brakes to the engine is clearly shown in our supplement. Two small cylinders with pistons are fitted at the lower ends of the brake hangers, and receive the air through small flexible copper pipes.

It will be seen that the outside cranks are in a line with, and not opposite to, the inside cranks, as is usually the case. This plan has been adopted by Mr. Stroudley for many years, with the most satisfactory results. The strain on the crank shaft bearings being that due to the difference between the resistance offered by the coupling rods and the impelling force of the steam on the piston, instead of being the sum of these two forces, the saving in the wear and tear of crank axle brasses effected in this way is remarkable. The opposite method of placing cranks is adopted with the intention of using the outer cranks as balance weights, but for this they are badly adapted. Mr. Stroudley uses balance weights in the ordinary way, counterweighting about two-thirds of the reciprocating mass. There are several other features about this engine worth notice, which have, however, been alluded to before in our pages —such as the gauges with duplicate action and two hands, one showing the boiler and the other the steam chest pressure; the speed indicator, and an electric bell in communication with the guard. The piston-rod and crosshead are in one forging of steel. The motion plate is also of cast steel. The safety valves are modified "Pops."



Cut-off, 73 to 17 per cent.; boiler pressure, 140 lb.; steam chest pressure, 90 to 120 lb.; speed, 15 to 20 miles per hour; gradient, 1 in 264 up; number of carriages, 12; approximate weight of train and passengers, 112 tons 10 cwt.



Cut-off 66 per cent; boiler pressure, 135lb.; steam chest pressure, 120 lb.; speed, 58 miles per hour = 251·3 revolutions per minute; gradient, 1 in 1328 down; number of carriages, 16; approximate weight of train and passengers, 170 tons; total indicated horse-power = 1089·0.

On page 321 will be found illustrations of the tender, the design of which is extremely satisfactory. It is fitted with inside frames, so as to be uniform in appearance with the engine, and to utilise the same wheels and axle-boxes. These last are oiled down through the tank from boxes on the top of the coping, to which access can be obtained by walking along the foot-plate. There is therefore no risk of men losing their lives in reaching over to oil the boxes while running, should they have occasion to do so. The great advantage, however, is that all the wheels are interchangeable, the trailing wheels of the engine and those of the tender being alike, and these are also the standard wheels of the tank and single express engines, so that when the leading wheels of the single express engines, which run over very crooked lines, are at all thin in the flanges, they can be removed to the trailing end or tender of this class of engine, and wheels with full-sized flanges put in their place. This is a very great advantage in every-day practice. We have now to consider what the actual performance of this fine engine is, and on this point there is no room for doubt, because experiments have been very carefully carried out to test the consumption of coal and water, and the power exerted. We publish a series of indicator diagrams, which are fac-similes of those actually obtained from the engine. The scale is 48 lb. to the inch. As it would have been extremely difficult with this type of engine to get diagrams from the back ends of the cylinders without the use of long pipes which at high speeds would have rendered the diagrams quite worthless, the indicator was fitted only to the forward cover of one cylinder. The engine beats quite true in all positions of the link motion; the setting of the valves is accurately known, and it has therefore been assumed that the diagrams from all four ends of the cylinders will be sensibly alike, and the differences, if any, in the power exerted small. It is just as likely that the diagrams we give are too small as that they are too large. But it is as probable as anything can be that they very accurately show the average power exerted in the two cylinders. The indicator drum was worked by a small return crank, secured to the crank pin of one of the leading wheels, and great pains were taken to avoid the usual errors made in rigging indicators. These diagrams will well repay careful examination. It will be seen that there is a certain speed at which the power exerted, 1080 horses, is greatest. The back pressure is in nearly all cases very small for a locomotive, and it may be mentioned here that the engines on the London and Brighton Railway do not throw sparks, and the smoke-box temperature is so low that a piece of waste tied to the exhaust pipe by one end will remain unconsumed for a considerable period. This experiment has actually been tried. The result is due, no doubt, to the large calorimeter of the tubes, and to the peculiar method adopted for working the fire, which is really more a gas furnace than anything else. We give on page 316 a very instructive diagram, which has been taken at various speeds. The throttle valve, link motion, and boiler pressure remaining unchanged, we see that as the speed is augmented the average pressure continually falls in the cylinder. We have here a beautiful experimental demonstration of Pambour's theorem that the impelling force of the steam on a piston is always precisely equal to the resistance offered by the piston.

As to the consumption of fuel and water we give the following particulars :—On Monday, the 8th October, the Gladstone left Brighton at 8.45 a.m. with twenty-five coaches; distance run, 50 miles 49 chains; time, one hour and nine minutes; gross weight of train, including engine and tender, 350 tons; water used, 1400 gallons. The engine returned to Brighton on the same day with the 5 p.m. express, fourteen coaches. Started to time, but arrived seven minutes late being stopped ten minutes by signal; running time, one hour and seven minutes; gross weight of train, 225 tons; water used, 1250 gallons. Average load for day's work, 19·5 vehicles; miles run, 101 18c.; vehicle miles, 1973 71c.; coal consumed, 28 cwt.; consumption per train mile, 30·98 lb.; per vehicle mile, 1·58 lb. If 10 lb. per train mile be allowed for engine, the consumption per vehicle mile would be 1·08 lb. Water used, 2650 gallons; pounds of water to pounds of coal, 8·45; average temperature of feed-water, 152·5; average boiler pressure, 132·5 lb.; weather, fine. No allowance is made here for coal consumed while standing under steam and shunting. In considering the evaporation, allowance must be made for the water returned to the tender in the shape of steam. If the performance of this engine be compared with that of the compound locomotive of Mr. Webb, it will be found that the advantage claimed for the latter does not come out very prominently.

Want of space has prevented us from referring particularly to many things connected with Mr. Stroudley's practice as embodied in the Gladstone which are well worth notice. What we have written, however, and our illustrations, will suffice to give our readers an excellent idea of the peculiarities of the engine, and they will suffice to prove that Mr. Stroudley has succeeded in designing and building an engine of sufficient merit to place him in the first rank as a locomotive engineer.

A REMARKABLE ERROR IN THE COMMON THEORY OF THE TURBINE WATER-WHEEL.

The following paper is contributed to the "Journal" of the Franklin Institute by J. P. Frizell. It will interest some of our readers.

All writers who have attempted a theoretical discussion of the turbine water-wheel, have agreed in representing the centrifugal force operating to increase or diminish the discharge of the wheel by a certain head. The difference, namely, between the head due to the rotary velocity of the wheel at the point where the water enters the wheel, and the head due to the rotary velocity of the wheel at the point where the water leaves the wheel. Among those who have done so to my certain knowlege are Weisbach, Redtenbacher, Rankine, Morin, and Bresse. To all these philosophers the very careful and complete experiments of Mr. Francis on turbine wheels have been accessible for the last thirty years; giving them, had they so desired, abundant means of comparing their theories with facts. They appear to have ignored these experiments entirely, and to have contented themselves with exhibiting the results of mathematical reasoning. Even in the late valuable and carefully considered treatise of Weisbach, no attempt is made to reconcile his conclusions with the results of these experiments or to explain the discrepancies that must have been known to exist. To the engineer who attempts to compare theoretical results with those of experiment, nothing becomes apparent sooner than that the above-mentioned principle wholly fails to represent the action of centrifugal force. Mr. Francis, in his "Hydraulic Experiments," expresses the opinion that centrifugal force plays a less important part in the turbine wheel than is assigned to it by mathematicians, though he does not attempt any inquiry into the foundation of the formula by which that force is represented; being probably, like many others, content to regard it as one of those scientific truths which are only true on paper but not true in practice; as a principle which water ought, in deference to eminent authority, to observe, but which its habitual wilfulness and perversity lead it to disregard. It is always worth while when we meet with a principle, so called, which does not represent facts, to inquire carefully whether it be well founded in theory. The principle in question is demonstrated by Weisbach in "Mechanics of Engineering, &c.," Coxe's translation, p. 610, and more concisely in the introduction to his later work "Hydraulics and Hydraulic Motors," by Prof. Du Bois. I reproduce the latter, though both are essentially the same, and this may be regarded as a type of the methods by which the principle is supposed to be demonstrated. "If the path C A B, in which a body moves, is not at rest, but turning about an axis C, it imparts to the body a centrifugal force P, by reason of which the body either performs work or work is performed upon it, according as it departs from or approaches the axis of rotation C. Let M be the mass of the body, ω the constant angular velocity with which the path turns about C, and let r denote the variable distance C M of the body which is moving in the path C A B. We have the centrifugal force of the body (Art. 13) $P = \omega^2 M r$, and for the work done by this force while the body describes an element M O of its path, and hence, while the radius C M = r is increased by an amount N O = dr, $dW = \omega^2 M r\, dr$. Hence for the whole work $W = \frac{\omega^2 M r^2}{2}$. Now the velocity of rotation at the distance r is $v = w\, r$, and therefore $W = \frac{M v^2}{2} = \frac{v^2}{2g} G$. When we substitute instead of the mass M, the weight $G = M g$. If the body begins its motion, not at C, but at any other point, A, at a distance r_1 from C, where the velocity of rotation is $v_1 = \omega r_1$, we have for the work done while passing from A to M,

$$W = \tfrac{1}{2}\omega^2 M r^2 - \tfrac{1}{2}\omega^2 M r_1^2 = \tfrac{1}{2}\omega^2 M (r^2 - r_1^2) = \tfrac{1}{2} M (v^2 - v_1^2).$$
$$= \frac{(v^2 - v_1^2)}{2g} G.$$

If, then, a body moves in a rigid path or groove which revolves about a fixed axis, the vis viva of the body is increased or diminished by the product of the mass (M) and the difference of the squares of the velocities (v^2 and v_1^2) at the two ends (A and M) of the path, or by the product of the weight (G) and the heights $\left(\frac{v^2}{2g} \text{ and } \frac{v_1^2}{2g}\right)$ due to these velocities. The increase takes place when the motion is from within outward, and the decrease when the motion is from without inward." Now who can fail to perceive that this demonstration is entirely erroneous, assuming as it does that ω represents the angular velocity of the body M. In other words, that this body has the same angular velocity as the revolving disc. The body M has a motion along the path C A B independent of its rotary motion imparted by the disc. This movement is partly angular and partly radial. The angular element of this motion must be added to or subtracted from the angular motion of the disc to find the true angular velocity of the body M on which the centrifugal force depends. This would lead to a very complicated expression for the centrifugal force, involving the equation of the path in which the body moves. The above expressions would be true if the body M had merely a radial movement on the revolving disc, but are entirely erroneous as soon as an angular element is added to that movement. How entirely a formula deduced from such assumptions must fail to represent the action of centrifugal force in a turbine wheel will appear from this consideration. All the above-mentioned writers prescribe as a condition of efficiency that the water at its exit from the wheel should have the same velocity as the latter, in the opposite direction. In other words, that the angular velocity of the water at that point must be *nil*, while a moment's reflection will show that their formula for the centrifugal force can only be true upon the assumption that the water has, here as well as elsewhere, the full angular velocity of the wheel. I append the following example of the application of this formula. In Mr. Francis's experiments of 1851 upon a Fourneyron turbine, he measured the discharge and useful effect at all velocities, from the condition in which the wheel was held fast by the brake, to that in which it ran entirely free. In the table "Hyd. Exp.," p. 33, the discharges are all reduced to a uniform fall of 13ft. It by no means follows, however, that the variations in the discharge, under these circumstances, are wholly due to changes in the centrifugal force. As the velocity increases from zero, there is a progressive change in the resultant direction of the water entering the wheel, and it comes more and more into coincidence with the direction in which the water leaves the guides. There is a progressively diminishing loss of head due to abrupt change of direction. Presumably, these two directions coincide, and the loss of head ceases, at the velocity corresponding to the maximum efficiency of the wheel. Between these two limits of velocity, therefore, viz., O, and the velocity of maximum efficiency, we should expect the discharge to increase faster than is called for by the formula for centrifugal force. The results of experiments show nothing of this kind. From the point of maximum efficiency to the point where the wheel runs free, there is an increasing deviation between the direction in which the water enters the wheel and that in which it leaves the guides, and, consequently, an increasing loss of head. Between these latter limits, therefore, we might expect the increase of discharge to be less than that called for by the formula for centrifugal force. Between the limits O and wheel running free, we might expect these two causes of discrepancy to neutralise each other, and the formula for centrifugal force to represent the total increase of discharge between these limits better than between any other limits. The velocity of the wheel, running free, was Expt. 23. Internal circumference 37·766ft. per sec.

$$\text{Ext. circum. } 37{\cdot}766 \times \frac{8{\cdot}292}{6{\cdot}75} = 46{\cdot}393\text{ft. per sec.}$$

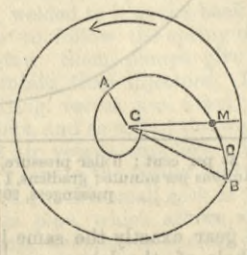
The difference between the heights due to these velocities is

$$\frac{46{\cdot}393^2 - 37{\cdot}766^2}{2g} = 11{\cdot}288.$$

The discharge of the wheel, standing still, under a head of 13ft. was (Exp. 43) 136·725 cubic feet per sec. According to the theorem under consideration, the centrifugal force should have the same effect in increasing the discharge as an addition of 11·288ft. to the head. The discharge, therefore, should be

$$136{\cdot}725\sqrt{\frac{24{\cdot}288}{13}} = 186{\cdot}88 \text{ cubic feet per sec.}$$

The actual discharge in Expt. 23 was 165·37 cubic feet per sec.



Felixstowe Docks.—The works in connection with these docks in Harwich harbour, which are being carried out by Colonel Tomline, at a cost of about £100,000, and which have been stopped, owing to the bankruptcy of the former contractors, Messrs. Lake and Taylor, are again in operation, the contract having been taken by Messrs. H. Lee and Son. Mr. John Russell, C.E. of 8, Victoria Chambers, Westminster, who was the acting engineer for the Felixstowe Railway, has been appointed engineer to the present work. The plans have been somewhat varied from the original form, an alteration being made in the size and shape of the dock, with the object of facilitating the swinging of vessels. This is secured by the addition of a triangular piece of ground on the southern side of the dock, so that the dimensions will be 600ft. long, by from 300ft. wide at the narrowest, to 450ft. wide at the broadest part. The basin will be dredged to a depth of 23ft. below low water at ordinary spring tides. Quay walls will run the entire length of the southern and western sides, for a length of 180ft. along the northern side and of 110ft. on each side of the entrance channel which connects the basin with Harwich harbour. This channel will be 240 yards long, 200ft. wide at the outer end, and 120ft. wide at the basin entrance, and will be dredged to the same depth as the interior of the dock. The entrance to the basin will be protected by two timber piers, that on the northern side being 130ft. long, and that on the southern side 430ft. long. The quay embankments will be 112ft. wide, and upon the southern quay there are to be two closed iron sheds, each 250ft. long by 60ft. wide, and 16ft. high. The sidings on the quays are to be connected by a branch with the Felixstowe Railway at a point between the pier and the town stations. According to the terms of the contract the work is to be finished within two years.—*East Anglian Daily Times.*

coals, 7s. 6d. to 8s. for seconds, 5s. 6d. to 6s. for common round coal, 3s. 6d. to 4s. for good slack, and about 3s. for common sorts.

There is a moderately good shipping trade being done at about 7s. 6d. to 8s. for good Lancashire steam coal delivered at Liverpool or Garston.

The men have sent in notices for an advance in wages of 15 per cent.; but until the coalowners can establish better prices than are now ruling, it is altogether improbable that they will entertain any question of higher wages.

Barrow.—I notice that the quiet demand for hematite pig iron still continues. No change has taken place in the state of the market, and the business being done both on home and continental account is inextensive, and there are no signs of a change for the better quickly taking place. Makers have few orders in hand, and the deliveries are very small, so that the stocks are now becoming very heavy, as the output of metal up to the present has been well maintained. It will be necessary for makers if a change does not soon take place, to reduce the output, for prices are now below the point at which there is a margin of profit, and it cannot be expected that they will be disposed to encourage the depression by accepting orders at lower values. Neither spirit or enterprise is being shown by purchasers, who seem to be buying for their immediate wants more than for speculation. A few firms in the district have taken the opportunity, trade being so very slack of putting down new and improved machinery, which is now at a low value, so as to be able to take advantage of any brisk trade that may spring up. The value of pig iron is well maintained, although there is an easier tone all round. No. 1 Bessemer is quoted at 49s. per ton net at works; No. 2, 48s.; No. 3, 47s.; while No. 3 forge is in quiet demand at 47s. per ton. Steel rails of ordinary heavy sections are selling at from £4 10s. to £5 per ton net prompt delivery. Iron ore is in limited request at from 9s. to 12s. per ton at mines according to quality. Coal and coke steady. Shipping quiet as freights are low.

The Whitehaven Shipbuilding Company on Monday launched from its yard a new iron vessel, named the Benicia, built for Messrs. Lowden, Edgar, and Co., of Liverpool, which is intended to trade between that port and Melbourne. She is 275ft. long, 39½ft. beam, with a gross tonnage of 1870 tons.

The substantial coffer dam which is in course of erection at the entrance to the new dock was severely tested by the heavy tides brought to bear against it last week, but, fortunately, it withstood all the weight of water, and sustained no damage, consequently the contractors are enabled to proceed with the construction of the new dock without being at all impeded in the work.

The large new steel works of Messrs. Cammell and Co., at Workington, were started at the end of last week. It is only something like two years since Messrs. Cammell first mentioned their project of removing from Dronfield to Workington. The first sod of the new works was cut twelve months ago, but in that time these immense works have been erected, machinery put down, and everything put into proper working order. The completion of the first rail was hailed with ringing cheers by the men. There are six converters, capable of producing from three to four thousand tons of steel rails per week.

THE SHEFFIELD DISTRICT.

(From our own Correspondent.)

The largest colliery meeting ever held in Sheffield or the district was on Tuesday, when the coalowners of South and West Yorkshire, Derbyshire, Nottinghamshire, and a portion of Leicestershire, met a deputation from the colliers, headed by the president, secretaries, and treasurer of the Yorkshire Miners' Association. Mr. B. Pickard, one of the miners' secretaries, stated the case for the colliers, and was followed by other speakers on the same side. Mr. J. D. Ellis, chairman of John Brown and Co., Limited, who own Aldwarke Main and Car House Collieries, presided, and represented the views of the coalowners very clearly and fully. He reviewed the condition of trade in the country, and held that it not only did not justify any advance in wages, but that any attempt to force up the value of coal by unnatural means would have a most detrimental effect on business generally, and on the iron, cotton, and woollen industries in particular. The Board of Trade returns for the nine months ending September 30th, in iron and steel, showed a decrease in exports of over £2,000,000 sterling. The price of Scotch pig iron in 1882 was £2 11s.; now it was £2 6s. 9d. The steel rails, which in 1882 were quoted £5 10s., are now £4 16s. The number of furnaces in blast, which was regarded as a very good criterion, was twenty-six less now than in 1882. The North-Eastern Railway weekly report showed for the last three weeks a decrease of £4000 per week, and that line was a very good index of the state of the coal and iron trade. Puddlers' wages were 6d. less than in 1882, and the ironworkers' wages in the North had been reduced 7½ per cent., and in Wales 10 per cent. In the face of all these facts, he could not see how it could be said the general trade of the country had improved.

Mr. Pickard's reply was simply a reiteration of several of the statements he has made in speeches throughout the district. He referred to Messrs. Charles Cammell and Co. having made 5 per cent., but was immediately told by Mr. George Wilson, the chairman of the company, that the dividend had been 7½ per cent. Mr. Wilson added, however, that the Oaks Collieries, which they owned, had not paid its shareholders 2 per cent. The profit of 7½ per cent. was on the ordinary iron and steel productions of the company. After a long discussion the deputation retired, and in their absence the coalowners held a brief conference in private. The result was the unanimous decision to refuse the request for an advance. Mr. Pickard, on being told their decision, asked if the proprietors would accept a pithead notice, or would require a notice from each individual miner. This is the usual preliminary to a general strike. The chairman replied that each colliery proprietor would be left to deal with his own employés.

At the adjourned conference of the miners' delegates, held at Rotherham on the 23rd inst., the refusal of the coalowners to concede the advance was considered. The report of the ballot table at the various collieries was considered sufficiently strong in favour of the advance to warrant the delegates in pushing the claim, and arrangements were made for notice to be handed in. We are thus on the eve of a great strike, unless more moderate counsels prevail at the last moment.

The Yorkshire British Electric Light Company has resolved to accept terms of amalgamation offered by the Hammond Electric Light Company. Both concerns have their shares largely held in this district. The shares, on which at present £3 15s. has been paid, were quoted recently at 3½ per cent. A further call of 25s. per share has to be paid before the end of the year, which will bring the paid-up amount to £5. The market value would therefore be £4 15s., which the chairman regarded as an arrangement which roughly gave them 16s. per share.

The Midland Railway Company has taken another important step in the acquisition of the Pullman drawing-room cars, which on and after the 1st of November they intend to utilise as first-class carriages. Each car is about 21 tons in weight, and as Pullman cars are frequently run half empty, there is a great waste of haulage power. The company hope to get rid of the present first-class carriages on all expresses, and thus shorten the trains as well as diminish the weight to be drawn. The Pullman Company are retaining their sleeping cars for the present.

Messrs. Charles Cammell and Co.'s new rail mills at Workington, which were started within the time announced by the chairman—six months—are now producing 3000 tons of rails per week, but they are capable of an output of 4000 tons per week. The shareholders, I believe, will have an opportunity of seeing their property in full operation within a week or two.

Another deplorable disaster occurred in the fiery Barnsley Seam, at the Wharncliffe Carlton Colliery—the property of the Earl of Wharncliffe—where twenty lives have been sacrificed. A second explosion risked the lives of thirty to forty explorers, five of whom were seriously burnt. It has been necessary to flood the colliery, leaving three bodies unrecovered. The Government has intimated its intention to send down an official inspector to make an investigation, as was done at Claycross.

THE NORTH OF ENGLAND.

(From our own Correspondent.)

There was but a scanty attendance at the Cleveland iron market, held at Middlesbrough on Tuesday last, and the tone was decidedly flat. The demand for No. 3 g.m.b. is less than it was, and prices are again weaker. Some merchants have made sales for delivery next month at as low a figure as 38s. 6d. per ton, but quotations are more often 38s. 9d. Several makers have accepted the latter price, but for special brands 3d. to 6d. per ton extra is obtainable. Consumers are holding back their orders as far as possible, and cannot be induced to offer more than 38s. to 38s. 1½d. for No. 3 for forward delivery. Grey forge iron is still 37s. per ton for both prompt and forward.

Warrants are freely offered at 38s. 6d. per ton, and it is reported that some holders have sold at 38s.

Messrs. Connal and Co.'s stock of Cleveland pig iron decreased 510 tons during the week ending Monday last, the quantity then held being 67,427 tons. In their Glasgow store on the same day there were 589,324 tons of pig iron in stock.

The exports of pig iron from the Tees up to Monday night amounted to 66,425 tons, being about 6000 tons less than shipped during the corresponding period of last month.

There is great pressure for prompt delivery of finished iron, and producers still obtain orders for immediate delivery at the prices which have ruled for some time past. For forward delivery lower rates are now accepted, Ship plates are £6 5s. for prompt, and £6 for forward delivery; angles, £5 12s. 6d. prompt and £5 10s. forward; and common bars, £5 17s. 6d. prompt and £5 15s. forward, all free on trucks at makers' works, less 2½ per cent. discount. Puddled bars are £3 12s. 6d. per ton net, and steel rails £4 12s. 6d. per ton at works.

Owing to the depression in the steel rail trade, Messrs. Bolckow, Vaughan, and Co., Limited, have given notice to about 400 of the men employed at Eston to terminate their engagements on Saturday, the 27th inst. It is said the directors find they cannot compete successfully with firms in other parts of the country, who are paying their workmen lower wages. Messrs. Bolckow, Vaughan, and Co., say they are paying almost as high a rate of wages as they were when rails were £6 10s. per ton.

At a recent meeting of the engineer apprentices on strike at Sunderland the following resolution was passed:—"We, the apprentices of the engineering trade of Sunderland, pledge ourselves not to resume work until the strangers engaged in the various shops are removed, as we do not consider them qualified to teach us our trade." The masters have taken out a great number of summonses against the apprentices, and the question will be considered by the magistrates on Tuesday next. An attempt is being made to arrange a conference between the masters and the men.

The boring operations which were being carried on by Messrs. Allhusen and Co., Limited, on the Durham side of the Tees, have been temporarily suspended. Two bore holes, each 10in. diameter, have been sunk. One of these has penetrated 1200ft. below the surface without reaching a salt-bearing stratum. The other hole is about 1050ft. down, and has been stopped through the breaking of the drill rod. Messrs. Bolckow, Vaughan, and Co. first reached salt at a depth of about 1050ft. Messrs. Bell Brothers' borings are 1127ft. and 1043ft. respectively. Messrs. Allhusen and Co.'s difficulties have caused great disappointment to those who had indulged in sanguine expectations as to the new industry; but on the other hand, those who own land and buildings in the neighbourhood, which might eventually have been undermined and let down, are experiencing a sense of relief, and taking fresh courage.

It is stated that Mr. E. Withy, iron shipbuilder of Hartlepool, is about to retire from business, owing to loss of health. He intends to proceed on a voyage to the Antipodes, and hopes to recover it thereby. His place will in part be supplied by Mr. Furness, the well-known shipowner of the same town.

NOTES FROM SCOTLAND.

(From our own Correspondent.)

The throwing of a large quantity of warrants upon the market at the close of last week had a most depressing effect, and by Tuesday forenoon the quotations had declined to 45s. 1½d. per ton. Subsequent buying slightly improved this backward condition of matters; but considering that the shipments were much larger than usual in the past week, and that the home demand is good, it is not easy to account for the present lethargic condition of the market. The addition to stocks are very small in the warrant stores, and it is not believed that makers' private holdings have materially increased during the past three weeks. The past week's shipments of pig iron from Scotch ports amounted to 16,440 tons, as compared with 11,787 in the preceding week, and 15,058 in the corresponding week of last year.

Business was done in the warrant market on Friday at 45s. 8d. to 45s. 5½d. per ton cash. On Monday forenoon transactions took place at 45s. 5d. to 45s. 3d., and in the afternoon at 45s. 3½d. to 45s. 1½d. cash. Tuesday's market was flat in the forenoon at 45s. 1½d. to 45s. 3½d. cash, and somewhat firmer in the afternoon at 45s. 3½d. to 45s. 4½d. cash. On Wednesday forenoon, business was done at 45s. 5d., 45s. 3½d., and 45s. 4½d. cash; the quotations in the afternoon being 45s. 4d. to 45s. 2d. cash; closing sellers, 45s. 3d. cash, and 45s. 5d. one month, buyers near. To-day—Thursday—being a church holiday in Glasgow, the market was closed.

The values of makers' iron are easier, as follow:—Gartsherrie, f.o.b. at Glasgow, per ton, No. 1, 54s.; No. 3, 51s.; Coltness, 57s. 6d. and 51s. 6d.; Langloan, 57s. and 51s. 6d.; Summerlee, 56s. and 50s.; Chapelhall, 55s. and 52s.; Calder, 56s. 6d. and 49s.; Carnbroe, 54s. and 48s. 6d.; Clyde, 49s. and 47s.. Monkland, 47s. 6d. and 45s. 6d.; Quarter, 46s. 6d. and 44s. 6d.; Govan, at Broomielaw, 47s. 6d. and 45s. 6d.; Shotts, at Leith, 57s. and 53s.; Carron, at Grangemouth, 49s. (specially selected, 56s. 6d.) and 47s. 6d.; Kinneil, at Bo'ness, 48s. 6d. and 47s. 6d.; Glengarnock, at Ardrossan, 54s. and 47s.; Eglinton, 47s. 6d. and 45s.; Dalmellington, 48s. and 47s.

There appears to be rather less buoyancy in the malleable iron trade, although most of the works are still well supplied with orders. A reduction of wages has been intimated to the workmen throughout Lanarkshire, in accordance with the decision lately arrived at in the North of England, it having been the practice here for a series of years to regulate wages by the rates prevalent across the Border. The reduction, which takes effect as from the 15th current, will be at the rate of 9d. per ton on puddlers, shinglers, and forgemen, and 7½ per cent. on millmen and rollers. Signs of dissatisfaction have been manifested in some places by the men, who think that as trade is busy here, they should not be reduced at present, but the likelihood is that they will submit to the reduction quietly. The engineering and foundry trades are well employed, and in the course of the past week there has been shipped from Glasgow £55,320 worth of machinery, £7323 sewing machines, £7500 steel manufactures, and £70,000 iron goods, exclusive of the exports of pig iron.

There has been considerable pressure in the shipping department of the coal trade at Glasgow this week, while the past week's shipments were good. Coal merchants are making an effort to obtain an increase of prices before the 1st proximo, upon which date the advance of miners' wages has been fixed to take place. In a number of cases notices have been given that the rise in price will date from Monday last, but it does not yet appear quite certain that this proposal will be generally carried out. There is an active demand for steam coal, and the cold weather now being experienced will quicken the inquiry from the domestic consumers. In the Lothians a good business in the various sorts of coal is reported. The Fife coalmasters are finding it no easy matter to obtain a rise in the price of coal, although the home trade there is described as brisk and the orders plentiful. At Grangemouth the exports of coal during the week were 8811 tons.

Despite the fact that the quotations of pig iron warrants have declined considerably since the masters promised the colliers in Lanarkshire an advance of 6d. a day in their wages, it is fully expected that it will be given, even although it might be found necessary to withdraw it a short time afterwards.

At a meeting held in Glasgow a few days ago the directors of the Caradon Copper Company obtained from the shareholders the requisite authority to increase the present capital by the issue of preference shares, bearing interest at 7 per cent.

In a convenient position for working, the Uphall Oil Company has just proved the existence of a valuable seam of shale, at a depth of 17 fathoms. The seam is known as the Straiton seam, and is of the unusual thickness of 7ft. 4in.

Some of the Clyde shipbuilders have booked good orders within the past few days, but the trade as a whole does not promise so well as of late.

WALES AND ADJOINING COUNTIES.

(From our own Correspondent.)

Socially the collier has made a great advance of late, and educational institutions promise to make the next generation a very much improved type. The establishment of a sliding scale began the good work by tranquilising labour; the next step was the establishment of a permanent fund, which now numbers 50,000 members. The last is the starting of a farthing rate amongst them, so as to found a scholarship; and there are indications that colliers are beginning to think that collieries and ironworks, and not chapels, are the proper thing for representation in Parliament. The coalfield in its great flush of prosperity is to be the scene of stirring local work in a little time.

Cardiff was never so prosperous, and Swansea and Newport are as busy proportionately. The gales, it is true, have not enabled shippers to show so good a list of exports; but there is no falling off in demand, and no slackening in price. Prices are very stiff; and this is due to coalowners having literally their hands full of business. Prices are now regarded as stationary for the next three months. At all events, that is the current trade opinion at Swansea, where the result of the audit of the Coalowners' Association of South Wales and Monmouthshire has been somewhat anticipated. The belief there is that there will be no advance of wages, and no advance in the price of coal.

I hear complaints of deficient coasting vessels, and it is alleged that the house coal trade might be considerably improved if there were more. This is a good opportunity for the new industry at Cardiff, the Dry Dock and Engineering Company. I am glad to hear that good things are being done there, and some elaborate repairs carried out.

The Dowlais Company applied last week to have its assessment reduced, the plea being the stoppage of the tin-plate branch. The question is held over. It is certain that the iron trade is bad; some of the works have not felt much relief by the last reduction, and it is possible another may be necessary. The iron and steel trade is unmistakeably bad, and advices from the Colonies and States are not assuring. I do not like an evidence of bad times that is occurring in some districts—raising fresh capital, when it is evident that it is not represented by value. This will only give a temporary relief and then increase the burdens.

The tin-plate trade is in better form. Foxhole Works, near Swansea, have been sold, and will be carrried on by a firm composed chiefly of Llanelly men. The current prices for I.C. coke are 16s. 3d. to 16s. 6d., and I have now heard of good brands selling at 17s., but this was where the quality was unmistakeable. Some offers at 16s. 3d. have been refused this week, not, perhaps, so much on account of price as quality. It is a good sign when buyers are making quality a special feature and price secondary. Llangennech Works are sold, and will shortly be restarted.

College Works, Llandaff, are idle again. In theory works by the seashore, saving rate for Spanish iron and in conveyance of manufactured iron, are feasible, yet singularly every ironworks in and around Cardiff seem to have a short life. This is owing to dearness of labour and house rent. The puddlers at Llandaff wanted 1s. 6d. per turn more than others are getting. Hence the stoppage.

The Forest of Dean colliers are moving for two objects—weekly payment of wages and the establishment of a permanent fund on the lines of that of Wales.

Mr. W. T. Lewis has put several new dredgers at work at Car diff during the last few days. Every effort is being made to promote safety and despatch in the treatment of the enormous coa traffic.

The Taff Vale Company is progressing well with its Roath sidings accommodation.

Progress, too, is making with the Severn tunnel, but the lines have been flooded by the storms, and the Great Western in particular has had its difficulties.

Society of Engineers.—The ordinary meetings of this society will be held in future at the Westminster Town Hall, Caxton-street, Westminster. The offices and reading-room will, for the present, be at 6, Westminster-chambers.

Naval Engineer Appointments.—The following appointments have been made at the Admiralty:—William Nicklin, chief engineer, to the Pembroke, for service in the Turquoise; Richard S. Hamm, engineer, to the Asia, for service in the Crocodile, vice Balcomb; Fred. A. Hillyer and James Ryan, assistant engineers, to the Northampton, additional; and Charles A. Moore, assistant engineer, additional, to the Swiftsure.

The Largest Rice Mill in the World.—Mersrs. Douglas and Grant, of Kirkcaldy, whose name has been well-known for many years as makers of Corliss engines and rice mills, have just completed an installation for Rangoon which throws other constructions into the shade. The practice in former times was to send the rice partially hucked to England and Germany to be finished for the market; but in such improved mills as that now referred to, the process is completed in India, and the white rice shipped here ready for use.

Green Sun Light.—The alleged green sun light, recently described in daily papers, as observed in India, was, it appears, observed in Ceylon from September 9th to 12th. One correspondent writes to the *Ceylon Observer*:—"Puleadierakam, September 12th.—I write this from the above place on my way to Trincomalee, being much interested to learn whether the same phenomena exist throughout the island. The sun for the last four days rises in splendid green when visible, *i.e.*, about 10 deg. from the horizon. As he advances, he assumes a beautiful blue, and as he comes further on looks a brilliant blue, resembling burning sulphur. When about 45 deg., it is not possible to look at it with the naked eye, but, even when at the zenith, the light is blue, varying from a pale blue early to a bright blue later on, almost similar to moonlight even at midday. Then, as he declines, the sun assumes the same changes, but *vice versâ*. The heat is greatly modified, and there is nothing like the usual hot days of September. The moon now visible in the afternoons looks also tinged with blue after sunset, and as she declines, assumes a most fiery colour 30 deg. from the zenith. The people are in terror at these phenomena, some even expecting the end." The correspondent asks, "Can this be the result of the eruption in the Sund Straits?"

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.**

16th October, 1883.

4908. Flat Wire Ropes, F. W. Scott, Reddish.
4909. Skates, A. G. Brookes.—(*J. A. Dodge and G. R. Marble, Massachusetts, U.S.*)
4910. Motive Power Apparatus, W. Fletcher, Faversham.
4911. Elastic Rods, &c., A. M. Clarke.—(*E. K. Warren, Michigan, U.S.*)
4912. Pipe Wrenches, A. M. Clarke.—(*J. L. Taylor, Ishpeming, U.S.*)
4913. Writing and Drawing Thimble, H. J. Haddan.—(*K. Weiglog, Freiberg, Saxony.*)
4914. Electric Arc Lamps, H. J. Haddan.—(*Dr. E. Boettcher, Leipzig, Saxony.*)
4915. Carpet Cleaners, A. J. Boult.—(*S. B. Ryder, Elizabeth, U.S.*)
4916. Wood-turning Machines, A. J. Boult.—(*E. Gerry, jun., and F. Hanson, Maine, U.S.*)
4917. Barrels, A. J. Boult.—(*G. O. Manning and W. Martien, Baltimore, U.S.*)
4918. Reducing Wood to Fibres, &c., A. J. Boult.—(*H. André, France.*)
4919. Moderator Lamps, W. P. Thompson.—(*A. J. Lan, Marseilles.*)
4920. Destroying Disease-bacteria or Microzymes, E. Sonstadt, Cheshunt.
4921. Rendering Fabrics, &c., Impermeable, F. Wirth.—(*Gademann and Co., Germany.*)
4922. Spinning Machines, W. R. Lake.—(*E. S. Ormsby, Brooklyn, U.S.*)
4923. Treble Warp Lace, T. Butler, Nottingham
4924. Bakers' Ovens, A. F. Link.—(*H. Grunwald, Germany.*)
4925. Signal Lamps, J. I. Coates, Headingley.
4926. Transmitting Electrical Impulses, A. W. L. Reddie.—(*La Société Universelle d'Electricité Tommasi, Paris.*)
4927. Paving Streets, &c., J. S. Gabriel, London.
4928. Attaching Buttons to Fabrics, S. Pitt.—(*F. A. Smith, jun., Providence, U.S.*)
4929. Folding Carriages for Children, W. Singer and F. Hinterleitner, Berlin.
4930. Obtaining Aluminium from its Ore, &c., H. A. Gadsden.—(*E. Foote. New York, U.S.*)
4931. Buckles, &c., E. P. Alexander.—(*W. R. Clough and B. Goodman, New York, U.S.*)
4932. Obtaining Heat, &c., from Electricity, J. H. Johnson.—(*H. de M. de Ballore, Lyons.*)
4933. Shoes for Horses, &c., T. D. Richardson, North Greenwich.
4934. Treating Phosphate of Soda, &c., C. Humfrey, Chester.

17th October, 1883.

4935. Slubbing, &c., Fibrous Materials, W. Tatham, Rochdale.
4936. Draw-bars, &c., S. Keeton, Lenton.
4937. Barometers, H. F. Alexander, Glasgow.
4938. Shaft Couplings, T. L. Ellis and C. Leonard, Coatbridge.
4939. Bridges, W. Morris, London.
4940. Nippers, A. M. Clark.—(*S. Lee, Windsor, U.S.*)
4941. Separating Ammonia from Gases, &c., G. Chapman, Glasgow.
4942. Magazine Rifles, &c., O. Jones, London.
4943. Coupling for Shafting, P. Brotherhood, London.
4944. Heating Stove, A. C. Kennard, Falkirk.
4945. Conductors for Electrical Railways, &c., W. Siemens.—(*Dr. E. W. Siemens, Berlin.*)
4946. Vacuum Pumps, W. H. Cullen, Bayswater.
4947. Measuring Electrical Energy, W. Siemens.—(*Dr. E. W. Siemens, Berlin.*)
4948. Pneumatic Malting Apparatus, F. H. F. Engel.—(*M. E. Meyer, Christiania, Norway.*)
4949. Cultivating Land, A. Greig & R. Fowler, Leeds.
4950. Preparing Asbestos, J. Dewrance, London.
4951. Obtaining Gases and Useful Products from Coal, &c., H. Kenyon, Altrincham.
4952. Envelopes or Guards for Carding Machines, O. Schimmel, Chemnitz, Saxony.
4953. Speed Indicators, E. J. P. Gallwey, Thirsk.
4954. Applying Chemical Agents to Stones and Stuccoes to Diminish their Porosity, &c., W. Spence.—(*Faure and Kessler, France.*)
4955. Electric Bells, F. J. E. Clarke, Chelsea.
4956. Printing, &c., E. Beaumont & A Doig, London.
4957. Cigars, F. Wirth.—(*Kaufmann & Co., Germany.*)
4958. Decorating Glass, H. J. Haddan.—(*H. Saint-Rémy, Liege, Belgium.*)
4959. Moistening Postage Stamps, &c., H. J. Haddan.—(*Sachs and Howorka, Berlin.*)
4960. Gauge Glasses or Tubes, A. M. Clark.—(*A. Guilbert-Martin, France*)
4961. Electrical Heating, J. S. Sellons, London.
4962. Bearing Blocks, M. Frenkel.—(*F. W. Uffers, Berlin.*)
4963. Boxes or Cases, J. J. Hamilton, Liverpool.

18th October, 1883.

4964 Transmitting, &c., Sounds, A G. Brookes.—(*T. N. Vail, Boston, U.S.*)
4965. Cooking Apparatus, R. Jackson, Leeds.
4966. Filling, &c., Internally Stoppered Bottles, F. Foster, London.
4967. Intermittent, &c., Signal Lights, W. B. Rickman.—(*R. and O. Pintsch, Berlin.*)
4968. Heating Apparatus, H. Defty, London.
4969. Fabrics, S. Hinrichsen and S. Whitlow, Manchester.
4970. Laying Underground Electric Wires, W. P. Thompson.—(*J. F. Martin, Chicago, U.S.*)
4971. Cutting Fibrous Materials, &c., W. R. Lake.—(*I. A. Canfield, Middletown, U.S.*)
4972. Preparing Food, E. Wylam, London.
4973. Building and Ventilating, W. R. Cornell, East Dulwich.
4974. Braces, W. Varney, London.
4975. Feeding Boilers, W. Beck.—(*E. Varlet, Paris.*)
4976. Extracting Precious Metals from their Ores, &c., A. P. Price, London.
4977. Breech-loading Fire-arms, E. Bled, Paris.
4978. Curtain Holders, F. Wirth.—(*J. Vaas, Germany.*)

19th October, 1883

4979. Furniture Castors, E. French, Birmingham.
4980. Anhydrous Sulphide of Zinc, E. Hill.—(*T. Macfarlane, Montreal.*)
4981. Treating Oils, &c., E. W. Bell and W. Fearenside. Liverpool.
4982. Dyeing, &c., J. C. Mewburn.—(*J. Stoltz, France.*)
4983. Driving Tricycles, &c., W. P. Thompson.—(*N. Merrill, New York, U.S.*)
4984. Checking, &c., Apparatus, R. Vining, Liverpool.
4985. Windlasses, &c., J. and T. Reid, Paisley.
4986. Boring, &c., Machine, J. Ruscoe, Hyde.
4987. Feeding, Gumming, &c., Sheets of Paper and Labels, J. J. Allen, Halifax.
4988. Gunpowder, T. Nordenfelt, London.
4989. Preventing Down Draught in Chimneys, &c., J. Baker, Penge.
4990. Galvanic Batteries, G. C. V. Holmes, S. H. Emmens, and F. E. Burke, London.

20th October, 1883.

4991. Gas, J. Somerville, London.
4992. Looms, W. W. Melville, Roebank.
4993. Grips for Cable Railways, B. J. B. Mills.—(*W. H. Paine, Brooklyn, U.S.*)
4994. Railway Buffers, J. W. Kelly, Dublin.
4995. Velocipedes, W. Parkin and D. Davis, London.
4996. Lawn Mowing Machines, T. Knowles, Turton.
4997. Folding Centre-boards, H. F. Martens and O. F. C. Bannier, Hamburg.
4998. Dust Collectors, P. V. Gelder, Sowerby Bridge.
4999. Fastenings for the Lids of Packing Cases, &c., F S Ollard, Handsworth.
5000. Mineral Phosphates, C. D Abel.—(*J. Brandt, Berlin.*)
5001. Telegraph Insulators, H. J. Allison.—(*C. C. Hinsdale, Cleveland, U.S.*)
5002. Exhausting Air, &c., H. J. Allison.—(*G. Lord, Watertown, U.S.*)
5003. Reeds for Looms, C. A. Burghardt, Manchester.
5004. Cleaning the Tubes of Steam Boilers, F. Geller.—(*O. Wirth, Germany.*)
5005. Rollers, T. Smith, Birmingham.
5006. Velocipedes, A. J Eli, London.
5007. Pencil Cases, W. R. Lake.—(*A. T. Cross, U.S.*)
5008. Telephonic Apparatus, W. R. Lake.—(*H. T. Cedergren and L. M. Ericsson, Stockholm.*)
5009. Hydraulic Lifts, &c., J. S. Stevens and C. G. Major, Battersea.

22nd October, 1883.

5010. Soldering Irons, J. O. Fry, Nottingham.
5011. Electro-plating Rollers, D. Appleton, Manchester.
5012. Applying Metal Letters and Devices to Cloth, &c., J. H. Hollinghurst, London.
5013. Spinning and Doubling Cotton, &c., W. Leach and J. Pearson, Accrington.
5014. Envelopes, W. E. Walmsley, Salford,
5015. Pumps, P. Jensen.—(*J. François and G. Dubois, Belgium.*)
5016. Packing Frilling, J. MacCallum, Manchester.
5017. Extinguishing, &c., Lamp Wicks, G. W. Smiley.—(*T. J. L. Smiley and C. H. Stombs, San Francisco.*)
5018. Revolving or Endless or Portable Railways, &c., J. A. Mays, London.
5019. Securing Glass in Greenhouses, &c., E. Newton, Hitchin.
5020. Gas Motor Engines, W. Briscall and A. Blackwell, Liverpool.
5021. Cradles, &c., L. Micciullo, London.
5022. Hinges, F. and W. Parker, London.
5023. Binding Sheaves and Trusses, J. Howard.—(*J. W. Twentyman, Christchuich, New Zealand.*)

Inventions Protected for Six Months on Deposit of Complete Specifications.

4891. Spinning, &c., Machinery, W. J. Kinder, Harpurhey.—13*th October*, 1883.
4915. Carpet Cleaners, A. J. Boult, London.—A communication from S. B. Ryder, Elizabeth, U.S.—16*th October*, 1883.
4916. Wood-turning Machines, A. J. Boult, London.—A communication from E. Gerry, jun., and F. Hansen, Maine, U.S.—16*th October*, 1883.
4962. Bearing Blocks, M. Frenkel, Berlin.—A communication from F. W. Ulffers, Berlin.—17*th October*, 1883.
4964. Transmitting, &c., Sounds, A. G. Brookes, London.—A communication from T. N. Vail, Boston, U.S.—18*th October*, 1883.

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

4200. Explosive Compounds, P. M. Justice, London.—15*th October*, 1880.
4212 Cooking Apparatus, S. J. V. Day, Glasgow.—16*th October*, 1880.
4219. Pianofortes, H. R. Schreiber, London.—16*th October*, 1880.
4224. Looms, W. Thompson, Larkfield.—16*th October*, 1880.
4628. Step-by-step Type Printing Telegraphs, F. H. W. Higgins, London.—10*th November*, 1880.
4707. Velocipedes, E. Burstow, Horsham. —16*th November*, 1880.
4733. Coking and Distilling Coal, L. V. Semet and E. Solvay, Brussels.—17*th November*, 1880.
4885. Driving Screw Propellers, C. Maw, London.—24*th November*, 1880.
4263. Envelopes, E. Hely, Dublin.—19*th October*, 1880.
4230. Explosive Compounds, S. J. Mackie, Peckham.—18*th October*, 1880.
4243. Pianofortes, E. G. Brewer, London.—18*th October*, 1880.
4244. Crushing, &c., Machinery, R. Cook, Sheffield.—18*th October*, 1880.
4248. Obtaining Copies of Writings, &c., O. Lelm, Paris.—18*th October*, 1880.
4299. Folding and Eyeletting Labels, E. A. Pallister, Leeds.—21*st October*, 1880.
4330. Washing, &c., Machinery, T. Bradford, London.—23*rd October*, 1880.
4555. Centrifugal Machines, C. D. Abel, London.—6*th November*, 1880.
4556. Drying Apparatus, C. D. Abel, London.—6*th November*, 1880.
4256. Registering Apparatus, J. H. Betteley, London.—19*th October*, 1880.
4277. Rollers and Beams for Looms, T. Reeder, Preston.—20*th October*, 1880.
4288. Steam Generators, J. Windle, Moston.—21*st October*, 1880.
4298. Propelling Navigable Vessels, J. Gibbons, Liverpool.—21*st October*, 1880.
4301. Printing Machinery, F. Payne, Otley.—21*st October*, 1880.
4302. Locks for Fire-arms, M. Kaufmann, London.—21*st October*, 1880.
4312. Temples for Looms, J. Parkinson, Bradford.—22*nd October*, 1880.
4286. Preparatory Stop-motion Doubling Frames, I. Briggs, jun., Wakefield.—21*st October*, 1880.
4292. Portland Cement, D. S. W. Dawe, Brading.—21*st October*, 1880.
4304. Locks, W. White, London.—21*st October*, 1880.
4310. Magnetic Apparatus, W. R. Lake, London.—22*nd October*, 1880.

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

4004. Heel-plate for Boots, D. W. Fessey, London.—17*th October*, 1876.
4030. Twist Lace Machines, A. Mosley, Nottingham. 18*th October*, 1876.
4540. Cocks, J. Dewrance, London, and J. Mallinson, Welwyn.—22*nd November*, 1876.
5006. Direct-acting Steam Pumps, J. H. Heck, London.—27*th December*, 1876.
4098. Musical Instruments, C. Pieper, Dresden.—23*rd October*, 1876.
4024. Elevated Railways, A. H. Wildy, London.—18*th October*, 1876.
4039. Pickers for Looms, A. S. Wild, Wardle, and G. Chadwick, Bury.—19*th October*, 1876.
4056. Measuring, &c., Apparatus, A. and J. J. Tylor, London.—20*th October*, 1876.
4428. Inexplosive Steam Generator, J. F. Belleville, Paris.—16*th November*, 1876.
4167. Grapnels, A. Jamieson, Aberdeen.—27*th October*, 1876.
4478. Velocipedes, &c., J. and J. K. Starley, Coventry. 18*th November*, 1876.

Notices of Intention to Proceed with Applications.

(*Last day for filing opposition, 9th November*, 1883.)

2948. Folding Packing Cases, H. Green, London.—13*th June*, 1883.
2353. Steam, &c., Motors, T. Morgan, London.—A communication from Messrs. Bonicard and Huet.—13*th June*, 1883.
2967. Stench Traps, J. E. Manock, Heywood.—14*th June*, 1883.
2969. Water-closet Basins, R. McCombie and W. Seaman, London.—14*th June*, 1883.
2971. Burners, Sir J. N. Douglass, Dulwich.—14*th June*, 1883.
2972. Fastenings for Studs, H. Owen, Birmingham.—15*th June*, 1883.
2976. Buttons, &c., W. B. Fitch, London.—15*th June*, 1883.
2985. Solutions for Extinguishing Fires, A. F. Sprawn, Oakfield, U.S —15*th June*, 1883.
3002. Heat-retaining, &c., Dresses, A. W. Ward, London.—16*th June*, 1883.
3008. Galvanic Batteries, J. Oliphant, E. B Burr, and J. W. H. R. Gowan, London.—16*th June*, 1883.
3011. Marking the Ground for Lawn Tennis, J. G. Howard, Biddenham.—18*th June*, 1883.
3034. Levelling Instruments, B. J. B. Mills, London.—Com. from J. Macdonald.—19*th June*, 1883.
3054. Roundabouts, &c., E. G. Brewer, London.—A communication from S. J. Mignot and J. B. Franchelli.—20*th June*, 1883.
3072. Casting Iron, T. and J. Robinson, Widnes.—21*st June*, 1883.
3093. Extracting Sugar from Molasses, J. H. Johnson, London.—A communication from J. E. Boivin and M. M. D. Loiseau.—21*st June*, 1883.
3103. Refining Jute, E. T. Hughes, London.—A communication from W. Lukacs.—22*nd June*, 1883.
3109. Construction of Pavements, &c., E. G. Banner, London.—22*nd June*, 1883.
3116. Arranging Circuits for Telephonic Communication, S. Pitt, Sutton.—A communication from C. E. Scribner.—22*nd June*, 1883.
3124. Bottle-filling Machines, C. A. Day, London.—A communication from E. L. Lloyd and C. C. Joly.—23*rd June*, 1883.
3131. Telegraphic, &c., Communication, O. Schäffler, Vienna.—23*rd June*, 1883.
3132. Miners' Safety Lamps, J. Wetter, New Wandsworth.—A communication from H. Friemann.—23*rd June*, 1883.
3150. Preparing Tannic Extracts, J. H. Johnson, London.—A communication from E. L. P. and G. C. Coëz.—26*th June*, 1883.
3194. Looms for Weaving, W. Smith, Heywood, and J. Wrigley, Bury.—27*th June*. 1883.
3201. Heating Water or Air, J. H. Johnson, London.—A communication from Messrs. Guillot, Pelletier, and Co.—27*th June*, 1883.
3238. Cartridges, H. E Newton, London.—A communication from La Société Anonyme Dynamite Nobel.—29*th June*, 1883.
3281. Moulds for Producing Castings, J. McLaren, Stenhousemuir.—3*rd July*, 1883.
3282. Transporting Boxes of Fish from Fishing Vessels, J. Scott, Granton.—3*rd July*, 1883.
4022. Utilising the Bye Products in the Coking of Coal, C. and J. Thomson, Glasgow.—20*th August*, 1883.
4265. Children's Cots, &c., W. F. and W. H. Keep, London.—5*th September*, 1883.
4314. Valved Dip Pipe for Hydraulic Mains, J. H. Lyon, Cosham.—8*th September*, 1883.
4328. Treadle Looms, C. D. Abel, London.—A communication from L. Laeserson and H. Wilke.—10*th September*, 1883.
4408. Treating Hops, G. F. Redfern, London.—A communication from Messrs. F. Slama and F. Felix.—14*th September*, 1883.
4420. Striking Work for Clocks, A. G. Hovde, Norway.—15*th September*, 1883.
4430. Injectors for Raising, &c., Liquids, R. G. Brooke and T. H. White, Manchester.—17*th September*, 1883.
4439. Roller Mills, J. A. A. Buchholz, London.—17*th September*, 1883.
4467. Solutions used in Galvanic Batteries, W. R. Lake, London.—A communication from F. H. Peckham, jun.—18*th September*, 1883.
4523. Turning Bags or Sacks after Stitching, &c., W. R Lake, London.—A communication from S. T. Lockwood.—21*st September*, 1883.
4740. Lithographic Apparatus, L. Schmiers, Leipzig, —5*th October*, 1883.
4803. School Slates, H. J. Haddan, London.—A communication from G. and R. Gray, G. W. Berrey, and G. O. Clarke.—9*th October*, 1883.
4804. Making Nails, H. J. Haddan, London.—Com. from A. E. Tenney.—9*th October*, 1883.
4891. Spinning, &c., Textile Materials, W. J. Kinder, Manchester.—13*th October*, 1883.
4915. Carpet Cleaners, A. J. Boult, London.—Com. from S. B. Ryder.—16*th October*, 1883.
4916. Wood-turning Machines, A. J. Boult, London.—Com. from E. Gerry, jun.—16*th October*, 1883.

(*Last day for filing opposition*, 13*th November*, 1883.)

3012. Protecting Corns, &c., E. Holliday, London.—18*th June*, 1883.
3014. Steam Engines, C. Baumgarten, Berlin.—18*th June*, 1883.
3024. Dividing Rails into Sections, H. Britten, Sheffield.—19*th June*, 1883.
3031. Producing Light hy Electricity, W. P. Thompson, London.—A communication from R. J. Sheehy.—19*th June*, 1883.
3032. Distributing Sand, &c., C. D. Abel, London.—Com. from E. Lesur.—19*th June*, 1883.
3036. Boots and Shoes, H. J. Morgan, Frome.—19*th June*, 1883.
3038. Annealing Iron Castings, W. R. Lake, London.—A communication from E. Jenkins and A. Law.—19*th June*, 1883.
3055. Metallic Permanent Way, W. P. Thompson, Liverpool.—A communication from L. Harty, sen., and L. Harty, jun.—20*th June*, 1883.
3057. Spring Beds, &c., F. Ellisdon, Liverpool.—20*th June*, 1883.
3071. Heated Air Motors, L. P. Martin, Vienna, and F. W. Gilles, Cologne.—20*th June*, 1883.
3075. Looms for Weaving, W. H. Tristram and H. Brereton, Halliwell, near Bolton.—21*st June*, 1883.
3082. Washing Machine, A. I. Denny, Germany.—Com. from F. Yahnel.—21*st June*, 1883.
3085. Hydrocarbon Heating Stoves, C. Butler, Birmingham.—21*st June*, 1883.
3089. Ammoniacal Products, L. Q. and A. Brin, Parls.—21*st June*, 1883.
3100. Incandescent Electric Lamps, R. Harrison, Newcastle-on-Tyne.—22*nd June*, 1883.
3104 Chlorine, H. A. Dufrené, Paris.—A communication from La Société Anonyme de Produits Chimiques.—22*nd June*, 1883.
3105. Steam Generator or Water Heater, H. J. Haddan, London.—A communication from J. M. H. Menay.—22*nd June*, 1883.
3106. Perambulators, C. Thompson, London.—22*nd June*, 1883.
3118. Stop Motions of Drawing Frames, J. Macqueen, Bury.—23*rd June*, 1883.
3142. Rolling Mills for Rolling Metal, W. H. Ellis, Leeds.—25*th June*, 1883.
3161. Shoeing Horses, J. B. E. T. Lacombe, France.—26*th June*, 1883.
3167. Incandescent Electric Lamps, H. J. Haddan, London.—A communication from R. H. S .Thompson.—26*th June*, 1883.
3183. Ornamenting Pottery, &c., T. Bevington, Hanley.—27*th June*, 1883.
3190. Hampers and Baskets, H. Brunner, Widnes.—Com. from C. Garneri.—27*th June*, 1883.
3229. Chromates of Soda, E. P. Potter and W. H. Higgin, Bolton.—29*th June*, 1883.
3287. Boiler or Digester for Effecting Chemical, &c, Operations, G. Knowles, London.—3*rd July*, 1883
3312. Velocipedes, J. White and J. Asbury, Coventry, and F. F. Francis, Folkestone.—4*th July*, 1883.
3365. Cutting-out, &c., Stays and Corsets, A. Whitehorn, Bristol.—6*th July* 1883.
3470. Conveying Cash, &c., between the Counters an Office, H. J. Haddan, London —A communication from H. H. Hayden.—13*th July* 1883.
3477. Fastenings for Purses, A. M. Clark, London.—Com from Alexandre and Co.—14*th July*, 1883.
3560. Utilising the Rise and Fall of the Tide, &c., C. M. Walker, London.—19*th July*, 1883.
3576. Water Meters, J. Imray, London.—A communication from A. Frager and V. Michel.—20*th July*, 1883
3580 Purifying Mineral Oils, W. R. Lake, London.—Com. from A. André, jun.—20*th July*, 1883.
3593. Cigar-making Machines, W. Clark, London.—Com. from F. Haehnel. 21*st July*, 1883.
3808. Winding Yarns or Threads. W. Clark, London.—A communication from La Société Ryo frères.—3*rd August*, 1883.
4112. Carts, Carriages, &c., T. Briggs, Darwen.—25*th August*, 1883.
4196. Disinfectants, F. H. Atkins, London.—30*th August*, 1883.
4364. Looms for Weaving, R. Brownridge and P. Bond Macclesfield.—12*th September*, 1883.
4374. Cleaning Grain, J. Ritchie, Liverpool.—12*th September*, 1883.
4415. Carbonic Acid Gas, G. Jarmay, Winnington.—14*th September*, 1883.
4428. Colouring Matters, A. P. Price, London.—Com. from H. Caro.—15*th September*, 1883.
4468. Obtaining Benzol, &c., G. E. Davis, Manchester.—18*th September*, 1883.
4485. Carriages, M. M. Ben-Oliel, London.—19*th September*, 1883.
4491. Tramways or Railways, R. I. Urquhart, Edinburgh.—20*th September*, 1883.
4513. Suspenders for Hats, &c., J. Porter, Coalville.—21*st September*, 1883.
4528. Wheels of Railway Rolling Stock, J. Holden, Swindon.—22*nd September*, 1883.
4585. Galvanic Batteries, A. W. Warden, London.—26*th September*, 1883.
4806. Pulverising Machines, W. R. Lake, London.—Com. from R. D. Gates.—9*th October*, 1883.

Patents Sealed.

(*List of Letters Patent which passed the Great Seal on the 12th October*, 1883.)

2017. Velocipedes, G. G. Tandy, Clapham.—20*th April*, 1883.
2033. Delivering Prepaid Goods, J. G. Sandeman and P. Everitt, London.—21*st April*, 1883.
2037. Propeller for Vessels, A. Figge, London.—21*st April*, 1883.
2055. Metallic Oxides or Bases, H. A. Bonneville, London.—23*rd April*, 1883.
2059. Ring Spinning, &c., Frames, J. Young and E. Furniss, Mellor.—24*th April*, 1883.
2062. Thermo-electro Generators, H. Woodward London —24*th April*, 1883.
2066. Printing Machines, H. M. Nicholls, London.—24*th April*, 1883.
2069 Locking Apparatus, W. P. Thompson, London.—24*th April*, 1883.
2097. Self-acting Couplings for Railway Carriages, T. Wood, Manchester.—25*th April*, 1883.
2112. Purifying Water, E. M. Dixon, Glasgow.—26*th April*, 1883.
2151. Looms for Weaving, J. Langton and J. Gregson, Preston.—28*th April*, 1883.
2189. Electric Telephones, H. J. Allison, London.—1*st May*, 1883.
2207. Preventing Horses from Getting Shy, G. W von Nawrocki, Berlin.—1*st May*, 1883.
2227. Malleable Iron and Steel, W. M. Murdock, Gilwern —2*nd May*, 1883.
2239. Coupling Buffers for Railway Vehicles, H. H. Lake, London.—2*nd May*, 1883.
2281. Depolarising Electrolytic Baths, A. M. Clark, London.—4*th May*, 1883.
2300. Alpha and Beta Naphthol, I. Levinstein, Manchester.—7*th May*, 1883.
2736. Fabrics for Surgical, &c., Dressings, S. Gamgee, Birmingham.—1*st June*, 1883.
2750. Refined Sugar, J. Allen, London.—2*nd June*, 1883.
3573. Slabs, Blocks, &c., L. A. Groth, London.—20*th July* 1883.
3711. Breaking, &c., Grain, H. Springmann, Berlin.—30*th July*, 1883.
3787. Plaiting Machines, L. J. Pirie, Birkenhead, and H. Findlay, Battersea.—2*nd August*, 1883.

(*List of Letters Patent which passed the Great Seal on the 20th October*, 1883.)

1497. Manufacture of Sugar, A. J. Boult, London.—21*st March*, 1883.
2064. Preventing Excessive Heat in Dynamo-electric Machines, H. Roberts, Pittsburgh.—24*th April*, 1883.
2098. Tieing-in Warps, J. P. Binns, Halifax.—25*th April*, 1883.
2100. Heaters or Boilers, C. D. Yates, London.—25*th April*, 1883.
2103. Bottles and Stoppers, A. J. T. Wild, London.—25*th April*, 1883.
2115. Insulators, J. S. Lewis, Birkenhead.—26*th April*, 1883.
2116. Block Calendars, &c., G. F. Redfern, London.—26*th April*, 1883.
2120. Retaining, &c., Steam in its Application to Engine Power, R. M. Marchant, London.—26*th April*, 1883.
2123. Lubricating Oil, N. C. de Kroeber, London.—26*th April*, 1883.
2124. Mowing and Reaping Machines, W. M. Cranston, London.—26*th April*, 1883.
2127. Steam Boiler Flues, &c., E. G. Colton, London.—26*th April*, 1883.
2130. Coverings for Bottles, O. Wölff, Dresden.—27*th April*, 1883.
2131. Capsules for Bottles, E. P. Alexander, London.—27*th April*, 1883.
2132. Washing Machines, E. K. Heaps, Ferrybridge, near Normanton.—27*th April*, 1883.
2138. Cutting, &c, the Teeth of Wheels, H. H. Grierson and T. O'Maher, Manchester.—27*th April*, 1883.
2140. Velocipedes, G. J. Stevens and J. S. Smith, London.—27*th April*, 1883.
2147. Generating, &c., Electricity, J. S. Williams, Riverton, U.S.—27*th April*, 1883.
2148. Generating, &c., Electricity, J. S. Williams, Riverton, U.S.—27*th April*, 1883.
2158. Steam Cooking Apparatus, E. A. Brydges, Berlin.—28*th April*, 1883.
2168. Rollers of Machines for Spinning Textile Fabrics, W. R. Lake, London.—28*th April*, 1883.
2186. Protecting Fraudulent Interference with the Contents of Bottles, E. P. Alexander, London.—30*th April*, 1883.
2195. Electric Ways or Conductors, B. J. B. Mills London.—1*st May*, 1883.
2230. Cleaning Tobacco Pipes, H. Emery, Burslem.—2*nd May*, 1883.
2248. Card Stands or Holders, P. Ruffani, Dresden.—3*rd May*, 1883.
2287. Cutting Metals, W. W. Hulse, Manchester.—5*th May*, 1883.
2302. Saddle Bars, J. W. Clarke, Guisborough.—7*th May*, 1883.
2338. Electric Tramways, H. H. Lake, London.—8*th May*, 1883.
2430. Velocipedes, H. H. Lake, London.—14*th May*, 1883.
2480. Wheel Gear, C. H. Murray, Newcastle-upon-Tyne.—17*th May*, 1883.
2512. Stoppers for Bottles, A. B. Vanes, Cape of Good Hope.—19*th May*, 1883.
2518. Compound Steam Engines, C. Pieper, Berlin.—21*st May*. 1883.
2562. Manufacture of Gas, A. M. Clark, London.—22*nd May*, 1883.

2615. SECURING CANDLES in CANDLESTICKS, W. R. Lake, London.—25*th May*, 1883.
2624. WATCHES, W. H. Spence, London.—26*th May*, 1883.
2669. OBTAINING AMMONIA from COAL GAS, W. J. Cooper, London —29*th May*, 18-3.
2672. CARDING ENGINES, A. M. Clark, London.—29*th May*, 1883.
2701. TRANSMITTING POWER for PUNCHING and other WORK, A. Higginson, Liverpool—31*st May*, 1883.
2802. STEAM and other PISTONS, A. MacLaine, Belfast. —6*th June*, 1883.
3073. ABSTRACTING HEAT in LARGER QUANTITIES from STOVES, C. J. Henderson, Edinburgh.—21*st June*, 1883.
3234. GAS-BURNERS, H. H. Lake, London.—29*th June*, 1883.
3342. EXTRACTING FERROCYANIDES from SUBSTANCES CONTAINING the SAME, Dr. H. Kunheim, Germany, and H. Zimmermann, Wesseling, near Cologne.—5*th July*, 1883.
3561. MOTIVE POWER ENGINES, H E. Newton, London. —19*th July*, 1883.
3620. ANTI-FRICTION ROLLER DEVICES for BEARINGS, &c., J. H Johnson, London —24*th July*. 1883.
3704. FEED for ROLLERS and PURIFIERS, R. S. Piercy, Blackburn.—28*th July*, 1883.
4131. IRONING MACHINES, C. A. Allison, London.—27*th August*, 1883.

List of Specifications published during the week ending October 20th, 1883.

658, 8d.; 796, 10d.; 968, 6d.; 989, 6d.; 996, 2d.; 998, 4d.; 999, 1s. 6d.; 1021, 6d.; 1039, 2d.; 1048, 2d.; 1052, 6d.; 1054, 2d.; 1056, 2d.; 1057, 2d.; 1062, 2d.; 1063, 6d.; 1065, 4d.; 1068, 2d.; 1071, 1s.; 1072, 2d.; 1074, 2d.; 1075, 2d.; 1076, 6d.; 1077, 2d; 1080, 2d.; 1083, 8d.; 1084, 6d.; 1086, 6d.; 1087, 8d.; 1088, 2d.; 1089, 2d.; 1090, 6d.; 1092, 6d.; 1094, 2d.; 1095, 2d.; 1096, 4d.; 1097, 6d.; 1098, 6d.; 1099, 2d.; 1100, 6d.; 1101, 6d.; 1103, 2d.; 1104, 2d.; 1105, 2d.; 1106, 6d.; 1107, 6d.; 1108, 2d.; 1109, 2d.; 1110, 2d.; 1111, 2d; 1112, 4d.; 1113, 6d.; 1114, 2d.; 1115, 4d.; 1116, 6d.; 1118, 8d.; 1119, 6d.; 1121, 4d.; 1122, 6d.; 1123, 2d.; 1124, 6d.; 1225, 6d.; 1127, 2d.; 1128, 6d.; 1129, 6d; 1130, 2d.; 1131, 6d.; 1132, 6d.; 1133, 6d.; 1134, 2d.; 1136, 1s.; 1137, 6d.; 1138, 6d.; 1139, 6d; 1140, 10d.; 1141, 6d.; 1142, 6d.; 1143, 2d.; 1144, 4d.; 1145, 6d.; 1147, 2d.; 1148, 4d.; 1151, 6d.; 1152, 6d.; 1153, 4d.; 1154, 6d.; 1155, 6d.; 1156, 2d.; 1157, 6d.; 1158, 6d.; 1159, 2d.; 1160, 6d.; 1861, 2d; 1163, 6d.; 1164, 6d.; 1165, 2d.; 1172, 8d.; 1173, 6d.; 1174, 2d.; 1176, 2d.; 1177, 6d.; 1179, 6d.; 1180, 2d.; 1182, 8d.; 1183, 6d.; 1184, 6d.; 1187, 6d.; 1188, 4d; 1189, 6d.; 1191, 6d.; 1199, 2d.; 1200, 2d.; 1202, 1s.; 1206, 6d.; 1608, 4d.; 1509, 2d.; 1211, 8d; 1212, 6d.; 1213, 2d.; 1219, 6d.; 1223, 4d.; 1224, 6d.; 1226, 4d; 1227, 2d.; 1228, 2d; 1230, 2d.; 1232, 2d.; 1235, 8d.; 1241, 6d; 1254, 6d.; 1261, 4d.; 1262, 8d.; 1322, 4d.; 1334, 6d.; 1362, 4d.; 1400, 4d.; 1431, 6d.; 1433, 6d.; 1464, 6d.; 1477, 6d.; 1612, 4d; 1819, 6d; 1860, 4d.; 1936, 6d.; 1937, 6d.; 2878, 6d.; 2928, 1s.; 3191, 8d.; 3299, 6d.; 3401, 4d.

*** 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.*

658. CONSTRUCTION OF BEDSTEADS AND SPRING MATTRESSES, *G. Lowry, Salford.—6th February*, 1883. 8*d.*

The objects are to provide means of mounting and stretching the laths of metallic and other bedsteads, and to form the laths in such a manner that they act as or form partially or wholly the spring materials.

796. CONSTRUCTION AND ARRANGEMENTS OF PARTS OF VELOCIPEDES, &c., *W. J. Spurrier, Birmingham.—13th February*, 1883. 10*d.*

This relates to several improvements in the general construction and arrangement of parts.

968. APPARATUS FOR MEASURING, CHECKING, CONTROLLING, INDICATING, AND REGISTERING THE MOVEMENTS, SPEEDS, AND QUANTITIES OF LIQUIDS OR FLUIDS PASSING IN OR BETWEEN GIVEN TIMES, &c., *J. J. Tylor, London.— 22nd February*, 1883. 6*d.*

This relates to improvements in the construction of piston meters.

989. MATHEMATICAL DIVIDING AND MEASURING INSTRUMENTS, *A. Leo and P. S. Marks, London.—23rd February*, 1883. 6*d.*

The instrument is constructed upon the principle of the "lazy tongs," forming a number of connected cells of equal size, and each capable of receiving corresponding angular motion.

996. APPARATUS TO BE EMPLOYED IN SINKING SHAFTS OR PITS, *A. J. Boult, London.—23rd February*, 1883. —(*A communication from I. Quinet and A. Denis, Denain, France.*)—(*Not proceeded with.*) 2*d.*

This relates to improvements in the means or apparatus employed for raising or lowering material in mines, &c., and particularly for removing the material that is broken down in sinking shafts.

998. MANUFACTURE OF BOOTS AND SHOES, *W. R. Lake, London.—23rd February*, 1883.—(*A communication from E. J. Le Gay, Paris.*)—(*Not proceeded with.*) 4*d.*

The sole is united to the heel by effecting the connection of the two parts in such a manner that they cannot be separated.

999. GAS AND OTHER ENGINES, *A. M. Clark, London. —23rd February*, 1883.—(*A communication from N. de Kabath, Paris.*) 1*s.* 6*d.*

The engine consists essentially of a cylinder of two diameters fitted with a corresponding double piston, of which one part is the working piston, and the other is for pumping the gases out of the working cylinder.

1021. BOTTLE STOPPERS AND TOOLS OR APPARATUS FOR THE MANUFACTURE OF GLASS BOTTLES, *W. R. Lake, London.—24th February*, 1883.—(*A communication from S. A. Bull, London.*) 6*d.*

The invention comprises an improved tool or apparatus whereby glass bottles can be made with a recess in the neck to receive a ring of cork or other suitable material, against which an internal stopper will be held by the pressure of gas within the bottle, when the latter is filled with aërated liquid. The invention is also applicable to bottles with external stoppers.

1039. APPARATUS FOR TETHERING HORSES, &c., *W. R. Lake, London.—27th February*, 1883.—(*A communication from G. Lettström, Stockholm.*)—(*Not proceeded with.*) 2*d.*

This relates to a tether which is easy of transport, occupies a small space, and is capable of being readily attached to a tree or the like.

1048. TRACTION ENGINES OR ROAD LOCOMOTIVES, *R. H. Abbot, Dewsbury.—27th February*, 1883.—(*Not proceeded with.*) 2*d.*

This relates particularly to the construction of a frame plate.

1052. TILLING MACHINES, *W. P. Thompson, Liverpool. —27th February*, 1883.—(*A communication from C. F. Sackett, Morristown, U.S.*) 6*d.*

This relates to a class of tilting appliances which are designed to perform simultaneously the several operations involved in the preparation of soil for seed. The object is to perfect each of the several processes executed by such an implement, viz, clearing, reversing, ploughing, aërating, and distributing the earth.

1054. BASKETS, BOXES, &c., *F. H. White, Liverpool.— 27th February*, 1883.—(*Not proceeded with.*) 2*d.*

This consists in a method of or arrangement for making folding boxes, baskets, and the like, by which they can be folded flat when not in use, yet when in use be stiff and strong.

1056. LOCKS AND LATCHES, *H. and T. Vaughan, Willenhall.—27th February*, 1883.—(*Not proceeded with.*) 2*d.*

This relates to the method of operating the latch bolt of a latch or the latch bolt of a lock, such as draw back locks, rim locks, rim and night latches; and to the means of fixing either when the latch is to be made fixed to act as fastened or locked latch, or when the bolt has been shot with a key to fix it in the inside; and also to the kind of latch called a drop latch used either as right or left locks, also to the opening of the latch lock from the outside.

1057. GAS VALVES, *H. Coley, London.—27th February*, 1883.—(*Not proceeded with.*) 2*d.*

The object is to effect in a gas valve the closing of the valve against its seat in an efficient way by simple means not liable to derangement, and such as will offer no obstruction in the passage for gas when the valve is open.

1062. STENCILLING ON CHINA OR EARTHENWARE, *G. Stellanus (Count Holtzendorff), Derby.—27th February*, 1883 —(*Not proceeded with.*) 2*d.*

This consists in a process by which an adhesive stencil plate of gelatine or other similar substance is formed on the surface of each article required to be decorated.

1063. WATERING THE ROADWAYS OF COLLIERIES, STREETS, LAWNS, &c., *W. Smethurst, near Wigan, and T. T. Crook, Bolton.—27th February*, 1883. 6*d.*

This relates to the construction of a centrifugal machine.

1065. MINING SIGNALS, *A. C. Bagot, Rugely.—27th February*, 1883.—(*Not proceeded with.*) 4*d.*

This relates to several improvements in electrical signalling apparatus.

1068. RUDDERS, *W. Blakeley, Bournemouth.—27th February*, 1883.—(*Not proceeded with.*) 2*d.*

This relates partly to the construction of a rudder principally applicable for small craft, but also applicable to ships, and has for its object to render the rudder flexible in a fore and aft direction, and thereby to approximate its action to the natural action of the tail of a fish.

1071. PRINTING MACHINES OR PRESSES, *W. R. Lake, London.—27th February*, 1883.—(*A communication from J. T. Hawkins, Taunton, U.S.*) 1*s.*

The object is to dispense with the curved stereotype plate heretofore generally used upon the type cylinders of perfecting presses, and to print perfected sheets from a continuous web of paper on the original type formes.

1072. APPARATUS FOR BASTING MEAT, *T. S. G. Kirkpatrick, London.—27th February*, 1883.—(*Not proceeded with.*) 2*d.*

This consists essentially in the combination with the common bottle-jack of a pump attached to and actuated directly by the mechanism of the jack itself, so that the operations of rotating and basting the meat are effected concurrently by one and the same piece of mechanism.

1074. APPARATUS FOR HEATING AIR AND DRYING AGRICULTURAL PRODUCE, &c., *W. A. and D. H. Gibbs, Chingford.—27th February*, 1883.—(*Not proceeded with.*) 2*d.*

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

1075. WRITING AND DRAWING PENCILS, *F. Clouth, near Cologne.—27th February*, 1883.—(*Not proceeded with.*) 2*d.*

The inventor mixes plumbago or other black, green, red, or blue pigment with india-rubber and with sulphur. The mixture is moulded into sheets and vulcanised, when it is cut into strips and used to form the cores of the pencils.

1076. APPARATUS FOR COUPLING AND UNCOUPLING RAILWAY CARRIAGES, &c., *J. Richardson and C. Greenwood, Harrogate.—27th February*, 1883. 6*d.*

This relates to the general construction of apparatus whereby an attendant performs the operation of coupling or uncoupling, tightening or slackening the couplings from either side of a train in safety, being clear from the buffers or rails.

1077. PLASTIC COMPOUND SUITABLE TO BE ROLLED INTO SHEETS AND USED AS A SUBSTITUTE FOR EBONITE, &c., *W. Smith, London.—27th February*, 1883. 2*d.*

This consists of gutta-percha and finely powdered bituminous coal which is suitable to be rolled into sheets and used as a substitute for ebonite and also to make battery cells and other articles.

1080. CONSTRUCTION OF SHIPS OR VESSELS AND APPARATUS FOR UTILISING RESISTANCE OF DISPLACEMENT, *R. H. Brandon, Paris.—28th February*, 1883.—(*A communication from E. Lavarenne, Paris.*)—(*Not proceeded with.*) 2*d.*

One of the main objects is to make use of the pressure of the water against the bows of a ship as a motive power to assist the ship in its progressive motion or advance.

1083. APPARATUS FOR SEPARATING SEEDS, GRAIN, MIDDLINGS, OR OTHER SUBSTANCES, AND PURIFYING AIR FROM DUST, *P. Van Gelder, Sowerby Bridge.— 28th February*, 1883. 8*d.*

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

1084. MACHINERY FOR THE MANUFACTURE OF PAPER, *L. Zeyen, Ragnhn, Germany.—28th February*, 1883. —(*A communication from C. Bötter, Oberwesel, Prussia.*) 6*d.*

In order to obviate the injury to the paper from irregularities in the speed of the same when being drawn through the machine wherever the paper is exposed to them, and with a view to regulate the drawing of the paper, the inventor provides the feed or guide rollers with yielding bearings, and arranges when practicable the said rollers between the damping presses, between the last damping press and the first drying roller, in front and at the back of the damp smoothing rollers, and behind the last drying roller.

1086. MANUFACTURE OF ENVELOPES, &c., *E. Sturge, London.—28th February*, 1883. 6*d.*

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

1087. DISTILLATION OF COAL, SHALE, IRONSTONE, AND ORGANIC SUBSTANCES, *J. Barrow, near Manchester. —28th February*, 1883. 8*d.*

This refers to the arrangement of retorts and the application of heating substances, so that variation and gradual increase of temperature may be easily obtained.

1088. PORTABLE AND OTHER EASY OR LOUNGE CHAIRS, SETTEES, AND COUCHES, *A. B. Barnard.—28th February*, 1883.—(*Not proceeded with.*) 2*d.*

This relates to the construction of the framework.

1089. MAKING-UP THE LEGS OF TROUSERS AND COMBINING THE LININGS THEREWITH AT ONE OPERATION, *C. Wills, Bristol.—28th February*, 1883. 2*d.*

This relates to the particular method of making-up the legs and linings of trousers and the like at one sewing operation.

1090. APPARATUS FOR RAISING AND FORCING LIQUIDS, *J. H. Kidd, Wrexham —28th February*, 1883. 6*d.*

This relates particularly to the peculiar construction of the steam admission valve.

1092. APPARATUS FOR THE PREPARATION OF DECOCTIONS OR EXTRACTS FROM TEA, COFFEE, &c., *E. G. Brewer, London.—28th February*, 1883.—(*A communication from Messieurs Malen and Deglise, Paris.*) 6*d.*

This relates to the production of a new kind of multiple circulating apparatus.

1094. GLOVE FASTENERS, &c, *P. M. Justice, London. —28th February*, 1883.—(*A communication from R. Derooster, Brussels.*)—(*Not proceeded with.*) 2*d.*

This relates to two sets of upper and lower plates enclosing the sides of the material to be fastened or secured together.

1095. APPARATUS FOR WASHING PHOTOGRAPHS, *J. W. Tattersall, Accrington.—28th February*, 1883.—(*Not proceeded with.*) 2*d.*

This relates to the employment of a fine spray of water.

1096 MANUFACTURE OF HYDRATES OF ALKALIES AND ALKALINE EARTHS, &c., *C. F. Claus, London.—28th February*, 1883. 4*d.*

The inventor claims, First, the production of hydrate of strontia by the action of caustic soda or caustic potash upon a sulphide of strontium; Secondly, a process for recovering the caustic alkalies used in the production of hydrate of strontia or of hydrate of baryta; Thirdly, the production of hydrate of strontia by the action of hydrate of baryta upon chloride of strontium, or upon a sulphide of strontium; Fourthly, the production of carbonate of strontia by the action of chloride of magnesium and carbonic acid upon the solution of a sulphide of strontium; Fifthly, the process of manufacturing carbonate of strontia by precipitating the same from a solution of a sulphide of strontium by means of gas liquor.

1097. PIPES FOR SMOKING TOBACCO, *O. Ber, Wierzbolowa, Russian Poland.—23th February*, 1883. 6*d.*

The object is to obtain a long passage for the smoke in passing from the bowl of the pipe before it reaches the smoker.

1098. GAS ENGINES, *E. G. Wastfield, Liverpool.—1st March*, 1883. 6*d.*

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

1099. CALCINING CEMENT AND KILNS THEREFOR, *G. Simpson, Edinburgh.—1st March*, 1883.—(*Not proceeded with.*) 2*d.*

This consists in the application of combustible gas, produced in a separate apparatus, to the calcination of natural cement stone, or of a mixture of cement forming material in intermittent or continuous working kilns.

1100. WEATHER BAR FOR EXCLUSION OF RAIN AT THE FOOT OR SILL OF DOORS, &c., *C. A. Wheeler, Swindon.—1st March*, 1883. 6*d.*

This relates to the form of the weather bar.

1101. APPLICATION OF MOTIVE POWER TO PNEUMATIC AND OTHER RAILWAYS, &c., *T. W. Rammell, London.—1st March*, 1883. 6*d.*

The inventor claims, First, the arrangement or combination of an elongated cylinder and guide tube, with special piston and other parts, whereby motive power may be applied by direct thrust for the movement of railway trains from station to station; Secondly, the application of this arrangement or combination or a modification thereof for arresting the motion of railway trains at stations; Thirdly, the general application of the arrangement or combinations with such modifications as may be found necessary to other purposes for which it may prove suitable; and in particular, its application to guns, engines, or apparatus for the launching of missiles.

1103. MANUFACTURING "CAGE MEAT SAFES," *T. Wrigley, London.—1st March*, 1883.—(*Not proceeded with.*) 2*d.*

This relates to mechanism to be employed for manufacturing that class of article called a "portable meat safe," which consists of a leno or gauze tube or covering distended by two or more hoop canes, the said gauze being closed in at top permanently by a meat hook, and the bottoms by slip strings or an elastic, which enables the cage-like tube to be readily opened for the reception of food and again closed.

1104. HAND PRINTING OR ENDORSING STAMPS, *G. K. Cooke, London.—1st March*, 1883.—(*Not proceeded with.*) 2*d.*

This relates more particularly to those stamps which have semi-rotating die plates alternately inking and stamping. It also relates to adapting to fixed die plates in combination with the removable die plates a dating or numbering appliance arranged to print alone or in combination with a printing die attached to the removable interchangeable die plate.

1105. CARD RAISING MACHINES, EMPLOYED IN FINISHING BLANKETS, &c., *H. Morton, Yorkshire.—1st March*, 1883.—(*Not proceeded with.*) 2*d.*

The object is to give a steady oscillating to-and-fro motion to the raising card cylinder and brush.

1106. COMBINED BED, TABLE, CHAIR, AND CLOTH RAIL, *G. Burklein, Munich.—1st March*, 1883. 6*d.*

The object is the construction of a combination furniture serving as a bed, as a table and chair, and as a cloth rail.

1107. PIANOFORTES, &c., *H. J. Haddan, Kensington.— 1st March*, 1883.—(*A communication from A. Biese, Berlin, and G. Zierold, Leipzig.*) 6*d.*

This relates to the pianoforte actions and to the method of attaching the sound-board.

1108. PORTABLE JIB CRANE TO BE USED AS A FIRE-ESCAPE, &c., *G. Powell, Cheltenham.—1st March*, 1883. —(*Not proceeded with.*) 2*d.*

The object is to construct and arrange a portable and inexpensive crane specially adapted for use in connection with windows or other openings in buildings, and which when not in use can be folded up into a small compass

1109. CIGARS AND CIGARETTES, *J. McGovern, Liverpool. —1st March*, 1883.—(*Not proceeded with.*) 2*d.*

This relates to a means of flavouring cigars, &c.

1110. SOLES OF BOOTS AND SHOES, *E. Goad, London.— 1st March*, 1883 —(*A communication from B. Colis, Perigueux, France.*)—(*Not proceeded with.*) 2*d.*

This relates to the means of making the soles from a series of folded strips.

1111. APPARATUS FOR PRINTING UPON MATCHES, SPLINTS, SPILLS, AND CIGAR OR OTHER LIGHTERS, *E. Goad and R. Taylor, London.—1st March*, 1883.— (*Not proceeded with.*) 2*d.*

This relates to the arrangement of the splints, &c., in series for the purpose of printing on the surface thereby presented.

1112. MANUFACTURE OF FERROCYANIDES, *G. De Vigne, Lille —1st March*, 1883. 4*d.*

The object is to extract from coal gas or smoke or from any other kind of gas or smoke which may contain them, the cyanogen and hydrocyanic acid, and at the same time to convert these substances into ferrocyanides.

1113. ELECTRIC GENERATORS, *R. D. Bowman, J. E. L. and W. J. K. Clark, London.—1st March*, 1883. 6*d.*

Iron cores, wound longitudinally with coils of insulated copper wire, are built up in several detachable sections to form the armature. The extremities of the pole pieces of the field magnets are formed with round extended surfaces, the inner surfaces having channels running in a direction parallel to the direction of rotation of the armature.

1114. EGG-CUPS, *W. Cook, Worcestershire.—1st March*, 1883.—(*Not proceeded with.*) 2*d.*

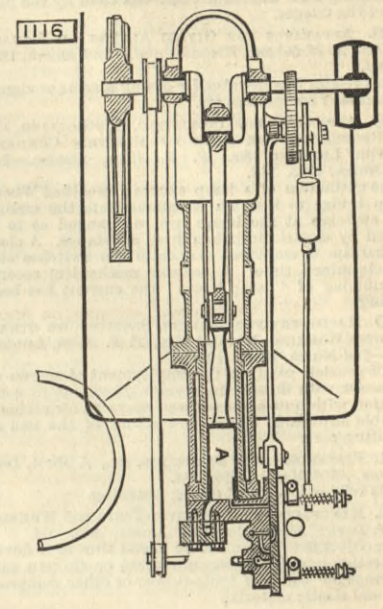
A groove is made inside the egg-cup, into which is inserted a ring of india-rubber or other elastic material, so as to grip various sizes of eggs.

1115. TELEPHONIC APPARATUS, *A. R. Bennett, Glasgow. —1st March*, 1883. 4*d.*

When induction coils are used, a third wire is wound on, and its ends joined directly together, or through a resistance. If condensers are used, they are provided with four or more plates. To overcome eletro-static induction in long lines, the line is divided into convenient sections, each section being provided with translating apparatus. To destroy the inductive influence on a single wire, induction coils or condensers are placed in with the line at each end, or a portion of the current is shunted to earth before reaching the instruments.

1116 GAS ENGINES, *R. Steel and H. W. Whitehead, Leeds —1st March*, 1883. 6*d.*

This relates to the pistons of gas engines, and consists in making such piston A of a hollow cylindrical form and closed at its outer end. Ordinary piston rings may be employed thereon, so as to ensure a perfect fit within the cylinder. The piston in its outward movement draws into the cylinder the explosive mixture of gas and air, and on its inward stroke the whole of the mixture passes from the cylinder into the hollow piston and is there compressed. When the piston has arrived at the bottom of its stroke and the bottom of the cylinder, sufficient compression is



thereby obtained, and the explosion is then allowed to take place. The invention also relates to the application of a pipe or tube for conveying a portion of the compressed mixture out of the hollow piston to the igniter for increasing the igniting power thereof. It further relates to a catch motion for opening an exhaust valve for the purpose of getting rid of the products of combustion.

1118. ROTARY ENGINES AND GOVERNORS, &c., *T. A. Hearson, Blackheath.—1st March*, 1883. 8*d.*

This relates partly to an engine in which the cylinder or chamber rotates with two or more sectors, whilst the piston sectors also rotating make an angular oscillation relatively to the cylinder.

1119. DECORATION OF WOOD AND APPARATUS TO BE USED FOR THIS PURPOSE, *H. Saunders and S. Comber, Brighton.—1st March*, 1883. 6*d.*

The object is to facilitate the production of any desired design or device upon the surface of wood by means of heated metallic dies.

1121. OBTAINING MATERIALS AND ELEMENTS TO BE USED IN CONSTRUCTING AND WORKING PRIMARY VOLTAIC BATTERIES, *D. G. FitzGerald and T. J. Jones, London —1st March*, 1883. 4*d.*

This invention relates to the electrolytic production of peroxide of lead, either in bulk or *in situ*, simultaneously with the reduction of a metal from an insoluble salt, and to their application in constructing and working primary batteries.

1122. SECONDARY BATTERIES OR ACCUMULATORS, *D. G. Fitz-Gerald, London.—1st March*, 1883. 6*d.*

To prevent the disintegration of the electrodes, made as described in patent 5338, of 1881, and more especially the anode, they are covered with a coating of insulating material, preferably "Prout's glue," which is made adhesive by heat, and is so perforated as to allow of the metal being attacked by the electrolyte only in the plane of the plate, instead of at every point of its surface as hitherto.

1123. MANUFACTURE OF MAIZE STARCH, *J. M. Harley, Paisley.—2nd March*, 1883.—(*Not proceeded with.*) 2*d.*

This consists in taking the starch after it has been drained of moisture and cut up or divided, and placing it in a stove wherein it is dried in an atmosphere charged with steam.

1124. MECHANISM FOR CONTROLLING THE STEERING GEAR OF, AND APPLYING BRAKE POWER TO VELOCIPEDES, *A. Burdess, Coventry.—2nd March*, 1883. 6*d.*

The steering is controlled by a screwed spindle instead of a rack and pinion.

1125. MACHINERY FOR STAMPING, EMBOSSING, AND COLOURING IN "RELIEF" ENVELOPES, &c., *E. Sturge, Lambeth.—2nd March*, 1883. 6*d.*

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

1127. INSULATING WIRES FOR ELECTRICAL PURPOSES, *W. A. Phillips, London.—2nd March*, 1883.—(*Not proceeded with.*) 2*d.*

A strip of insulating material is laid on longitudinally, the seam being secured by heat. The coated wire is then covered with the same or other material by braiding. A final protecting covering of jute is used.

1128. DEVICES OR APPARATUS FOR SHARPENING OR POINTING PENCILS, *B. S. Cohen, London.—2nd March*, 1883 6*d.*

This relates to a pencil 'sharpener' provided with springs.

1129. VELOCIPEDES, *J. D. Ellson, Coventry.—2nd March*, 1883. 6*d.*

The object is to enable the rider to obtain at will different rates of speed, thereby increasing or diminishing the power required for propelling a velocipede.

1130. METAL ROLLERS FOR PRINTING FABRICS, *C. J. Appleton, Salford.—2nd March*, 1883. 2*d.*

This relates to the production of metal printing rollers by engraving, etching, or otherwise producing the so-termed engraved design upon an iron or steel roller, and rendering such rollers suitable to be used in printing by coating the engraved surface with a thin deposit of nickel or of copper, or other metal suitable for the purpose.

1131. APPARATUS FOR BALANCING, SECURING, AND FASTENING SLIDING WINDOW SASHES, *J. B. Adams and J. Telford, Liverpool.—2nd March*, 1883. 6*d.*

This relates to an arrangement in which a rack and pinion and weights are employed.

1132. TOOLS AND MACHINES FOR SCREWING AND CUTTING OFF METAL PIPES AND TUBES, &c., *W. and J. Maiden and E. F. Cowley, Hyde, Chester.—2nd March*, 1883. 6*d.*

The object is the construction of an improved steel tool or cutter in a continuous length and width, which shall be capable of being sharpened on the grindstone without recourse to what is known as the drawing out process.

1133. APPARATUS FOR THE MANUFACTURE OF SPOOLS OR BOBBINS, *F. Wirth, Frankfort-on-the-Main.—2nd March*, 1883.—(*A communication from A. Abegg, Laufenburg, Germany.*) 6*d.*

This relates to the manufacture of spools or bobbins made of paper and also to the apparatus.

1134. VELOCIPEDES, *H. T. Davey, Putney.—2nd March* 1883.—(*Not proceeded with.*) 2*d.*

This relates to means for increasing the speed.

1136. STEAM ENGINES AND BOILERS FOR THE SAME, *L. Perkins, London.—2nd March*, 1883. 1*s.*

This relates to several improvements in the general construction of the engine and boiler.

1137. Construction of Break-down Guns and Safety Apparatus to be applied to Guns generally, *W. Nobbs, London.*—*2nd March*, 1883. 6*d.*

This relates, First, to a novel arrangement of parts for effecting the ejectment from single or double break-down guns of exploded cartridges, and if one cartridge only of a double-barrel gun be exploded for retaining the unexploded cartridge in its barrel; Secondly, to means for locking the tumbler or hammer and the sear of break-down or other guns, and thereby preventing their discharge otherwise than by the pulling of the trigger.

1138. Apparatus for Giving Alarms or Signals, &c., *A. M. Gibson, Westmoreland.*—*2nd March*, 1883. 6*d.*

This relates to apparatus for giving alarms or signals by means of compressed air.

1139. Apparatus for Indicating, Controlling, and Regulating the Flow of Electric Currents for Lighting, &c., *P. R. Allen, London.*—*2nd March*, 1883. 6*d.*

The extinction of a lamp causes a modified Wheatstone bridge to insert a resistance into the circuit. The switches at the lamps are so arranged as to be moved by electric impulses from a distance. A clock mechanism is employed to operate the switches at a predetermined time. A counter mechanism records the number of "lamp hours" the current has been flowing.

1140. Machinery for Shaping, Slotting, or otherwise Working Metals, &c., *P. R. Allen, London.*—*2nd March*, 1883. 10*d.*

This consists partly in the employment of screws or of a screw with threads in reverse directions in combination with nuts arranged and operated for giving a variable adjustable stroke and return of the tool or operating part.

1141. Fastenings for Bracelets, &c., *J. Hirst, London.*—*3rd March*, 1883. 6*d.*

This relates to a coiled spring fastening.

1142. Manufacture of Grooved Tires for Wheels, *G. Davies, Manchester.*—*3rd March*, 1883. 6*d.*

The object is to manufacture metal tires of a dovetail section in order to secure thereto or therein surface rings or bands of india-rubber or other compressible and elastic material.

1143. Driving Belts, *A. Carney, Glasgow.* — *3rd March*, 1883.—(*Not proceeded with.*) 2*d.*

This relates to constructing leather belts with chains of flat metallic links.

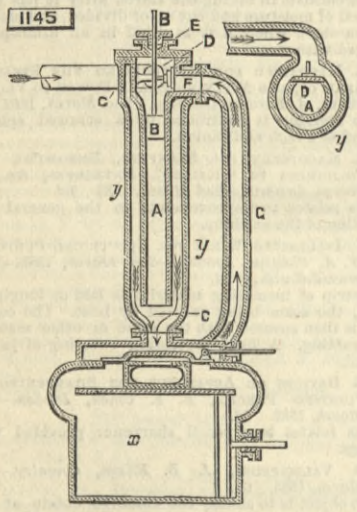
1144. Preparation of Agents to be used in the Treatment of Sewage, &c., *W. C. Sillar and J. W. Slater, London.*—*3rd March*, 1883. 4*d.*

The inventors claim, First, the preparation of crude muriate of alumina or muriate of alumina and iron for use in the treatment of sewage, by mixing a solution of sulphate of alumina, or the lixivium of shales or other minerals containing sulphate of alumina alone or sulphate of alumina and sulphate of iron, with a solution of chloride of calcium; Secondly, the preparation of an agent for use in the purification of sewage, by adding sulphuric acid or muriatic acid or both, by any process in which salts of alumina or clay or salts of alumina and clay have been used; Thirdly, the use in the treatment of sewage of the product resulting from the treatment with sulphuric acid or muriatic acid or both, of the mud or precipitate produced, by treating sewage by any process in which salts of alumina or clay or salts of alumina and clay are used.

1145. Apparatus for Utilising the Exhaust Steam in Engines, *H. J. Haddan, Kensington.*—*3rd March*, 1883.—(*A communication from A. Zalm, Rotterdam.*) 6*d.*

x represents the cylinder of an ordinary steam engine provided with a piston. The introduction of the live steam as well as the discharge of the exhaust steam takes place in the ordinary way, viz., by means of a slide valve; *y* represents part of the steam conducting tube or a tube in communication with the same. The tube *y* encloses the cylinder A, the communication of which with the tube *y* at C^1 may be interrupted by means of the valve D. This valve is arranged in such a manner as to be automatically closed by the live steam leaving the boiler. In Fig. 2 this valve is shown in section. The cylinder A contains a piston B with rod B passing through the cover E of a stuffing-box. The rod B, which is connected with a counterweight, is of sufficient length to permit the piston to descend to the bottom of the tube A. The tube G, which com-

1145



municates with the interior of the slide valve, is connected with the cylinder A through an opening capable of being closed by means of a valve F. When the slide valve occupies the position shown in the drawing, the two steam ports of the cylinder *x* are closed, and the piston B occupies the position indicated in the drawing. If the piston B is caused to descend by means of the counterweight attached to the rod B, the valve F closes, while the valve D may remain at rest, because the pressure may be the same on both sides of the valve D. At this moment the steam cylinder will be full of steam, the steam piston will occupy the position indicated in the drawing and the two sides of the piston are exposed to steam of low density.

1148. Apparatus for Dressing Stiff Net, &c., *G. Mawritz, Penge.*—*3rd March*, 1883.—(*A communication from G. H. Gruner, Dresden.*) 4*d.*

This relates to improvements in the means of dressing and in the apparatus employed therein.

1151. Hoists or Lifts, *J., J., T., and D. Barker, Oldham.*—*3rd March*, 1883. 6*d.*

This relates to hoists or lifts which pass through several floors or rooms, and the object is to construct hoists, so that the doors to the well may be under the control of the attendant in the hoist edge.

1152. Apparatus for Generating Motive Power, &c., *R. Hallewell, Blackburn.*—*3rd March*, 1883. 6*d.*

This relates partly to steam generators and ports of prime movers, wherein steam is suddenly generated in a small intensely heated space from a small quantity of liquid injected for each stroke and admitted to act upon a piston or upon pistons by opening a valve or valves, which is or are closed or permitted to close at an early part of the stroke.

1153. Attaching Door Knobs to their Spindles, *A. Varah, Sheffield.*—*3rd March*, 1883. 4*d.*

This relates to means of attaching without set screws.

1154. Smokeless Stoves, &c., *R. E. Cox, London.*—*3rd March*, 1883. 6*d.*

This relates to the manufacture of stoves for burning smokeless fuel with or without the combination of gas or liquid fuel.

1155. Producing Imitation "Guipure D'Art" Lace in Twist Lace Machines, *A. Mosley, Nottingham.*—*3rd March*, 1883. 6*d.*

This relates to an arrangement of guide bars.

1156. Electric Incandescent Lamps, *A. M. Clark, London.*—*3rd March*, 1883.—(*A communication from J. M. A. Gerard-Lescuyer, Paris.*)—(*Not proceeded with.*) 2*d.*

Relates to a lamp having a pair of fine carbons pressed at their free ends against a block of carbon, and to the method of supporting the lamp bulb.

1157. Steel Making and other Furnaces, *F. W. Dick and J. Riley, Glasgow.*—*5th March*, 1883. 6*d.*

This relates to the arranging or combining together of steel making and other furnaces using gaseous fuel with their regenerative chambers.

1158. Date Indicator, *G. H. T. Hawley, Bromley, Kent.*—*5th March*, 1883. 6*d.*

The object is to enable a person to calculate almost instantaneously the number of days for which interest has to be charged upon a bill of exchange, &c.

1159. Apparatus for the Evaporation of Liquids and the Extraction of Solid Matters therefrom, *A. Bell, Manchester, and J. H. Lewis, Widnes.*—*5th March*, 1883.—(*Not proceeded with.*) 2*d.*

This relates to an arrangement of a pan and trough and an endless chain of buckets.

1160. Disintegrating Apparatus for Flour Mills, *C. Pieper, Berlin.*—*5th March*, 1883.—(*A communication from A. C. Nagel, R. H. Kaemp, and A. Linnenbrügge, Hamburg*) 6*d.*

This consists in the employment of fan blades fixed either on the edge of the rotative disc carrying the beating pins, or on the shaft of the same, and in the combination with such blades of a channel leading to the machine, or apparatus on which the grist produced is to be sifted or purified, or to a collecting chamber, the object being to convey the grist to its place of destination by means of the air current created by the fan blades.

1161. Felted Fabrics, &c., *F. Marriott, Birstall.*—*5th March*, 1883.—(*Not proceeded with.*) 2*d.*

The object is to manufacture felted fabrics with plain or fancy borders or stripes of different colour or shade to the other portion of the felted piece.

1163. Apparatus for Treatment of Pulmonary, Cutaneous, and other Affections, *J. T. Dann, Brixton.*—*5th March*, 1883.—(*A communication from H. Wartmann, Switzerland.*) 6*d.*

This relates to an apparatus for producing medicated vapour.

1164. Manufacture of Handles of Fish and other Table Knives and Forks, *R. E. Sawtell, Sheffield.*—*5th March*, 1883. 6*d.*

The handles are made up of frames adapted to receive suitable scales or plates.

1165. Apparatus for Harvesting, &c., *E. Cavanagh, Stafford.*—*5th March*, 1883.—(*Not proceeded with.*) 2*d.*

This relates to the construction of apparatus for passing air through stacks.

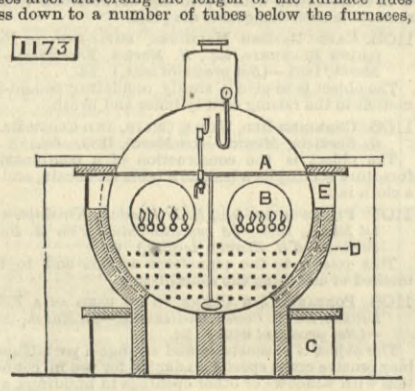
1172. Securing and Finishing the Excentrics on Crank Shafts of Locomotive or other Engines, &c., *F. Holt, Derby.*—*5th March*, 1883. 8*d.*

The object is to secure excentrics upon crank shafts without rising keys or other loose pieces.

1173. Appliances for Heating Steam and other Boilers by the Combustion of Gas, *W. H. Thompson, L. Hardaker, and J. M. Porter, Leeds.*—*5th March*, 1883. 6*d.*

The drawing shows an elevation, partly in section of a combined double furnace and multitubular boiler with double furnaces, in which furnaces are placed a series of Bunsen or other gas burners. The heated gases after traversing the length of the furnace flues pass down to a number of tubes below the furnaces,

1173



and are thereby brought to the front, from whence they pass down underneath the boiler, from whence up again on each side through the divisional flues D D into two flues E E, and pass from thence to the general flue; at the end of the boiler C C are hot air flues for heating the incoming air or gas, or both, by means of the spare heat. Suitable plates, baffilers (plain or water way) and midfeathers A are used to direct the currents in the required direction.

1173. Appliances for Heating Steam and other Boilers by the Combustion of Gas, *W. H. Thompson, L. Hardaker, and J. M. Porter, Leeds.*—*6th March*, 1883. 6*d.*

This consists partly in the heating of steam boilers by means of gas fuel internally fired, in the use of a combined double furnace and multitubular boiler with descending currents and parallel channel flues.

1174. Paving Roads and Ways with Wood, Stone, and other Materials, *J. Rowley, Dulwich-grove, Surrey.*—*5th March*, 1883.—(*Not proceeded with.*) 2*d.*

This relates to the general construction of the roadway.

1176. Apparatus for Drying Skins, Woven Fabrics, &c., by means of Currents of Warm or Cold Air, *E. Edwards, London.*—*5th March*, 1883.—(*A communication from O. Lumpp, Lyons, France.*)—(*Not proceeded with.*) 2*d.*

The apparatus consists of a building or chamber in which are suspended from rails the skins or other articles which are to be dried.

1177. Coast Life-boats, &c., *W. M. F. Schneider, Limehouse.*—*5th March*, 1883. 6*d.*

This relates to the construction or arrangement of channels or scuppers of life-boats adapted to facilitate the discharge of water from within such boats provided with self-acting valves to control such discharge of water.

1179. Roller Mills, *H. Simon, Manchester.* — *5th March*, 1883. 6*d.*

Part of the invention relates to means of causing the cessation of the feed either to stop the mill automatically or to give an alarm, so that the mill can be stopped or have its feed rectified, or both.

1180. Instrument for Measuring Distances, *J. T. Whish, Southsea.*—*5th March*, 1883.—(*Not proceeded with.*) 2*d.*

This relates to an instrument for measuring the distance of distant objects situated at the apex of a triangle, the base of which is very small as compared with the length of the sides.

1182. Electric Arc Lamps, *J. B. L. and W. J. K. Clark, and R. D. Bowman, London.*—*5th March*, 1883. 8*d.*

Relates to that class of lamps in which the descent of the upper carbon is controlled by a lever, the short end of which is adapted to fit against the carbon holder, the larger end being so placed as to be under the influence of an electro-magnet coupled in a shunt circuit.

1183. Joints of Perambulator and Carriage Hoods, *J. Collett, Olton.*—*5th March*, 1883. 6*d.*

This consists in constructing the middle joint by which the two rods constituting the essential parts of the hood joint are jointed together, of two discs placed face to face and turning on a joint pin, the opening out of the two rods being limited by means of a stop pin on one disc coming against a cross-bar or stop in a circular groove in the other disc, in which circular groove the stop pin works.

1184. Apparatus for Regulating the Speed of Engines used for Driving Dynamo Machines for Electric Lighting, &c., *P. W. Willans, London.*—*5th March*, 1883. 6*d.*

This relates to the employment of a solenoid or electro-magnet with a valve arranged to control the supply of a fluid to the opposite ends of a cylinder, in which works a piston coupled to the valve of the steam engine.

1187. Feed Motion of Circular Sawing Machines, *T. N. Robinson, Rochdale.*—*6th March*, 1883. 6*d.*

The object is to construct a simple feed motion, which may be easily removed from the surface of the saw bench when not in use.

1188. Apparatus for the Manufacture of Chloride of Lime, *F. C. Glaser, Berlin.*—*6th March*, 1883.—(*A communication from J. Fehres, near Magdeburg.*)—(*Not proceeded with.*) 4*d.*

This relates to the general construction of the apparatus.

1189. Runners of Umbrellas and Parasols, *J. Imray, London.*—*6th March*, 1883.—(*A communication from J. B. Wilson, Philadelphia.*) 6*d.*

This relates to mounting on the notched sleeve of the runner a spring lever having sloped shoulders or their equivalents to catch on studs fixed on the stick.

1191. Construction of Chimney or other Flues, &c., *W. G. Hudson, Manchester.*—*6th March*, 1883. 6*d.*

This relates to the manufacture or construction of chimney or other flues in which the curve of the interior contour of the flue is moulded out of part of the side or sides of the bricks themselves.

1199. Vacuum Boxes for Paper-making Machines, *H. Schofield, Sheffield.*—*6th March*, 1883.—(*Not proceeded with.*) 2*d.*

The object is to reduce the friction of the woven copper wire against the sides of the boxes.

1208. Galvanic Batteries, &c., *T. Slater, London.*—*6th March*, 1883. 4*d.*

Relates to secondary batteries, and consists in forming the electrolyte of quicklime slacked by pouring thereon a solution of bichromate of potash; to this is added nitric acid. To these are added wood sawdust macerated with caustic soda or potash, and after thorough mixing chloride of sodium is added to the whole. One electrode is formed of strips of carbon and the other of a metallic plate.

2868. Railway Car Couplers, *H. J. Haddan, Kensington.*—*8th June*, 1883.—(*A communication from N. P. Cowell, Cleveland, U.S.*)—(*Complete.*) 4*d.*

This relates to car couplers, and more particularly to that class known as automatic car couplers, that are adapted to engage with the opposite couplers when the same are brought together without the interposition of any mechanical device or endangering the life or limbs of a brakeman.

2904. Machines to be Used in the Manufacture of Wood Screws, *H. H. Lake, London.*—*11th June*, 1883.—(*A communication from H. A. Harvey, New York, U.S.*)—(*Complete.*) 4*d.*

This consists essentially in giving to the stationary die the capacity of yielding in a direction perpendicular to the axis of the rotating die.

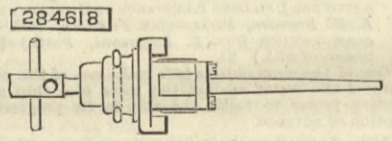
SELECTED AMERICAN PATENTS.

(From the United States' Patent Office Official Gazette.)

284,618. Tool for Expanding the Ends of Boiler Tubes, *John F. Dettmar, Brooklyn.*—*Filed May 17th*, 1883.

Claim.—(1) The combination, substantially as before set forth, of the longitudinally-slotted hollow stock, the removable ring at one end of said stock, the pressure rollers or swages whose axles turn in radial slots in the head of the stock and removable ring,

284618

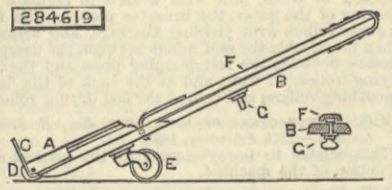


respectively, and the tapering distending plug. (2) The combination, substantially as before set forth, of the stock supporting the pressure rollers or swages, and the bearing piece loosely mounted on the stock and adapted to bear on the tube sheet.

284,619. Hand Truck, *James L. Downing, Richmond, Ill.*—*Filed April 21st*, 1883.

Claim.—(1) The combination, in a hand truck, of the small rollers D D, arranged at the front end of the truck, the large swivelled wheel E E, arranged underneath the rear part of the truck platform, the handle B, the hinged hook-shaped arm F, and the catch G,

284619

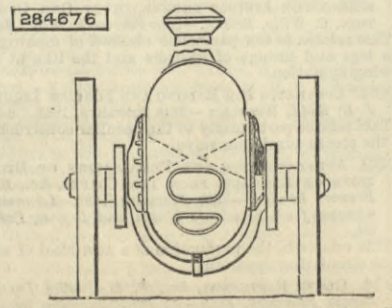


the arm or lever B being adapted to receive the hook of the arm F, substantially as and for the purposes specified. (2) The combination, with the handle of a truck, of the hinged hook F, provided on its hooked end with a soft tongue or cushion, substantially as and for the purposes specified.

284,676. Traction Engine, *William M. Rumely, La Port, Ind.*—*Filed December 22nd*, 1882.

Claim.—(1) The spring case and axle guide shown and described, being a casting the base of which is

284676

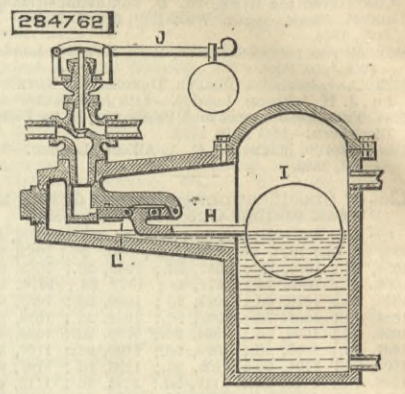


substantially a plate capable of being bolted to the side of the boiler of a traction engine, and having in common with itself two parallel outwardly-projecting vertical walls, and a third outwardly-projecting wall connecting the two former at or near their upper ends, so as to form a case open at the side and below for resting upon, holding and guiding the helical spring which cushions the boiler upon the axle, and for holding and guiding said axle while permitting vibrations of the spring, the top of the case being provided with a lug for retaining the top of the spring in position, and parallel side walls of the case extending below the top of the axle sufficiently to form suitable guides for the latter.

284,762. Feed-water Regulator for Steam Boilers, *George P. Salisbury and Charles W. Foster, New Haven, Conn.*—*Filed May 22nd*, 1883.

Claim.—The feed-water valve L, link, lever H, and float I, in combination with suitable means for forcing

284762

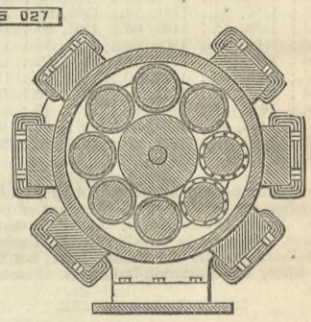


water into the boiler, and with the waste-water valve, held to its seat by the weighted lever J, as described, whereby the quantity of water in the boiler is kept nearly uniform, all arranged as set forth.

285,027. Dynamo-electric Machine, *Joshua Gray, Medford, Mass.*—*Filed November 13th*, 1882.

Claim.—The method of operating dynamo or magneto-electric generators, which consists in causing

285 027



their armatures and field-magnets to pass with a rolling motion in close proximity to but out of contact with each other, substantially as described.

CONTENTS.

The authorities of Langport, Somerset, having invited engineers to submit schemes for the prevention of the flooding to which portions of the town are periodically subject, have awarded the premium to, and accepted the scheme with report and particulars submitted by, Messrs. Brierley and Holt, civil engineers, Blackburn and Manchester.