A TOUR IN THE PROVINCES.

CHAPTER IX.

MANCHESTER.

I HAVE now been nearly three months in Manchester; have perambulated most of her principal thoroughfares and byways, and watched the living stream of faces which surges along them. I have looked at and admired her churches and her public buildings of all sorts; listened to the converse of her citizens in all their various moods and phases; visited most of the large manufactories, and seen Manchester both at work and at play; and I have derived both pleasure and instruction from contact with, perhaps, the most active and intelligent community in England.

One can hardly walk the streets without being struck with the thoroughly business-like air of the throng, who, each intent on his own affairs, hurry along, twitching at his watch chain with that nervous impatience which bespeaks the man who values time, and means to keep it. The idle saunterer is a rare fish in this stream; the hah! yahs! with miraculous ties, clerical coats, and wonderful umbrellas, do not seem to thrive here. Dandyism, unless among the Greeks, is at a discount; people are too busy to have time to admire them. The clouds of smoke, uncoiling themselves from a thousand chimneys, proclaim the master influence of the place. The steam steeds are champing in their harness and impatient of delay. Steam and time are both up, and the world's work calls all hands to labour. If to labour be to pray, then is Manchester in the way of salvation. The whir of spindles, the clash of looms, the groaning of wheels, the heaving of beams, and the panting of blast pipes, all proclaim that here, work—work—work is the religion of life. To work!—ere "winking mary-buds begin to ope their golden eyes," work—while the swallows are twittering round the eaves, and the bee is rummaging the fox-glove bells—while the breeze is swaying the grass in undulating shadows, like clouds over the face of the blue sky—while the blackbird sings in the hazel dell,—

> "where sun and shade at play
> Make silver meshes, while the brook goes singing on its way,"

—while the sea is rippling on the beach

> "'Mong all those bright red pebbles, which the sun,
> Through the small waves, so brightly shines upon."

—while the air is fragrant with the smell of newly mown hay; the scent of distant bean-fields; the breath of cows; the meadow sweet; the wild dog-rose; and—ah me!—

> "A breeze borne tinkling from my country's own blue hills."

Oh! for a glimpse of the brown heath, a dog, a double barrel—and—"and a philibeg," exclaims our worthy editor, "you were not sent to Manchester to indite pastorals, or rhapsodise in hackneyed phrases about summer weather."

It is, perhaps, natural that at this season of the year, people should begin to feel weary of the monotonous iteration of bricks and paving-stones of the "many streeted and smoke-smothered town," and to institute unfavourable comparisons between the *agrémens* of town and country life. Without attaching too much importance to this tendency, it may safely be asserted, that during the very warm weather in the beginning of August some special features of Manchester came into rather disagreeable prominence. The bituminous cement in which the paving stones are imbedded began to ooze up through the seams, as if the streets were going to melt, and betake themselves, in a fluid state, through the gully holes and sewers to the *sweet* waters of the Irwell. About this time, too, by some strange fatality, the principal thoroughfares were in a constant state of disruption. Wherever you went, an evil smell of hot asphaltum came across you like a blast from Tophet. Huge portable caldrons of the abominable stuff lay in wait at every corner, while the workmen seemed to take a fiendish satisfaction in ladling and splashing it about so as to give you the full benefit of its pestilent aroma. The system of paving adopted in Manchester is a most satisfactory one for wet weather; as the impervious nature of the substratum of cement prevents the water from lodging; and, by causing it to flow off into the side channels, the surface is kept clean and dry. But in the dog days, and with the adjuncts I have alluded to, it is anything but pleasant.

There is, I am aware, plenty of pure soft water of the very best quality to be had in Manchester; but why should it all be stowed away in butts and cisterns? How comes it that, in a city so famed for its liberal spirit, the water carts should be the only public dispensers of the liquid element? There is not anywhere in Manchester, so far as my observation has extended, anything in the shape of a public pump or wayside well with iron ladle to refresh the parched lips of the wayfarer. There is something very pleasing in the sight of those elegant little granite basins which, in many parts of Liverpool, offer an eleemosynary cup of cold water to all who need it. They remind the poor and the stranger that they are not altogether forgotten or uncared for by their fellow men. Not only Manchester, but, most other large towns, would do well to imitate the example of Liverpool in this respect. In those engravings of Manchester, in which the Infirmary forms a conspicuous object, there is quite a profuse display of fountains to be seen; but nowhere else have I succeeded in getting a glimpse of one.

The dogs, poor things! are all muzzled and miserable; but, really, it seems scarcely fair that they alone should be suspected of hydrophobia, while the authorities show such a desire to keep water out of sight.

One feels under deep obligations to the vendors of patent filters in this weather. The sight of the hydraulic demonstrations in their windows is really most refreshing. What a pity the water companies do not advertise in the same manner, by erecting public fountains in the most conspicuous localities of the town. There is no consolation to be had from looking at the *sweet* waters of the Irwell; they are only a foul and pestilent congregation of dirty streams from dye works, gas works, calico printers, &c. The only wonder is, that it has not long ago been covered in as a common sewer. Possibly, the "navigation" may be of more consequence than the health of the lieges. The other day, while standing on one of the bridges, I observed a weird-looking little steamboat crammed with passengers, wending its way slowly down the narrow stream "flanked by houses tall and grim," and disappeared between the gloomy factory walls in the distance. There was a brass band on board; and as the sound came, echoing along the banks and through the dark arches, in fitful screams and wailings, it looked as if old Charon were conveying a cargo of doomed souls to Hades.

Standing on Victoria-bridge, and looking towards the old church, I accidentally obtained a clue to the where-abouts of Somebody and Co., under the churchyard—a mystery which has haunted me ever since I came to Manchester. In the face of the wall which forms the bank of the river, in front of the old church, I observed, at a considerable distance below the level of the street, a series of large glazed windows! It at once occurred to me that my underground friends, Somebody and Co., were in some way connected with these strange lights, and I immediately set about exploring the mystery. In passing along the pavement in front of the church gates I came upon an open grating, from which, as I stooped to examine it, there came a sour smell of hot cataplasms, that peculiar odour which the steam-engine gives out in hot weather. Somebody and Co. are evidently at work below and have steam-engines to help them; but how about the smoke? There is no appearance of any outlet by which it can escape. Have they solved the problem of smoke combustion so completely as to dispense even with chimneys? In my perplexity I went over to the other side of the street, and looked along the river wall, to see whether there were any projecting funnels or chimney-tops protruding from it by which the smoke could escape; but no, not a vestige of anything of the sort was to be seen. I next examined the churchyard and the old tower for indications of smoke, but with no better success. At last, in casting my eye over the neighbouring buildings, I observed a tall chimney attached to the front of a private dwelling house, which had no appearance of being a manufactory; but, as the door plates informed me, was occupied by a phrenologist and a medical gentleman, one of whose yellow handbills was most obligingly presented to me by a man on the pavement! What on earth could a phrenologist and a medical man want with a chimney stalk sixty feet high? What could it mean? Were those two professionals in league with the mysterious Somebody underground? I confess I became rather alarmed at this new phase of the inquiry, but more determined than ever to fathom the mystery. Accordingly I went to the gateway of the underground entrance, from which, as mentioned in the first chapter, I had seen the waggon of castings issue, and boldly descended into the tunnel. After proceeding a considerable distance I heard strange rumbling sounds, as of heavy rollers grinding on one another, but could neither see nor feel any door or entrance in the walls. So on I went, deeper and deeper into the bowels of the earth, until at last I caught a glimpse of daylight in the distance. The road was now uphill, and I followed the direction of the light, still ascending till I reached a flight of steps, and on the top a narrow passage which led me out again into the street, beside the chimney-stalk and the phrenologist's doorway!! With eyes dazed by the sudden change from the dark tunnel to the full light of day in the open street, and utterly bewildered by the mystery which seemed to enshroud these subterranean mechanists, I resolved to avoid further prying into what seemed to be altogether unearthly. What if—like the Moorish King Boabdil and his army—they were shut up in the earth by enchantment, and compelled to endless and unheard of labour in some unholy craft? Suppose I had succeeded in gaining admission, was it quite certain I would ever be allowed to return? Might I not be seized and compelled to atone for my intrusion by, say, grinding brass candlesticks on a dry grindstone to all eternity?

As this chapter will be the last devoted to Manchester for some time to come, I must, in concluding the series, advert to a number of details which could not well have been made the subject of a special article.

In giving an account of the Messrs. Collier's establishment, I mentioned having seen a nut forging machine of a very interesting description, but of which I was then unable to give a more detailed account without the aid of an illustration. We are now enabled to present our readers with a detailed drawing of it. Several attempts have been made at different periods to produce a machine for forging nuts, but hitherto their success has not been such as to bring them into anything like general use. The design of the machine employed by the Messrs. Collier, and which is the subject of a patent by Mr. H. B. Barlow, is, I understand, an importation from our American cousins, and certainly does them credit. It has been at work since 1854, and has given very great satisfaction. On the occasion of my visiting the establishment of the Messrs. Collier, I had an opportunity of seeing the machine at work, and testing the quality of the nuts which it turned out. One man only was required to attend to the machine, and the nuts were stamped out of a flat bar of iron at the rate of about three in a minute. The only difficulty seemed to be in keeping up a supply of bars heated to the proper temperature, with sufficient regularity to keep the machine constantly employed. As with Galloway's rivet-making machine, the dies are supplied with a constant stream of cold water, which keeps them from getting heated, and at the same time causes the scale to crack off from the finished nuts, leaving them as clean and well defined in form as if they had been cast in a mould. For ordinary purposes the nuts require no further finishing after they come from the machine, than a boy can impart in about a minute with the aid of a grindstone. As to the strength of the nuts so manufactured, the peculiar nature of the process employed, in which the iron is subjected to great pressure while in the dies, seems to have the effect of greatly improving the quality of the iron. Some nuts, which were split open with a conical drift to show me the quality of the iron, exhibited a dense fine fibre, equal to the very best specimens of wrought iron, although the bar from which it had been stamped was of a very common description.

Figures 1 and 2 show a front elevation and section of the machine. A, A, is the main framing by which the various moving parts of the machine are supported. The principal feature of novelty in the machine is the employment of a female die or die box, to cut off portions from the bar, and to receive the blank or portions cut off, swages to compress the blank into the desired shape, and a punch to perforate the hole or eye in the blank. The female die, or die-box, I, is formed of cast-iron, being a block with a square or hexagonal hole through its centre. The hole is larger on the upper side, and is lined with cast steel plates neatly fitted in, with the upper ends wider and thicker than the lower ends, to prevent them from dropping downwards; and they are prevented from rising by a circular wrought-iron plate let into a recess in the cast-iron block; the plate having a square or hexagonal hole in its centre for the reception of the upper swage, J, to enter the box die. The swage J is made of wrought-iron, its lower edge being faced with steel, and made to correspond in size with the die-box, in which it is to work; the upper end is larger, to prevent it from dropping out when the die-box is made to rise. The hole, through which the punch is made to ply is usually made larger at the upper end, and small enough at the lower end, for about half an inch, to fit that part of the punch which makes the hole in the nut. The lower end of the swage J is recessed or dished, to form the impression of a washer upon the upper face of the nut. The stationary die is made of steel, and is also perforated for the reception of the punching, forced out by the punch T. The mode of operation is as follows:—The end of a properly heated bar of the width of the die-box is laid upon the rest or guide N, immediately in front of the die-box I; and as soon as the knocker P has passed from between the upper and under swages, the bar Z is to be pushed forward, immediately below the end of the upper swage J, which, at this position of the cams, protrudes a short distance from the die-box I, until it strikes the end of the back plate, which is made somewhat larger than those of the other sides, and forms a guide for the length of the blank; and now, the end of the bar Z being placed immediately under the opening of the die-box I, and over the end of the stationary die-box K, the cam-shaft B, on which is the cam G, by its revolution operates on the frame H, which is connected by the rod Q to the lever E, and causes the cross-head C to be depressed. The die-box I, being fixed to the cross-head by means of two screw bolts, *a*, *a*, is carried down on the stationary die K, so that end of the bar or blank is enclosed in the die box I. For although at the commencement of the turning of the cam-shaft, the cavity of the die-box was filled entirely up by the upper swage J, still there is nothing to cause it to descend until after the blank is enclosed in I, when the further descent of the cross-head C, coming in contact with the cheek-piece O, causes it to descend with the die-box I, and presses the lower end of the swage J upon the die-box, and thus compresses the nut contained in it. Immediately after this, the cam R, also fixed on the shaft B operating upon the frame S, draws down the cross-head D, in which is fixed the round punch T for perforating the blank, and causes the punch to pass through the nut while thus compressed in the die-box I; and, after it is compressed, and before it is relieved—or, in other words, before the pressing swage begins to return. Then the die-box is carried upwards by the return motion of the cam G, and as the nut, at this stage of the process is tight in the die-box, it would also be carried upwards by the friction on its sides; but the cheek O, which is placed immediately above the upper swage, is prevented from rising more than half the distance, through which the pieces, being held down by the two screws upon the rods O, I; and thus the upper swage J is made to project through the die box I, as before, and consequently the finished nut is thrust down below it and is ready to be knocked off by the revolving arm or knocker P, which is fastened upon the upper end of the vertical shaft F, driven by bevel wheels from the shaft B. It will thus be seen that the forging of the nut consists of three distinct operations:—First, the cutting of a piece from the end of the heated bar and lodging it in the die box I. Secondly, the compression of the blank while in the die. And thirdly, the punching of the hole or eye of the nut while still under pressure. By this means any superfluous metal which may be cut off from the bar is forced out of the die along with the punching, which also carries off the scoria or burnt portions of the iron.

These machines, from their tried efficiency, are likely to come into general use, and supersede the use of hand-made nuts. They are simple in their construction, easy to be managed, and are capable of doing the work of at least twenty men. The nuts manufactured by this machine also possess many advantages over those made by hand;—the perfect regularity of shape, the uniform distribution of the metal, and the absence of welding, render them much more trustworthy in all various applications to mechanical purposes. The ease with which they are tapped and the perfect centreing of the hole, also effect a very considerable saving of labour. The great compression which the iron of the nut undergoes while hot, has the effect of very materially increasing the strength and tenacity of the material employed. I understand that Messrs. Collier are doing a very considerable business in the manufacture of these nuts, and the demand for them seems to be increasing in proportion as the public get acquainted with their superior quality.

I have been very much gratified by a visit which I lately paid to the bleaching establishment of Messrs. Omerod and Mackenzie, of Salford. A bleach-field, under the old process, used to be rather an extensive affair; the long rows of straggling buildings, generally situated at a considerable distance from the town, in order to avoid the smoke and dust, which would otherwise interfere with the long continued exposure of the goods in the open air, which the old system required, the lofty chimney which was required for the same purpose, and the extended area of meadow land covered with white webs of cloth, gave one the idea that bleaching must be a very tedious and expensive process, and one which required an enormous outlay of capital for its successful prosecution. I was, therefore, a good deal surprised to find the whole of Messrs. Omerod and Mackenzie's appliances condensed within the limits of a moderate sized workshop, situated in rather a populous neighbourhood in Salford. The most conspicuous feature of the establishment, and the one which has rendered such a condensation of the usual area required possible, is one of Wallace's patent bleaching and washing machines, of which a detailed description and illustrations were given in our 32nd number of 8th August. These machines are only about seven or eight feet diameter, and about four feet in length. Externally there is little to distinguish them from the ordinary dash-wheels employed by calico printers, if we except a series of pipes disposed radially from the axis, which is hollow, and serves as a means of conveying steam and the various chemicals required to the interior of the wheel where they are distributed among the goods to be bleached. The wheel is driven by one of Mather and Platt's cast-iron steam engines, which I alluded to in describing their establishment. Above the wheel are disposed a series of what looks like organ stops, but in place of the usual Italian terminology, there was the following singular parody—water, ash, chlore, lime, acid.

By varying these stops, and with the cast-iron engine to turn the handle, the brown webs of cloth were bleached with a decidedly allegro movement. In fact, the process which formerly required six days, is, by the use of this machine, condensed to six hours.

Judging from the specimens shown me, the goods were in every respect as effectually bleached as they usually are under the old system. In the application of the chemicals employed, the constant motion of the dash-wheel accomplishes what, in washing our hands, is effected by rubbing them together; and the difference of time required under the old and new systems of bleaching may be compared with the time which would be required to wash one's hands, by holding them in a basin of water to soak, and that which serves to render them clean by the usual method of procedure.

The whole process is highly suggestive of the condensation which characterises all modern improvements in manufacturing operations. Here we have, within the area of a seven feet revolving drum, the whole essentials of the method which used to occupy some twenty or thirty acres of land, and a cumbrous arrangement of vats, cisterns, tanks, &c., while the time required is about one-twentieth of that which was considered necessary with the old method.

It seems, now, to be pretty generally understood among engineers, that the details of engine fittings have been so far systematised that any special design for them is no longer thought of. They have, so far, been reduced to a common plan that is now all but stereotyped. Some prefer ordering them from one maker, some from another; but the differences between them are very slight; and no one thinks of making any departure from the general routine of construction. This disposition to adhere to fixed forms renders the manufacture of these articles an excellent subject for special departments of trade, in which the manufacturers devote themselves to the fabrication of some one particular article; an arrangement which is likely to be advantageous to all parties concerned, although it

AMERICAN NUT FORGING MACHINE, PATENTED BY MR. H. B. BARLOW.

FIG. 1

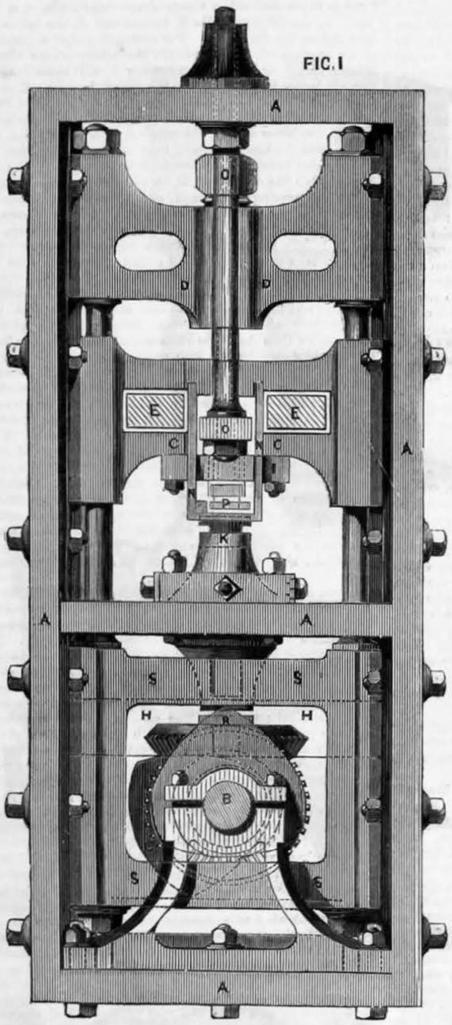
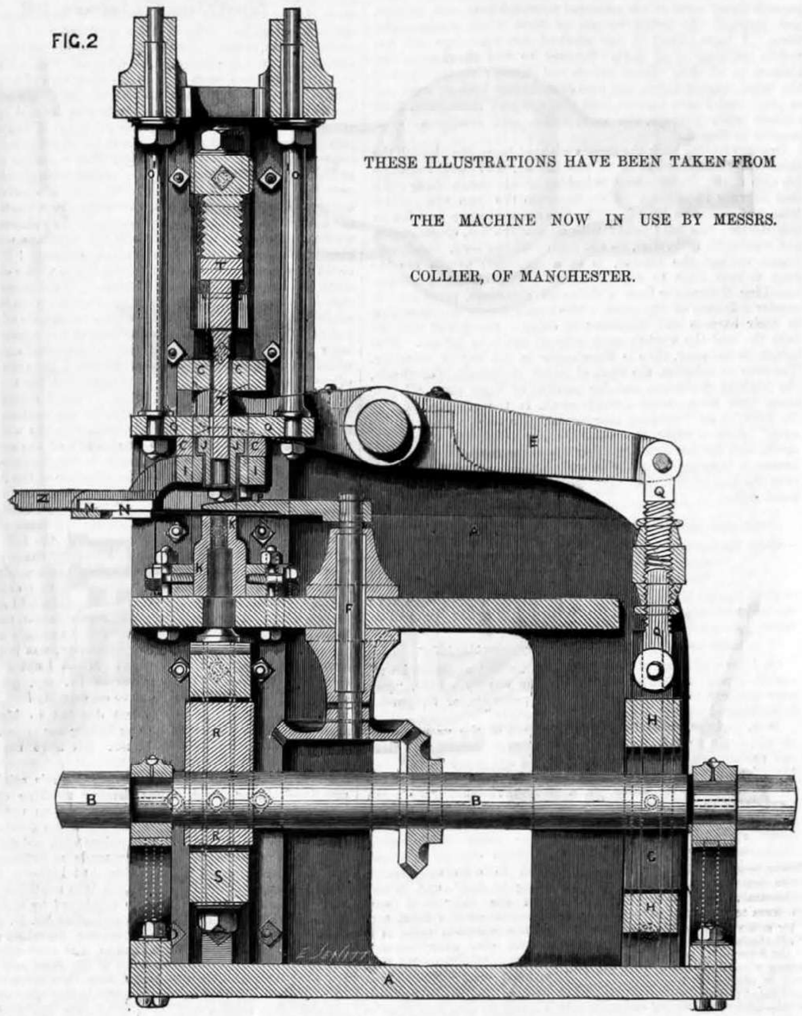


FIG. 2



THESE ILLUSTRATIONS HAVE BEEN TAKEN FROM THE MACHINE NOW IN USE BY MESSRS. COLLIER, OF MANCHESTER.

unquestionably has a tendency to render old forms rather persistent, and to place difficulties in the way of introducing new and improved ones.

I have been led into these reflections by an inspection of the manufactory of Mr. James Allen, of Cambridge-street, who has for some time past devoted himself exclusively to the construction of the miscellaneous brass and other fittings required by engineers — such as steam taps and valves, water gauges, whistles, tallow cups, petcocks, &c. To suit the taste of various parties, the external form of these articles is a good deal varied, but essentially they are all pretty much alike. I certainly had no idea that the externals of these appendages were of such importance, but the very great variety which Mr. Allen finds necessary to keep in hand shows how fanciful engineers can be in unimportant matters of detail. Indeed, the eccentricities in the appearance of some of these articles suggested a ludicrous comparison with the various patterns displayed in the stores of a calico printing establishment. Besides the articles I have mentioned, I was shown a large assortment of brass and soft metal bearings equally various and fanciful in form; and on which, no doubt, a large amount of original scheming had been expended by the designers.

Mr. Allen's collection of patterns constitute quite a museum of the variations to which articles intended for the same purpose may be subjected by the fancy or caprice of those who have apparently the same end in view. There, in letters of brass and gun metal may be seen the sign manual of most of our locomotive superintendents, each with its appropriate flourishes and eccentricities as legibly written as if they had been preceded by yours truly.

Mr. Allen is also extensively engaged in the manufacture of vacuum pans, and other apparatus for sugar refiners. At the time of my visit there was a copper worm in the process of construction, the mode of forming the joints of which struck me as rather interesting.

The portion of the worm already finished was lying coiled upon the floor of the workshop; and the successive additions of length were soldered on by means of a small circular hearth or stove, having an aperture in the centre for the reception of the pipe constituting the worm. The hearth was filled with coke, and the fire urged by means of a fan blast, communicating, by a flexible pipe, with the circular hearth or dish of glowing coke. When the pipe had been heated up to the required temperature, the spelter was poured into the joint, and allowed to settle well round it: the fire was then moved up the pipe to the next joint, and the blast again applied to prepare for the addition of another length of the worm. And so on until the whole was completed.

There are several very novel and interesting details in Mr. de Bergue's establishment in Strangways. Mr. de Bergue is well known as the inventor of several very original and neatly designed contrivances; and his manufactory bears in every feature the impress of his peculiar talents.

In the foundry, I had an opportunity of witnessing the operation of his moulding tables; a contrivance by which the necessity for skilled labour in the moulding of ordinary patterns, is in a great measure done away with.

The moulding-table consists of a square or rectangular box, about the average dimensions of the patterns usually employed in the foundry, and having at each end an iron bar placed horizontally across the end of the table. These bars are supported by two vertical rods passing through the top of the table at the corners, and moved vertically by wheel work within the body of the table. The lower mould box is laid upon the top of the table between the two horizontal bars, and the pattern is imbedded in sand in the usual way, and the parting smoothed off. The upper half of the mould box is then laid on and the sand sifted over the pattern, and then rammed down on it. When this process is completed, the workman turns a handle projecting from the side of the box, and the two horizontal bars are gradually elevated with a perfectly equable motion. These bars carry with them the upper half of the mould box, or the pattern, as the case may be. All that is required to disengage the pattern from the sand, or the upper box from the pattern, is a few slight taps with a hammer as the bars rise from the surface of the table. By this means the moulder is relieved from the trouble of lifting the pattern and the danger of breaking the sand, by any inequality or unevenness of the motion by which it is withdrawn from the mould is completely obviated. A common labourer, and a boy to turn the handle of the machine, can by this means accomplish as much work in a more perfect manner than any six skilled moulders could accomplish in the same time without the aid of the table. Besides doing a very considerable business in the construction of stationary and marine engines, permanent way of a peculiar form which is the subject of one of his patents, iron underframes for railway carriages, and waggons, india-rubber spring buffers, &c., Mr. De Bergue carries on an extensive manufactory of reeds for carpet and other weavers. This department of the business presents some of the most beautiful and ingenious specimens of mechanism I have anywhere had an opportunity of inspecting.

Almost the whole of the machinery for this purpose has been specially designed by Mr. De Bergue; but as they have not been patented, I am not at liberty to give any detailed description of them. The manufacture of the reeds is principally conducted by boys and young lads, and from the perfection of the mechanism employed very little skill seems to be required in the process: almost all the machines being self-acting or nearly so, merely requiring an attendant to supply the wires from which the reed dents are made, and to remove the finished portions of the work as they are produced.

By a very simple arrangement of pegs through which the wires are drawn from a reel, they are first straightened, and all kinks and twists removed. The wire then passes between a series of rollers, by which it is flattened out to the required form for the dents; and then, by a series of very elegant little machines, gets it scraped or planed to the proper thickness; and lastly smoothed and polished with great nicety and precision.

Another machine cuts the wire off into pieces of an uniform length, and sorts them in little tin boxes, ready to be used in the construction of weaving reeds. Not only does this machine cut off the lengths of wire of uniform length, dispose them regularly in boxes with a definite number of dents to each box, but the boxes so filled are themselves removed by the action of the machine, and arranged in perfect order on a tray for removal.

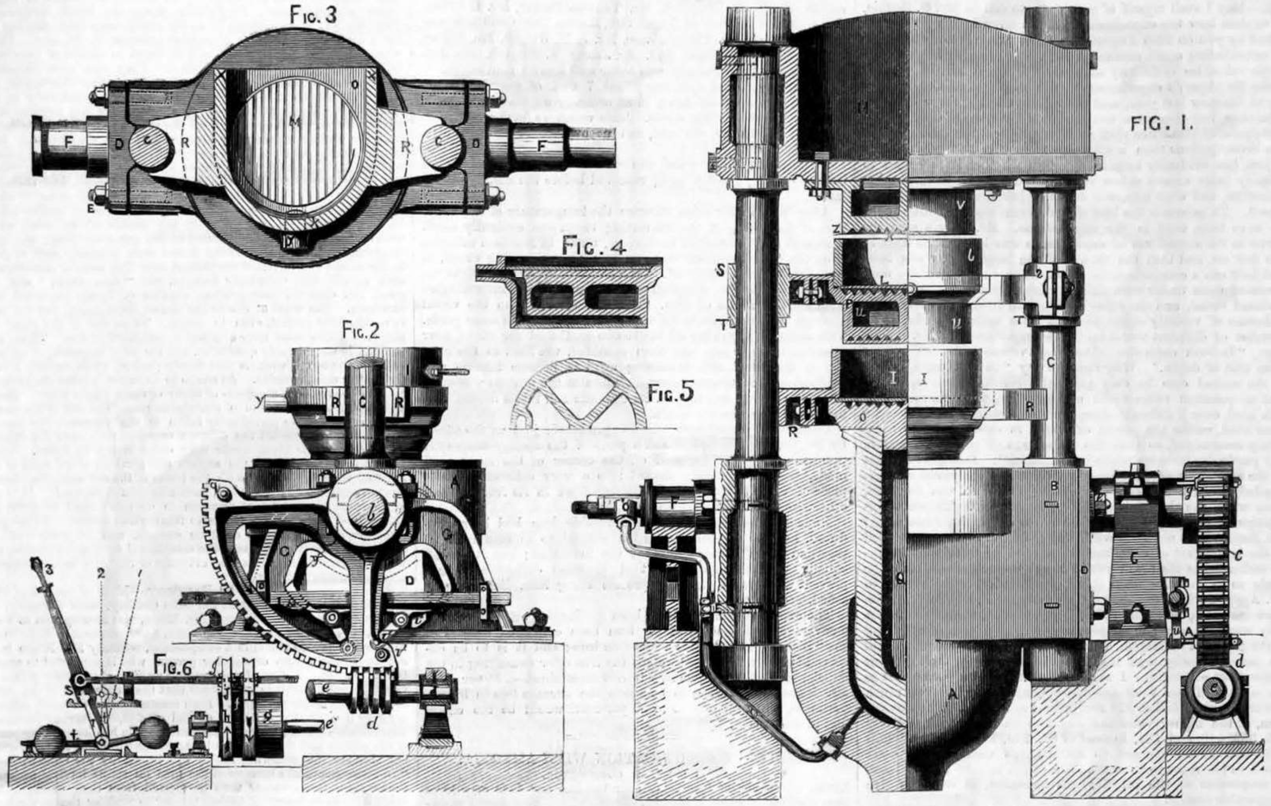
Perhaps the most interesting spectacle in this department is the process by which the reeds are *woven* from a continuous band of flattened wire, and without the aid of the machine which cuts and assorts the dents. The loom employed for the weaving of the reeds is a most extraordinary looking contrivance. The materials employed in the fabrication of the reeds are two semi-cylindrical strips of clean pine wood for the top of the reed and two for the bottom. Between these the flattened wire is drawn in, at intervals, by the hand of the operative, and cut off at the required length by a contrivance worked by a pair of treadles under the feet of the weaver. While the dents are thus put in position, a bobbin with pitched thread takes a turn round the slips of pine, and between the dents, wrapping firmly together. To keep the pitched thread in a sufficiently softened condition, a series of small gas jets are kept burning beneath and around the reeds, so that it looks as if the loom were weaving a warp of flame with woof of iron.

In the first of these papers we gave a description and illustration of Nasmyth's Grooving Drill; since then, we have given an illustration of a modified form of the same machine, by the Messrs. Kersham. In fact, the principle once developed, there was every likelihood that it would soon be adapted to a variety of purposes, and make its appearance under very different forms. I mentioned in the account I gave of the establishment of the Messrs. Galloway, that they also had got a grooving drill, made after a design of their own, and adapted for cutting the key seats of shafts. In all of these contrivances, however, the drill was stationary, while the lateral motion was communicated solely to the work. This arrangement, although very convenient for small or light articles, was manifestly inconvenient when large and heavy pieces of work had to be operated upon. In the machine by Messrs. Sharp and Furnival, of which we this week give an illustration, quite a new arrangement of the machine is adopted. In this the lateral motion is entirely confined to the drill and head-stock, which carries the drill spindle. By this means the work is made stationary, so that very large pieces may be operated upon with greater ease and precision than by the old method. It also possesses the advantage of allowing two articles, or the two ends of one article, to be operated upon at the same time, so that locomotive connecting rods, and other articles of the same character, may have their ends slotted or grooved by drill of unequal dimensions at the same time. There is an additional arrangement also, by which the article to be operated upon is supported in a chuck to which a rotary motion is communicated, so that a spiral groove or other formed groove may by cut by the drill. I had the pleasure of seeing this machine at work at the Atlas Foundry, and was much struck with the extreme precision and neatness with which it executed its work.

RAILWAYS IN SWEDEN.—The elections in Sweden have returned to the Diet a liberal majority. The session ensuing will be much occupied with railway projects. The Government proposes a complete system of railways connecting the North Sea with the Baltic and the towns of Christiani, Gottenburg, and Upsal, with the capital, at a cost of 128,000,000f.

BODMER'S HYDRAULIC SEED CRUSHING MACHINES OR OIL PRESSES.

PATENT DATED 20TH DECEMBER, 1855.



THESE improvements relate to certain contrivances for facilitating the extraction of the oil from seeds or other substances from which oil is to be obtained by pressure, and also for facilitating the flow of the oil from the receptacles containing such seed or other substance. The receptacles preferred are plain wrought-iron rings, but frames of other shapes may be used, their area and depth being proportioned to the force of the press. Each ring stands upon a perforated plate or strong wire sieve resting upon the grating or grooved surface of the tray or platform. A plunger, provided with a similar grating and perforated plate, is placed over the ring, and will, when the press is in operation, enter into it, whereby the oil contained in the seed will be squeezed out and escape through the two perforated plates, the area of which is equal to that of the ring, into the grates of the trays and plungers, which communicate by means of suitable passages with spouts, from which the oil is discharged into cans or other receivers. In order to secure an easy and rapid discharge of the oil from the gratings of the trays and plungers, the whole press is suspended in bearings by means of trunnions so placed that the weight of the press above and below the trunnions shall be balanced, as nearly as is practicable, instead of permanently fixing the press in the usual upright position. This arrangement admits of the press being brought into a slanting or horizontal position, whereby the gratings above referred to assume a vertical or such other inclined position as is most favourable for the off-flow of the oil. This change of position of the press may be effected either by a worm and worm wheel, or other suitably applied gearing, moved either by hand or by power.

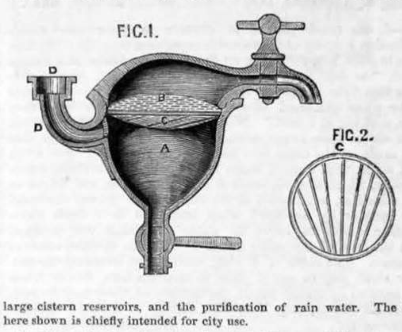
Fig. 1 represents a front elevation, partly in section, of the improved press, which is furnished with two trays; Fig. 2 is a side elevation of the same; Fig. 3, a ground plan, with the upper part of the press removed; A is the cylinder, with the cheeks B cast on it, into which the two pillars C, C, are secured by means of the cap D and bolts E, E. The trunnions F are cast or forged of one piece with the caps D, and are supported by the pedestals G which are fixed upon suitable foundations. The upper parts of the pillars C are secured in the head, H, of the press in the usual manner. The rings or receptacles I and J, for containing the seed, are placed upon the perforated plates or wire sieve K and L, which rest upon the grooved surfaces or gratings M and N of the trays O and P. The trays O and P are open in front, as shown in Fig. 3, but otherwise surrounded by a rim ×, ×, so that the receptacles or rings I and J can be easily withdrawn from their respective trays, and again replaced with the certainty of their occupying the precise position required. The tray O rests upon the ram Q of the press cylinder, and is guided on the pillars C by the brackets R, whilst the tray P is guided on the pillars C by the brackets S, which rest upon the collars T, shrunk or otherwise fixed on the pillars, and thus support the tray P whilst it remains in the position indicated in Fig. 1. The cylindrical projecting part U of the tray P serves as plunger for the ring I, whilst a similar plunger V fixed to the head H of the press, serves for the ring J. The lower surfaces of both these pistons are furnished with grooves or gratings in a similar manner as the surfaces of the trays O and P, and fitted with perforated plates, so that when the ram Q of the press cylinder rises, the plungers U and V will respectively enter into and compress the seed contained in the rings I and J. Fig. 3 shows how the grooves in the tray O communicate with the spout a^1, and Figs. 4 and 5 represent in transverse and horizontal sections the manner in which the grooves on the surfaces of the tray P and plunger U communicate by means of passages with the spout b'. On the prolongation of one of the trunnions F, a worm-wheel quadrant C is keyed, gearing into the worm *d* on the shaft *e* (see Fig. 2), which revolves in suitable bearings. On one end of the shaft *e* the fast pulley *f* and the loose pulleys *g* and *h* are placed, which are driven by the open strap I and crossed strap J in the direction of their respective arrows. The straps I and J are respectively guided by the forks fixed on the guide rod *m*, which is linked to the starting lever *n*. The rod *m* and starting lever *n* act in combination with certain clicks, levers, and weights, (as seen in Fig 6 drawn to a smaller scale), for the purpose of changing the position of the press. It is necessary to mention that tables or forms are fixed on that side of the press from which the receptacles or rings for holding the seed are introduced. These forms or tables being on a level with the surfaces of the upper and lower tray, the rings can with ease be moved to and from the trays, as may be required.

The press is worked in the following manner:—The seed may be put into the rings or receptacles I and J, in bags or wrappers as usual; but it is proposed altogether to dispense with such bags, and to use mats of hair instead of them. One mat is placed at the bottom of the ring, and another at the top, with the seed between them; experience having proved that when pressure is applied, the mats which are made to fit tightly into the rings expand, and effectually prevent any escape of the seed between the edge of the mats and the ring. The rings thus charged are then placed over their respective trays, and hydraulic pressure is applied to the ram Q through a swivel joint and the pipe O^1. When the ram Q begins to rise, the starting lever *n* is moved from its normal position, indicated by the dotted line 2, into the position 3, in which it is represented in Fig. 2, whereby the strap I is brought from the loose pulley *g* upon the fast pulley *f*. The moment the starting lever *n* arrives in the position 3, the weighted catch *p* will fall into the notch *m*, and thus arrest the bar *m* with the strap forks, in the position indicated in Fig. 2. The worm-wheel quadrant C will now move in the direction of the arrow (see Fig. 2), until the press arrives in a horizontal position, when the pin *q* of the quadrant will have come in contact with and moved the weighted catch *p* out of the notch m^1. The adjustable weight of the bell-crank lever *r*, which on the starting lever *n* being moved from position 2 to position 3, had been raised by means of the stud *s*, will, on the rod *m* being released, force the starting lever *n* back into its normal position 2, where it will be arrested by the other end of the stud coming in contact with the upright arm of the weighted bell-crank lever *t*. The press is allowed to remain in a horizontal position until the oil has ceased to flow from the spouts, whereupon the pressure is removed from under the ram Q, and the starting lever *n* is moved from the position 2 into the position 1 in which it will be retained by the catch u^1 falling into the notch. The strap J being now on the fast pulley *f*, will make the worm-wheel quadrant C move in the direction of its arrow, and cause the press to return into its former vertical position, on arriving at which the pin *v* will raise and disengage the weighted catch *u* from the notch P*b*, whereupon the weighted bell-crank lever *t* will force the starting lever *n* back into the position 2, where it will again be arrested by the upright arm of the bell-crank lever *r* after having thrown the strap J upon the loose pulley *h*. The trays and rings will by this time have returned from the horizontal position into those seen in Figs. 1 and 2. The rings I and J are then withdrawn, and others, which have in the meantime been filled with seed, introduced in their stead, when the same operation is repeated. The pipe o^1 moves with the press from the position indicated by the dotted line *y* (see Fig. 2) to that indicated by the dotted line *z*, and *vice versa*. The grooved surfaces or gratings of the trays and their corresponding plungers are represented in the illustration as fitted with perforated plates of sheet iron, but it is intended to make and use in place of the perforated plates, wire sieves, which will allow the oil to run more freely into the grooves of the trays and plungers. The sieves are formed of pieces of steel wire, placed side by side, either close to each other or within a greater or less distance from each other, and fitted into a suitable frame, so that the sieve may be more easily removed from and again secured to the tray or plunger. When the sieve is in its place, the wires will be at right angles with the ribs of the grooved surfaces upon which they rest. The wires may be round, or square, or oblong, and rounded on the surfaces only. Similar wires can, with slight modifications in the corresponding parts, be applied with advantage to all kinds of oil presses.

RECENT AMERICAN PATENTS.

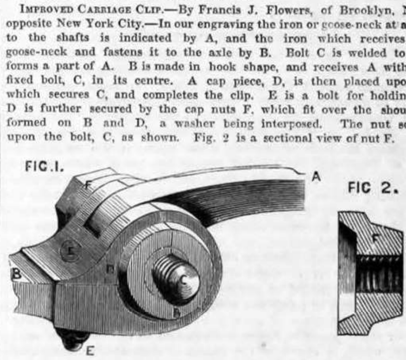
(*From the Scientific American.*)

IMPROVED WATER FILTER.—By Jas. H. Wright, of New York City.—In this improvement the filter is divided into two chambers, each having a separate stop cock, the arrangement being such that either filtered or nnfiltered water may be drawn off at pleasure. The water passes slowly through the filtering machine; hence the convenience of a second stop-cock, through which the liquid may be more rapidly drawn, in case of necessity or when filtration is not required. A is the shell of the filter. The filtering medium consists of a piece of felt or flannel, or other suitable substance placed between a perforated disc, B, and a barrel ring, C. D is the induction pipe, through which the water enters. If filtered water is needed the lower stop-cock is closed, and the water rises and passes out through the upper faucet. Unfiltered water can be held at any time by opening the lower faucet. The bars in the ring D serve to direct the water across and against the bottom of the felt or other filter, when the lower cock is opened, and thus to sweep off and keep the under side of the filter always clean. This is an important feature. One great objection to the use of small filters is their liability to clog up by the accumulation of dirt on one side of the filtering material. The present improvement overcomes that difficulty in a great degree. The invention is applicable to



large cistern reservoirs, and the purification of rain water. The form here shown is chiefly intended for city use.

IMPROVED CARRIAGE CLIP.—By Francis J. Flowers, of Brooklyn, N. Y. opposite New York City.—In our engraving the iron or goose-neck attached to the shafts is indicated by A, and the iron which receives the goose-neck and fastens it to the axle by B. Bolt C is welded to and forms a part of A. B is made in hook shape, and receives A with the fixed bolt, C, in its centre. A cap piece, D, is then placed upon B, which secures C, and completes the clip. E is a bolt for holding D. D is further secured by the cap nuts F, which fit over the shoulders formed on B and D, a washer being interposed. The nut screws upon the bolt, C, as shown. Fig. 2 is a sectional view of nut F. This



improvement prevents all rattling of the clip, which is a very common objection, and it forms a strong, cheap, convenient, safe, and durable fastening. The arrangement is such that there is little or no liability to accidental loosening or separation, although, when desired, it may be quickly taken apart. It is an excellent improvement.

IMPROVED HARVESTER.—By Stephen R. Hunter, of Cortlandt, N. Y.—Consists in the employment of rotary cutters fitted within slotted fingers, and attached to curved plates which are hinged together by a joint and fastened to the axle in such a manner that the cutters may be made to conform to the inequalities of the ground. An improvement of this kind has long been needed in many sections of the country.

SELF-ACTING SHIP'S PUMP.—By J. Stever, of Bristol, Conn.—Consists in attaching a series of pumps to a frame, which is secured to a hollow vertical shaft, the latter being allowed to turn freely in its bearings. The pumps communicate with the hollow shaft, and have weights connected by gearing and levers with their pistons, so that the pumps will be operated by the motion of the ship as it rises and falls, or rolls on the sea. The hollow shaft serves as the force and suction pipe. Many plans have heretofore been devised to take advantage of the motion of vessels to pump water from their holds; but this is the most ingenious and practial of any that have come under our notice.

LETTERS TO THE EDITOR.

We do not hold ourselves responsible for the opinions of our Correspondents.)

SCREW PROPELLERS AT HIGH VELOCITIES.

SIR,—May I avail myself of your pages to call on Mr. G. Rennie, to explain how the experimental results given in his paper published by you on 20th August, show that a gain is to be obtained by substituting small screws at high velocities for large screws at the velocities ordinarily adopted? I heard Mr. Rennie describe Mr. Apsey's experiments at the British Association Meeting at Glasgow last year, and wished to elicit further explanation then, but discussion was curtailed for want of time. I am disappointed that since then no more progress has been made in the investigations than is apparent from this last paper. The object has evidently been to ascertain whether it is better to employ large screws at low velocities, or small screws at high velocities, and what influence depth of immersion has upon the result. To ascertain the best size, different sizes of screws ought to have been used in the experiments. Mr. Rennie says the screw in the second set of experiments was larger than that in the first set, and that the thrust of the larger screw was less; but how can a comparison be drawn when the two screws were operated upon under such different circumstances—one being in a closed vessel, and the other in the open river? Similarly the influence of velocity ought to have been tested by adopting a number of different velocities in the experiments. Mr. Rennie says, "In both cases the influence of velocity is much greater than that of depth." Why does he say "in *both* cases," when in the second case he only gives the results of *one* velocity? But no practical value could attach to experimental results of this kind, even if different sizes of screws and different velocities were tried, unless the power expended in each case were accurately ascertained, so that the percentage of power utilised in any particular instance might be determined. It is obvious that in the second set of experiments a much greater power was expended, when a thrust corresponding to 405 lb. was obtained, than when the thrust was only equal to 4 lb. To what percentage of the power exerted do these quantities correspond? Mr. Rennie does not state what was the pitch of the screw used in the second set of experiments—are we to infer that it was 28 inches, as in the first screws? If any deduction at all is to be made as to velocity from these experimental results, it is to Mr. Apsey's trials only that we can look for it, as two velocities were used at these trials. Examining, then, these results in the only way that seems to me practicable, with a view of obtaining anything like a deduction, I find they are actually in favour of the lesser velocity, and that the higher velocity is injurious rather than otherwise. I assume that the power exerted is as the square of the velocity—consequently four times as much power was expended at 920 revolutions as at 460. The thrusts, then, at the higher velocities ought to have been respectively 242, 352, 448, and 504, instead of 67, 299, 350, and 448. This deduction seems opposed to Mr. Rennie's views, but I don't attach much value to it, as the pitch ought to have been reduced in proportion as the velocity was increased, in order to give comparable results.

The experiments bring out strongly the increased resisting power of the water at lower depths; but even as regards this point, the amount of power exerted must be known to make the results useful.

Glasgow, August 30, 1856. EDMUND HUNT.

SIR,—I was much pleased to observe in your last week's publication a record of the valuable experiments by Mr. G. Rennie, made in June last, following up those of Mr. Apsey at a former period, "to determine the resistance of a screw," which go to prove that "the thrust or resistance of the screw is 6¼ times greater when immersed three feet *below* the water level, than when working at a *level*." Will you be good enough to permit me to add to these experiments the result of several others that were made on the canal here nearly four years ago, upon a run of 1½ miles, with a small steam boat, having a two-bladed screw propeller, which was immersed at different depths, and driven at high velocities, as recorded at the time, which proved the speed to be greater by one-third when immersed to a depth corresponding to four feet below the water level, than was obtained when the level of the water was level with the circumference of the screw. The mode of driving, raising, and lowering the propeller shaft may be out of place to mention here, but as it has been secured by letters patent, particulars of these may be seen in THE ENGINEER, page 458, and shortly in a more detailed advertisement. I am, your obedient,

Glasgow, September 3, 1856. G. NAPIER.

THE SEWAGE OF TOWNS.

SIR,—In your paper of last week a correspondent, "Jacobus," requests information as to the best mode of draining and turning to profitable account the sewage of towns. In reply, I take the liberty of mentioning what I have often previously felt inclined to do, when reading the discussions on the subject of "Deodorising," &c. &c., as if the subject and idea were new, viz., That the system has been extensively acted upon in the neighbourhood of Edinburgh for the last twenty-five years, where land of little or no value, of a sandy nature, and in some places capable of growing whines only, was raised in value to a yearly rent of £25 per acre, by irrigating said lands with the sewage water from the town; the same being in operation at this moment on the lands of Craigmilleo, and also to the west of Edinburgh, where your correspondent or others may see the whole process, which produces six or eight crops or cuttings of grass a-year. These lands are rented by cowfeeders for their stall-fed cattle.

Another mode of using the sewage has been in use for a like period in a large piece of ground near Edinburgh,—by forming three or more ponds or reservoirs adjacent to the stream of said sewage, which is conveyed (by means of sluices) alternately into each as they become *filled with the deposit*, the water only running off from the surface at the opposite side of the pond; thus while the second, third, and fourth are being filled, the first has become sufficiently solid to admit men with the use of a plank to stand upon it and throw it out on the bank, and requires no "patent chemical and mechanical treatment" to reduce it "into a most fertilising agricultural manure." I have purchased this manure at 4s. per cartload, the quality of which was superior to any manure to be then had; and from the circumstance of its being largely charged with lime and gaseous matter, it killed all grub and snail, reducing them to manure.

Thus, if the "Metropolitan Board of Works" adopt the new plan proposed by the President, to "carry the whole sewage down to the sea by a single line," it will be the best and most profitable one, by *renting* the *use* of the stream *along its whole course*, as adopted in India from canals. And this can be done by either of the two plans above suggested, according to the choice of the farmer or tenant. I remain,

Your obedient servant,

West Campbell-street, Glasgow, G. N.
Sept. 2, 1856.

THE MANUFACTURE OF MALLEABLE IRON AND STEEL WITHOUT FUEL.

ANOTHER trial of Mr. Bessemer's invention was made at Baxter House, on Monday last, and the following account of it will be interesting. About eighty gentlemen were present, amongst them were Mr. S. H. Blackwell, Mr. Richard Smith, Mr. James Nasmyth, Mr. E. B. Dimmack, Mr. Thomas Barker, Mr. H. Firmstone, Messrs. Walker of Gospel Oak, Messrs. Davis and Bloomer, Mr. H. Marten, Mr. Thomas Rose, Mr. E. T. Wright, Mr. Haden, Mr. Smith of Windmill End, Mr. James A. Shipton, Mr. Jobson, General Lord Rokeby, and other well known gentlemen.

The iron operated upon was about 7 cwt. of grey Blaenavon "pig." It was melted down in an ordinary cupola before being run into the converting vessel. This vessel we have already described. The blast was cold, and at a pressure of about 8 lb. per square inch.

The interior of the vessel was raised to a common dull red heat as before; the fire being removed before the metal was let into it.

After blowing for a few minutes the temperature of the upper part of the lining of the converting vessel was evidently much increased, and continued to increase, until, in fourteen minutes from the time the metal was run into the converting vessel, it began to boil and throw off, with a series of apparently slight explosions, a quantity of light frothy scoriæ or cinder, intermingled with small globules of iron. This was ejected from the vessel through the two holes in its upper part, and thrown some yards. This action of throwing off the scoriæ continued for about four minutes, more or less, and then subsided, the heat in the interior of the vessel still increasing until it became intense and brilliant, and in about twenty-six minutes the process was complete—the vessel was tapped, its contents run into a mould, and malleable iron was the result.

Undoubtedly, malleable iron was produced, just as described by Mr. Bessemer himself—and a piece of the spongy scrap spilt upon the ground, or knocked off the corner of the ingot then made, was subsequently shaped into a very satisfactory little piece of wrought-iron bar, exhibiting fibre in its fracture, and otherwise indicating good quality.

None doubted that completely malleable iron had been produced, and the general impression seemed to be favourable as regarded the ultimate success of the invention; but it was an equally general impression that practical difficulties would prevent the present puddling process being immediately superseded.

The experiment would have been much more satisfactory had an average good quality of pig iron been employed instead of the "Blaenavon," which is a first-rate iron; and it is to be observed that Mr. Bessemer weighs the iron *after* re-melting in the cupola, so that the whole loss is not ascertained—12½ per cent. Mr. Bessemer considers to be about the average loss in his experiment, but probably 15 to 20 per cent. would be the entire loss in conversion.

ELECTRIC COMMUNICATION WITH AMERICA.

From the Cork Constitution.

LYING at anchor off Queenstown for the last few days may have been observed a small, unsightly, ill-painted, rusty-bottomed screw-steamer, without one point of attraction about her, except the stars and stripes fluttering in the breeze. Yet that boat and some of the officers she contains have been the world's wonder for a season, and have just now concluded a task which is the forerunner of an event more wonderful still. The Arctic was the vessel that was sent to rescue Dr. Kane, who had previously been sent to rescue Franklin. She was successful, and brought home Dr. Kane and his crew, who had been obliged to abandon his ship and search. She was then a light ship on the American coast. She is now the bearer of Lieutenant Strain, of Darien notoriety, and Captain Berriman, who has before, and now again, crossed from Newfoundland to take soundings of the whole Atlantic from St. John's to Valencia, with the view to ascertain the probable success with which a telegraphic cable may be laid between these points. The result is satisfactory. For some 50 or 60 miles from St. John's, and again on this side, is a bank varying from 25 to 120 fathoms. Between these there is a plateau nearly level, the bottom soft, composed of shells so fine that only the microscope can discover them, each shell perfect in its minute beauty, proving the absence of currents at the bottom, and with due deference to Stephenson and others, the want of that vast pressure, which was to be so dreaded, and exhibiting at every point not only a capacity, but the most perfect capacity, for the very use for which it is required. The whole apparatus for arriving at these facts is most perfect. Steam-power, separate from that of the ship, works the axle from which the sounding-line is 'paid out.' Soundings have been taken to the depth of 27,000 fathoms. By a neat contrivance each sounding shows not only the depth, but the nature of the bottom, which is brought up in five quills, and the temperature of the water, the latter being given by the expansion or contraction of metallic spiral ribands, placed round a centre pin, fixed at the top, and attached at bottom to a needle and indicator, the latter remaining fixed after the first has ceased to act, showing the exact variation between the surface and the bottom. Most careful drawings have been made by Mr. Van Den Berg (to whom has been assigned the special post of draughtsman) of the soundings, showing a profile of the bottom of the sea with the greatest accuracy. There can be no doubt that telegraphic communications between Ireland and St. John's, a distance of 1,640 geographical miles, may be regarded as a certainty. It is in the hands of a small American company, but, though small, if its members possess but a tithe of the energy of their representative, Mr. Cyrus W. Field, who is also here making every inquiry, it will be enough to overcome every difficulty. Captain Berriman laughs at laying the cable. He asks but a ship large enough, and he will undertake to do it at 10 miles an hour right across. The company have already obtained the sole grant for erecting telegraphs through the whole of Newfoundland, and have already some 1,700 miles at work, or will have in a few days, which is in connexion with the American lines. The difficulties and trials of temper in taking these soundings have been tremendous. Repeatedly after 'paying out' tens of thousands of fathoms of line, and getting all up within some 60 or 80, it was snapped, and all had to be done again. Six and eight hours have been occupied in getting one sounding only, and these have been made nearly every half degree the whole way across. From the captain to the cabin boy, each has given his willing aid. No trouble was thought too much—no time too long; each appeared to feel the honour of his nation at stake, and proud in every way to advance the object in view. They have done their work well. Nature has granted all we could ask; art will soon do its part, while nature, science, and art, worked out by man's hand, will produce one grand whole to benefit mankind.

A FAMILY RAILWAY TRAIN.—The new railway train built by the Orleans Company for the Emperor is composed of five carriages. No. 1 forms a dining-room and saloon for the aides-de-camp, with kitchen and dressing-room. No. 2 forms a kind of terrace, and is all made of wrought iron, polished and of beautiful workmanship. No. 3, which is the state carriage or reception saloon, is surmounted by the Imperial crown; it is composed of an antechamber with folding sideboards for refreshments. No. 4 is the bedroom; it has been very ingeniously divided. It comprises a bed-room for the ladies of honour; bed-room for the Emperor and Empress, with a cradle for the Prince Imperial, dressing-rooms, &c. No. 5 is a waiting-room for the servants, place for luggage, and also has a cupboard containing every kind of tool that could be required in case of an accident. All these carriages are decorated and furnished with the greatest elegance.

A SUBMERGED FOREST.—Visitors to our seacoast, says a correspondent, often feel at a loss for a motive to that exertion so favourable to the acquisition of the health and strength they came there to seek, and this is more especially the case with the invalid. As one object which will repay attention, we may mention the overthrown and submerged forest of Hartlepool Bay, of the interest connected with which very few, probably, of the numerous visitors to Seaton Carew are acquainted. In walking along the beach northwards, when the tide is low, especially at the lowest neap tides, patches of a black colour are observable at regular intervals in the sand. These, when examined more closely, will be found to consist of pure vegetable matter, resting on a bed of clay. They occur more frequently as the observer passes northward to the pier of West Hartlepool, and may be seen again at low water at and near the breakwater at Old Hartlepool. These curious-looking patches form the remains of an ancient forest, which once grew on the spot, as the roots proceeding from the stump outward and downward in the clay beneath sufficiently testify—and the black matter of which they are composed is nothing more than the accumulation of a long period of the growth and decay of under plants, the fall of leaves, twigs, and branches, and finally of the trees themselves, the overturned stems of which may be seen embedded in the peat. The observer of nature will be curious to ascertain the character and species of the trees which whilom spread forth their branches in this primeval forest, and upon examination he will be gratified to find them precisely such as grow in the woods and forests of the present day. The oaks, of considerable size, he will find outwardly decayed, but "heartwhole" and, by good, but difficult, management, capable of being converted into furniture. The wood of the fir has almost disappeared, but the bark is wonderfully perfect, even in colour. There also is the alder, the plants of which must have attained a considerable size. Thorn also is found in considerable quantities, but the most abundant of all probably is the hazel, with its rind nearly perfect, while scarcely a vestige of the wood remains. As was to be expected, among the decayed mass of leaves, &c., the seeds of many of these plants occur. Shells of the hazle nut are found in abundance round the root of the parent plant, as they have periodically fallen to the ground. The cups of acorns, too, will reward the diligent searcher, and even the shining wing cases of the black beetle may occasionally be found. Other animal remains, such as the antlers and portions of the skull of the red deer or hart, together with the horns of the ox and other bones, not yet satisfactorily made out, have also been discovered. It is not our purpose on the present occasion to do more than to direct the attention of the sea-side rambler to this curious matter. To the geologist the subject, though common enough, will be always full of interest, as constituting one of the established facts of his science, and we may recur to the interesting evidence of this at a future opportunity.—*Durham Advertiser.*

THE COLLIERS' STRIKE AT BARNSLEY.—Most of the hands who, ten weeks ago, struck work at the Oaks Colliery, near Barnsley, on the ground that the manager, Mr. Minto, was incompetent to work the mine in a safe and efficient manner, have returned to their work, the dispute having ended in a compromise, whereby Mr. Minto is to act under the orders of another person, who is appointed to superintend the pit. A few of the men, however, obstinately refuse to return to work, and it is understood that the ringleaders in the strike are not to be employed again. Both masters and men have suffered severely from the late strike, a capital of £80,000 having remained unproductive during the ten weeks the dispute has lasted, and many of the colliers and their families being reduced almost to starvation. On Monday the following notice was issued by the committee:—"In consequence of a number of the men on strike having accepted the masters' terms rather than be ejected from their cottages, the committee have deemed it useless further to prolong the struggle in which they have been engaged for the last ten weeks. To want of organisation and funds they have been opposed by all the resources that wealth, vindictiveness, and a combination of the masters could effect. The committee now beg to return their sincere thanks to the public for their kind sympathy and generous support; and also to the *Times*, *Herald*, *Advertiser*, and the Manchester and local press, for the able assistance they have rendered by the publicity given to, and in some instances advocacy of, their cause. The public having become acquainted with the cause of the strike, the committee trust that should another accident occur, and looking at the Cymmer colliery verdict, they will demand a searching investigation."—GEORGE THOMPSON.

EXPLORATION OF THE NILE.—The mystery of the Nile is about to be attacked on every side. Capt. Burton is preparing a new expedition; the East India Company having granted him two years' leave with full pay, and the English Government having allowed £1,000 towards the expenses. The Pasha of Egypt has ordered a new expedition under M. le Comte D'Escayrac de Lauture, an experienced African traveller, and the author of a recent work on Sudan and of other treatises on African geography. The expedition will be accompanied by twelve Europeans—eight of whom have been already engaged—including three Frenchmen and three Austrians; and we understand that the chief is very desirous to be joined by two or three young English officers accustomed to astronomical and meteorological observations, and the management of boats. Count de Lauture has just left London, having been in communication with the Secretary of the Royal Geographical Society on the subject of the expedition, which is intended to start from Cairo early in October. Will any of our dashing young officers—in these piping times—volunteer for the Nile? Count de Lauture and Capt. Burton will advance in friendly rivalry from opposite quarters towards the sources of the Nile, and perhaps meet on a common ground to solve the most attractive of geographical problems. Could not Dr. Vogel be instructed to co-operate in this investigation? The way from Lake Chad to the upper waters of the Nile is not impracticable to a traveller so skilful as Vogel; indeed, it is no more hazardous than the journeys about to be undertaken by Capt. Burton and Count de Lauture. The convergence of these three expeditions on a single point would most likely clear the mystery; and if it cleared it at all, would do so in a pleasant manner, the three intellectual nations of Europe being severally represented and associated in a discovery interesting to all scholars and geographers.

CHANGES IN THE APPROACHES TO LIVERPOOL.—At the meeting of the Liverpool Dock Committee on Thursday, the marine surveyor, Lieutenant Parkes, submitted his survey of the northern approaches to Liverpool, executed during the season 1856. In consequence of changes in the Channel, the marine surveyor suggests the following alterations in the lighting and buoyage of the pool:—That the light at present exhibited in Formby Lighthouse be discontinued, and Crosby Lighthouse brought into use; that the Formby Lightship be shifted about half-a-mile SSE. ½ E. from its present position; that the Bell Beacon be shifted 400 yards to northward. These three objects to form a leading line up the Victoria Channel over the deepest part of the west middle into the Crosby Channel; and that the limits of the shoal water on either side of this line be further defined by additional buoys to be placed on each side of the bight formed by the Victoria Channel in the west middle shoal. With respect to these and other changes, the chairman observed that the suggested changes should be carried into effect as soon as possible.

FRENCH MODEL LODGING-HOUSES.—There is some idea of undertaking a vast enterprise, which is said to have received the approbation of the Government. It is, to erect just within part of the fortifications 2,500 houses in groups of fifty, which would thus give fifty villages, each forming a sort of square. Each house is to accommodate six workmen's families, at a rent to each of not more than 150f. Each square is to bear the name of a victory, such as Fontenoy, Austerlitz, Alma, &c. Each group is also to have its own bakehouse and butcher's establishment, at which food will be sold below the current price.—*Paris Siècle.*

WHEN the electric cable, about 130 miles long, had been laid down from Cape Spartivento nearly to Galita Island, to form a link of the European and African line, a violent storm arose, and to save the lives of the people on board the Dutchman steamer, it was found necessary to abandon the cable. It has been insured for £30,000. This is the second cable lost in attempting to carry out this enterprise.

THE BOILER EXPLOSION NEAR BURY.

THE adjourned inquest took place at Bury this day week. The evidence then adduced comprises the substance of what was delivered on the first day of the inquest, and, therefore, we confine our extracts to the report of the second day's proceedings.

Mr. Baldwin, consulting engineer, had received instructions from the coroner to make an inspection of the scene of the accident, and furnish a report to the jury. The following is the report referred to:—

ENGINEER'S REPORT.

Having received instructions from the coroner to examine into the cause of the boiler explosion which took place at the works of Messrs. Warburton and Holker, of Hampson Mills, near Bury, I proceeded to the scene of the accident on the morning of the day following that occurrence, and found, after examining the various parts of the exploded boiler, that a description of their various positions would be necessary. Before the accident there were two boilers lying side by side, and coupled together by pipes and valves in the usual manner. Standing at the front of, and looking towards, the boilers, the one on the left was 28 ft. 3 in. in length and 8 ft. in diameter, with two internal flues; that on the right is the one that exploded, the diameter of which was 9 ft. 1 in. and 36 ft. 6 in. in length; the thickness of the shell being ⅜ in. The front end was ⅝ in. in thickness, the back end being ½ in. in thickness; one longitudinal stay 2 in. in diameter passed from end to end of the boiler at a distance of 2 ft. 3 in. from the top of the shell, being in a lateral direction, near the centre of the boiler; this stay passing through each end, also through an oval plate 17 in. by 11½ at the back end, and a circular one 18 in. in diameter on the front end, the whole being secured by two nuts at each end of the boiler. The front end had also two diagonal plate stays ⅞ in. thick passing from shell to ends, each 6ft. in length and 15 in. broad at the boiler end by 12 in. at that part fixed to the shell. The boiler contained two internal flues, the diameter of each fire-box being 3 ft. 10½ in. continued for a length of 8 ft. from which point the diameter gradually decreased to 7 ft. 8 in., and continued that size to the other end of the boiler, the thickness of these flues being ⅜ in.

The plates of which the boiler was made are 5ft. in length by 2 ft. 2 in in breadth; the riveted joints are not crossed, but form straight longitudinal lines, running along the shell from one end of the boiler to the other. The boiler setting was such that the current passed from fire-box to end of boiler, then underneath, splitting in front and returning up each side to the chimney. The boiler was fed by hand, and the feed regulated by a 2-in. valve in front near the bottom; one steam gauge by Smith was fixed on the pipes coupling the boilers together. The left hand boiler had no safety valve fixed upon it; the exploded boiler had one 5-in. safety valve fixed on front. At a short distance from the boilers a safety valve 6½-in. in diameter was fixed on the steam pipes answering for both boilers. On the same range of pipes, and about 70-ft. from the last named valve, stands an 8½in. valve with lever and weights, the purpose of this valve being to allow the steam from the high pressure pipes to pass into the low pressure pipes when said steam exceeded the working pressure, or when more steam was required for low pressure purposes. The steam engines are of the non-condensing class, working with a back pressure of about 9lb. per square inch. The steam, after doing its work at the engines, is used for boiling purposes.

After the explosion, the back end of the boiler with the longitudinal stay attached (which stay was bent in the form of the letter S), and also part of the shell, having a mean breadth of about 8-ft. and 28-ft. in length—the length having been the circumference of the shell—was found at a distance of 115 ft., and nearly in a straight line with the longitudinal axis of the boiler. The other end of the boiler, with part of the shell and also the fire-box end of the left-hand flue 16 ft. 3 in. in length, was thrown a distance of 70 ft. in the opposite direction to the parts mentioned above, and turned entirely over in their flight. The end of the flue penetrated the wall of the wash-house, passing into the interior a distance of 5 ft. The other part of the above-named flue is 20 ft. 6in. in length and 2 ft. 8 in. in diameter, being torn entirely from the back end of the boiler and torn across the rivet-holes from the other part of flue, was thrown into a garden on the other side of the river, turning entirely over in its flight; the back end coming in contact with the ground made a hole about 18 in. deep, the other end being flattened by a fall on its side. The line of flight of this part of the flue was to the left from the back towards the front of the boiler, making a horizontal angle of about 45°, the distance to which it was thrown being 180 ft. The right-hand flue remains entire, being torn from the ends and thrown towards the front of the boiler, a distance of 36 ft. The middle part of the shell was torn into three parts of nearly equal size, and very little removed from their original position; no part of the circle remaining entire, the plates being spread out nearly flat, and lying upon the shattered brickwork originally composing the flues. Two of these parts contain each a plate, evidently part of the boiler bottom, situate near the centre of its length, and only one-sixteenth of an inch in thickness, the greater part of the thin plate being torn away, and no doubt containing the patch spoken of by the mechanic, but which has not yet been found. The longitudinal stay contains on that end originally attached to the front end of boiler, part of the cast iron plate before spoken of, the edges of which have been broken off, leaving only the centre part nearly in the form of a parallelogram 7 in. by 8 in., which broken plate has been torn through the end plate to which it was attached, rending the plate on side of centre about nine inches.

I examined the safety valves and found them in working order, there being no signs of the valves or joints having been fast in any parts. . . .

A careful calculation gave the mean pressure in the boiler 40·65 lbs., or in round numbers, 40 lbs. to the square inch. . . .

Having now ascertained that the pressure in the boiler was 40 lbs., and knowing also from observation on the morning of the accident, that the valve which coupled the boilers together was wide open, it remains to show what may have been the cause of the accident. I am strongly of opinion that this melancholy catastrophe was caused by the thin plate before mentioned not having sufficient tenacity to retain a pressure of 40 lbs. per square inch acting upon it; that the thin part of the plate was blown out, and probably the patch before mentioned along with it. The rents made in the plates by this action would soon spread over the surface of the shell, gaining increased destructive force, because gaining increased leverage by the steam acting upon the liberated plates, the continuous line of rivets offering great facility to the active force by allowing it to act in straight lines through the weakest part of the boiler. The great diameter of the boiler would also facilitate its destruction; for so soon as a longitudinal line of rivets were rent asunder, the force of the steam would act on that part and open out the shell, stretching it out nearly in straight lines at right angles to the longitudinal axis of the boiler. The boiler having been at work about ten years, the iron will have decreased very much in tenacity, for it has been proved experimentally that iron used as boiler plate will in a few years lose one-third of its retaining power. As to that part of the flue thrown across the river, I feel certain that 40 lbs. per square inch is more than sufficient to account for that phenomenon. The area of the longitudinal section of the tube is 20·5 × 2·75 = 56·65 square feet, or 8,147·6 square inches, and its weight about 2,914 lbs. or rather more than 1¼ tons; hence, by dividing 2,914 by 8,147·6 we have ·357 lb as the weight or force of gravity acting on each square inch of section of the tube. The steam acting on this surface would require a pressure of about 28 lbs. per square inch to throw the tube a distance of 180 feet, the angle of elevation being 45°, the remaining 12 lbs. per square inch being more than would be necessary for the resistance of the air, this resistance being very small for small velocities. In the present case, the velocity of the tube in its flight is about 80 feet per second, that of a locomotive engine when running one mile per minute 88 feet per second nearly, the resistance of the air being about 3 lbs. per square foot. The weight of the boiler and water would be about 56¼ tons, or 126,507 lbs.; its longitudinal section about 47,742 square inches; the former being divided by the latter gives 2·65 lbs. per square inch of steam to just lift the boiler. When fourteen times this force is applied, having the power of motion within itself of 172 feet per second, we need not be surprised at the dreadful havoc committed by this powerful agent.

With respect to the bearing cast iron plate through the front end of boiler, this must have been accomplished with a force less than that required to tear asunder the longitudinal stay, the diameter of which is 1⅞-in. at the smallest part of the screw, requiring a force of 64 tons to tear it asunder; hence, I conclude that a force less than 64 tons pulled the cast iron plate through the boiler end. The force acting against the boiler end just before the explosion would be about 134 tons.

Old boilers larger than about 6-ft. in diameter cannot be too highly censured when the pressure exceeds 20lbs. The exploded boiler was not of the best construction, the ends being badly stayed, and the plates rivetted together with the longitudinal joints continuous, thereby losing about one-third of its retaining power. No bricksetter would ever think of building a wall without crossing the vertical joints of the brick-work. It has been stated since this accident occurred, that since high steam possesses a higher temperature than low steam, the strength of the boiler plates is much decreased by this increase of temperature. This, however, is not correct, since the maximum strength of wrought iron plates is found to obtain at a temperature of 570° Fahrenheit; the temperature of the steam in the present case being only 288° Fahrenheit; hence the strength of the boiler is increased by the addition of heat up to its maximum. Taking 25,000lbs. as the ultimate strength per square inch of section for rivetted plates where the joints are not crossed, one-fifth of which ought not to be exceeded by boilers in constant use, viz., 5,000lbs. per square inch of section, we find, by multiplying twice the thickness of the plate by 5,000, and then dividing by the diameter in inches, that 34lbs. per square inch would be about a fair pressure to have worked the exploded boiler, supposing all its plates in good condition, and the boiler judiciously stayed.

IMPROVED MODE OF IRON SMELTING.

WE are informed that preparations are making for trials in the blast furnaces with a view of using the system of smelting, recently patented by Mr. Mickle, of Willington, county of Durham. The change that the effectuation of this will make will most probably be the greatest that can occur in the manufacture of iron; and, with Mr. Bessemer's invention in malleable iron, will be the commencement of a new era in this branch of our trade. The benefit arising from Mr. Mickle's improvement as regards the Cleveland stone will be incalculable, and stimulate the opening out of it, and the erection of furnaces, to an extent not at present conceived.

Mr. Mickle, in a circular which he has recently issued, thus describes the nature of his invention:—

In the present mode of iron smelting there is an enormous proportion of the fuel which the coal contains altogether wasted, and the early adoption of a process to prevent this waste is clearly of much moment to the manufacturer and the community.

It is proposed, in the first place, to divide the coal by dry distillation; and then use the gas and coke produced as fuel to smelt the ore.

The coke may be charged as usual, while the gas is conveyed from the gasometer in pipes and pumped into the furnace.

The gas pipe can either be introduced into the air pipe near the furnace, or the gas itself forced through separate pipes and tuyeres. The former is the more readily effected. At the mouth the gas pipe ought to be one-fifth to one-half inch inside diameter according to quality.

The heat from the oxy-hydrogen blow-pipe is well known—it is inferior only to the solar heat or to that produced by electricity. It fuses the most refractory substances and even renders some gaseous.

The plan infers the use of a blow-pipe—the heat will necessarily be most intense and the fusion of material rapid.

An eminent ironmaster and scientific chemist considers that one-fifth of the gas would cause his furnaces to yield 50 per cent. more of metal; the gas flame in the upper part of the furnace facilitating the reduction of the hearth; the quality of the iron being also improved.

Dr. Richardson, of Newcastle-upon-Tyne, a chemist of high standing, expresses an opinion that "the working of the furnaces would probably be so rapid that the hearth would, within twelve hours, require frequent tapping, yielding a superior quality of iron.

The heating of the air blast may either be continued or not—if continued, it will add to an already extraordinary heat.

But irrespectively of intensity—

One lb. of carbon requires for combustion 2⅔ lb. of oxygen—and 1lb. of hydrogen, 8lb. oxygen; the heat is in proportion to the oxygen, that is 1lb. of hydrogen evolves as much as 3lbs. of solid carbon; and there are consumed—

1lb. H.	plus	8 lbs O.	=	9 lbs.
1lb. C.	plus	2⅔lbs. O.	=	3⅔lbs.

Charcoal is carbon—coke is a more compact impure form of carbon.

From the official report on the coals suited to the steam navy, the average of the analysis of 43 varieties used in this country gives—

Carbon	82¼
Hydrogen	5¼
Oxygen	6¼
Nitrogen	1¼
Sulphur	1¼
Ash	3¼
	100

By dry distillation, as there is no waste, all the carbon and hydrogen are obtained less 1¾ of the latter, which combines with the oxygen, &c., or, reckoning carbon into hydrogen, it is equal to 94½ per cent. of the former.

Whether coke is made in ovens or retorts, it contains the ash; and moisture from cooling, say 3 to 5 per cent.

It is to be questioned whether coking in ovens yields on an average 60 per cent.; but taking it so—comparing it with the above, and adding ash and moisture to equalise; 94½ plus 3¼ plus say 4 = 101¾, less for tar and hygrometric water 7¾ = 94, or in other words, there is obtained from coal equal to 94 per cent. of coke instead of 60.

Trials in ordinary gas works give the following results with two different coals.

3 essays—best coal—nearly 2 cwt., gas per ton of coal.
81¼ per cent. strong hard coke cooled without water and a little small coke.
86 per cent. strong hard coke cooled with water and a little small coke.

4th essay—11,650 feet or 3 cwt. gas per ton.
75 per cent. large coke, cooled with water.
3 per cent. small coke.
—
78

2 essays—secondary coal—11,453 ft., or 3 cwt. gas.
75 per cent. strong hard large coke.
8 per cent. small (would do for retort fires), cooled with water.
—
83

From the ovens of the district, 55 to 60 per cent. of coke, cooled with water.

As there has not been inducement, attention has not hitherto been devoted to retort coke which, from experiment, is capable of being highly improved.

In smelting, the coal is used either raw or coked; if raw, there is sulphur, and the volatile part of the fuel flies off unconsumed, or partially consumed, with a proportion of the heat of the furnace.

Where one ton of metal is smelted by	30 cwt. coke.
Water and ash	1½
Net coke	28½

such coal contains of carbon and hydrogen, a ter allowing for hygrometric water and tar, equal to 95 per cent. of coke—28·5 multiplied by 100 div. by 95 = 30 cwt. coal required.

The gas pump can either be fixed horizontally to the blast engine, or one of 6 or 8 horse power will pump enough for 3 or 4 furnaces.

The fuel of the heating stoves will be nearly the same as, or more than, that for the retorts and small engine. The capital for gas works, and the cost of manufacture, equal to, or less than, those for coke ovens.

Coal gas, purified as ordinarily, will be found the purest fuel since charcoal was abandoned in this country.

The average cost of fuel may probably be 22s. 6d. to smelt a ton of metal; but supposing 1½ tons coke be used at 12s.			18s.
then 1½ tons coal at	6s. 6d.		
net cost of carbonising	1s. 6d.	8s.	12s.
Saving			6s.

In a large furnace, yielding at present one ton of metal in the hour—

then 1½ ton coal at 9,000 ft. gas per ton	= 13,500
at 120 oxygen multiplied by 5	= 81,000
using 5,000 ft. air per minute	=300,000

the gas thus consumes upwards of one-fourth of the air.

The air required to ensure complete combustion in such a furnace would be about 15 tons—it receives at the above rates 11¼—and thus one-half of the coke passes off as carbonic oxide.

To prevent explosion, the pressure of the gas should be maintained as high as, or slightly in excess of, that of the air; pressure gauges may be attached to the pipes of both valves, opening only to the furnace placed in the gas-pipes, and taps placed as closely into the furnace as possible, and turned off immediately before the engine ceases to pump. Proper attention to the pressure and taps will from the experiments made prevent danger.

It is reasonable to expect that, coupled with purified fuel, the intensity of heat will more effectually separate the iron from the slag, and *vice versa*; thus improving quality, and, besides the saving from economy of fuel, cause the production of a much larger quantity of metal.

For the development and use of the ore of the lias which traverses England, without coal from Middlesbro' to the Channel, and which, from the abundant supply it affords, is perhaps the most valuable the country possesses, this invention may be of peculiar value, because it is possible that the concentrated heat of the whole of the gaseous fuel, used in the manner proposed, will reduce the metal so fast as to render the cost for fuel comparatively trifling; and cause a poor ore to yield purer and superior iron.

There have been 3,000,000 tons made during the year in Great Britain. To smelt this would be required 7,500,000 tons of coal; and of the latter, the best and commandible part, upwards of 1,000,000 with 1,500,000 tons of coke have been altogether rejected and dissipated.

After it is pointed out, and the way in which it is to be avoided is shown, the system will likely be changed and the waste prevented, the results of such change will, in all probability, be reduced expense, better iron, without increase of capital, or of charge on any item except labour, a much larger quantity of metal from every furnace, and more general use with extended demand and power of supply.

BRITISH ASSOCIATION FOR THE ADVANCEMENT OF SCIENCE.

AT the conclusion of the late meeting of the Association at Cheltenham, the following recommendations were made:—

Involving Grants of Money.

At the Disposal of the Council for Maintenance of the Observatory at Kew	£350 0
To Mr. Osler to complete his reductions of Anemometrical Observations	20 0
For a Report on the Chemical Nature of the Image formed in Photographic Processes	10 0
For a Report on the Compounds of Platinum and the Allied Metals with Ammonia	10 0
For Investigations on Earthquake Waves	50 0
For Completion of Table of Strata in the British Islands	15 0
For Experiments on the Temperature of Deep Mines in Cornwall	10 0
For a Report on the British Annelida	25 0
For Dredging Experiments on the Coast of Ireland	10 0
For a Report on Dredging the West Coast of Scotland	25 0
For a Report on Vegetable Imports of Liverpool	10 0
For a Report on Vegetable Imports of Glasgow	10 0
Completion of Report on the Typical Forms of Groups as the basis of Museum Arrangements	10 0
For Observations on the Growth of Salmon	10 0
For Completion for Publication of Rev. P. Carpenter's Report on the Mollusca of California	10
To Madame Pfeiffer for Researches in the Natural History of Madagascar	20
To Mr. G. Rennie for Experiments on Heat developed by Motion in Fluids	20
For Investigations of Life Boats and Fishing Boats	5 0
	£620 0

That copies of the Reports of the Parliamentary Committee for 1854-5, and 1855-6, be transmitted to each Member of the General Committee, with a request that opinions may be expressed as to the important subject, "Whether any measures could be adopted by the Government or Parliament that would improve the Position of Science and its Cultivation," and that such opinions be forwarded for the consideration of the Council before the 20th of September.

That Mr. Cayley be requested to complete his Report on Theoretical Dynamics.

That an Application be made to Government by the Council of the Association, for an Expedition to complete our Knowledge of the Tides.

That the Application which was made to Government in September, 1852, concerning the Great Gentham Telescope, be renewed by the Council.

Section A.—That General Sabine, Professor Phillips, Sir J. C. Ross, R. W. Fox, Esq., and Rev. Dr. Lloyd, be requested to repeat the Magnetic Survey of the British Islands.

That Dr. Booth's Memoirs on the Geometrical Origin of Logarithms be printed entire in the Reports, &c.

Section B.—That Dr. Miller be requested to report on Electro-Chemistry, and Dr. Price on Commercial Varieties of Iron.

Section C.—That the Communication of Dr. Wright on the Echinoderms of the Oolite be printed entire in the Transactions of the British Association.

That Mr. Etheridge's List of the Fossils from the Lias Bone Bed be printed in the Transactions of the Association.

Section D.—That Professor Buckman and Professor Voelcker be requested to continue their researches into the Effects of External Agents on the Growth of Plants.

Section E.—That a deputation be named to wait upon her Majesty's Secretary for Foreign Affairs, to urge the desirableness of sending out an Annual Expedition to the Niger, at the period of the rising waters of that river, which has been proved to be the most healthy season), as proposed by Dr. Baikie, supported by the Royal Geographical Society, and advocated by persons deeply interested in establishing a regular commercial intercourse with the inhabitants of that portion of Africa.

Section F.—That a memorial be presented to the Admiralty, praying for the complete publication, in a minute form, of the results of the trials of her Majesty's Steam Ships.

Section G.—That Mr. Rennie be requested to prosecute his experiments on the velocity of the screw propeller.

That the Earl of Harrowby, Lord Stanley, Mr. J. Heywood, Mr. T. Webster, and other gentlemen, be requested to continue their efforts for amending the patent system of this country, so that the funds arising may be available to the reward of meritorious inventors.

That Mr. Henderson, Mr. Russell, Mr. Atherton, and others, be requested to consider the best mode of improving the system of measurement for tonnage of ships, and the estimation of the power of steam-engines.

Mr. Fairbairn was requested to complete his reports on boiler explosions; Mr. Thompson, his report on the measurement of water, by weir boards; and these two gentlemen to concur in experiments on the friction of discs in water and on centrifugal pumps.

IRONWORKING AND FUEL.

MR. ADAMS, adopting our last week's suggestion, appears to have been "puddling" over the matter of the application of Bessemer's "*heat.*" It has fallen into good hands, and we hope he may make something very good out of it. Why should not the refinery be placed beneath the smelting furnace, from which the molten metal could percolate and be performed at once, giving off heat to smelt a constant supply of ore?

Mr. Adams says:—

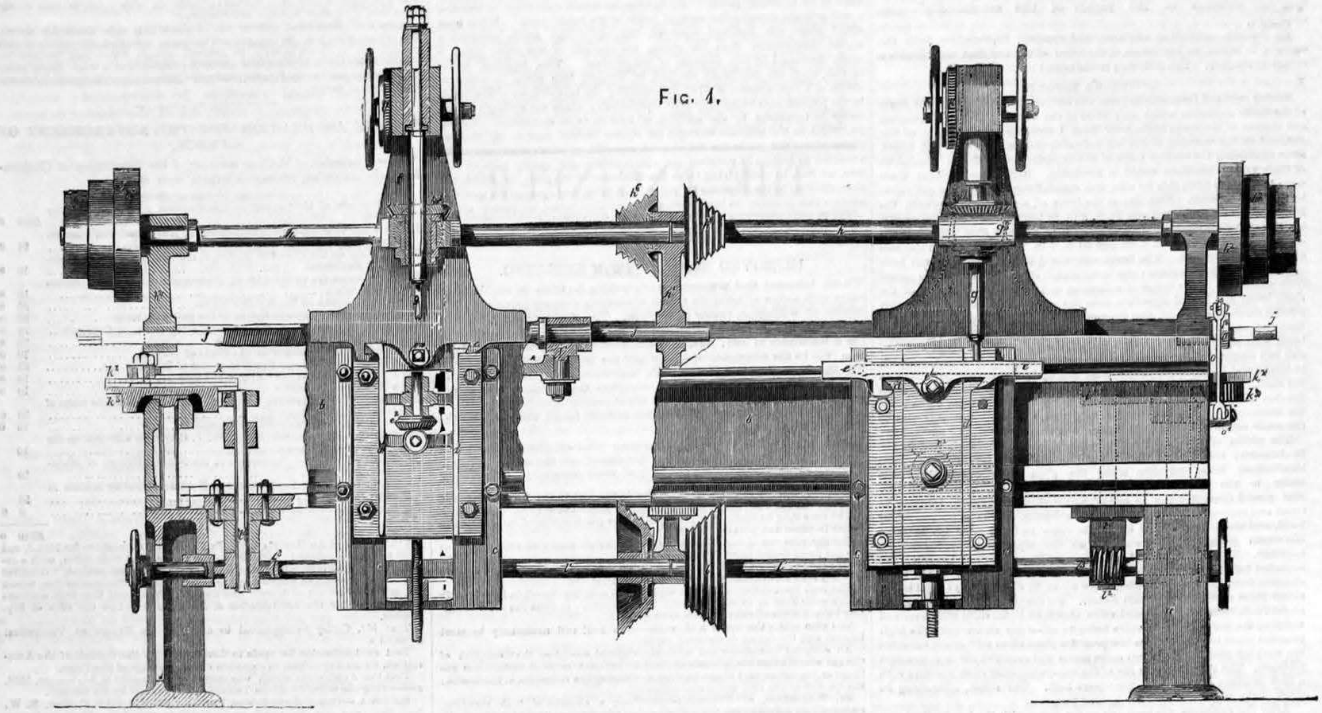
"Mr. Bessemer's process engenders an enormous increase of heat, at present not applied usefully, but wasted, and the problem has yet to be solved how far this heat can be applied to reduce ores in the blast furnace. It would be a curious result to find that the heat taken originally from the blast-furnace, and increased in the refining furnace, could be given back again to another blast-furnace, to return more heated metal to the refining furnace, the consumption of fuel being confined to the blowing-engine, or dispensed with by water power. It may be that ultimately the whole process will be performed in one furnace, incessantly filling and discharging, air passages being provided both above and below the molten metal. The solution is commenced of the vast problem alluded to by Dr. Daubeny for the production of artificial heat without the process of coal digging, and the indication of Mr. Bessemer will lead to cognate chemical researches in glassmaking, pottery, general metallurgy, steam power, and al those large processes hitherto very remarkable by the imperfect combustion of crude fuel, and it is by the chemist and not by the magistrate that London and other large cities may ultimately be freed from smoke. It is evident that henceforth iron of as good quality may be made in Wales or Staffordshire or elsewhere as in Yorkshire, and the difference of price, from £8 to £18, equalised. Pure iron is like pure gold, *sui generis*, and now that the process is discovered of easy and certain purification from extraneous matter, the only difference in cost will be, not in the quality, but quantity of metal which can be extracted from the different classes of ore, and in the cost of human labour for getting the ore, together with the royalty of proprietorship. Fortunately, we do not find metallic iron, like Michigan copper, in masses, or it would puzzle us to turn it to account. The oxygen, sulphur, and other ingredients that render it impure make it also friable, and capable of extraction, and the simple mode of purification being attained, the rich ores of Cumberland, the red hematite, impregnated strongly with sulphur, and hitherto only capable of making "red-short" iron, now become tractable, and will probably be among the most valuable.

"Out of this discovery of Mr. Bessemer we shall get, among other things, railway bars of homogeneous quality and as hard in texture as may be consistent with the absence of brittleness. We shall not have the surface rent into stringy fibres, like birch brooms, nor squeezed out in patches, like iron dough. With moderate weights in the driving and other wheels, and possibly improved structure of the machines, railway shareholders will yet get into the possession of that long-desired property, a "permanent way," permanent in fact as well as in name; and it may yet become possible for people to travel on rails for days and weeks together with no more injury to health than is experienced in a sailing vessel,—a conclusion which medical experience tells us is not yet attained, even in a daily return journey between London and Brighton.

"The talents and faculties that will be stimulated to profitable exercise by this stirring fact in the history of iron give us the warranty of an opening future, in which the sweat of the brain within the brows will be the true reading of man's destiny, which has hitherto been translated literally. It sets the pulses a-glow at the thought that men's muscles will finally be freed from wasting drudgery, and only used in healthy exercise."

SHARP AND FURNIVAL'S IMPROVEMENTS IN MACHINERY FOR DRILLING, GROOVING, AND SLOTTING.

Fig. 1.

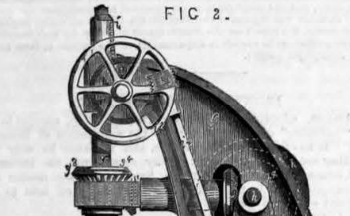


The above illustrations of Messrs. Sharp and Furnival's improved machine for grooving and slotting are referred to in our article, "Tour in the Provinces." The bare description of the machine is given below.

Figure 1 of the accompanying illustrations is a side elevation of the compound drilling, grooving, and slotting machine; and Figure 2 is an end elevation, partly in section.

In these views some of the pieces are omitted, and others broken off, in order that the mode of construction may be better understood. *a, a*, are the standards, supporting the bed plate *b*, near each end of which is bolted a plate *c*, for the adjustable angle bracket *d* and table *e*, by which the articles to be operated upon are supported. The level of these tables may be raised or lowered by the screws e^1, bevel pinions e^2 and handle, and the table may be moved horizontally by the screw e^4. Near each end of the bed plate *b* is a moveable headstock *f*, for the drilling spindles *g, g*, each of which is turned round by one of the shafts *h, h*; each of these shafts is supported by the centre bearing h^1, and outer bearing h^2; the speed pulleys h^3, fixed on the shafts *h*, are driven by straps from the counter shaft, and the rotary motion of the shafts *h* is transmitted to each of the drilling spindles *g* by the bevel pinion h^4, loose on the shaft, but connected to it by a key; each of these pinions gears into a pinion g^1, which

FIG 2.



is fixed on the shaft g^2 revolving in a bush cast on the moveable headstock *f*; to the shaft g^2 is also fixed the pinion g^3, gearing into the pinion g^4 through which the spindle *g* is at liberty to move vertically. The spindles are brought down to increase the depth of the cut by means of the rack *i*, pinion, i^1 worm wheel i^2, worm i^3, diagonal shaft i^4, bevel pinions i^5 and i^6, the latter of which is loose on the shaft *n*, to which the ratchet wheel i^7 is keyed; this ratchet wheel is worked by the click i^8 and lever i^9, loose on the shaft *n*, to which the pinion i^6 is connected by a key taking into a groove; by this arrangement, when the headstock *f* moves to and fro, the pinion i^6 is moved with it. The requisite up and down motion is given to the end of the lever i^9 by the link *o*, the lower end of which is connected to the double lever o^1, which is acted upon by a projection on the wheel k^3. The headstocks *f, f*, are moved to and fro lengthwise of the bed plate *b* in the following manner:—Each headstock is connected to one of the slide rods *j* by a bridle j^1; these rods slide in projections from the bearing h^1 and h^2, the centre bearing having two holes a little distance apart to allow the slide rods to pass each other. The slide rods *j* are screwed, and are each connected to one of the moveable headstocks *f* by a nut j^2, see Figure 2, for the purpose of being able to vary the position of the headstock on the bed. The connecting rods *k, k*, are each jointed at one end to one of the bridles j^1 on the slide rods *j*, and at the other end to a crank pin k^1, projecting from the face plate k^2, to which a slow rotary motion is given by the conical groove pulleys k^6 and *l*, shaft l^1, worm l^2, worm wheel l^3, shaft l^4, excentric pinion l^5, gearing into the elliptical wheel k^3, cast with the face plate k^2; by means of the excentric pinion l^5 and elliptical wheel $k3$, the unequal motion imparted by the crank pin k^1 in the face plate k^2 is to a great extent obviated. By this compound machine two articles may be operated upon at the same time, and a slot or groove of different dimensions produced in each, the size of the cutting tool, the velocity of the drilling spindles, the length of traverse, and the velocity of the drilling headstocks being in each case independent of the other; and also in operating upon locomotive connecting rods or other large articles, two grooves or slots of equal or unequal dimensions may be made at the same time in the same article. The mode of giving lateral motion to the drilling headstock, and allowing the article under operation to remain stationary, is also applicable to machines with only one drilling headstock. When spiral or other shaped slots or grooves are required, the article in which such slots or grooves are to be cut is supported on a chuck fixed to the table *e*; a slow rotary motion is then imparted to the chuck from any convenient part of the machine, which rotary motion (imparted to the article under operation), in combination with the lateral motion of the cutting tool, produces the spiral or other shaped slot or groove required. When this part is applied to drilling, grooving, and slotting machines of the usual construction in which the drilling headstock is stationary, the same result is obtained by the lateral motion of the table and the rotary motion of the chuck.

The New Free Trade Hall, Manchester.—The new Free Trade Hall at Manchester, built on the site of the hall bearing that name in which the great Anti-Corn Law meetings were held, and which is one of the most commodious and handsome buildings in the country, is to be opened on the 8th of October next. On that occasion the proprietors give a dinner and ball to their friends, and among the principal gentlemen to be invited are Messrs. Cobden, Bright, Brown, Heywood, Kershaw, and Crook,—all members of the Legislature, and proprietors of the building. The hall has already been engaged for a number of other meetings to succeed, including two by the Bible Society. It has also been engaged for the Monday evenings throughout the winter for a series of people's concerts.

Graving-dock Accommodation at Liverpool.—The graving-dock accommodation on the Mersey has been the subject of so much discussion that it may not be uninteresting to report that the new graving-docks, near Woodside, on the Cheshire shore, belonging to Mr. Laird, to Messrs. Clover and Co., and to Messrs. Clayton and Co., are likely to supply all present wants. On Monday a large screw steamer, the Ottawa, was undocked, and with the same tide the Charity, a vessel of the same dimensions (1,200 tons, and 270 feet long) was placed upon the block just vacated by the Ottawa. Mr. Laird's graving-dock, No. 2, capable of taking in vessels larger than the Himalaya, will be opened within a week, and Nos. 3 and 4 graving-docks within a month. No. 3 is 420 feet long and 35 feet entrance; and No. 4, 420 feet long and 87 entrance, nearly 100 feet longer and 15 feet wider than the Persia.

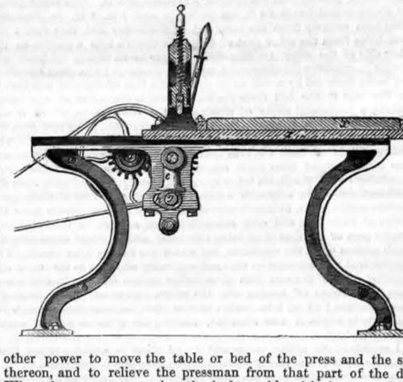
Inauguration of the Wellington Statue at Manchester.—The ceremony of inaugurating the noble statue of the late Duke of Wellington, which has been raised in front of the Manchester Infirmary, took place on Saturday afternoon, in the presence of 15,000 to 20,000 people. The Mayor and Corporation walked in procession from the Town-hall, accompanied by the Bishop of Manchester, Lieutenant-General Sir Harry Smith and staff, and a number of the subscribers to the memorial, and the ceremony altogether was of a very imposing character. The statue is by Noble, and represents the noble duke in the character of a statesman.

MACLURE'S IMPROVEMENTS IN LITHOGRAPHIC PRINTING PRESSES.

Patent dated 8th December, 1855.

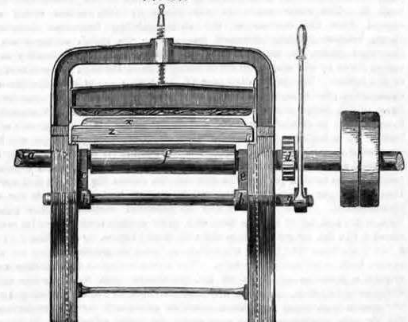
This invention has for its object a more convenient arrangement of the parts of a lithographic printing press, in order to apply steam of

FIG.1.



other power to move the table or bed of the press and the stone thereon, and to relieve the pressman from that part of the duty. When the pressman requires the bed or table with the stone thereon to be moved, the pressman or another has simply, by a lever or otherwise, to move the roller or bed a short distance to bring their surfaces in contact, when the power applied to keep the roller constantly in motion will by the roller propel the table or bed to the desired extent, and the bed or table will be brought back by a weight or otherwise. Figure 1 is a longitudinal section, and Figure 2 an end elevation.

FIG.2.



a is the main shaft, which is driven by a band and pulley; there is a pinion on the axis *a*; an axis carrying the cog wheel *d*, receives motion from the aforesaid pinion, the axis turning in bearings *e*, which are capable of sliding up and down in guides or openings in the side framing; *f* is a roller mounted on the axis; *g* is an axis passing from side to side of the machine, and which has mounted on it the eccentrics or cams *h*, and on the eccentrics or cams the bearings of the axis rest; *i* is a handle, by which a partial rotary motion can be given to the axis so as to cause the eccentrics or cams *h* to act on the under side of the bearings *e*, and raise the roller *f* into contact with the under side of the carriage or bed of the press, and thus the carriage is caused to move forward and carry the stone under the scraper or pressing instrument, by the action of which the ink is transferred from the stone to the paper.

TO CORRESPONDENTS.

A Subscriber.—*If you are distrustful of every one, your only plan is to obtain provisional protection, and then you need not fear to acquaint persons of the nature of your invention, that is, supposing there is no patent for the same thing which dates before your application, and which yet remains unspecified.*

A Mechanic (Leeds).—*The steam hammer, invented by Mr. Dundas, of Dundas Castle, is at work in Leith. The hammer descends, not only by its own weight, but is forced down by the steam acting on the piston.*

W. S. Y.—*The meeting of the members of the Institution of Mechanical Engineers will take place in Glasgow on the 17th instant.*

B.—*Look at this week's letter from the Midlands. Continue to watch our "Notice" column, and you may, perhaps, learn that our correspondent has procured you a sample.*

(To the Editor of The Engineer.)

Sir,—Would you kindly inform me, in the next Engineer, where I could get a catalogue of the French publications, called "Manuels Roret." They form a series, similar to that of Weale's, in this country.

Your's, &c.,

Cavan, August 26, 1856. Q. U. C. E.

[*The publisher, in Paris, is M. Roret, libraire, Rue Hautefeuille, No. 12. A catalogue appears at the end of each volume, but it is probably published separately.*]

(To the Editor of The Engineer.)

Sir,—Would you be kind enough to inform me in what part of Australia a surveyor and mining engineer would be most likely to meet with success in that branch, and oblige,

Your's, &c.,

August 30, 1856. A Mining Engineer.

[*We should think Melbourne the best place; bnt the neighbourhood of Adelaide must afford employment to many engineers. Perhaps some of our readers can inform our correspondent from their own experience.*]

(To the Editor of The Engineer.)

Sir,—On reading the description of Mr. Bessemer's process, I find that he has a number of tuyere pipes, whose united area is two square inches. To force the air into the molten mass a foot beneath the surface he employs a blast of about 10 lbs. to the square inch. Will you be kind enough to inform me, in your answers to correspondents in The Engineer, what quantity of air he forces into or through the mass per minute?

Your's truly,

Knottingley, September 2, 1856. E. S. Atkinson.

[*The size of the air cylinder is 16 inches diameter, and 2 feet 6 inches stroke, and makes 50 strokes per minute: this gives roughly 350 cubic feet as the quantity actually passed through the tuyeres per minute, the pressure being about 8 lbs. per square inch. It is believed that an air cylinder, of the size named, and worked at 50 strokes per minute, will convert, at the rate of one ton of metal per hour, or even more; but the exact quantity has not been determined.*]

(To the Editor of The Engineer.)

Sir,—Will you allow me to suggest that a description, with illustrations, of the Rochester new bridge, would prove very interesting to your readers at large, and myself in particular? Permit me, also, to call your attention to the absurdity of "Sheppard's improved tap," as shown in the last number of The Engineer. The caoutchouc spere "*d*" is stated to be "*wholly detached* from the valve seat, and other parts of the tap." If so, what is to prevent the efflux of water from washing this spherical valve completely out of the mouth of the tap? Certainly, according to the drawing, this would be the result; or if the nozzle of the tap was contracted, the ball would stick *there* and stop the flow altogether! Perhaps Mr. Sheppard may *amend* his contrivance, after this hint, from

Your's, &c.,

Lymington, September 1, 1856. L. C. E.

[*We determined, some time since, to fully describe and illustrate the new bridge at Rochester, and we shall do so as soon as possible. With respect to Mr. Sheppard's tap, we have no doubt that gentleman will be very grateful for the hint from L. C. E., but presume Mr. Sheppard could satisfy his fears. The socket, which rests upon the ball, must be made sufficiently deep to prevent the ball getting away. It would still be wholly detached from any part of the tap.*]

(To the Editor of The Engineer.)

Sir,—Being much interested in the construction of lighthouses and their lanterns, I shall feel much obliged if you will recommend me, through your valuable paper, some book which will enlighten me on the subject.

Yours, &c.,

Pimlico, August 29, 1856. G. S.

[*We think the best work, on a small scale, is Stevenson's, in Weale's series.*]

(To the Editor of The Engineer.)

Sir,—With reference to my letter of 23rd January last, want of means prevents me showing my locomotive on the common road; but any one will be satisfied, on seeing her working, with the wheels off the ground, that steam will be superseded by air. The engine may be seen at the workshop 38, Whitfield-place, Leith-walk. The speed of the air engines is brought up by means of a 4 feet wheel working, with a 2 feet wheel on the crank shaft, connected by a pitch chain; and in order to give leverage power, a 2 feet wheel on the crank shaft works with a 4 feet wheel on the shaft of the driving wheel. It will be obvious to practical engineers, that while, by the arrangement, the increased speed of the fly-wheel will render the power of the air engines more effective, that the power of the men being applied to the slow motion, will be likewise more effective in assisting the locomotive to ascend an incline, or a vessel to overcome the resistance caused by contrary winds, when steam, in like circumstances, blows off at the supply-valve, and in many cases the steam vessels are compelled to go into the nearest port for safety. I have now proved the applicability of my patented principle to the freeing from water and the purifying of mines by compressed air, on the plan of the spring air-gun. I have, in the experiment at the workshop, used the power of only half of my largest air-engine, which forces to *any height* as much water as the present fire-engines can do with twenty men. In the arrangement there are only three valves, one at the air-engine, another at the suction pipe, and one at the rising main, which is a pipe of ¾ inch, the suction pipe is a foot long, and two inches in diameter, and has two valves of 1½ inches. The air from the engine forces the water into the rising main, and the exhaust stroke of the engine allows time to the suction valve to open, and supply the water forced up the rising main. The advantage of the plan over the present fine-engine must be obvious to practical engineers. By the fire-engine, the men at the pump have the whole weight of the column of water to support, while by using air they are relieved of the weight of the water, being forced forward by the compressed air; in short, it self loads, and forces water balls, instead of lead balls, as in the case of the spring air-gun. It must be obvious to practical engineers, that were the principle applied to steam, or hydraulic engines, or sailing vessels, &c., a more powerful impulse can thus be obtained than by the present fallacious system of working steam expansively. I hope you will give publicity to this valuable discovery in your next journal, and I will cheerfully pay the expense.

Yours, &c.,

George Goodlet.

[*We publish our correspondent's letter, supposing that there must be something good in a "valuable discovery;" at the same time we must confess that the description given does not much enlighten us upon the nature of it. We trust our readers will read the letter with more profit to themselves than we have done.*]

(To the Editor of the Engineer.)

Sir,—My attention has been called to a letter in your journal of the 22nd ult., signed James Oldham, from the perusal of which your readers would naturally infer, that the writer had seen at Mr. Oxley's works here a system of making wooden wheels by machinery, remarkable for its entire novelty and perfection. I think it right, therefore, to apprise you, that with the exception of some difference in the manner of cutting the ends of the spokes, the whole of the processes and machines employed by Mr. Oxley, both in making the wheels, and in preparing and putting on the tire, are exact copies of similar machines, which have been, during many years, in daily use at the Wheel Works, established here, by my father, upwards of ten years ago. The services of Mr. Oldham, as an eulogist, would appear to have been engaged for the sole purposes of puffing, as a mechanical novelty, a plagiarism as bold and complete as the talent and circumstances of Mr. Oxley would enable him to perpetrate. I shall feel obliged by your inserting this in your next week's impression,

And remain, Sir,

Your obedient servant,

Beverley, September 2, 1856. Alfred Crosskill.

Advertisements cannot be guaranteed insertion unless delivered before eight o'clock on Thursday evening in each week. The charge for four lines and under is half-a-crown; each line afterwards, sixpence. The line averages eleven words. Blocks are charged at the same rate for the space they fill.

Letters relating to the publishing and advertisement department of this paper are to be addressed to the publisher, Mr. Bernard Luxton, *Engineer-office,* 301, *Strand, London. All other letters and communications to be addressed to the Editor of* The Engineer, 32, *Bucklersbury, London.*

THE ENGINEER.

FRIDAY, SEPTEMBER 5, 1856.

NOTE BOOK.

ENGLISH PATENTS.

Recurring to the practical objections to the system of preliminary examination of applications for patents in America, put forward by Mr. Justice Mason, Commissioner of Patents in the United States, quoted in Mr. Woodcroft's report, Mr. Mason finds that—

"The multiplicity of the business of the office renders it wholly impossible for the Commissioner to exercise a personal supervision over the decision in each of the numberless cases presented for official action. When the examiner reports in favour of granting a patent it is issued without further question or examination. Under such circumstances the importance of correctness and uniformity of decision upon the first examination can hardly be too highly appreciated. This cannot reasonably be hoped for under the system now in operation, and the more that system is extended the greater the evil becomes."

The number of patents granted in the United States last year was 2,024, whilst the number of applications was 4,435, more than double the number granted. It may thus be inferred that the business of the Commissioner was no sinecure, as it would seem he has rejected more than one-half of all the applications, on the score of want of originality and value; or, at least, that that number have been thrown aside either on account of the adverse decision of the Commissioner or of the voluntary withdrawal of the patentee. 4,435 applications in one year average 14 applications per week-day. We think that no single examiner could do justice to so many applications daily; for, besides a well-stored memory and a ready wit, he should possess a knowledge of the actual condition of every branch of the arts and manufactures. We do not know how the system works in America, but we should think that republican notions of propriety revolt at the idea of making the substantial rights of property of citizens depend on the discretion of an executive officer. When an application for a patent is rejected by the Commissioner no opportunity is allowed the applicant for maintaining the justice of his claims before a court or a jury. It is probable, nevertheless, that the examining department of the business of the Commissioner of Patents is conducted with a leaning in favour of the applicant; and that it is only in the presence of direct and decisive evidence of its invalidity that an application is rejected. We are led to adopt this view of the case by an inspection of the returns of English patents. In 1855 there were 2,958 applications for provisional protection: for 2,044 of these, or 70 per cent., patents were passed; the remainder, 30 per cent., of the total applications, is the number of applications voluntarily abandoned by the promoters after the first stage—provisional protection. Now, of the applications for patents last year, in America, 45 per cent. were granted, leaving 55 per cent. abandoned or rejected; if an allowance of 30 per cent. be taken to represent, as in England, the portion of applications that either were or would have been abandoned had they not been rejected, there would remain a balance of 25 per cent., or one-fourth of the whole number, as the proportion of ineffective applications chargeable directly to the veto of the examiner. And really, when one reflects on the masses of crude and impracticable rubbish submitted for protection in this country as well as abroad, the conclusion is inevitable, that the American Commissioner discharges the ungracious duties of his calling with exceeding leniency. And why should he not? The public are concerned chiefly to see that no real germs of utility are crushed in embryo, and that, rather than the conceptions of genius should be thwarted or strangled, the conceits of some, and the *brusqueries* of others should be tolerated by their side. Even these have their utility—they are safety-valves to ease the minds of restless schemers, dissipating the vapours of revolution, and promoting the cause of order.

In France, it has already been remarked, the practice of preliminary examination has long since been abandoned. The number of French patents granted last year was 4,056, or 13 per day, double the number granted in England. The contrast is curiously indicative of the inventive turn of the French mind, and the comparatively work-a-day tendencies of the English, or, to put it more correctly, the superior concentrative power of the English mind; with fewer patents it produces a greater result. We remember noting a curious statistical fact respecting French patents in 1847 and 48, that only three or four out of 260 French patents turned out advantageously, that is about 1½ per cent., and these were of English origin. After that, there need be no wonder that the system of preliminary examination failed to give satisfaction in France, for the less of significance there is in an invention, the more pugnaciously is it defended.

We think upon the whole, that the embarrassment incident to the multiplicity of patents is rather imaginary than actual, as the great majority of patents expire by neglect and inanition, and the vigorous few which are self-sustaining, commonly adapt themselves to the exigencies of the time and the situation. Abandon the notion of preliminary examination as useless and unsatisfactory, grant to every one his patent, let him pay for his experience, and leave those which carry within them the germ of vitality to push their own way in the world.

RAILWAY SIGNALS.

A second letter has appeared in the *Times* of last Friday from a "Railway Director," following up his argument in favour of the "affirmative" system of signalling, and considering the objections urged against it. It is objected that danger is indicated when there is no danger, and that the signal would therefore be disregarded; which he answers by proposing to get rid of the word "danger," as belonging to the semaphore arm when standing at right angles with the post, and calling it by its proper name, a "stop" signal. Very good: we like the tone of the proposition, we think there is much in a name, and we approve of calling things by their proper names. As a general answer to the objections which, naturally enough, arise in men's minds to the increased attention and manipulation demanded by the affirmative system, "A Railway Director" falls back upon the fact that this system is in universal operation at all junctions, which are the parts of a railway that are considered doubly hazardous, and he asserts that junctions, in themselves most liable to danger from collisions, are found practically to be the safest part of a railway, supporting the assertion by his experience of the working of a junction over which he travels almost daily, where from 100 to 200 trains pass belonging to opposing companies,—"and while almost every station on the two railways has its tale of horror," he adds, "this junction, as far as my own knowledge goes, has been entirely free from accident." We are fully prepared to admit that, under the existing system, junctions are amongst the safest parts of the railways, just as terminal stations are among the safest parts, for the reason that at these localities there is *certainly* more caution required on the part of drivers and guards than on the open line, *because* there is more danger and a greater risk of accident by inattention or neglect. Here lies the gist of the argument; it is because the danger at those places is *certainly* greater, that the precautions to obviate danger are also greater; not only on the part of the signal-men and others in charge of the stations and junction, but also on the part of enginemen and others in charge of the trains. The degree of attention given, and the precautions taken to avert danger, are then in proportion to the real known danger—that is, liability to accident; and we fear it ever will be so: indeed, it is, in our mind, impossible that the state of the case can be otherwise; for we hold it to be a law of our nature, that the means are proportioned to the end. We should, therefore, be disposed to retort upon "A Railway Director" the objection he urges against the existing system—that "it seems to ignore intelligence, and to make every man into a machine;" for he appears to assume that enginemen and others ought to experience an equal degree of solicitude and anxiety, and exercise an equal amount of vigilance, under all conditions, which is absurd and impracticable, and, were it practicable, would in reality accomplish that which he seeks to avoid—the ignoring of intelligence, and the conversion of a man into a piece of railway machinery. Say what you like, a man has only a certain modicum of nervous energy, and his duty is to expend it judiciously and economically in the discharge of his functions; if he exhaust his store in the form of anxious watchfulness, upon all occasions, or outruns the reproductive power of the human system, he must ultimately lapse into lethargy, more or less complete, and fail in the indispensable condition of safety—continuity of vigilance. How otherwise are we to explain that, in general, the most ignorant men make the best engine-men? If engine-men run away amongst the clouds, or contemplate the loves of the flowers by the banks of the railway, number the telegraph posts as they pass, or submit to the fascination of the "curtseying lines" suspended upon them, it is not the most probable thing in the world that they will bestow the same degree of attention upon the exigencies of the journey, as the man to whom "a primrose by the river's brim" is a primrose and nothing more. So long since as 1841, Mr. Brunel very forcibly pronounced the distinction we are attempting to illustrate, in his evidence before the Select Committee on Railways. "Our very best men on the Great Western Railway," says he, "the very best engine-driver we ever had—a very superior man, who is now foreman of our engineers at Reading—a man whom I trust better than anybody I have got on the line—can neither read nor write, and yet he issues instructions, and he has a clerk who writes written orders." * * * I am not one to sneer at education, but I would not give sixpence in hiring an engineman, "because of his knowing how to read or write. I believe that, of the two, the non-reading man is the better of the two, and for this reason—I defy Sir Frederick Smith or any person who has general information, and is in the habit of reading, to drive an engine. If you are going five or six miles without anything to attract attention, depend upon it you will begin thinking of something else." * * * "I never dare drive an engine, although I always go upon the engine; because if I go upon a bit of the line without anything to attract my attention, I begin thinking of something else." In short, an engineman must have all those qualities which are included in the general term "steady," as the most likely to prevent the dispersion of his attention towards irrelevant matters, and to economise his nervous energy.

We are, then, led to the conclusion that an equal amount of precautionary organisation at all parts of a railway—the most open to accident, as well as the least uncertain—is neither expedient nor desirable; and we can only reiterate the principle we supported in a recent impression, that everything should be done in harmony with the moral feeling of the *employees*, in the way most likely to realise the maximum of security with the minimum of appliance. The affirmative system, confined to peculiarly exposed situations, as junctions and terminal stations, works well and simply; spread over the whole line indiscriminately, the efficacy of the system seems questionable. It might—and we think would be with good results—extended to intermediate stations of importance; but it is of no use for any one to judge peremptorily as to the extent to which it may be most beneficially employed. It does not contain elements inconsistent with the prevailing system, and we do not feel that the experiment of extension needs be dangerous or even inconvenient. Contrast and gradation are necessary, and we believe that were the affirmative system universally employed it would defeat its own object; as if not rigidly worked by the station attendants, it would fail to command the respect of the enginemen, and they would probably learn to run past a "danger" signal as unconsciously as the fifty-two drivers examined by Captain Tyler had done for years at Peterboro' Station.

THE BOILER EXPLOSION NEAR BURY.

THE inquest was resumed this day week, when additional evidence was taken with reference to the construction of the boiler, and its condition at the time of the explosion, the particulars of which will be found in another column. It appears that the boiler was made in 1845, eleven years ago, and was intended for a high-pressure boiler, to work at 40lbs. pressure per square inch. After five years' working it was repaired, when the fire-boxes were renewed. About two years ago "a little leakage was discovered, and then the boiler was overhauled and thoroughly repaired." "All the old plates that were bad were taken out, and new ones put in;" so that if this statement is to be literally interpreted, the deterioration of the boiler bottom, where the explosion originated, must have taken place in the course of the last two years. The renewal of plates must have been very partial, as the cost of these repairs is stated by one of the proprietors of the works to have been only about £11.

In the report of Mr. Baldwin to the jury, we find that the boiler which exploded was nine feet one inch diameter, and thirty-six feet six inches long, of three-eighth inch plates; it had two internal flues, two feet eight inches in diameter, expanded into fire-boxes three feet ten and a half inches diameter, and eight feet long, of three-eighth inch plates. The rivetted joints of the shell-plates were not crossed, but ran continuously from end to end. The smoke was passed on, through the internal flues, returning underneath, split in front, and proceeded along the sides of the boiler to the chimney. All the safety-valves indicated alike, viz., a pressure of forty pounds per square inch, at the time of the explosion,—judging from the dimensions of the valves and levers, subsequently measured by Mr. Baldwin. He found that one of the bottom plates, near the middle of the length of the boiler, was only one-sixteenth of an inch in thickness, of which pieces had been torn away, and even lost, containing, he had no doubt, the missing patch; and he concludes that the explosion was caused by the thin plate being unable to bear the forty pounds pressure, and that the thin part of the plate was blown out.

Here is one of the prettiest cases on record: the boiler, we are calmly told, was thoroughly repaired two years ago by a respectable firm, who actually renewed one or more of the worn plates; and yet we hear, only two years subsequently, of plates remaining in the boiler only one-sixteenth of an inch thick. Originally three-eighths of an inch thick, they have worn to one-sixth of the initial thickness. All the witnesses agree that the reduction of thickness has been caused by external corrosion; and Mr. Park, the maker of the boiler, suggests that the corrosion resulted from moisture percolating through the wall, of which the oxygen united with the sulphur from the coal, to form sulphuric acid, which is a powerful solvent of iron. This is of the same class of chemical reasonings as Mr. Nasmyth's when he injected steam into a body of cast-iron, in hopes of consuming the carbon, to make pure iron. The hydrogen of the water percolating through the wall would continue in combination with the oxygen, and the sulphur could only derive its equivalent of oxygen from the air admitted into the fire-place. It is familiarly known that the surfaces of contact of boiler-plates with brick and mortar seats are subject to corrosion, and we presume that, in the present instance, the corrosion was due to ordinary causes. We miss, in Mr. Baldwin's report, any specific allusion to the causes of corrosion, and it would have been more satisfactory had he attempted to indicate the locality of the corrosion, with relation to the brick seat, and favoured the jury with his judgment of the specific cause; for, after all, this is the real point of interest in the investigation. There is no question as to whether boilers of nine feet in diameter, and of three-eighths inch plates, should be permitted to work for eleven years without renewal, laid in brick and mortar, and under a pressure of 40 lbs. per inch. But the question is, to what cause is the corrosion, or reduction of thickness of the plates, to be attributed? It is monstrous that, at this time of the day, the question of the corrosion of boilers, externally as well as internally, should not yet have been investigated and measured; so that, if we are to continue to bury them in brick and mortar, we should, at least, hedge them round with such restrictive and tentative measures as should insure the safety of the public, and prevent the destruction of property.

The circumstances of the accident indicate clearly enough the urgent necessity that exists for a supervising and controlling authority in respect of steam-boilers, armed not only with a power of inspection, but also with a power of adjudication and of enforcing its decisions. The Manchester Association for the Prevention of Boiler Explosions is in extensive and beneficial operation, and probably a legal recognition of their existence, with sufficient administrative powers, would be the most feasible course for establishing the desiderated authority in the northern counties. In the case of the Bury explosion, it is scarcely credible that the tending of the boiler should have been confided to a workman, at sixteen shillings a week. Who was the really responsible person? Not the engineman, for he was not paid for responsibility; but the proprietors, unquestionably, who drew the profits arising from the working of the boiler. One of the proprietors—it seems the principal partner—acknowledged that he was not a member of the Manchester association, though he had been invited to join it. "He had heard," he says, "that larger boilers were unsuitable for high-pressure, but he would not have been afraid to stand before the boiler that has exploded if the pressure had been at 60 lbs.!! Far are we from desiring to immolate any proprietor on the shrine of his own presumption. But it is in "stationary" matters as in railway matters; alteration or improvement, obvious enough and necessary it may be, to provide against the contingencies of altering conditions, can be promoted only under the most powerful stimulus—the sacrifice of a proprietor, a bishop, or a railway director.

There prevails in this calculating age a huge fallacy which, were it not for the tragical consequences which flow from its recognition in practice, would appear as it really is—very ridiculous. This prevalent fallacy is, that people can be got to manage other people's affairs for nothing—from the Government of the country down to the directorates of joint-stock companies of every class, and farther down, through all grades of society to the stoker who works for pariah's wages. We say they are expected to do their work as well and as thoroughly, at fixed and limited salaries, as if they were principal partners or sole proprietors of the concerns. This is the grand blunder and curse of the age, and its existence demonstrates a woful ignorance of the first principles of human nature, and a weakness of apprehension which we find paralleled only in the history of trades' unions, or in the annals of Owenism.

BESSEMER'S PROCESS.

EVERY innovation is looked upon with suspicion, the more so as it is important in its results but simple in its nature. This appears to be the case with respect to the invention of Mr Bessemer, an invention or discovery towards which others have approached so closely that it is difficult to understand how they failed to arrive at his result. Doubts and suspicions seem to be gathering on all sides. One man doubts whether either iron or steel is made by Mr. Bessemer's process, but admits the result to be *decarbonized* iron; another, admitting the facts, claims the merit as his own; a third calls the process the oldest one practised; a fourth appears to suspect that some trick is played with the crude iron before being melted, the quality and quantity of the original charge of metal being demanded; a fifth, seeing all other inquiries have been made, wants to know how much air Mr. Bessemer requires, fearing perhaps a deficiency. In fact, we have received innumerable letters containing inquiries on all points connected, either directly or indirectly, with the process, and we are sorry we cannot satisfactorily reply to them; indeed Mr. Bessemer himself cannot do so. Experiment alone can determine some of the numerous questions which have grown so rapidly out of this subject. Whether air is the best thing, or a mixture of air and other gas or gases, is yet uncertain; so also whether it should be admitted gradually or otherwise. Whether the converting vessel or furnace should be at the side, at the bottom, or even at the top of the blast furnace, is not yet settled, or indeed whether there should be any separate furnace at all. What qualities or quantities of metal are best calculated to give good results is doubtful; what time the process should continue; also, whether the blast should be suddenly stopped after a certain time or not; what quantity of metal should be operated upon at one time; what is the best pressure of the air. These, and a thousand other questions which suggest themselves, are yet unanswered. It should be recollected that Mr. Bessemer has only during a very short time become acquainted with the process upon which he is now rigorously examined in detail; and unless the British Association had happened to be holding its meetings when it did, we know that Mr. Bessemer would not for some time to come have made his invention public—feeling certain that he would be expected to have fully perfected his plans, which the lapse of time had rendered impossible. We are aware that numbers of persons, with perhaps the best intentions, or perhaps the worst, have requested ingots of the converted metal to be forwarded to them, offering to tear, roll, crush, and work it to death to prove its qualities, none of which operations they have presumed Mr. Bessemer could himself perform. These requests have been, and we think properly, refused, as no guarantee existed, in many cases at least, that anything like a fair trial would be made; and who knows but that some persons, whose interest the new process may affect, might profess to have experimented, and might publish results never arrived at? We are very glad to hear that a trial on a large scale, and carefully conducted, with every necessary precaution, is likely to be made very shortly at the extensive works of Samuel Beale and Co., of the Park Gate Iron Works, near Rotherham; and we trust that the results will quiet all unnecessary anxiety as to the quality of the metal produced, and the capability of the malleable iron being rolled, and the steel being made into knives, files, chisels, and many articles not yet anticipated. In the meantime, a trial takes place today at Baxter House, the result of which we shall give next week; but we may state that we have ourselves seen several specimens of the metal after being rolled, and which presented all the appearance of the best bar iron. As we noticed in our report of the first public trial, we believe that the improvement in iron making cannot stop at the point now reached, inasmuch as a vast number of minds are certain of being set to work, determined to carry the principle of Mr. Bessemer's invention to its furthest extent, or at least to take up other parts of the manufacture, and with probably more or less success. We believe no branch of manufacture has stood so still as that of iron; the modes of operating being, to a great extent, traditional, and, in some cases, incapable of being explained; so, also, the construction of the furnaces, the forms being according to ancient custom, and departed from only with the utmost caution. That which may well make the iron manufacture so attractive a subject of study, is the vast interests involved in it; the only drawback being the difficulty of experimenting. Why should not our large iron masters have laboratories attached to their works, as is the case abroad, where the quality of the ores and fuel, as also of the iron produced, is accurately ascertained, and in which laboratories, or in the works themselves, experiments can be readily performed? We would suggest that, for once, those interested in the iron trade should put aside their jealousies and establish experimental works on an adequate scale, where the experiments made might be scientifically performed, and where any useful suggestion could be tested. Such an establishment would save many thousands of pounds in avoiding the necessity of independent trials, and its advantages might be reasonably open to all, in and out of the trade, upon adequate terms. If an experiment be suggested by any one, and it appeared feasible, let it be tried, under agreement that the result, if successful, should redound partly to the benefit of the originator of the idea. Until our manufactures are scientifically as well as practically studied, our progress must be slow, as accident alone in the one case leads to improvement, and deductive reasoning in the other.

THE PATENT JOURNAL.

(Condensed from the Journal of the Commissioners of Patents.)

Grants of Provisional Protection for Six Months.

1052. EVAN THOMAS, Holywell-street, Millbank, Westminster, "Improvements in the construction of counting apparatus, for ascertaining and indicating the number of rotations made by shafts or spindles in various descriptions of machinery.—*Petition, recorded 3rd May*, 1856.

1344. DUNCAN CAMPBELL DALLAS, Islington, London, "Improvements in chemical preparations applicable to the photographic and photo-galvanographic processes.—*Petition, recorded 5th June*, 1856.

1748. HENRY DOUBLEDAY, Coggeshall, Essex, "An improvement in the manufacture of starch.—*Petition, recorded 23rd July*, 1856.

1802. RICHARD ARCHIBALD BROOMAN, Fleet-street, London, "Improvements in ladies' skirts or petticoats and dress-improvers or bustles."—A communication from Madame Vernier.—*Petition, recorded 30th July*, 1856.

1828. RICHARD ARCHIBALD BROOMAN, Fleet-street, London, "Improvements in the manufacture of artificial fuel."—A communication.

1830. JOSIAH RHODES, Holborn Brass Foundry, Nottingham, "Improvements in machinery or apparatus for reducing turnips and other vegetable substances to a pulpous state."

Petitions, recorded 2nd August, 1856.

1832. JOSIAH HARRIS, Dolgelly, Merioneth, North Wales, "An apparatus for collecting and condensing smoke and gases generated in furnaces."—*Petition, recorded 4th August*, 1856.

1861. ALEXANDRE THEODORE NICOLAS GOLL, Rue de Brétagne, Paris, "An improved button."

1863. SAMUEL KING, Brighton, Sussex, "Improvements in spirit lamps."

1865. CHARLES WRIGHT, Green-street, Southwark, "Improvements in the preparation of lubricating materials."

Petitions, recorded 7th August, 1856.

1867. JOSEPH LEESE, junior, Manchester, "Certain improvements in machinery used for printing calico and other fabrics."

1867. THOMAS AUSTEN, Waltham Abbey, Essex, "A machine for ascertaining the propelling force of gunpowder."

1871. WILLIAM EDWARD NEWTON, Chancery-lane, London, "Improvements in machinery for composing and distributing types."—A communication.

1873. DIEDERICH FEHRMAN, Liverpool, "Improvements in lamps adapted for burning resin oil."—A communication from Friedrich Benkler, Wiesbaden.

Petitions, recorded 8th August, 1856.

1875. WILLIAM WEBSTER, Bunhill-row, London, "An improved valve-cock."—A communication from Abner Van Horn, New York.

1877. EMILE KOPP, Paris, "Improvements in the manufacture of gas."

1879. EUGENE ERNEST AMYOT, Paris, "Improvements in the preparation of pulp for paper, pasteboard, and other uses for which pulp is required."

1881. ARCHIBALD LOCKHART REID, Glasgow, "Improvements in producing ornamental figures or devices on textile fabrics and other surfaces."

1883. GEORGE ANDERSON, Queen's-road, Dalston, "Improvements in the construction of taps or valves for regulating the passage of gas."

Petitions, recorded 9th August, 1856.

1885. JOHN CARTLAND, "Birmingham, "A new or improved door spring."

1887. RICHARD ARCHIBALD BROOMAN, Fleet-street, London, "An improved fermenting agent."—A communication.

Petitions, recorded 11th August, 1856.

1889. ARMAND RIEUPAYROUX JANET, Perigueux, France, "A certain apparatus for taking measure of coats."

1891. JOSES WEAVER DOWNING, Birmingham, "Improvements in the manufacture of metallic and other wheels and pulleys."

1893. JOHN HARDAKER, Leeds, Yorkshire, "Improvements in machinery or apparatus for stopping railway trains, which are also applicable for alarm signals generally."

Petitions, recorded 12th August, 1856.

1895. RICHARD DUGDALE KAY, Accrington, Lancashire, "Improvements in machinery or apparatus for washing, scouring, cleaning, preparing, dyeing, or finishing, woven fabrics, yarns, or threads."—A communication.

1897. JEAN BAPTISTE CLARA, Rue de l'Echiquier, Paris, "Certain improvements in producing and employing steam and the gaseous products of combustion for obtaining motive power."

Petitions, recorded 13th August, 1856.

1899. EDWARD HALLEN, Cornwall-road, Lambeth, and WILLIAM HOLLAND KINGSTON, Bandon, Cork, "Improved means for making signals on railways."

1901. JOHN KNOWLES, Holcombe Brook, Lancashire, and WILLIAM CLARKE, Manchester, "Certain improvements in looms for weaving."

1903. WILLIAM MORGAN, Gloucester-terrace, Hyde-park, "Improvements in the manufacture of guns and mortars."

1905. PETER AUGUSTIN GODEFROY, King's Mead Cottages, New North-road, "An improved treatment of the matrix of rock quartz and all like substances for the extraction of auriferous, argentiferous, and other metals contained therein."

Petitions, recorded 14th August, 1856.

1908. HENRY COLUMBUS HURRY, Wolverhampton, "Improvements in railway crossings."

1910. COL STEPHEN SZABO DE KIS-GERESD, Widnes, near Warrington, Lancashire, "Improvements in obtaining motive power."

1912. HENRY DUBS, Vulcan Foundry, Warrington, and JOSIAH EVANS, Haydock, Lancashire, "Improvements in effecting the consumption of smoke."

Petitions, recorded 15th August, 1856.

1914. WILLIAM HARGREAVES, Bradford, Yorkshire, "Improvements in Colliers combing machine, in combing wool, hair, cotton, silk, flax, and other fibrous substances."

1916. DAVID CHALMERS, Manchester, "Improvements in looms for weaving."

1918. ALFRED HODGKINSON, Springfield Bleach Works, Belfast, "Improvements in bleaching, scouring, and cleansing plain and embroidered fabrics."

1920. PHILIPPE PIERRE HOFFMANN, Strasbourg, France, "An improved compound to be used for waterproofing fabrics, paper, leather, or other materials."

Petitions, recorded 16th August, 1856.

1922. THOMAS C. RICHARDSON, Drury-lane, London, "The process for the procuring and manufacturing the sulpho-saccharate of simarubine."

1924. WILLIAM TYTHERLEIGH, Birmingham, "A new or improved manufacture of rollers or cylinders for printing fabrics."

1926. WILLIAM COLBORNE CAMBRIDGE, Bristol, "Improvements in the construction of portable railways."

1928. JOHN STOPPERTON, Isle of Man, "Improvements in propelling vessels."

1930. ANDREW PEDDIE HOW, Mark-lane, London, "Improvements in pumps."

Petition, recorded 18th August, 1856.

1932. JAMES LEACH, WILLIAM TURNER, and JOHN TEMPEST, Rochdale, Lancashire, "Improvements in rollers, applicable to condensing and all other kinds of engines for carding wool, cotton, and other fibrous materials."

1934. PIERRE NOYER, Gerrard-street, Soho, "Winding up fusee watches and pocket chronometers and setting the hands without key."

1936. HENRY BURDEN, Troy, New York, United States, "Improvements in machinery for apparatus for manufacturing shoes for horses, mules, and other animals."

1938. HENRY BESSEMER, Queen-street-place, New Cannon-street, London, "Improvements in the manufacture of iron and steel."

1940. JAMES APPERLY, Dudbridge, near Stroud, Gloucestershire, "Improved machinery for carding wool or other similar fibrous substances."

1942. ANTHONY CHARLES VETTER DE DOGGENFELD, Trinity-square, Brixton, Surrey, "Improved glass ornaments for ornamenting gardens, summer houses, dinner and other tables, and for other ornamental and decorative purposes."

Petitions, recorded 19th August, 1856.

1944. JOHN HENRY JOHNSON, Lincoln's-inn-fields, London, "Improvements in roller fulling mills."—A communication from Theodor Wiede, Chemnitz, and Ernest Pressprich, Grossenhain, Saxony.

1946. CHARLES CLARK, Somerset-terrace, Albion-road, Stoke Newington, "Improvements in combining and arranging looking glasses for toilet purposes."
1948. JULES LALEMAN, Lille, France, "Improved machinery for combing flax and other similar fibrous materials."—A communication.
1950. JOSEPH MAUDSLAY, Lambeth, "Improvements in steam engines, especially applicable to screw propulsion."

Petitions, recorded 20th August, 1856.

Patents on which the Third Year's Stamp Duty has been Paid.

2000. JOSEPH CUNDY, Victoria-road, Kensington.—Dated 29th August, 1853.
2001. EDWARD PATRICK GRIBBON, Dublin.—Dated 29th August, 1853.
2002. PETER ARMAND le Comte de FONTAINEMOREAU, South-street, Finsbury, London.—A communication.—Dated 29th August, 1853.
2029. JOHN TAYLER, Manchester, JAMES GRIFFITHS, Wolverhampton, and THOMAS LEES, Stockport.—Dated 2nd September, 1853.
2100. JOHN WARD, Saville House, Leicester-square, and EDWARD CAWLEY, Stanley-street, Chelsea.—Dated 10th September, 1853.
2021. WILLIAM EDWARD NEWTON, Chancery-lane, London.—A communication.—Dated 31st August, 1853.
2004. JOHN HENRY JOHNSON, Lincoln's-inn-fields, London.—A communication from François Durand, Toulouse, France.—Dated 29th August, 1853.
2060. WESTON GRIMSHAW and ELLIS ROWLAND, Morsley, Antrim, Ireland.—Dated 7th September, 1853.
2008. CHARLES GOODYEAR, Avenue-road, St. John's-wood.—Dated 30th August, 1853.
2009. CHARLES GOODYEAR, Avenue-road, St. John's-wood.—Dated 30th August, 1853.
2010. JOSEPH CUNDY, Victoria-road, Kensington.—Dated 30th August, 1853.
2013. WILLIAM EDWARD NEWTON, Chancery-lane, London.—A communication.—Dated 30th August, 1853.

Erratum in Journal of 26th August.

1025. For "Louis Jean Baptiste Manevy," read "Louis Jean Baptiste Manery."

Notices to Proceed.

964. DAVID LLOYD, Ebbw Vale Iron Works, South Wales, "Improvements in washing minerals, coal, and ores."
967. WILLIAM GEORGE ARMSTRONG, Newcastle-upon-Tyne, Northumberland, "Improvements in apparatus for lifting, lowering, and hauling."

Petitions, recorded 22nd April, 1856.

972. JAMES GARNETT, Low Moor, Clitheroe, Lancashire, "Improvements in twisting, winding, and reeling yarn, and in machinery or apparatus employed therein."—*Petition, recorded 23rd April*, 1856.
980. ALEXANDER SOUTHWOOD STOCKER, Poultry, Cheapside, London, "Improvements in the application of certain materials to the manufacture of ink and other stands, and other articles, and in the manufacture and finishing of articles produced out of such or other material or materials."—*Petition, recorded 24th April*, 1856.
1000. EDMUND TOPHAM, Mansfield-road, Nottingham, "Apparatus for cleansing out the sediment from the water in steam boilers, and preventing incrustation of the same."—*Petition, recorded 26th April*, 1856.
1011. WILLIAM DENNY RUCK, Topping's Wharf, Tooley-street, "An improvement in tanning hides and skins."—*Petition, recorded 28th April*, 1856.
1014. JAMES STEAD CROSLAND, Openshaw, Manchester, "Certain improvements in furnaces and steam generators for locomotive steam-engines and other purposes."
1015. THOMAS GREENSHIELDS, Little Titchfield-street, London, "Improvements in sleepers for railways."

Petition, recorded 29th April, 1856.

1021. SMITH and WILLIAM CRAVEN, Collyhurst, near Manchester, "Certain improvements in machinery or apparatus for dressing, machining, and finishing velvets, velveteens, and other fabrics."—*Petition, recorded 30th April*, 1856.
1028. NATHAN DEFRIES, Fitzroy-square, London, and GEORGE HENRY BACHHOFFNER, Montague-street, London, "Improvements in gas fires."
1031. CLAUDE PERRON and VICTOR BOULLAND, Paris, "An improved knitting machine."
1038. SAMUEL HUNTER, Ravensworth-terrace, Gateshead, and Dock Anchor Works, Hartlepool, "An improvement in anchors."

Petition, recorded 1st May, 1856.

1059. ALFRED CHADBURN, Sheffield, Yorkshire, "An improved construction of pressure guage."—*Petition, recorded 5th May*, 1856.
1063. JOHN WRIGHT, Upnor, near Rochester, Kent, "Improvements in apparatus for lowering ships' boats."—*Petition, recorded 6th May*, 1856.
1081. JAMES GRAY LAWRIE, Glasgow, "Improvements in steam-engines."—*Petition, recorded 8th May*, 1856.
1091. LEON LOUIS JARDIN and JOSEPH BLAMOND, Rue de l'Echiquier, Paris, "Certain improvements in engraving on stone, earthenware, china, and glass, and also in ornamenting the same."—*Petition, recorded 9th May*, 1856.
1107. JOHN HENRY JOHNSON, Lincoln's-inn-fields, London, "Improvements in machinery or apparatus for cutting irregular forms."—A communication from Hy. D. Stover and James W. Bicknell, Boston, United States.—*Petition, recorded 10th May*, 1856.
1119. WILLIAM EDWARD NEWTON, Chancery-lane, London, "Certain improvements in machinery for pumping and forcing water and other fluids."—A communication from George Denison, United States.
1120. WILLIAM EDWARD NEWTON, Chancery-lane, London, "Improved machinery for splitting or cutting blocks of wood for match splints, kindling wood, treenails, and other purposes."

Petitions, recorded 12th May, 1856.

1140. ALPHONSE MEILLET, Rue de l'Echiquier, Paris, "An improved artificial stone for grinding, sharpening, and polishing."—*Petition, recorded 14th May*, 1856.
1172. JOHAN JACOB MEYER, Tatham-street, Rochdale, Lancashire, "Improvements in machinery for mortising, tenoning, rounding sweep and straight moulding, boring, grooving, and mitreing."
1175. RICHARD KNIGHT, Foster-lane, London, "Improvements in apparatus for ærating liquids."

Petitions, recorded 17th May, 1856.

1182. GEORGE CLARK, Great Cambridge-street, Hackney-road, London, "Improvements in the manufacture of illuminating gas."—*Petition, recorded 19th May*, 1856.
1196. ALFRED VINCENT NEWTON, Chancery-lane, London, "An improved rotary pump."—A communication.—*Petition recorded 20th May*, 1856.
1197. JOSEPH HENRY REYNELL DE CASTRO, Manchester, "An improved method of propelling railway or other carriages up inclines."—A communication.
1212. THOMAS LAWRENCE, Birmingham, "Improvements in machinery to be used for grinding and polishing gun barrels, swords, matchets, bayonets, scythes, fire-arms, and other articles similar in transverse section to any of those above named."

Petitions, recorded 21st May, 1856.

1404. SERVANS DE JONG, New Hampstead-road, London, "Improvements in warming and ventilating apartments and buildings."—*Petition, recorded 13th July*, 1856.
1579. JAMES ALEXANDER MANNING, Inner Temple, London, "Improvements in the manufacture or production of manure."—*Petition, recorded 5th July*, 1856.
1592. WILLIAM COLBORNE CAMBRIDGE, Bristol, "An improvement in the construction of press wheel rollers and clod crushers."—*Petition, recorded 7th July*, 1856.
1711. WILLIAM PAPINEAU, Harrow-bridge, Stratford, "An improvement in the production of spirits of wine."—*Petition, recorded 19th July*, 1856.
1730. SAMUEL COLMAN, Norwich, "Improvements in steam-boilers."—*Petition, recorded 22nd July*, 1856.
1739. GEORGE NORTH, Ashburnham-road, Greenwich, "An improved spring catch for the security of jewellery and articles of personal ornament and general utility."
1750. JOHN WEBSTER, Moreton-terrace, Pimlico, "Improvements in distilling and treating rough turpentine and resinous matters."

Petitions, recorded 23rd July, 1856.

1818. ALEXANDRE TOLHAUSEN, Duke-street, Adelphi, London, "A new and improved flexible pocket umbrella, being likewise applicable to common and other sticks, canes, &c."—A communication from Louis Amand Mangin, Paris.—*Petition, recorded 1st August*, 1856.
1871. WILLIAM EDWARD NEWTON, Chancery-lane, London, "Improvements in machinery for composing and distributing types."—A communication.—*Petition recorded 8th August*, 1856.
1887. RICHARD ARCHIBALD BROOMAN, Fleet-street, London, "An improved fermenting agent."—A communication.—*Petition, recorded 11th August*, 1856.
1899. EDWARD HALLEN, Cornwall-road, Lambeth, and WILLIAM HOLLAND KINGSTON, Bandon, Cork, "Improved means for making signals on railways."
1906. JOHN GODDARD, Moss-row, Bagslate, near Rochdale, and GEORGE HULME, George-street, Rochdale, Lancashire, "Improvements in carding engines for the more speedy and effectual doffing or stripping of the cotton, woollen, silk, or other fibrous substances therefrom."

Petitions, recorded 14th August, 1856.

1936. HENRY BURDEN, Troy, Rensselair, New York, United States, "Improvements in machinery or apparatus for manufacturing shoes for horses, mules, and other animals."—*Petition, recorded 19th August*, 1856.

1950. JOSEPH MAUDSLAY, Lambeth, "Improvements in steam-engines, especially applicable to screw propulsion."—*Petition, recorded 20th August*, 1856.

And notice is hereby given, that all persons having an interest in opposing any one of these applications are at liberty to leave particulars in writing of their objections to such application, at the Office of the Commissioners, within twenty-one days after the date of the *Gazette* (and of the Journal) in which this notice is issued.

List of Specifications published during the week ending 29th August, 1856.

2442, 6d.; 2560, 10d.; 149, 1s. 10d.; 150, 3d.; 152, 3d.; 153, 7d.; 154, 3d.; 158, 3d.; 161, 1s. 3d.; 168, 3d.; 170, 9d.; 172, 3d.; 173, 9d.; 174, 3d.; 175, 4d.; 176, 3d.; 177, 9d.; 178, 3d.; 179, 3d.; 180, 3d.; 181, 6d.; 185, 1s. 4d.; 186, 5d.; 187, 5d.; 188, 3d.; 189, 10d.; 191, 6d.; 193, 1s. 5d.; 197, 1s. 1d.; 201, 3d.; 205, 3d.; 206, 9d.; 208, 6d.; 209, 6d.; 210, 1s. 5d.; 212, 9d.; 213, 3d.; 215, 5d.; 216, 3d.; 220, 3d.; 223, 3d.; 225, 3d.; 227, 10d.; 229, 3d.; 234, 3d.; 235, 3d.; 238, 3d.; 239, 3d.; 240, 3d.; 241, 3d.; 242, 3d.; 264, 10d.; 297, 3d.; 312, 4d.; 427, 6d.; 611, 7d.

* Specifications will be forwarded by post on receipt of the amount of price and postage. Sums exceeding 5s. must be remitted by Post-office order made payable at the Post-office, High Holborn, to Mr. Bennett Woodcroft, Great Seal Patent Office.

ABSTRACTS OF SPECIFICATIONS.

The following Descriptions are made from Abstracts prepared expressly for The Engineer, *at the Office of her Majesty's Commissioners of Patents.*)

CLASS 1.—PRIME MOVERS.

Including Fixed Steam and other Engines, Horse, Wind, and Water Mills, Gearing, Boilers, and Fittings, &c.

404. WILLIAM WILLCOCKS SLEIGH, London, "Producing motive power, which he entitles 'The Hydrostatic Motive-power Engines.'"—Dated 18th February, 1856.

The principle by which the said "Hydrostatic Motive-power Engine" produces motive-power "consists in counteracting, by means of wheels acting on and being supported by a disc, that portion of any force or pressure (produced by any suitable matter, solid fluid, or liquid) which is in the direction opposite to that in which it is intended motion should take place, said motion not depending upon nor being produced by the exit or escape of any fluid or liquid."

405. ALFRED VINCENT NEWTON, Chancery-lane, London, "Construction of steam-engines for the purpose of converting the reciprocating motion into a rotary motion, and for operating the slide-valves."—A communication.—Dated 18th February, 1856.

Prior to the discovery of the present improvements attempts were made, by the inventor thereof and others, to employ driving curves, formed of a cylinder, with screw-like projections fastened upon it, or grooves cut into it, in combination with a piston rod, for the purpose of converting a reciprocating into a continuous rotary motion; but none of these proved practically available. After numerous experiments, the inventor has discovered that the angles of the cross curves with the line of the axis of the curves should be made to approximate more nearly to a right angle, and that the action of the piston rod should be applied indirectly to the surface of the guide curves, through the medium of wheels placed upon the piston rod or cross head, and that these wheels should be made of a considerable diameter, so as to apply the action of the piston rod on the curves out of the line of the piston rod.

427. JAMES KNOWLES, Eagley-bank, near Bolton-le-moors, Lancaster, "Metallic Pistons."—Dated 20th February, 1856.

This invention cannot be described without reference to the drawings.

433. JOHN HENRY JOHNSON, Lincoln's-inn-fields, London, "Steam engines."—A communication from N. Davoir, Liancourt, France."—Dated 20th February, 1856.

According to one modification of this invention, two cylinders are employed, placed endwise in the same axial line, either vertically, horizontally, or obliquely, fitted into suitably fixed supports, and divided from each other by one common division plate, serving as the bottom to each cylinder. The two cylinders are both double-acting, and are fitted each with a separate piston and rod of their own, passing through stuffing boxes at the extreme ends of the combined cylinders. The rods are connected to separate cross heads, which are again united by side rods. To these rods, at or near their centres, are jointed two connecting rods, which are united at their opposite ends by a cross head connected by a short rod to the crank. The valve for the inlet of the steam is separate and distinct from the escape valves, and both ends of valves are worked from separate eccentrics of their own. The inlet valve consists merely of a rectangular plate, having a rectangular opening in the middle of it, and this valve works in a steam chest, placed over the division plate of the two cylinders. It is actuated by two arms, fitted to a rocking valve spindle, which is passed through a stuffing box in the side of the steam chest. On the outer end of this spindle is a toothed segment gearing into a corresponding segment which works on a stud centre. A species of link is cast on the lower part of this last-mentioned segment, in the curved slot of which is a sliding block or pin, which serves as an attachment for the end of the connecting rod, and also for a rod connected with the governor. The valve is thus enabled to work with a variable expansion through the action of the governor. There are two ports for each cylinder in the steam-chest face, making four in all, namely, one for the top, and one for the bottom of each cylinder. The slide is so constructed, that when its central aperture is over the port leading to the bottom of one cylinder, the edge of the slide will be just past the port leading to the top of the other cylinder, and *vice versa*. The exhaust or escape valves, of which there are four, are all connected to one rod, which is worked by a segment, actuated by an eccentric and rod of its own. The steam, on escaping, may either enter a condenser, or escape into the atmosphere, according as the engine is used as a condensing or high-pressure engine. The same eccentric which works the escape valves, works also a feed pump.—*Not proceeded with.*

434. See Class 10.

CLASS 2.—TRANSPORT.

Including Railways and Plant, Road-making, Steam Vessels, Machinery, and Fittings, Sailing Vessels, Boats, Carriages, Carts, Harness, &c.

430. RICHARD ARCHIBALD BROOMAN, Fleet-street, London, "Railway switches and crossings, and certain indicating apparatus for preventing accidents on railways."—Dated 20th February, 1856.

This invention consists, Firstly, in working railway switches and crossings from the locomotive instead of from the road; and, Secondly, in a tell-tale or clock-work index for indicating the passage of every train, and the time elapsed since its passage. The inventor fixes in the road, and at the side of the taper end of every switch, an apparatus acted upon by a roller depressed by the driver or attendant. To two fixed blocks are centered the inner ends of two levers, the outer ends of which carry a band, and another band or rail, the edge of which is rounded off at the centre, where it is made to press against the end of the switch or crossing rail. These bands are elevated from the grounds by means of a strong spring placed under them, and when so raised the switch or crossing rail is out of action. When crossing or siding the driver depresses the roller by means of cranked levers, which depress the bands, and thus forces the switch against the main rail and takes off the train. The tell-tale consists of an apparatus fitted with a dial and pointer worked by clock-work and the passing of the train, and acts as follows. Suppose a locomotive has just passed, and the index on the dial points to 12, the clock movement is, by the passing of the train, brought in gear with the pointer, so that the driver of the next train may observe the time that has elapsed since the first one passed.—*Not proceeded with.*

474. LOUIS NORMANBY, Judd-street, Brunswick-square, London, "Constructing and fixing the rail of railways."—A communication from L. D'Aubréville, Rue de l'Echiquier, Paris.—Dated 25th February, 1856.

The object of this invention consists in substituting longitudinal rolled iron sleepers for the wooden cross or longitudinal ones now in use for laying the rails in the construction of the permanent way of railways; such sleepers being united from place to place by cross sleepers or transoms made also of suitably I-shaped rolled iron, the whole forming a compact body resting on the ballast.

480. CHARLES FREDERICK CLAUS, Latchford, Cheshire, "Metal ship-building, applicable also to steam-boilers, and other structures in which metal plates are used."—Dated 26th February, 1856.

This invention consists in the production of extended surfaces of metal by uniting a number of bars or strips in such manner that they are interlaced or platted together. In order to obtain greater firmness the patentee notches the said bars or strips, and so arranges them that projecting parts fit into corresponding recesses, and round the lapping edges in order to gain a smooth face. He also welds the several portions, or applies tin and lead or such metals so as to solder the whole together. The metal plates thus formed may be applied to the construction of metal ships, bridges, gasometers, and other structures in which metal plates are rivetted together.

CLASS 3.—FABRICS.

Including Machinery and Processes for Preparing, Manufacturing, Printing, Dyeing, and Dressing Fabrics, &c.

381. JOHN EMSLEY, Bolton-road, Bradford, Yorkshire, "Tube-spinning frames employed in spinning worsted, yarn, and other fibrous substances."—Dated 14th February, 1856.

This invention consists in the use and employment of an instrument called a cleaner, constructed and operated in the following manner: into a piece of wood of nearly the same shape as the top of the cap, and fitting loosely therein, is fixed a stout piece of wire, over which is passed some cloth washers, being circular pieces of cloth of such size as to fit the inside of the cap to be cleansed. These washers may be kept in position by passing another piece of wood smaller than the inside of the cap over the wire, and fastening it thereto in any convenient manner. In applying this invention to tube-spinning frames it is proposed to place one of the above cleaners opposite to each capped spindle, so that at each operation of "doffing" and "piecing," the cap, as it is removed from the spindle, has simply to be pushed over and upon its respective cleaner, and when withdrawn therefrom the cap will have been perfectly cleaned.—*Not proceeded with.*

393. EDMUND LEACH, JAMES LEACH, and EDMUND LEACH, the younger, Rochdale, Lancashire, "Preparing, spinning, and drying yarns, and manufacturing the same into cloth."—Dated 15th January, 1856.

This invention consists, Firstly, in taking a number of ordinary twisted rovings, and placing them in a suitable creel, and winding them upon a long spool or bobbin bearing upon a surface drum, the rovings passing through suitable guides and at a proper pitch for the spinning machine, such guides having a short traverse to wind the threads even and regular, and when using untwisted rovings they are placed upon surface drums or creepers as shown for uncoiling the same. These surface drums or creepers for uncoiling are connected with the surface drum for winding on, so that the letting off of the one will correspond with the taking up of the other. And when spinning two or more threads together, a corresponding number of rovings pass through the same guide, and are wound on the spool or bobbin with great uniformity. Secondly, in placing the cops or bobbin of yard upon revolving spindles, and passing the threads over a friction surface (to give sufficient tightness to the thread), on a bobbin or spool upon a vertical spindle, which spindle has a differential motion communicated by conical drums or other suitable apparatus, so as to wind at one uniform rate, whatever the size of the bobbin may be, hence an uniform quantity of twist during the operation of winding, the amount of twist being given by the speed of the first mentioned revolving spindles. The patentees also apply a cam or small lever to each of the winding spools, for the purpose of lifting the bobbin from the friction plate or notch, which takes the bobbin round with the spindle. This is done for the purpose of facilitating the piecing-up of the threads when broken. Thirdly, in doffing combs where the radial arm to which the combs are attached are in front of the doffing cylinder, as in the machines generally known as "Belgian condensers," they place the centre of the radial arm of the comb of the lower doffing comb in front of and below the rubbing belts, and further from the doffing cylinder, by which means a greater length of lever is obtained, which causes the doffing comb to follow more closely by the surface of the doffer, thereby stripping the sliver from the carding much more efficiently, and enabling them to doff it much nearer and more direct to the belt apron or roller which receives the same, and allowing greater facility for piecing up broken slivers. Also for a combination of the radial arms of combs in which their centres or fulcrums are placed in an opposite position to those before described. Fourthly, in steeping the warp or yarn (if wool or a combination of wool and other material) in urine or other scouring liquor, passing it between pressing rollers, and under a roller or rollers in a vessel or cistern containing a suitable liquid, then through a series of such pressing rollers and cisterns, until the yarn or warp is cleansed. They then pass it through pressing rollers to make it fit to receive the size, and under a roller or rollers in a cistern containing size or other stiffening matter, then between another pair of pressing rollers to regulate the quantity of size or stiffening matter to be used, and over a cylinder or roller from which it falls into a suitable receiver; or it may be wound upon a reel, thus combining a series of operations which have hitherto been performed partly by hand. Fifthly, in drying the warp, yarn, cloth, they wind it upon a reel formed with radiating arms, having grooves to admit of staves being placed between each coil, and by the application of a fan revolving within the interior of the said reel, or outside if preferred, for the purpose of circulating a current of air through the warps or yarns to facilitate the drying of the same. Sixthly, in making the meshes and dents of the heddles and reeds gradually wider towards their extremities than in the centres, to compensate for the contraction of the weft, caused by the tightness of the thread as drawn from the shuttle, which varies according to the number of shoots and width of the loom. Seventhly, in the employment of a conical serrated or rasped roller, or a roller with projections on its surface, in connexion with a friction-wheel acted upon by the movement of the lathe or other motion, for the purpose of forming a self-acting temple.

406. JAMES STRANG THOMSON, and ANDREW BARCLAY, Kilmarnock, Ayrshire, "Printing and embossing textile fabrics and other surfaces, and in the production of apparatus to be employed therein."—Dated 18th Feb. 1856.

This invention relates to various improvements in connection with the printing of carpets and other fabrics and surfaces, comprehending both an improved system of producing the printing surfaces, and improved machinery for applying such surfaces in the actual process of printing. According to this invention the printing surfaces are prepared by combining a series of pins, types, pegs, or other details of metal or other material, into such an arrangement or mass as will allow of a printing block being moulded therefrom in gutta-percha or other suitable material. These pins are in two lengths, long and short, as is well understood by practical men, the difference in the lengths being equal to the amount of relief to be given to the printing surfaces to be produced by their agency. In combining such pins to form the matrix, the operator reads off the individual colours of his design from a paper or other design in the usual manner, putting into the matrix frame or holder a short pin at each increment of surface where the colour is to appear, and inserting a long pin at the other parts where blanks or other colours are to occur. This insertion or combination of the pins or types may be effected either by hand or by a mechanical adjuster. As each colour is read off and built up in the pins the series is bound firmly up, and a cast is then taken from the surface thereof as formed by the pin ends, in gutta-percha or other suitable material which will answer to print from, such mould then answers to print from all the sunk pins in the original matrix answering to the colour portions obviously producing corresponding relief portions in the moulded surface. All the colours are treated in this manner, and the blocks or surfaces are then applied to print in concert, in the usual manner. Or instead of this process of transference of surface the required printing blocks may be produced from the original matrix by any of the known processes of stereotyping.

407. HENRY HODGKINSON, Donegall-street-place, Belfast, Antrim, "Bleaching cotton, linen, and other woven or textile fabrics."—Dated 18th February, 1856.

This invention consists in certain novel and improved apparatus in which steam is employed, in combination with bleaching matters or drugs such as are used in bleaching. The following will be found a convenient form of machine or apparatus for bleaching linen, &c. A steam-tight casing made in two parts, with a place at bottom to hold liquid; inside this casing there is a wheel revolving upon an axis, and containing the fabrics to be operated upon; there is a tap and a perforated pipe at the bottom part of the casing by which steam is admitted thereinto for boiling the bleaching liquid therein. The aforesaid wheel is formed with sides, and has a series of buckets placed around its periphery and openings at the bottom of each of such said buckets for the admission and emission of the bleaching liquid as the said wheel revolves. There are four or more openings made in the side of the wheel for charging and discharging the goods to be operated upon. The top of the casing is furnished with a valve for regulating the discharge of the steam from the interior thereof.

413. SYLVESTER EMIL SICHEL, Bradford, Yorkshire, "Apparatus for weaving ribbed cloth and bands of chenille."—A communication.—Dated 19th February, 1856.

This invention consists, Firstly, in weaving ribbed cloth. This invention relates to a novel disposition of the "healds," whereby the patentee is enabled to simplify to a great extent the working of the loom, and considerably to prevent the wear of the same, and also to diminish the number of healds, and prevent the unnecessary twisting of the warps. In this improved apparatus for weaving, the stationary warp does not shed, but remains in its place, and the binder warp in passing over the stationary warp, first from left to right and then from right to left, is tied each time by the weft, forming a kind of ribbed fabric which, when subsequently printed, presents a similar appearance to tapestry. Only one heald is employed, made in three parts, termed semi-healds, and so arranged that the binder warp passes through an eye in the lower or semi-heald, which is tied below to a treadle. This semi-heald is attached at its upper part by two semi-healds (one of which embraces the stationary warp) to two independent levers moved by two distinct treadles,—when one lever rises the binder warp is lifted by one semi-heald along one side of the stationary warp; when the other lever rises its corresponding semi-heald lifts the binder warp along the other side of the stationary warp, and so on, the weft being thrown in after each upward and cross over movement of the covering or binder warp. Secondly, the improvements in apparatus for weaving bands of chenille consists of a similar disposal of the healds, but in weaving chenille the stationary and binding warps are arranged in groups or series of the required number, say from three to six of each warp, more or less, and placed at an interval apart corresponding with the height of the chenille to be produced: both warps may be of cotton or common material) and the weft silk or woollen.

HEPPLESTON AND HUNTER'S IMPROVEMENTS IN STRETCHING AND FINISHING YARNS.

PATENT DATED 10TH DECEMBER, 1855.

FIG. 1.

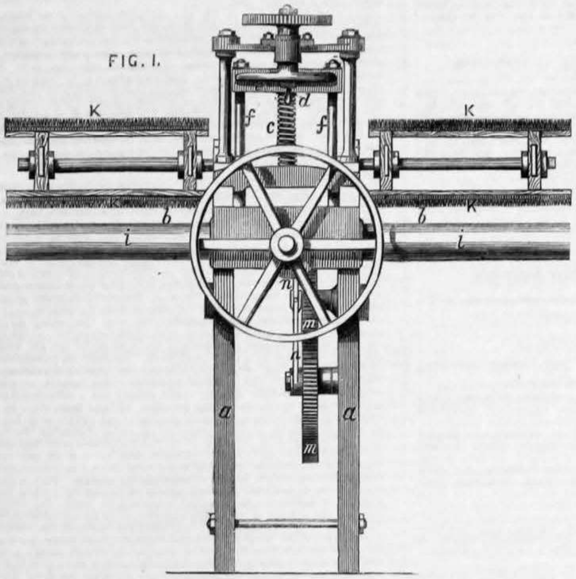
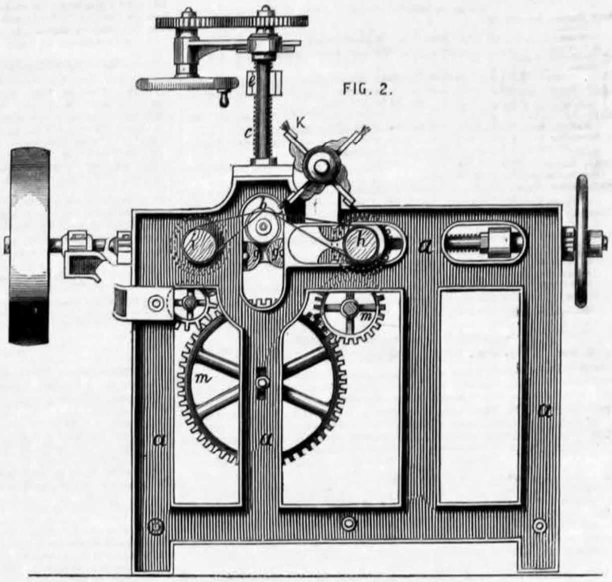


FIG. 2.



IN this invention a hollow cylinder of copper or other suitable metal is employed, mounted on framework, and capable of being heated from the interior by steam, hot air, or gas, or any other convenient means, which cylinder may be raised or lowered by means of a nut attached to a crosshead, through which a screw passes; this cylinder having the hanks of yarn previously passed over it for causing an extra stretch to the yarn, thereby increasing the friction, so that a lustre or finish is imparted to the thread or yarns; the hank being caused to move by suitable rollers (in the framing), around which they pass one of these rollers, being adjustable by nuts and screws, causing the hanks to be more easily placed and removed, and also allowing of a better regulation of the tension of the yarn when required, the adjustable roller being driven by appropriate carrier wheels and connecting rods from the first or driving roller, around which the hanks of yarn pass. In finishing yarns of light colours that will not withstand the heat of the cylinder a fan wheel is employed, suitably placed, that it may dry the hanks passing over the cylinder whilst cold, if preferred.

Fig. 1 is a front elevation of the improved machinery for stretching and finishing yarns and threads; and Fig. 2 is an end view of the same; *a, a*, is the framing of the machine; *b* is the cylinder, into which steam may be admitted when required, and over which the hanks of yarn pass; this cylinder is capable of being raised or lowered by the action of the screw *c*, in conjunction with the nut *d*, fixed upon the crosshead *e*. Depending from the crosshead are two rods *f, f*, each terminating in two bearings, and in each of which are fitted two friction rollers *g, g*. Upon these friction rollers the cylinder *b* rotates, so that by raising the crosshead and friction rollers the cylinder *b* will be elevated, and the required tension will be given to the yarn, &c.

The same arrangement of screw and crosshead is used when the yarn is put on or taken off the rollers; for instance, when the yarn or thread is required to be placed on the rollers, the roller *h*, which is actuated by the above-mentioned apparatus, is driven forward towards the cylinder *b*, until the yarn can be placed round it and the driving roller *i*, and passed over the top of the cylinder *b*; the roller *h* is then screwed back until the required stretch is given to the hank of yarn, &c. An extra tension may be given to the hank during the operation of stretching and finishing, either by the apparatus connected with the roller *h*, or by that connected with the cylinder *b*. At a convenient part of the machine are fixed the rotating brushes *K*, which are driven by a pulley; these brushes act as fans to dry the yarn, &c., when the heated cylinder is not used, as well as brushing the yarn or thread, so as to lay the fibres in one direction, thereby giving to the hank a lustrous finish, and also strengthening the threads. When the cylinder *b* is employed heated, these brushes are not used, but it is requisite in such instances that both the rollers *h, i*, should be driven by gearing, instead of the roller *i* driving the roller *h* and the cylinder *b*, by means of the friction caused by the hank of yarn, &c. These rollers are driven by the gearing *m, m*, which is kept in gear by means of the connecting arms or rods *n, n*. By this arrangement the gearing of these wheels may be ensured, although the wheel upon the roller *h* is not always in the same situation, in consequence of its being altered by the screw and apparatus connected therewith, for the removal, stretching, &c., of the hanks. The operation of the apparatus may be thus described:—The roller *h* is first brought to a convenient position to allow of the hank of yarn being easily passed round it; the hank is then placed around the diving roller *i*, thence over the cylinder *b*, and round the roller *h*; it is then drawn out to the required stretch by means of the roller *h*. If the yarn is of light texture and colour the brushes are put in motion, and the thread or yarn by this means becomes polished, and the fibres laid in one direction; but should the hank of thread or yarn be of such a nature as to be able to withstand the heat of the heated cylinder, the brushes are then dispensed with, and the finish is given to the yarn by the friction caused in passing over the heated cylinder. During this operation, should it be requisite to stretch the yarn to a greater extent than was done in the first instance, such stretch can be effected either by moving the roller *h* or the cylinder *b*. When a hank of yarn has thus been stretched and finished, the roller *h* is screwed up towards the cylinder, which causes the hank to slacken; it can then be removed, and the machine is ready for a repetition of the operation.

WILTON'S PATENTED IMPROVEMENTS IN FURNACES.

Fig. 1.

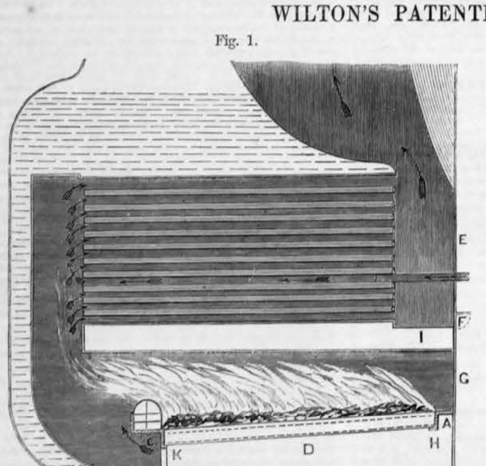


Fig. 2.

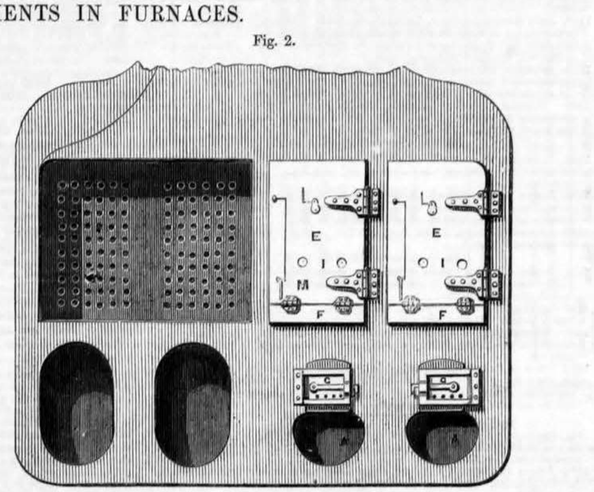


Fig. 3.

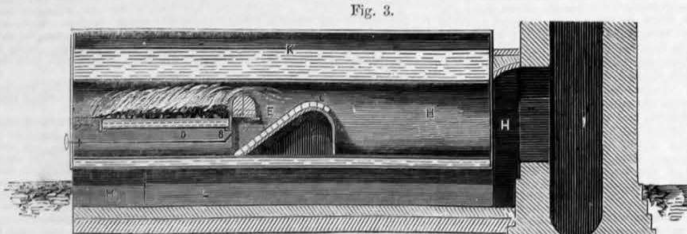
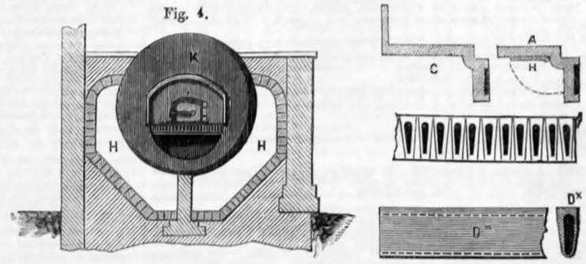


Fig. 4.



THIS invention consists in improvements in the furnaces of steam boilers, and is equally applicable to marine as well as to stationary boilers, breweries, soap factories, &c. It has been adopted with considerable success in several steam ships, as also for land boilers.

In the accompanying diagrams, Fig. 1 shows a vertical section of a marine boiler. Fig. 2 a front elevation, partly in section; A is the dead plate; C the bridge plate; D, D, malleable or cast-iron furnace bars; E, E, smoke box doors; F, F, doors for checking the draught; G, G, furnace doors; H, damper for closing the apertures through the bars; I, I, air tubes; K, door for cleaning out the space behind the bridge. The fire-bars, dead and bridge plates are shown in detail by the smaller figures. Figs. 3, 4, represent the improvements applied to a stationary boiler. A is the dead plate; C, door at the back of the ash pit; D, furnace bars; E is the bridge plate; G, a bridge in the combustion chamber; H, the flue leading to the shaft; I, K, the boiler; the details being similar to those before referred to. The furnace bars are made of malleable or cast-iron, and are formed hollow, as shown by the cross section, Fig. D*. A side view of the bar is also shown The dead plate and bridge plate have a series of apertures made in them opposite the furnace bars, as shown by the figures, affording an uninterrupted passage for the air to pass through the bars; at the bridge the heated current of air meets the smoke and unconsumed gases, by which they are instantly flashed into flame, which passes through the tubes. A further supply of air is furnished by the air tubes I, I. The doors F, F, are for the purpose of checking the draught and damping the fires without opening the furnace doors, to prevent the cold air passing through the furnace, which does great damage to the crowns and sides by causing unequal contraction; it also obviates the use of a damper in the funnel, which hitherto has caused great inconvenience, by being partially closed, and throwing great heat into the engine-room. The apertures in the bars may be closed by the damper H when required—for example, during the lighting of the fires. The patentee recommends the malleable iron bar for marine service, considering it to be lighter and more durable, and being the material now usually employed; but for land furnaces cast iron may be used

PRICES CURRENT OF METALS.

British Metals are quoted Free on Board; Foreign in Bond.—Extra sizes are charged for at the rates agreed by the trade. Brokerage is not charged for buying except on Foreign Tin.

	£ s. d.	Dis.
IRON English, Bar and Bolt:—		p. ct.
in London ... per ton	9 0 0	2½
in Wales ...	8 0 0	"
in Liverpool ...	8 12 6	"
Delivered into boats with Staffordshire Bars ...	9 0 0	1½
Sheet, Single ...	10 10 0	"
Dbl ...	12 0 0	"
Hoop ...	10 0 0	"
Rod, Round ...	9 0 0	"
Nail Rod Sq. ...	10 0 0	"
SHIPPING IRON, Stafford. Bars	9 5 0	2½
Sheet, Single ...	10 10 0	"
Double ...	12 0 0	"
Hoop ...	10 0 0	"
Rod, Round ...	9 5 0	"
Nail Rod Square	8 15 0	"
IRON, Rails, in Wales, Cash	8 0 0	nett
6 months	8 5 0	"
in Staffordshire	8 10 0	"
Railway Chairs, in Wales	4 10 0	"
in Clyde	4 10 0	"
Pig, No. 1, in Clyde	3 14 0	"
3-5ths No. 1, and 2-5ths No. 3	3 12 6	"
No. 1, in Wales	4 0 0	"
No. 1 in Tyne and Tees	3 16 0	"
Ditto Forge	3 10 0	"
Staffordshire Forge Pig (all Mine) at the Works, L.W., nom.	4 10 0	"
Welsh Forge Pig (all Mine) at the Port	3 10 0	"
Scotch Pig, No. 1, in London	4 10 0	"

	£ s. d.	Dis.
Swedish ... to arrive per ton	16 10 0	2½
Russian C C N D ...	14 10 0	"
STEEL, Swedish Keg, nom.	20 0 0	"
Faggot ...	20 0 0	"
Milan ...	—	"
SPELTER, on the spot ...	25 7 6	nett
To arrive ...	25 7 6	"
ZINC, in Sheets ...	33 0 0	1½
COPPER, Tile, 14 to 28 lbs.	107 10 0	2½
Tough Cake ...	107 10 0	"
Sheathing and Bolts ... per lb	0 1 0	"
Sheet ...	0 1 0	"
Bottoms ...	0 1 1	"
Old ...	0 0 10½	"
Yellow Metal ...	0 0 10½	"
South American ... per ton	100 0 0	"
Russian ...	105 0 0	"
LEAD, British Pig ...	25 0 0	"
Sheet ...	25 0 0	"
Spanish ...	24 0 0	"
W.B. at Newcastle ...	24 0 0	"
TIN, English Block, nom. ...	127 0 0	2½
Bar ...	127 0 0	"
Refined ...	128 0 0	"
Foreign Banca ...	128 0 0	nett
Straits ...	127 0 0	"
TIN PLATES, Charcoal IC. per bx	1 16 0	3
Ditto ... IX	2 2 0	"
Coke ... IC	1 11 0	"
Ditto ... IX	1 17 0	"
Do. at Newport, 1s. pr. bx. less	—	—
Do. at Liverpool, 6d.	—	—
CANADA, Plates ... per ton	14 10 0	2½
QUICKSILVER ... per lb	0 1 8½	1½

RAILS.—The makers' books are well supplied with orders. There are some inquiries from Italy, but American buyers are still kept back from the difficulty of negociating their bonds. The nearest price for Newport or Cardiff shipments is £8 per ton.

SCOTCH PIG IRON, in the early part of the week, receded to 72s., which brought in buyers to some extent, in consequence of which the market rallied to 72s. 6d., at which it closes for mixed numbers, viz., 3-5ths No. 1, and 2-5ths No. 3, good merchantable brand, free on board in Glasgow. No. 1, Gartsherrie, 78s., No. 1, Summerlee, 77s., No. 1, Calder, 76s., and No. 1, Coltness, 76s. The stock on warrants is about 54,000 tons, and the shipments for the week ending the 4th instant were, 14,500 tons, against 8,800 tons corresponding period last year.

MANUFACTURED IRON.—The Staffordshire makers are better supplied with orders. The last mail from America having brought considerable indents for the fall trade.

SWEDISH IRON AND STEEL.—There is no stock in first hands. Fine Indian specifications are much in request.

SPELTER is not quite so active as last week. The market closes at £25 7s. sellers. The present stock is about 1,673 tons.

COPPER cannot be had for early delivery. The nominal quotation is 12d. per pound, but there are no sellers at that price.

LEAD.—A good bus ness doing. Spanish is scarce.

TIN.—Banca has advanced to £128 per ton, with an upward tende ncy.

TIN PLATES continue in good demand, but very scarce.

The following are the exports of iron for the first six months of the year 1856, as compared with that of 1855 :—

DESCRIPTION OF IRON.	June 30, 1855. Tons.	June 30, 1856 Tons.	June 30, 1855 Declared Value. £	June 30, 1856 Declared Value. £	June 30, 1855 Equivalent in Pig Iron. Tons.	June 30, 1856 Equivalent in Pig Iron. Tons.	June 30, 1856 Increase. Tons.	June 30, 1856 Decrease. Tons.
Pig Iron..	158,758	176,448	540,309	686,496	158,758	176,448	17,690	..
Castings..	30,497	33,326	294,599	317,625	32,022	34,992	2,970	..
Bar, Bolt, and Rod	233,973	356,165	1,974,701	3,166,927	311,964	474,887	162,923	..
Wrought, Sundry.	73,712	135,997	1,075,063	1,803,192	98,283	181,329	83,046	..
Wire	2,469	4,275	53,966	89,992	3,708	6,412	2,704	..
Steel	7,505	10,836	267,518	360,411	11,257	16,255	4,998	..
Tin Plates	..	..	520,293	694,489	28,905	38,583	9,678	..
Machinery	..	..	558,536	731,979	27,926	36,598	8,672	..
Steam Engines ..	..	..	463,567	358,597	30,704	23,906	..	6,798
Hardware	..	..	1,364,784	1,703,246	27,296	34,065	6,769	..
			7,113,396	9,912,954	730,822	1,023,475	299,450	6,798
							6,798	Deduct Decrease.
							292,652	Increase in 6 mos.
Add 0 mo. same rate.			7,113,396	9,912,954	730,822	1,023,475 Tons ..	292,652	
Rate per an	..	..	14,226,792	19,825,908	1,461,646	2,046,950	586,304	Rate Incr. per ann.

MOATE and CO., Brokers, 65, Old Broad-street.

September 5, 1856.

TIMBER.

per load—	1855. £ s.	£ s.	1856. £ s.	£ s.
Quebec, red pine ...	8 0	9 0	0 0	0 0
yellow pine	3 10	4 6	3 10	0 0
Miramichi, yellow ..	0 0	0 0	0 0	0 0
St. John's, N.B., red	5 0	6 0	0 0	0 0
yel.	5 0	6 0	0 0	0 0
Quebec, oak, white ..	6 0	6 10	5 0	5 10
birch ...	5 0	5 10	3 15	6 0
elm ...	5 0	5 10	5 10	0 0
Dantzic, oak ...	6 0	7 0	4 0	5 0
Memel, fir ...	3 10	4 0	3 10	4 10
Riga ...	3 10	3 15	0 0	0 0
Swedish ...	2 15	3 0	2 15	3 0
Masts, Quebec red pine	6 0	9 0	9 0	12 10
yel pine	5 0	8 0	5 0	10 10
Lathwood, Dntsc. fm.	10 0	10 10	8 0	9 0
Memel ..	9 0	10 0	8 0	9 0
St. Petersb'g	12 0	13 0	0 0	0 0
Quebec ..	5 0	6 0	3 0	5 10
Deals, per C. 12 ft. by 9 in.				
Quebec, white spruce	17 0	20 0	15 10	19 0

per load—	1855. £ s.	£ s.	1856. £ s.	£ s.
Quebec, red pine ...	16 0	20 0	17 0	20 0
St. John, white spruce	16 0	18 0	15 0	17 0
Yel. pine, per reduced C.				
Canada, 1st quality	17 0	19 0	16 0	20 0
2nd ditto ..	11 0	12 0	10 10	12 10
Archangel, yellow ..	17 0	17 10	22 0	23 0
St. Petersburg, yel. ..	16 0	0 0	0 0	0 0
Memel ...	12 0	18 0	14 10	19 0
Gefle, yellow, 14 ft. ..	21 0	25 0	26 0	28 0
Gothenburg, yellow	11 0	15 0	23 0	27 0
white	10 0	12 0	17 0	20 0
Christiania, per C. 12 ft. by 3 in.				
yellow ..	26 0	30 0	25 0	30 0
white ..	24 0	30 0	20 0	24 0
Deck Plank, Dntz. per 40 ft. 3 in.	1 0	1 10	1 0	1 11
Staves, per standard M.				
Quebec, pipe ...	70 0	75 0	65 0	75 0
puncheon ..	17 0	20 0	18 0	19 0
Baltic, crown pipe	130 0	140 0	110 0	150 0

IMPORTS AND EXPORTS OF METALS AT THE PORT OF LONDON.

IMPORTS.—August 26.—5 casks crude antimony, by H. Gammon, from Hamburgh; £450 bullion, by Betham and Co., from Holland; 1 cask old copper, by C. Moss and Co., from Genoa, and a quantity ditto, by Teighe and Co., from Bathurst, West Coast of Africa; 713 bags iron, by St. Katherine's Dock Co., from St. Petersburg, 713 bags, by A. Waring, from St. Petersburg, and 960 bags, from Wyborg, 3,000 bags, by Rew and Co., from Sweden; 1 case and 1 keg copper ore, by Phillips and Co., 52 barrels ditto, by Jolly and Co., from Genoa; 400 kegs steel, by Rew and Co., from Sweden, and 500 kegs, by J. Wyllie and Co., from Sweden; 20 barrels zinc, by Enthoven and Sons, from Belgium.

August 27.—23 hogsheads old copper, by Sims and Co., from Hamburgh; 1,551 bars iron, by S. Odell, from St. Petersburg, 290, by A. Waring, from St. Petersburg, and 987 from Wyborg, 153 pieces by Ludgren and Sons, from Sweden; 3 cases melting pots, from France, by J. Lamb; 14 cases tin ore, from Port Phillip, by E. and W. J. Dork Co.; 4 bundles steel, by E. Abell, from France.

August 28.—1 cask and 2 pieces copper ore, by E. and W. J. Dork and Co., from Grenada, 2 casks and 4 barrels, by Dunbar and Sons, from St. Helena; 1,100 casks copper ore by A. Johnson and Co., from Manilla, 1,132 kegs ditto, by Thomson and Co. from the Cape Colony, 1,481 kegs by J. G. Willing, from the Cape of Good Hope; 319 slabs tin by Van Dadilsen and Co., from Holland, 300 by Enthoven and Sons, and 320 by N. Brubarb; 35 casks zinc, by J. Harris, from Belgium.

August 29.—20 boxes antimony, by J. C. Rohrweger, and 20 boxes, by J. Hunt, from Holland; 18 casks and 19 cases copper by J. Harris, from Holland, 20 cwt., by F. P. Wilson, from Bahia; 1,882 tons iron, by Engstrom and Co., from Sweden; 30 serons copper ore, by St. Katherine's Dock Co., from Punta Arenas; 14 hhds. of tin ore, by Tregelles and Co., from Port Phillip.

August 30.—16,687 ingots and 3 plates copper, by the Alton Mining Association, from Kaafford; 3 bags of old copper by the St. Katherine's Dock Co., from the Cape of Good Hope, 42 packages copper, and 1,251 copper bolts by H. E. and M. Moses, from Sydney; 1,314 bars iron, by Engstrom and Co., from Sweden; 30 serons copper ore, by Shillingford and Co., from Parma, 538 bags and 1 box copper ore, by Redfern and Co., from Sydney; 12 casks manganese ore, by Cannon and Co., from Hamburgh.

September 1.—18 casks of antimony, by M. Brumber, from Hamburgh; 2,478 bars iron, by Seeviking and Son, and 1,667 bars by J. Nelham, from Sweden; 25 packages pig lead, by Cole and Co., from Guatemala; 59 cases metal, by Dickson, Brothers and Co., from Sweden; 32 tons copper ore, by W. Purdy, from Adelaide; 870 slabs tin, by A. Brubart, from Holland; 36 barrels rolled zinc, by J. Harris, from Belgium.

EXPORTS.—August 26.—300 oz. silvers and 70 oz. gold coin, by Samuel and Co., to Antwerp; 200 lbs. quicksilver, by J. Hall, jun., to Gibraltar; 3½ tons copper, by H. Grey, to Havre; 1 ton ditto to Stettin, by Enthoven and Son.

August 28.—5 tons zinc, by J. Harris, to Buenos Ayres; 25 tons steel, by Wyllie and Co., to Calcutta, and 5 tons by Hazell and Co., to Calcutta; 30 tons iron, by J. Benoliel, to Mogadore; 7 tons copper, by W. Grey, to Tonning; 39 cwt. nails to Launceston, by J. Bishop; 300 silver plate, by W. Escombe, to Ostend, and 76 ditto to Quebec.

August 29.—60 tons iron, by Pelly and Co., and 80 tons, by Bell and Co., to Bombay; 31 cases iron wire to Constantinople and Odessa, by G. Child; 4 cases brass wire to the Canaries, by Baker and Co.; 42 tons iron to Hamburgh, by J. W. Lawson; 30 cases wire, by J. Harris, to Hamburgh; 500 lbs. quicksilver, to Havre, by J. Lamb.

August 30.—1,600 lbs. quicksilver, by J. Harris, to Antwerp; 14 cases quicksilver, to Madras, by J. G. Hillam; 320 oz. gold bars, by J. Hunt, to St. Petersburg.

September 1.—8,000 lbs. copper wire, by Hopcraft and Co., to Calcutta; silver plate, by W. Escombe, 42 oz. to Bombay, 148 oz. to Havanna, 710 oz. to Ostend, 218 oz. to St. Petersburg, 215 oz. to St. Thomas; 21 oz. by J. Thudder, to Rotterdam.

September 2.—118 cases plumbago, to Boston, by J. Harris; 300 ozs. gold coin, to Ostend, by H. Grey; 4,335 oz. silver dollars, by Guthrie and Co., Rotterdam.

GENERAL EXPORT FOR THE WEEK ENDING AUGUST 28.—8 cases copper ware, and 1 of iron ware, to Malaga; 26 cases iron ware, to Barbadoes. Small arms: 68 fowling pieces, to Bombay; 50 swords, 59 scabbards, and 25 bayonets, to Rotterdam; 30 rifles, and 242 pistols, to Bombay; 292 oz. silver plate, to St. Petersburg. Metals: 12 cwt. steel, to Valparaiso; 114½ tons to Bombay, 10 cwt. to Madras, 59½ tons iron to Madras, 338 tons iron to Bombay; 55 cwt. zinc, to Valparaiso; 200 cwt. to Buenos Ayres; 23 cwt. tin, to Palermo; 1 ton spelter, to Gottenberg, and 3 tons to Madras; 168 cwt. plumbago, to Rotterdam; 25 tons copper, to Havre; 20 tons, to Tonning; 10 tons bronze, to Calcutta. Quicksilver: 10,332 lbs. to Tonning, and 150 lbs. to Palermo; 355 to Madras; 10,628 lbs. to Bombay; 1,600 to Boulogne; 33 cwt. phosphorus, to Hamburgh; 100 oz. gold coin, to Boulogne, and 6,060 oz. to Belgium; 17,500 oz. bar gold, to Belgium; 1,900 oz. silver coin, to Belgium; and 1,000 oz. to Boulogne.

NEW YORK, August 21. IRON.—The inquiry for Scotch pig is steady, sales of 65 tons, at 31 dols. 50 c., to 32 dols. at six months.

LEAD.—Further sales of 100 tons Spanish have been made at 6 dollars for common, and 6·12½ for best, and 250 tons refined German, to arrive at 16·25 short time. The shipments of copper, per Lake Superior, for the month of July through the St. Mary's Falls Ship Canal, amounted to 1,074 tons, or about 2,500 barrels.

SINGAPORE, JULY 18.—METALS.—Several parcels of Scotch bar iron have been placed at 2 dols. 30c. per picul (1⅓ cwt.) of Swedish, the market is bare. Copper sheathing and yellow metal are at 40 dols. for the former, and 33 to 34 for the latter, per picul. Pig lead is wanted for shipment to China, and stands at 8 dols. the picul. Tin has advanced nearly 1 dol. per picul on last mail's rates, with a brisk demand. 5,040 piculs of antimony ore were shipped by the Washington Irving for London, via Bombay, on the 16th ult.; 6,720, by the Ann, on the 30th June, and 6,720 piculs on the same day, by the Lima, 2,016 piculs on the 3rd by the Celestial, via China. The imports of metals in the last four weeks have consisted of the following:—2,318 piculs of iron, 226 copper sheathing and nails, 375 piculs of yellow metal and 103 of composition nails; 372 of zinc sheathing and 100 kegs iron nails, 2 anchors and 500 muskets. Malacca tin is quoted 27 dols. per picul, other sorts 20 to 24 dols.

MADRAS, JULY 23.—The demand for iron of good assortment continues steady; 193 tons sold at 62s. per candy (of 500 lbs), 138 bars of steel, at 76s. per cwt. Other descriptions are quiet. Lead pig and sheet in demand, of the former there is none in the market. Spelter is in fair demand at 140s. to 150s. per candy. Quicksilver is dull at 24 to 25 rupees per maund. Tin plates are improving at 19 to 21 rupees per box. There is no banca tin in the market.

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

(*From our own Correspondent.*)

Bessemer's Process: Excitement of the Ironmasters of South Staffordshire: Experiments upon the Purified Metal: Production of "Red Short" Iron: Experiment at Woolwich, and Production of Fibrous Iron: Doubt as to the Commercial Success of the New Process, as compared with the one now in use: Charles Sanderson's Opinion—Trade of the District: Preliminary Meeting—Colliery Explosion at Oldbury: "Times" Suggestion of making Pit Proprietors Amenable—Mr. Tremenheere's Report upon the Mining Districts—Mr. Shipton's Patent Engines for a Tender to a Vessel for the South American Trade: These Engines used in working Appold's and Gwynne's Pumps at Sydenham—Berlin News: Thirty Railways Projected in Turkey: Drain of Workpeople and Scientifics: A Student of the Polytechnic Institution of Berlin appointed Superintendent of Mills at Damascus—An elegant Work of Art: Lady Godiva in Electro-plate—New Method of Coating Iron and Steel with Zinc—Valuable Remarks upon Metallic Combinations aiming at diminished Destructibility—How to secure increased Mechanical Strength in Iron: Nickel and Iron: how to Mix them: Importance of the Subject—John Wilkinson the Shropshire Ironmaster: how he managed his Business: how he cheated Morpheus: "Wilkinson's Iron Men:" He made the first Iron Barge.

IT was a "long time ago" since there was such a buzz amongst the ironmasters of South Staffordshire as on Tuesday morning last. On the previous day a large number of them were at Baxter House witnessing another operation upon Bessemer's principle, and most of them had brought away small pieces of the purified iron as memorials of their visit. Several of these had been submitted to the action of the smith's fire, and then beaten out upon the anvil; and the tests demonstrated that the "clay colander" (as Mr. Adams in yesterday's *Times* aptly termed Mr. Bessemer's furnace) had sent out as malleable iron that which twenty minutes before had entered it has Blaenarvon pig iron; but grave doubts were expressed as to its possessing the required fibre. Yesterday (Thursday) two of the largest pieces that were brought into the di trict were heated together in, we believe, the ordinary ball-furnace, and then passed beneath the rolls at a slow pace, making at last about four feet of "quarter-round" iron. This, upon being broken up into several short lengths, confirmed previous opinions and firmer statements, as it demonstrated that the iron was what is well known as "red-short," and, therefore, not of the value of fibrous iron. The operation to which we have referred was conducted at the works of Messrs. Hickman, at Tividale; and it was made principally at the suggestion of Mr. J. A. Shipton, of Dudley. The rod was widely exhibited on 'Change at Birmingham yesterday, and its inspection was accompanied with many grave shakes of the head, indicative of the doubts of the inspectors as to the commercial value of the process. A portion of the rod was despatched to Mr. Bessemer last night, and at the same time suggestions were made that he should send down two or three whole ingots to be rolled as this had been. Parallel with this announcement we are glad to be able to state that, according to a statement which we cannot question, there has been produced at Woolwich, from Mr. Bessemer's process, iron as fibrous as could be desired. A specimen of such iron is now in this district.

Whilst the prevailing impression is that the process has many practical difficulties to overcome, there is a strong desire to see it fairly tested in the district. This will be done in as short a time as possible. We are bound, however, to state that an ironmaster of enlarged experience in the Wolverhampton district, and one to whose opinion we customarily express much deference, has pronounced a very positive opinion as to the impracticability of working the system so as to make it compete successfully in a commercial aspect with the present method.

No little exertion, it is expected, will be required to procure the needed pressure of blast, the strongest blast in general use at the blast furnaces being now 4 or 4½ lbs. to the inch. And this, notwithstanding a letter in the *Times* on Tuesday. There Mr. A. M. Perkins, after claiming precedence of Mr. Nasmyth in the method of introducing heated steam and cold blast into a furnace for making raw iron, says that he has obtained a steam pressure (for the purposes of his steam gun, we presume) which is practically 1,500 lbs. to the square inch, which force, he adds, "is more than sufficient to dispense with the blowing machinery altogether; and at no further cost than would be necessary to generate the steam."

The following bold statement, in reference to Mr. Bessemer's process, has been published by Mr. Charles Sanderson, of Sheffield. After describing the process, that gentleman says:—"The result is a metal not capable of being drawn under a hammer, or rolled into a bar; and whilst I venture to state that the process will not produce steel, fit for any useful purpose, I must also add that it will not produce the malleable iron suited to our wants."

There is no change to note upon last week's report in the trade of the district. The preliminary meeting will be held on the 25th of this month, when, in order to secure more American orders, we are of opinion that prices will be reduced. In anticipation of this state of things consumers for the most part are purchasing only a from-hand-to-mouth supply.

Much confusion and no little tautology were apparent in our remarks last week upon the colliery explosion at Oldbury, in consequence of a separate article which narrated the chief points of the evidence having been placed in the midst of our letter. We hope, however, that our readers were able at the time to detect how this confusion and apparent tautology arose. The particulars of the inquest we were glad to perceive drew forth a powerful and argumentative article in the *Times*, suggesting that in the event of pit accidents from unskilled managers, pit proprietors should be deemed as amenable to the law as railway directors now are in the event of accidents upon lines of which they may be the acting proprietors, which accidents could have been prevented by their servants.

This year's report upon the Mining Districts, by Mr. Tremenheere, to which reference was made last week cursorily, urges the necessity of a measure to compel all boys between ten and fourteen years of age, who work below ground, to attend some school for a hundred hours every six months. We hope that the next Act for the regulation of mines will embody this suggestion. It will be a step in the right direction—the direction which leads to the prohibition of any child being permitted to work in pits or factories until they are thirteen years of age. The Rev. Mr. Norris, the Government inspector of schools in the Midlands, is doing good service in lengthening the average period during which the children of the working classes in his district remain at school; but progress in this respect will be miserably slow until Government mercifully interposes. We say "mercifully," for we have yet to learn that parents do otherwise than a positive injustice to their comparatively helpless offspring, in depriving them of the ability of enjoying, and often preserving life, by the many means which the development of their intellect, through the medium primarily of book instruction, afford. Mr. Tremenheere's report then refers to the efforts at improvement made in the South Wales districts; where, in Monmouthshire and Glamorganshire, the proprietors—some of the chief of whom are also South Staffordshire firms—have taken steps to provide for their workpeople better means of general and religious instruction than they have before enjoyed. The recent Scotch strike occupies the remaining portion of the report, which forms a blue book of fifty-six pages.

Within the past few days we have seen in motion one of a pair of 20-horse engines, intended for a tender to a boat of 800 tons burthen, which is now being constructed for the South American trade, into which there will be fixed a pair of 30-horse engines by the same patentee, Mr. James Alfred Shipton, of Dudley. The principle is that of an eccentric revolving in its own diameter, for which a patent was taken out as early as 1848 by Mr. Shipton and Mr. Joseph Simpson. The peculiar features of the engine are the direct converse of rectilinear motion, given by the reciprocating action of the piston, in which rotary motion is obtained through the medium of a crank. In this engine the steam coming upon the piston propels it to and fro in a steam chamber or steam cylinder; and this piston although propelled to and fro, gives out at the same time circular motion, thus, it will be perceived, dispensing with the customary crank. We perceived in this description of engine the same method for the admission of steam as in other engines, namely, by means of a slide valve or valves of ordinary construction; expansion and condensation, also, can be carried out by it in the same manner as customary. We were very much pleased with the exceedingly compact appearance of the engine. It was very pleasing to witness so much power proceeding from an engine so small and without several complicated features which we have seen borne by other engines of no greater strength. At the same time we saw an engine of the same description working, with marked ease, a saw-mill and a variety of other machinery connected by very long shafting. Two ten-horse engines on the same principle are now working the pumps of Messrs. Appold and Gwynne, at Sydenham, and they are attracting the marked attention which they deserve. Through a three-quarter-inch pipe, with steam at forty lbs., Edwin Rose, the foreman of the machine department at Sydenham, says:—"I keep up a nice stream of water." The engine is capable of being applied to almost every purpose, either in draining or propulsion, and seems especially suited for boats. It has undergone several improvements since it was first made public, so many as to justify us in giving a fuller description of it, with drawings, in a future number of THE ENGINEER.

The following is a piece of engineering information which has recently been published under the head of Berlin:—"The many great works going on now in the world—thirty railway lines projected in Turkey alone—will cause a great drain not only of workmen but also of *scientifics*. Thus, all the young men whose term of study expires next autumn at the Polytechnic Institution of Berlin are already engaged. One student, quite young, has obtained the situation of superintendent of mills at Damascus, with 3,000 thalers, yearly, salary."

An elegant work of art in the metal for which Messrs. Elkington, Mason, and Co., of Birmingham, are celebrated, has just recently been produced by them for the Warwick Racing Committee. It was run for on Wednesday last; and, in addition to being the "plate" for the Warwick Races, is intended to form a prominent part of the productions of Messrs. Elkington and Co., that will be shown at the Manchester Fine Arts' Exhibition, the firm in question, having, when constructing the article, asked the winner of it to permit it to be so shown. The plate is a group of figures which represent the Lady Godiva riding through the streets of Coventry. In the treatment of this very tender subject the chief of the fine art department of Messrs. Elkington and Co's firm (Mr. Jeannest) has displayed qualities eminently called for in such a work, together with a master's hand in their development. The air and the attitude of the chief figure form a well-conceived embodiment of the blended modesty and daring with which the fair Countess must have traversed the silent streets. These are especially seen in the downcast but resolute countenance, the effort to make her luxuriant tresses serve the purpose of vesture more completely, and in the additional nerve imparted by the very position of her right foot, and so on. The horse—its head in particular—is admirably modelled. The rich housings of the animal are an excellent contrast to the oxydised silver of the figures. They are in silver, and said to be in strict accordance with the style of the period. In these the exercise of the chaser's art has found abundant scope. The group is mounted on a richly adorned pedestal, on the sides of which are bronze chasings in high relief. One of these represents Godiva's liege lord seated under a canopy of state and listening to an appeal made by his wife on behalf of the citizens, some of whom are submissively seated in the distance. The opposite panel illustrates the Peeping Tom episode, and shows the picturesque streets and quaint buildings of ancient Coventry. Lesser panels contain the arms of Coventry and Warwick. The pedestal is in itself a fine work.

The method of Mr. Alexander Watt, the editor of the electro-metallurgical department of the *Chemist*, for coating iron and steel with zinc, deserves to be extensively known. Mr. Watt's skill in electro-metallurgy is no secret. By the process to which we refer Mr. Watt dissolves 200 ounces of commercial cyanide of potassium in 20 gallons of water (rain water or distilled water being preferable) in a suitable vessel. He then pours into this solution 80 ounces by measure of strong liquid ammonia (of the specific gravity of 880 by preference.) Having stirred these compounds together, he places several large porous cells, such as those used in forming Daniell's batteries, in this solution, and pours into each of them as much of a strong solution of cyanide of potassium (say about 16 ounces to the gallon) as will be equal to the height of the solution in the larger vessel. He then attaches several pieces of metal (copper or iron by preference) to pieces of copper wire, which are then to be attached to the negative pole of a galvanic battery. These pieces of copper or iron are then to be placed in the porous cells. He next attaches a piece, or several pieces of zinc to the positive pole of the battery, and then immerses these pieces of zinc in the solution of cyanide of potassium and ammonia. The galvanic battery is now to be set in action, and allowed to continue so on the above materials until the solution of cyanide of potassium and ammonia has taken up about 60 ounces of zinc, that is to say, about 3 ounces to the gallon of solution. As soon as the pieces of zinc have been weighed to determine the amount dissolved into the cyanide solution, he dips them into diluted hydrochloric acid, and then rinses them, when they are placed aside for future operations if necessary. The porous cells are then to be removed. He now dissolves 80 ounces of a carbonated alkali (by preference the carbonate of potassa) in a portion of the above solution, and when dissolved adds it to the original solution, and stirs the whole together for a few moments, after which he allows the solution to stand undisturbed until the sediment formed has subsided. He then transfers the clear solution to another vessel, when it is ready for use. The articles to be coated are first plunged in a pickle of sulphuric acid one lb., hydrochloric acid half lb., water two gallons; and this pickle removes any oxide of iron that may be upon them. They are then rinsed in clear water, brushed with a hard brush, sand, and water, and again rinsed in clear water; this pickling and brushing being continued until the whole of the oxide is removed. They are next placed in the solution we have described, and connected to the negative pole of the battery. As soon as the articles are sufficiently coated, they are to be removed from the bath and rinsed in clean water (hot water being preferable); they may then be placed in saw-dust to dry them. Brightness may be given to the articles either by the application of the scratch-brush, or by gently scouring with silver-sand and a soft brush.

In relation to the above department of the question of metallic combinations, which department has for its especial aim diminished destructibility from atmospheric and chemical agency, the following are the remarks of an analytical and practical chemist of unquestioned ability and enlarged experience: "The prospect of improvement in this department seems chiefly limited now to the employment of electricity through the intervention of other agents than water—a medium evidently unfitted for the deposition of a great variety of metals, amongst which platinum, iron, nickel, zinc, cromium, and perhaps aluminium, may be mentioned. The object here will, therefore, consist in procuring materials of easy fusibility, capable of transmitting the electric current, and holding in solution the oxides or salts of the metals to be operated upon. For this purpose, the fact discovered by Berthier may prove useful. It is, that various salts in atomic proportions fuse together at a much lower temperature than the more fusible of the two! Thus, an atomic mixture of carbonate of potash and carbonate of soda fuses readily at a dull red heat. An atom of sulphate of lime with an atom of fluoride of calcium is still more remarkable; and innumerable instances of the same kind may be cited. Having thus obtained a suitable solvent, we may dissolve in this, at a red heat, some of the metallic substance which it is desired to coat with, and then with perhaps a more powerful battery than for water we may proceed in the usual way. For the sake of illustration, let us suppose that a mixture of nitrate of lead and nitrate of potash, or a mixture of oxide of platinum and caustic potash, has been fused together—the question is, whether, by making the ordinary electrical arrangements, a piece of copper might not be covered by lead or platinum to any required extent or thickness."

With reference to the other department of the admixture of metals—that which relates to increased mechanical strength—we remarked in a previous letter upon the increased strength which would be imparted to iron by the admixture of nickel; such a compound, possessing proportions of 98 parts of iron and 2 of nickel, we said, had all the peculiarities of the best meteoric iron, that it had more tenacity than pure iron and was not so liable as it to rust or oxidize. On account of readers of the Engineer having manifested considerable interest on this subject, we add that a great many experiments have convinced a large number of persons well capable of forming a correct judgment upon the matter, that iron of all kinds, but especially malleable iron, is very greatly increased in tenacity and strength for resisting impact, by being alloyed with from two to three per cent. of nickel. By these experiments it was also found that such a mixture resisted much better than pure iron the action of air and moisture. It must be admitted that after a time the compound rusts or oxidizes, but the oxide of nickel being insoluble in water or water containing carbonic acid, it remains attached to the surface of the alloy and thus forms a coating. In other words it hermetically seals up the remaining metal from further action; whereas the oxide of iron is dissolved or falls from the metal, and thus permits oxidisation to any extent.

The ore of sulphate of nickel, which is now being worked upon the property of the Duke of Argyll, near to Inverary, contains 10 per cent. of nickel, free from arsenic, and is selling at about £25 per ton. Several tons of the alloy were made during the experiments to which we have referred, and its marked adaptation to ordnance purposes made it very probable that it would be employed by the Government authorities at Woolwich, notwithstanding their antipathy to anything novel from without-doors; but the late peace has rendered its appliance to such a purpose less important at present. We trust, however, that now that the question is fairly mooted, private enterprise will be found sufficient to further experiment upon this alloy on a large scale. In such a case the crude nickel should be mixed with the pig iron, and the whole passed through the puddling furnace, refinery, &c., and the tests be applied to the bar iron obtained. Satisfied, ourselves, of the value of the compound, we venture to promise a handsome remuneration to any one who will take up this matter with the spirit that its importance deserves. Soon or late the matter must be taken up, and if the British hardware manufacturer should not be he who will first introduce the alloy into his productions, and the British machinist and engineer he who will be the first to employ it in uses in which iron of great strength and tenacity are required, they will early find that members of their respected crafts elsewhere are benefiting at their cost. To such, however, for the most part, the alloy must come through the hands of the ironmaster, to whose especial notice, also, we would commend it.

We are not alone in our opinion, that if Mr. Nasmyth's celebrated gun had been made of this alloy, and not of pure iron, it would not have so disappointed its inventor's expectations.

In further demonstration of the greater strength of alloys than pure metals, we may have a few additional words to say next week.

"The house now in the occupation of George Pritcherd, Esq., Broseley, was formerly the residence of John Wilkinson, Esq., the eminent Shropshire ironmaster referred to in our last. Many incidents illustrative of character, and many anecdotes suggestive of the mental activity and untiring perseverance with which he sought to push improvements in the trade, are yet current. With a remarkable vigour of mind, and a calm collectedness of purpose, he acted the master of his extensive works as became him. Surrounding himself by the most intelligent workmen he could procure, placing over them agents in whom he could confide, while he himself held the reins that governed the whole, collected from the reports constantly furnished a correct knowledge of his position; and brought a mind unfettered by the mechanical details of his concerns to originate and provide new spheres of operations and modes of improvement. 'More is done by scheming than by working,' is a common saying among mechanics of the iron works. Wilkinson, it is said, was used to lie in bed and scheme. He took good care, too, that an idea, once awakened, should not be lost until it had assumed forms and proportions sufficiently tangible and complete to produce a more than passing lodgment in the brain. To overcome the natural tendencies of sleep that might otherwise prematurely tend to dissipate the weft of his nocturnal cogitations, he had recourse to the following ingenious expedient: He lay, holding in his hand over a copper basin, an iron ball, which, upon his going to sleep, again recalled him to the task he had imposed, by the noise created by its fall. The frequent accidents that soon began to arise from getting the deeper coals now coming into use for smelting and other purposes, led him to construct a machine in order to obviate the necessity of colliers exposing themselves unnecessarily to danger in 'holing,' as it is called, or undermining the measures. These were simple in construction, and like all other of Wilkinson's inventions, were of his favourite metal. They were called by the colliers 'Wilkinson's Iron Men.' The innovation was at once condemned by the workmen, who refused to 'set the trees,' or wooden props necessary to support the roof of the mine, saying, 'if Wilkinson's iron men did the one they should do the other.' Wilkinson's next innovation was among the barge builders upon the Severn, who enjoyed a sort of monopoly by the trade, and whom he could not get to supply him fast enough and cheap enough with vessels to carry his guns and castings down the river. He said, 'I will make an iron barge.' The threat was deemed an idle one, and thought to be a capital joke. It was a joke upon which watermen and barge-carpenters traded pretty freely during its erection. Would it swim? If it did, would it be manageable on the river? Who would he get to work it? were questions asked and answered, and embellished with many an oath? But the man who made the "iron bellows" and the "iron men" succeeded in making and in swimming his iron barge, which traded for many years upon the river, was manageable, and was the precursor of others built upon its banks, or upon the banks of the Clyde and the Mersey, for mercantile and warlike purposes."

METALS AND MANUFACTURES IN THE YORKSHIRE AND LANCASHIRE DISTRICTS.

(From our own Correspondent.)

Since our last week's communication the iron trade has improved in consequence of the favourable prospects of the harvest, and the arrival of large orders from America and the north of Europe, which had been withheld during last month. The orders for some descriptions of merchant iron have been given out for immediate execution. The demand for America is likely to continue, as the condition of that country is reported to be highly prosperous. The demand for bars for Australia is but slack, but the home demand for plates has improved. The large orders given out by several railway companies, for railway iron, have also given an impetus to the trade. The makers of secondary qualities of iron are but indifferently supplied with orders, but there is less underselling prevalent now than during the past month. Prices are tolerably well maintained. The best brands of bar-iron realise £9 per ton, and inferior makes have ranged from 20s. per ton lower. The demand for pig-iron is inactive, and though stocks are small, having been reduced during the hot weather of last month, there is no prospect of an improvement unless the iron trade should continue to improve. The best mine pigs realise £4 2s. 6d. per ton.

The preliminary meeting of the iron trade is appointed for the 25th inst., when the question of prices will be discussed. If the trade continues to improve, it is probable that present prices will be maintained; but should they be reduced, the ironmasters will then be compelled to reduce the wages of the men, which may lead to unpleasant trade disputes.

It is stated that Mr. Bessemer intends to erect one of his furnaces for the improved make of malleable iron, and that some experiments will be made in connexion with it in a short time.

There has been a slight improvement in the coal trade during the last week, owing to the demand for the autumn trade.

The half-yearly meeting of the South Yorkshire railway was held at Sheffield on Friday last, when the report disclosed some interesting facts relative to the coal trade. It stated that the coal traffic had been much depressed, prices in London having ranged so low as 12s. or 14s. per ton. The quantity of coal sent from the Yorkshire field had considerably increased, being 304,650 tons as compared with 270,485 tons for the half-year ending December, 1855; but in consequence of the low selling price, the railway rates had been necessarily on a reduced scale.

The company had subscribed £25,000 to the capital of the Anglo-French Steam Company at Grimsby.

As a navigation company they had the power to charter steamer to convey traffic from Sheffield to the mouth of the Humber. It was under these powers that they had undertaken to subscribe £25,000, or one-fourth of the capital of the Packet Company, the Manchester Railway Company and a body of French gentlemen finding the remainder. Their doing this was not a legal act, but a judicious one; for they had been exporting on an average 1,000 tons a week. This export trade was opened in connexion with one of the first French firms, by which they secured a market on the other side of the Channel. The project was paying extremely well in itself, besides affording this company a new opening to a district from which unfortunately they had for years been excluded.

The company had already exported 16,500 tons, and the demand was increasing.

The quantity of steam coal exported from England in 1855, was between four and five million tons; yet of this not more than 70,000 tons were from Yorkshire. In Yorkshire they had better steam coal than that of South Wales or Durham. What was wanted was an arrangement by which they could get their coals introduced into France, certified of good character, and by people of reputation. When the proposal, therefore, was made to them by the Manchester, Sheffield, and Lincolnshire Company and a French firm of high standing, who were themselves importing into France near 400,000 tons of coal, they felt it an opportunity of developing that trade which might not occur again, and therefore joined with it. It had proved successful. There the coals were going, week after week, entirely for foreign trade; and it was a trade that, once opened, would never close upon this South Yorkshire field.

The statutory meeting of the Anglo-French Company was held on Saturday, when a dividend of 5 per cent. was declared. The trade of the company was progressing as rapidly as it could, and ships were only wanted to increase it. There were now 3,000 tons of coal shipped from Grimsby weekly. The object of the company was to ship coals to France, and bring wines and other goods in return from France.

Messrs. M'Larty and Co, and Lamont M'Larty and Co, of Liverpool, have suspended their business with liabilities amounting to £100,000, occasioned by losses in the Australian trade, and in working a portion of the screw steam mercantile marine.

The statistical column of the Liverpool "Bill of Entry" states that, for the week ending on Saturday last, the 30th August, as compared with the corresponding week of 1855, there had been a decrease of 8 ships "entered inwards," the decrease in tonnage being 9,123; in "cleared outwards," there was an increase of one ship and 3,343; and of "reported inwards," a decrease of 16 ships, with an increase in tonnage of 210,388,—a fact which speaks volumes for the increased size of the ships and steamers employed in our mercantile marine.

The inquest on the bodies of the unfortunate men who perished by the boiler explosion at Bury terminated on Saturday last, in the following verdict:—"We find that the death of John Cumstive has been caused by the explosion of the steam boiler at Hampson Mills, and that the said boiler was very defective, and working at a much higher pressure than it was calculated to bear. We find that the said boiler was corroded by the action of dampness, to about one third of its original thickness, on that part of the boiler resting upon the brickwork or seating. We are also of opinion that sufficient caution had not been exercised by the owners, they not having had the boiler latterly examined by competent persons, and we recommend that Government take measures to have steam boilers regularly inspected." —The latter words of the verdict are of great importance; but we would remind the jury, that an excellent institution, well conducted, has existed at Manchester for some time, for the prevention of steam boiler explosions, which has been the means of effecting a large amount of benefit by the prevention of such catastrophes.

Trade in manufacturing localities has improved, owing to favourable harvest prospects, and the operatives are well employed. At Leeds the Cloth Halls have been well attended, and transactions in seasonable goods have been done to an average extent. The Manchester markets have been brisker, owing to a rise in the price of cotton. At Huddersfield the demand for manufactured goods has been brisk, and the trade has many encouraging aspects.

The continued fine weather has exercised a favourable influence on the price of corn, and the markets have declined 8s. per quarter.

The local stock and share markets in those counties have been dull and heavy, and little business doing.

The Mexican Government have adopted the Ramsey route for an interoceanic railroad between the Gulf of Mexico and the Pacific, at Acapulco. Colonel Albert C. Ramsey is authorised to form the company and take charge of the works. All materials for the road are to be admitted free of duties. The Government guarantees six per cent. on all moneys expended until the road becomes productive.

The great bell for the Westminster Palace clock has been raised from the pit in which it was cast: the founding appears to have been quite successful. The bell is supposed to weigh fifteen tons; it has been tried with a clapper of seven hundredweight; the note is E natural. The bell stands 7 feet 10½ inches high; its diameter is 9 feet 5½ inches.

A Hint to Paper Inventors.—By the number of the London *Engineer* of the 4th July ult., we find the record of two new patents granted for manufacturing paper; one to Joseph Barling, Eng., for making paper from the roots of hop vines; and the other to W. G. Plunket and John Bower, Ireland, for manufacturing it from the leaves, stalks, and roots of beets and burdocks. These patents are not of the least value whatever, as paper cannot be manufactured as cheap from these materials as from pure cotton, even before it is made into rags. These patentees have made the same mistake that scores of others have, who supposed they had accomplished the grand object by merely substituting one material for another. There are many persons who know how to manufacture paper from almost every tree and plant that grows, and the process of doing this is neither complex nor secret. It simply embraces the well-known method of treating those plants or woods first with a caustic alkali to remove the resin in them—as from pine wood shavings—or the silicon from them—as in straw,—and then pursuing the same processes that are commonly employed in making rag paper, viz., washing, bleaching, and reducing to pulp. And it cannot but be somewhat mortifying to many recent inventors of paper, from what they supposed were new materials, to be told that there is nothing new about them.—*Scientific American.*

Heinrich Heine's Opinion of London.—I have seen the greatest wonder which the world can show to the astonished spirit; I have seen it and am still astonished—and still there remains fixed in my memory the stone forest of houses, and amid them the rushing stream of faces of living men with all their motley passions, all their terrible impulses of love, of hunger, and of hatred—I mean London. Send a philosopher to London, but, for your life, no poet! Send a philosopher there, and stand him at the corner of Cheapside, where he will learn more than from all the books of the last Leipsic fair; and as the billows of human life roar around him, so will a sea of new thoughts rise before him, and the Eternal Spirit which moves upon the face of the waters will breathe upon him; the most hidden secrets of social harmony will be suddenly revealed to him, he will hear the pulse of the world beat audibly, and see it visibly—for, if London is the right hand of the world—its active mighty right hand—then we may regard the route which leads from the Exchange to Downing-street as the world's pyloric artery. But never send a poet to London! This downright earnestness of all things, this colossal uniformity, this machine-like movement, this troubled spirit in pleasure itself, this exaggerated London, smothers the imagination and rends the heart. And should you ever send a German poet thither—a dreamer, who stares at everything, even a ragged beggar woman, or the shining wares of a goldsmith's shop—why, then, at least, he will find things going right badly with him.—*Pictures of Travel*, translated from the German of Heinrich Heine.

The Euphrates Valley Railway.—General Chesney, as commissioner of the Euphrates Valley Railway Company, accompanied by Sir John Macneill, the engineer-in-chief, and a staff of engineers, left last night en route for Constantinople and Syria, to obtain the firman for the concession for the railway; the preliminaries having been previously arranged with his Highness the Grand Vizier, when in this country. The mission has secured the sanction and concurrence of her Majesty's Government, and is assured of the countenance and support of the British ambassador at Constantinople. From the advanced stage of the negotiation, it is expected that General Chesney and Sir John Macneill will only be detained a few days in Constantinople, and that they will proceed with the engineering staff to make the necessary surveys of the line between the Mediterranean and the Euphrates. Advices received by the last Overland Mail, bring intelligence that Messrs. Hunt and Elmslie, the chief contractors for the East Indian railway, have sent an engineer to survey the proposed route of the Euphrates Valley Railway, with a view of making a tender to the company, of which Mr. Andrew is chairman, for the execution of the works.

Atmospheric Propeller for Steamers. — The Philadelphia *Ledger* describes an experiment made in that city on a model boat two feet long, propelled by the action of wings or fans in the air, an improvement of Mr. Thomas Silver, the inventor of the marine governor. The boat is to be furnished with a steam engine, to which is attached four fans, with the handles placed in a hub, upon a spindle the whole forming a mechanical power, similar to the screws now used as propellers. It is intended to use the air, instead of water, as the fulcrum for the fans to work upon, making up for the difference in density between the air and water, by a greater rapidity of motion. "The inventor claims that for canal purposes this mode of propulsion would be far superior to the ordinary water-wheel in consequence of the non-agitation of the water, which would prevent the washing of the banks, a serious injury, which always results in the use of steam power." To employ the air as a medium of steam-boat propulsion, in place of the submerged propeller, the propeller will require to be of great proportions, and driven with an immense velocity. A surface velocity of such a propeller, amounting to 1760 feet per minute, will only exert a pressure of about 2 lb. on the square foot. —*Scientific American.*

Tin.—The uses of tin are more various than those of any other metal, and it possesses very valuable properties. England is the greatest tin-producing country on the globe. She possesses the most abundant natural sources of this metal, and has long been the tin-plate manufacturer of the world. The produce of the metal in Cornwall is about 10,719 tons per annum, but it is used for so many purposes that it is the source of a vast amount of wealth to Great Britain. We cover our houses with tin-plate, and we manufacture vast quantities of it into vessels of every description for domestic use. We have iron mountains, and innumerable beds of copper and lead; we have the greatest coal fields on this globe, and gold and silver exist abundantly in our hills and valleys. No country is so rich in useful minerals, but as yet no rich deposits of tin have been discovered. We have some faith in that existence of this metal in our rocks, and that it will yet be obtained in considerable quantities. We hope that more attention will be devoted to prospecting for it, as it is more valuable than copper, and far more useful. We pay 4,709,000 dollars annually for tin plate and sheets; 724,000 dollars for tin in pigs and bars, and 44,000 dollars for unspecified tin manufactures.—*American Paper.*

To Make Ink.—1. Take three ounces of best galls and one-fourth of an ounce of cloves, bruise to a coarse powder, and boil over a slow fire in a pint of water for a few hours, stirring frequently; then set aside in a covered vessel till cold; then strain, and supply the place of the water lost by evaporation till it measures one pint. 2. Now dissolve one ounce and one dram of best copperas in half-a-pint of water and strain; then dissolve five drams of gum arabic in half-a-pint of water, and add to the copperas solution and half-a-pint of good cider vinegar. Now mix 1 and 2, and add one ounce of liquid blue. Use soft water. Let your ink be exposed to the air and you will have a black ink.—*Scientific American.*

The following appointments in connexion with Victorian railways are announced, viz., engineer-in-chief and surveyor, George Christian Derbyshire, Esq., C.E.; engineers and surveyors—Charles R. Sayer, Esq., C.E., Robert Watson, Esq., C.E., William B. Hall, Esq., C.E., William A. Zeal, Esq., C.E., William H. Greene, Esq., C.E., William F. Hardie, Esq., C.E., Frederick C. Christy, Esq., C.E. To be draftsmen—Robert Adams, Esq., C.E., William E. Bryson, Esq., Adam A. Jackson, Esq., Samuel V. Kemp, Esq. To be secretary to the trustees of the Melbourne, Mount Alexander, and Murray River Railway—Mr. Richard Wooley.

Manchester Mechanics' Exhibition.—The opening of this exhibition, on the 9th inst., is to take place with less ceremony than was intended. In addition to the excuse of Lord Palmerston, who is prevented from attending by the death of his brother, the committee of management have also received letters from other distinguished gentlemen on whose assistance they had calculated, and have therefore given up their intention of holding an evening meeting at the Theatre Royal. Mr. Oliver Heywood, the president of the Mechanics' Institution, will deliver an address in the morning, and it is expected that a considerable number of season ticket holders will be present.