



A.D. 1843 N° 9707.

Metal Pipes and Bars.

PROSSER AND CUTLER'S SPECIFICATION.

TO ALL TO WHOM THESE PRESENTS SHALL COME, we, RICHARD PROSSER and JOB CUTLER, of Birmingham, in the County of Warwick, Civil Engineers, send greeting.

WHEREAS Her present most Excellent Majesty Queen Victoria, by Her
5 Royal Letters Patent under the Great Seal of Great Britain, bearing date at Westminster, the Twentieth day of April, in the sixth year of Her reign, and in the year of our Lord One thousand eight hundred and forty-three, did, for Herself, Her heirs and successors, give and grant unto us, the said Richard Prosser and Job Cutler, Her especial licence, full power, sole privilege and
10 authority, that we, the said Richard Prosser and Job Cutler, our exors, admors, and assigns, and such others as we, the said Richard Prosser and Job Cutler, our exors, admors, or assigns, should at any time agree with, and no others, from time to time and at all times during the term of years therein mentioned, should and lawfully might make, use, exercise, and vend,
15 within England, Wales, the Town of Berwick-upon-Tweed, and in our Islands of Jersey, Guernsey, Alderney, Sark, and Man, and also in all our Colonies and Plantations abroad, our Invention of "IMPROVEMENTS IN THE MACHINERY TO BE USED IN MANUFACTURING OF PIPES AND BARS, AND IN THE APPLICATION OF SUCH PIPES OR BARS TO VARIOUS PURPOSES;" in which said Letters Patent
20 is contained a proviso, obliging us, the said Richard Prosser and Job Cutler, by an instrument in writing under our hands and seals, particularly to describe and ascertain the nature of the said Invention, and in what manner the same is to be performed, and to cause the same to be enrolled in Her Majesty's High Court of Chancery within six calendar months next and immediately

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after the date of the said in part recited Letters. Patent, as in and by the same, reference being thereunto had, will more fully and at large appear.

NOW KNOW YE, that in compliance with the said proviso, we, the said Richard Prosser and Job Cutler, do hereby declare that our said Invention is described and ascertained in this our Specification, aided by the six Sheets 5 of Drawings appended hereto (that is to say):—

The universal practise of connecting together wrought-iron gas or steam pipes is by means of a short cylinder, called "a socket," and in Sheet 1, Figure 1, a sectional representation is given of two pipes and a "socket" ready to be connected or screwed together. *a* is the socket screwed internally; 10 and *b* and *c* are two pipes having both their ends screwed externally, though one end only of each pipe is shewn in the Drawing. Each of these pipes *b* and *c* are screwed into the socket *a*, until their ends meet and touch each other about the middle of it, and they then appear as in Figure 2, which is a representation of the two pipes *b* and *c* connected together by the socket *a*. 15 Figures 3 and 4 shew our improved method of connecting together wrought-iron pipes. Upon one end of each pipe we form a "socket," or, if preferred, the socket may be welded on to the end of the pipe, and screw it internally, and the other end is left plain and screwed externally, like the pipes shewn in Figure 1. Figure 3 is a sectional representation of two such pipes placed in 20 a proper position to be connected together, and Figure 4 shews them connected. Figure 5 is a plan, Figure 6 a side elevation, and Figure 7 a vertical section, taken through the line *A, A*, on Figure 5, of the machine for forming a "socket" upon the end of a pipe; and Figure 8 shows the die *B* with a pipe in it, and the "socket" completely formed. *C, C*, is a strong 25 frame, on which is fixed two chairs *D, D*, that support a shaft *E, E*, carrying a fast or diving pulley *F*, and a loose pulley *G*, and also three excentrics *H, I*, and *J*. The excentric *I* moves its rod *d*, which, being connected to what we call the "internal hammer" *e, e*, moves it to and fro. The excentrics *H, J*, give motion to their respective rods *f, g*, which are connected to the "external 30 hammer" *h*, and move it to and fro likewise, and this latter hammer slides over the "internal hammer" and serves as a guide and support for it; for the "external hammer" is itself supported upon two grooved wheels *i, i*, that traverse to and fro on the rails *j, j*. *K, K*, is a bed of iron, which slides freely between two dovetail grooves, and is forced up towards the hammers by two 35 powerful springs *L; L*. Upon the bed *K, K*, are two dies *B, M*, each having a semicircular hole cut in them lengthwise, so that when they are brought together they form a round hole to admit and hold firmly the iron pipe; the die *M* is moved to and fro between dovetail grooves by the screw *N*, which is

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gartered into the die M, and the screw is moved by the capstan-headed lever m, m, m, m. To make a "socket" by this machine it is used as follows:—The operator draws the bed K, K, from towards the hammers e and h, and drawing the die M apart from the die B, introduces the
 5 pipe n, o, (the end n having been previously heated to a welding heat), with so much of its end n extending beyond the front of the dies B, M, as is necessary to be enlarged or formed into a socket a, the dies are then closed together. To grasp the pipe firmly, while it undergoes the enlarging operation, the iron bed K, K, is set at liberty, and the springs L, L, force it at once in
 10 contact with the "internal hammer e, e;" the machine being now set in motion by a hand passing over the driving pulley F, the "internal hammer" e, e, presses against the inside of the pipe and causes it to expand outwards all round, and as the "internal hammer" e, e, withdraws itself, the external hammer h, h, is forced over the outside of the pipe to keep its exterior of a
 15 proper size and shape; for it might happen, if the "external hammer" was not used, that the "internal hammer" would cause the end of the pipe to expand too much. The alternate action of the two hammers is kept up until the socket is completely formed, as represented in Figure 8, which is the case when the part p of the "internal hammer" is in the same plane as the front
 20 face q of the dies, or when the bed K, K, is forced against the stop r, r. It must be understood that the object of the springs L, L, is to keep the pipe up in contact with the hammers, and partially to give way to the action of the "internal hammer" to prevent its rupturing the end of the iron pipe, which
 25 pipe had no power of receding from the blow; and it must likewise be understood, that though the springs L, L, allow the pipe to recede partially from the blow given by the hammer, they must, nevertheless, be strong enough to offer a considerable resistance to the blow, otherwise no impression could be made by the hammer upon the pipe.

30 Whereas in pipes or tubes made of iron certain excrescences arise upon their exterior surface, either from defects in the iron, imperfections in the machinery, or other causes; to give them a smooth appearance we employ a machine for this purpose, which is illustrated on Sheet 2; Figure 1 being a sectional elevation, and Figure 2 a plan. A, A, is a cylinder,
 35 supported at each end in chairs B, B, which are fixed firmly on a bench C, C, and on the outside of this cylinder four pair of "ears" D are cast, and between each pair are fixed cutters a, moveable upon centres c at one end, and their other ends fall through oblong holes e in the cylinders A, A, so that they would meet, if not prevented by wedge-shaped pieces of iron being

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placed under them, in the spaces *d, d*. *H* is a wheel, fixed to the cylinder, to give motion to it; and *I* is a cone, fastened to the cylinder by two screws, to facilitate the entrance of the pipe or tube to be operated upon into the machine. Now, suppose the pipe *J, J*, to be entering into the machine in the direction of the arrow, and that its foremost end as advanced as far as 5 the dotted line *i, i*, (which is the point of contact between the cutters and the tube); motion is then given to the cylinder *A, A*, by means of a band passing over the small pulley *K*, which moves the large spur wheel *L*, that gears into the small wheel *H*, fixed upon the cylinder, and gives a very rapid revolving motion, which, carrying the cutters round in contact with the tube, removes all 10 excrescences upon its exterior surface, and as the tube advances while the cutters revolve, its whole length becomes smooth. As the machine is designed to scrape tubes of any size up to five inches in diameter, it is necessary to be able to adjust the cutting tools *a* to these varying sizes, which is done by having wedge-shaped pieces of iron fixed under the cutters in the spaces *d, d*, 15 to keep them far enough apart, and springs *g* pressing upon the top of each cutter keeps them closely in contact with the surface of the pipe or tube. If at any time there is such a projection or excrescence upon the tube as cannot be removed by the cutters, the springs *g* will of course give way, and allow the cutters to rise until the immovable projection has passed from under them. 20 The springs are held down by small pins *m*, round which they can move, so that they can be removed from off the cutters *a* at pleasure. As the cutters *a*, revolving round the pipe or tube, will have a tendency to twist it, we employ two machines (as shewn in the Drawing), acting simultaneously, but revolving in contrary directions, which will neutralise the twisting effect of each other. 25 Figure 3 is a transverse section, taken through the line *i, i*, Figure 1, shewing the position of the cutters and the form of that part of their surfaces which are in contact with the pipe or tube, which in this case is concave, but we prefer having them flat, as shewn in section, Figure 4.

Sheet 3: Figures 1, 2, 3, 4, 5, and 6 also represent a machine for the pur- 30 pose of clearing bars or pipes from any superfluous metal which may be found thereon, by passing them through rolls or other machinery, and at the same time rendering them smooth and cylindrical upon their external surface; and in order to effect this object the machine is placed as hereafter mentioned. Letter *A* shows the frame of the machine, with its bell-mouthed or conical hole or guide 35 in the centre; the tubes, pipes, or bars passing through the rolls are thereby propelled through the cutters or escentric cams contained in this machine, as herein-after described. *c, c, c*, represent the plates, which are screwed on or secured to the frame of this machine, in which the cutters or escentrics are

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made to slide, in consequence of the edges of such plates being bevilled on their under side; D, D, D, are the cutters or escentric cams bevilled on their edges, so as to fit into the gutters or counter barrels of the plates c, c, c; e, e, e, represent the pins or studs on the cutters or escentric cams, by which they are moved backwards and forwards; F represents the escentric disc or moving plate, with its perforated parts to admit the pins or studs e, e, e, upon the cutters or escentric cams d, d, d; G is the lever and ball by which the disc escentric or moving plate F is put in motion. When the plate F is placed in the machine, it is secured in its proper position by a covering plate H, screwed to the machine, by which means it is kept in proper working gear. When the lever is raised up, it has the effect of forcing back the cutters or escentric cams, and when it is again lowered it has the effect of closing them, and when so closed together they form a perfectly cylindrical hole of the required size. The entrance of the cylindrical hole contained in these cutters may either be perfectly square, so as to throw up a cutting edge, or may be made bell-mouthed or conical, whichever may be found best to answer the purpose required. Our intention is to place the machine upon the shield at the back of the rolls, patented by me, the said Richard Prosser, on the Twenty-seventh day of March, One thousand eight hundred and forty, for welding pipes, for the purpose of removing any fins or superfluous metal that may be upon them, when they, the pipes, leave the rolls, and to make them perfectly cylindrical and smooth; and to enable this to be done, it will be necessary to fix this machine exactly opposite the centre of the rolls, so that the bar or pipe, when it passes through the rolls, will, on leaving the bite of the rolls, pass direct through the centre of this machine; as soon as the bar or pipe reach the cutters or escentric cam the lever is shut down, this brings the cutters or escentric cams together, which press the tube or pipe as it is propelled by the rolls through, and clears them of any superfluous metal which may be on the external surface of the bar or pipe.

Sheet 4: Figure 1 represents a box or bed, containing three or more rollers, which when put together form a perfect circle. We place the box or bed upon a draw-bench against a pair of stops, and then introduce the end of a tube between the rollers; the end of the tube which is so passed through the rollers is then taken hold of by a pair of pliers attached to an endless chain, and the gear of the bench is then thrown into motion, and the tube is drawn through the rollers; this will have the effect of rendering the tube perfectly cylindrical and uniform on its external surface throughout. If the tubes are intended to be made in any other form or shape than round, or to be ornamented, by either being fluted, beaded, or otherwise, it will be necessary to have the rolls turned into the

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required slopes, as Figures 2, 3, and 4; or if the tubes are required to have the appearance of being embossed, then it will be necessary to have the rollers engraved with the pattern required; when the rollers are so prepared and fixed in the box or bed, the tube is inserted between the rollers and drawn through at the draw-bench, as before described. A mandril may either be used or not in performing this operation, but we prefer using a mandril, and having the tube red-hot; when the tube has been passed through the rolls, and a perfect impression made thereon of the pattern required, they may then be applied to a variety of purposes, such as bedsteads, palisadoes, &c. &c. If they are required for palisadoes, we should finish them by attaching some kind of ornament upon the top, and to accomplish this we mould up some device or ornament in sand in moulds, as is usually done in foundries, and having done this we place one of the tubes in the mould, and proceed to run the melted metal into the mould, when the ornament will be formed, and will be secured to the iron tube. This being done, they may then be cut off to the required length, and used as palisadoes or fencing, in the same way as cast iron is now used for these purposes.

Our method of turning up flat plates of iron, called "skelps," into the form of pipes or tubes previously to their being welded, is represented in Figures 1, 2, 3, 4, 5, and 6 on Sheet 5. Figure 1 is a plate of iron or "skelp," having so much of its end A turned up as is necessary to insert it into the machine; Figure 2 is a plan of the machine; Figure 3, a side elevation; Figure 4, a vertical section through the line B, B, on Figure 2; Figure 5 is an end elevation, and Figure 6 is a section, through the line C, C, on Figure 2; D, D, is the frame, on which a pair of rollers E, F, capable of revolving, and a trough or gutter G, are fixed; H is a roller working in the gutter, and having attached to its axle I, I, a lever (not shewn in the Drawing), by which it can be raised or depressed at pleasure; J is a mandril, inserted between the rolls to keep the iron "skelp" from collapsing irregularly as it is drawn in between the rollers E, F; K is a wurtle (kept in its place by two bars L, M), having a conical hole in it, through which the "skelp" is drawn, to form it into a round pipe (previously to its being welded). Skelps are turned up in this machine in the following manner:—The roller H having been raised and the mandril J taken away from between the rollers E, F, the end A of the "skelp," shewn in Figure 1, is forced through the rolls E, F, until it occupies the position represented by the dotted lines a, a, a, a. The roller H being then depressed and brought in contact with the skelp, and the mandril J inserted inside the skelp and between the rollers, as shewn in the Drawings, the end A of the "skelp" is taken hold off by the pliers of the draw-bench, and the draw-bench set and continued in motion until

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the whole of the skelp is drawn through the wurtle and brought into a round form, like the end A. of the "skelp" in Figure 1. The rollers H and E, E; merely act as auxiliaries in "turning up" the "skelp;" into a round form; it is left for the wurtle to complete the operation.

5 One of our improvements in the manufacturing of pipes or bars, consists in the use of a brush, composed of iron or steel wire, or other proper fibrous material, which we employ for the purpose of brushing off or removing any superfluous or foreign substance from the surface of the pipe both before and after the welding process. For these purposes, we employ the fibrous brushes, first to remove any
10 redundant matter sticking to the tube before the welding is performed; and, secondly, we form the fibrous material into circular brushes, and pass the pipe or bar at a red heat between the external surfaces of two or more brushes while the circumferences of the brushes are in rapid motion, and by passing and re-
15 passing the pipe or bar at a red heat between the revolving brushes the external surface of the tube is cleaned from scale or oxide; or the brushes may be stationary and the pipe passed over the surface of the fibrous material forming the brush, which we prefer should be composed of steel wire, like the brushes in ordinary use, called scratch brushes; our object being to remove any foreign
20 substance from the surface of the pipe or bar while it is at a welding heat and before it is welded; and, secondly, to clean the surface of the pipe or bar from scale or oxide afterwards.

Sheet 6: Figure 1 is a plan of a set of bedsteads formed out of pipes or bars; Figure 2, a side elevation of the same; and Figures 3, 4, 5, 6, 7, and 8 shew in detail the application of pipes or bars to the manufacture of bedsteads.
25 Figures 3, 4, and 5 exhibit one method of connecting the pipes or bars together; and Figures 6, 7, and 8, another method of accomplishing the same thing.

Having now described our "Improvements in the Machinery to be used in Manufacturing of Pipes and Bars, and in the Application of such Pipes or Bars to various Purposes," and explained how they are to be carried into effect, we
30 wish it to be understood that we claim, as our Invention, the improvements in manufacturing pipes or bars described in this our Specification, and shewn on Sheets 1 to 6, inclusive, of the Drawings hereunto annexed. And we also claim the application of such pipes or bars to various useful purposes, such as bedsteads or palisadoes.

35 In witness whereof, we, the said Richard Prosser and Job Cutler, have hereunto set our hands and seals, this Nineteenth day of October, in the year of our Lord One thousand eight hundred and forty-three.

RICHARD (L.S.) PROSSER.

JOB (L.S.) CUTLER.

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SLAVET, Extra.

AND BE IT REMEMBERED, that on the Nineteenth day of October, in the year of our Lord 1843, the aforesaid Richard Prosser and Job Cutler came before our said Lady the Queen in Her Chancery, and acknowledged the Specification aforesaid, and all and every thing therein contained and specified, in form above written. And also the Specification aforesaid was stamped according to the tenor of the Statute made for that purpose.

Enrolled the Twentieth day of October, in the year of our Lord One thousand eight hundred and forty-three.

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