No. 647,868. Patented Apr. 17, 1900.

. P. C. PATTERSON.

APPARATUS FOR SCARFING AND BENDING SKELP.

(Application filed July 5, 1898.)

(No Model.) 4 Sheets—Sheet 1.

Fig. 1.

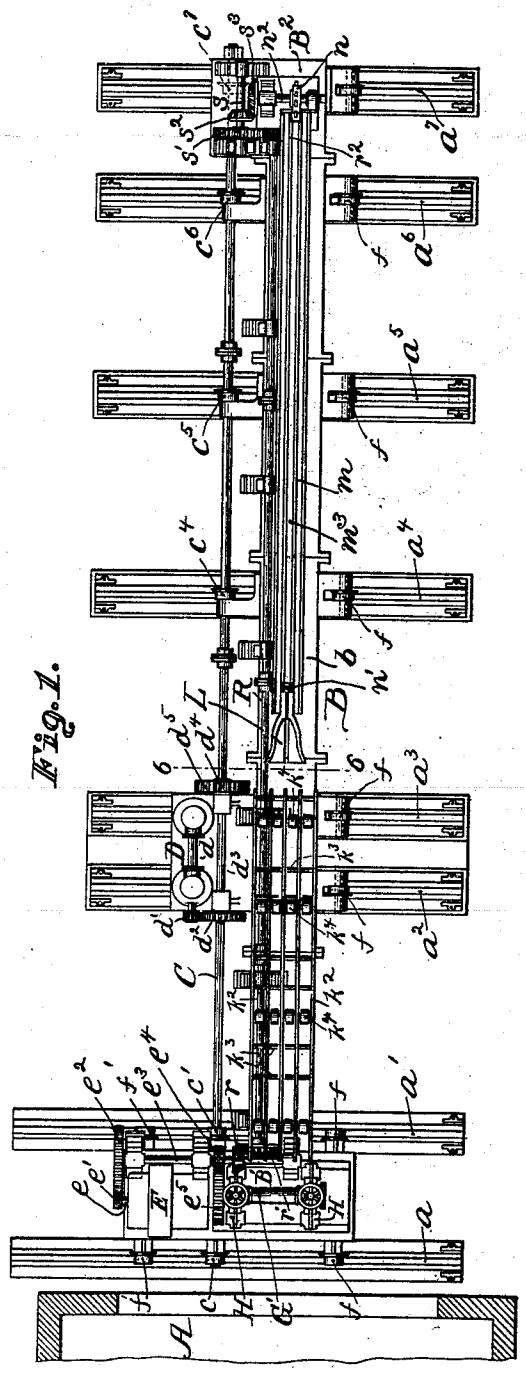
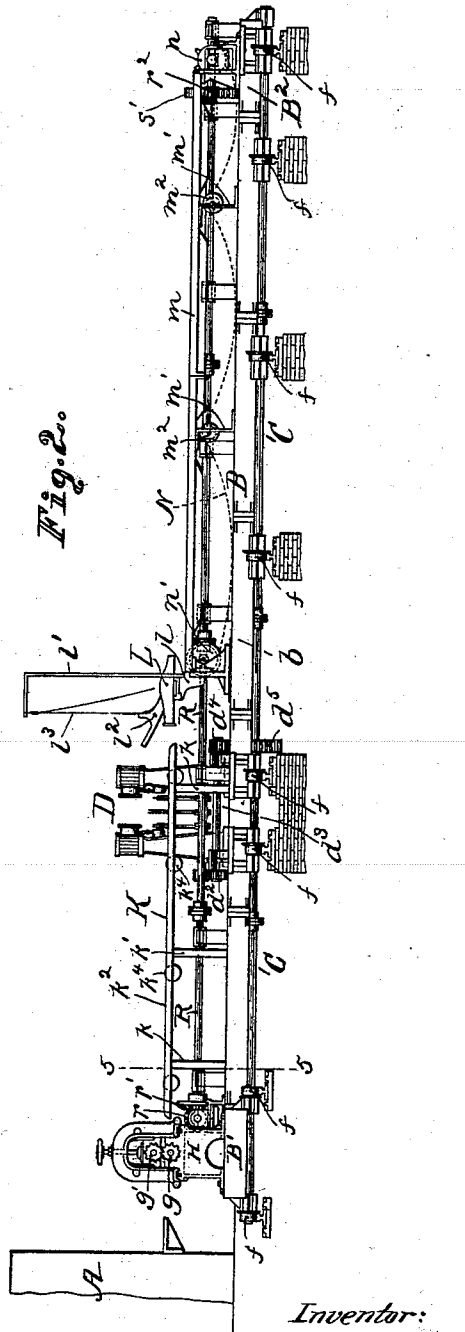


Fig. 2.



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## APPARATUS FOR SCARFING AND BENDING SKELP.

(No Model.) (Application filed July 5, 1898.) 4 Sheets—Sheet 2.

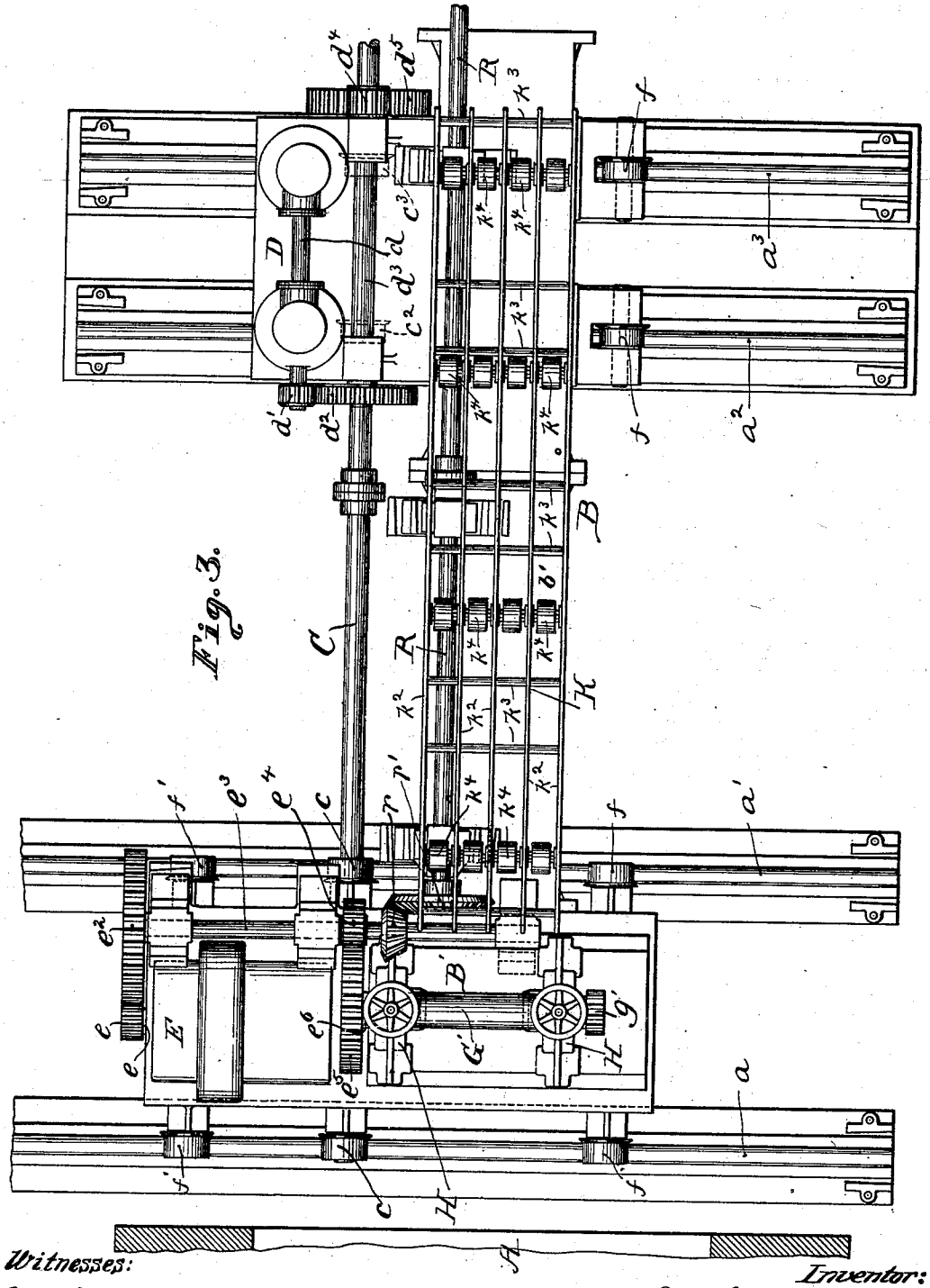


Fig. 3.

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APPARATUS FOR SCARFING AND BENDING SKELP.

(No Model.) (Application filed July 5, 1898.) 4 Sheets—Sheet 3.

Fig. 6.

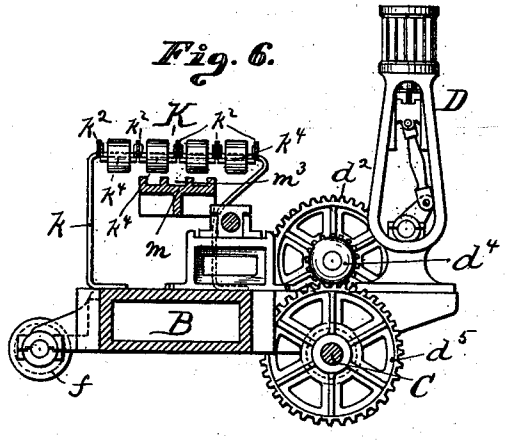



Fig. 4.

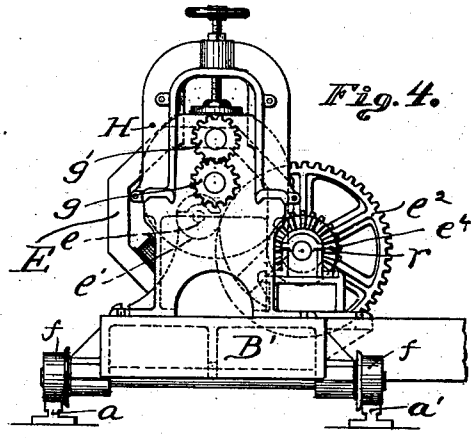



Fig. 5.

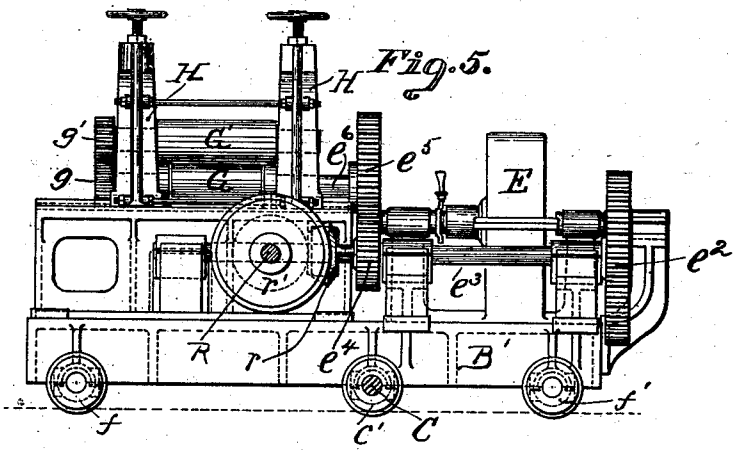



Fig. 7.

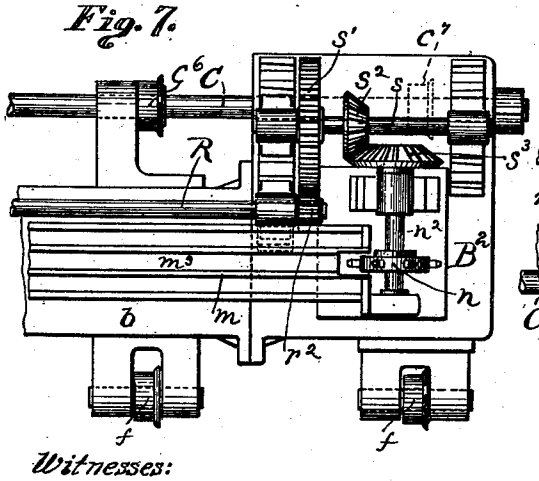
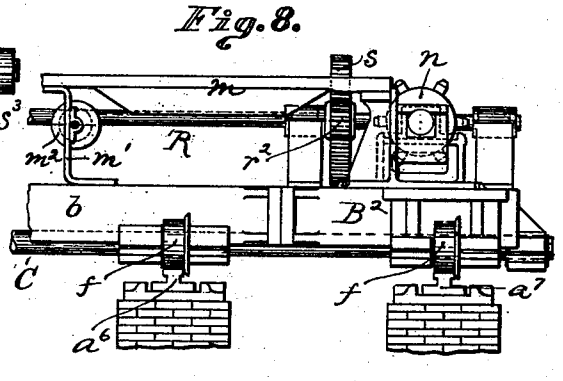



Fig. 8.




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APPARATUS FOR SCARFING AND BENDING SKELP.

(No Model.) (Application filed July 5, 1898.) 4 Sheets—Sheet 4.

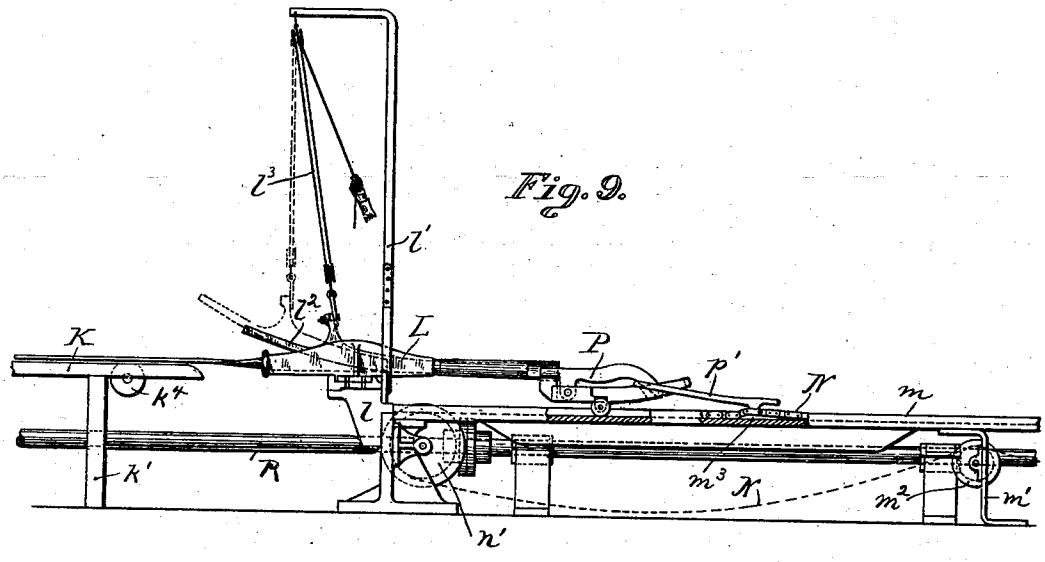



Fig. 9.

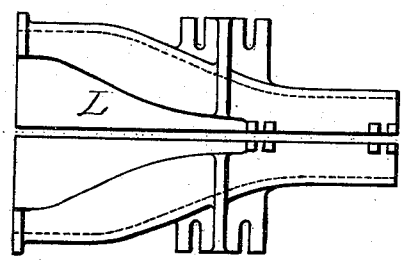



Fig. 10.

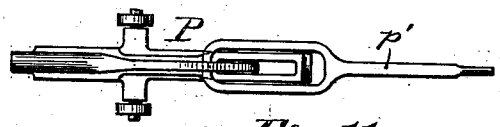



Fig. 11.

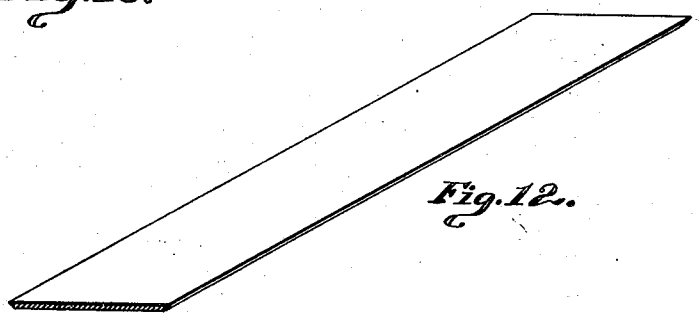


Fig. 12.

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# UNITED STATES PATENT OFFICE.

PETER CHARLES PATTERSON, OF McKEESPORT, PENNSYLVANIA, ASSIGNOR TO THE NATIONAL TUBE COMPANY, OF NEW YORK, N. Y., AND PITTSBURG, PENNSYLVANIA.

## APPARATUS FOR SCARFING AND BENDING SKELP.

SPECIFICATION forming part of Letters Patent No. 647,868, dated April 17, 1900.

Application filed July 5, 1898. Serial No. 685,218. (No model.)

*To all whom it may concern:*

Be it known that I, PETER CHARLES PATTERSON, a resident of McKeesport, in the county of Allegheny and State of Pennsylvania, have invented a new and useful Improvement in Apparatus for Scarfing and Bending Skelp; and I do hereby declare the following to be a full, clear, and exact description thereof.

My invention relates to apparatus for scarfing and bending tube-skelp, its object being to provide efficient mechanism for scarfing and bending the heavy skelp used in the manufacture of tubing of large diameter, so that the plate can be both scarfed and bent into skelp form at the same heat, and to provide such apparatus which can be moved transversely across the heating-furnace, so that it can receive the plates from different parts of the furnace and either individual plates or piles of plates may be heating in the furnace during the scarfingand bending of other plates.

It comprises, generally stated, the combination, with a heating-furnace, of a carriage movable transversely in front of the same and having scarfing-rolls close to the furnace, a receiving-platform back of such rolls, a skelping-die in line with the rolls, drawing mechanism back of the skelping-die, and driving mechanism both for the movement of the carriage and for the operation of the rolls and the drawing mechanism, which are mounted on and travel with the carriage and are therefore entirely at the control of the operators on the carriage.

The particular points of invention desired to be covered will be hereinafter more fully set forth and claimed.

To enable others skilled in the art to make and use my invention, I will describe the same more fully, referring to the accompanying drawings, in which—

Figure 1 is a plan view of the apparatus embodying the invention. Fig. 2 is a side view of the same. Fig. 3 is an enlarged plan view of the front end of the apparatus. Fig. 4 is an enlarged side view of the extreme front portion thereof. Fig. 5 is a cross-section on the line 5 5, Fig. 2, looking toward the furnace. Fig. 6 is a cross-section on the line 6 6, Fig. 1. Fig. 7 is a plan view, and Fig. 8 is a side view, of the extreme rear end of the apparatus. Fig. 9 is an enlarged side view of the middle or scarfing portion of the apparatus. Fig. 10 is a plan view of the bending-dies. Fig. 11 is a plan of the skelping-tongs used in drawing the plate through the dies, and Fig. 12 is a perspective view of a portion of plate after having passed through the scarfing-rolls.

Like letters of reference indicate like parts in each.

The general machine embodying the invention is constructed upon a plan to enable it to handle plates of large width and weight, and it therefore includes a long continuous carriage—long enough to receive the plate from the furnace, roll the bevels or scarfs thereon, and deliver it onto a platform, from which it is received in the skelping-die, being grasped by the skelping-tongs and pulled through that die by the drawing mechanism. As the plates handled are generally over eighteen (18) feet in length, it will be seen that the machine itself must be of considerable length, and, as it moves transversely, it must be supported at different points. For this purpose I have provided the tracks $a$ and $a'$ close to each other at the proper point to support the weight of the rolls, the motor, and the connecting mechanism between the rolls and motor, and the tracks $a^2$ $a^3$ close together in proper position to support the motor or engine for moving the machine transversely, and back of the same the tracks $a^4$ $a^5$ $a^6$ $a^7$ to support the rear portion of the machine. These tracks are built upon suitable foundations in front of the heating-furnace A.

The carriage B of the machine has the bed-plate $b$ cast to shape and formed in sections, as is necessary for a machine of the length above referred to, which sections are securely bolted together, the bed-plate being of course of proper shape to provide the necessary bearings for the different parts of the apparatus and being formed of hollow castings to reduce the weight.

For the general support of the machine upon the tracks I provide the power-driven

rollers $c$ $c'$ $c^2$ $c^3$ $c^4$ $c^5$ $c^6$ $c^7$, running on the tracks above referred to, all of which are rigidly secured to the longitudinally-extending power-shaft C, which is driven by the power-generating mechanism D, which is illustrated as a steam motor or engine, practical use showing that this is the best form for giving the necessary control of the movement of the machine, reversing engines or motors being used, so that the direction of the movement of the entire machine transversely of the furnace can be controlled thereby. The power of the motor or engine is transmitted from the motor-shaft $d$ through the pinions $d'$ $d^2$ to the shaft $d^3$, which extends above the shaft C and gears therewith through the pinion $d^4$ and gear-wheel $d^5$, the speed of the engine being thus geared down to reduce it to the proper speed and to obtain the necessary power for the movement of the heavy carriage. To support the carriage B, I also employ the idle rollers or wheels $f$, extending along on one side of the carriage and traveling on the different tracks, and on account of the width of the frame where the motor E for driving the beveling or scarfing rolls is located provide also the idle rollers or wheels $f'$ on the other side of the machine to support that part of the frame.

It will be seen in Figs. 3 and 5 that the main driving-motor for the rolls is supported at one side of the rolls on what might be termed the "motor bed-plate" B', an electrical motor being provided in this case, such being preferred to generate the necessary power within the confined space, and a motor of high efficiency being supported on the bed-plate B' at one side of the frame, its armature $e$ carrying the pinion $e'$, meshing with the gear-wheel $e^2$, carried on the cross-shaft $e^3$, which shaft has the pinion $e^4$ meshing with the gear-wheel $e^5$ on the shaft $e^6$ of the lower or bevel roll G, which roll is mounted in the housings H, supported on the bed-plate B'. The said housings also carry the plain-faced roll G', and the two rolls G and G' are connected by the gears $g$ $g'$ on the opposite side of the housings H to the gear-wheel $e^5$, the power being thus transmitted by mechanism supported on or forming part of the auxiliary bed-plate $b'$, carrying all the bearings for the parts in which the gearing, shafts, rolls, &c., are mounted.

As will be seen more particularly in Figs. 2 and 3 and as shown at the front end of Fig. 6, I support on the bed-plate back of the scarfing-rolls G G' the receiving-table K, such table being supported above the main bed-plate on standards $k$ $k'$ and being formed of a series of longitudinally-extending bars or plates $k^2$, having cross-braces $k^3$, and mounted on said bars or plates at intervals on the table are the antifriction-rolls $k^4$, so that when a plate is delivered from the beveling-rolls it will pass onto this roller-platform and will travel with the speed obtained in the rolls back along the same in proximity to the skelping-die L, in which it is to be bent into skelp form. The roller-platform is supported, as shown, on the same horizontal plane as the furnace-opening, the pass of the rolls, and skelping-die, and a considerable distance above the bed-plate $b$ of the carriage, and through the series of rolls thereon it provides an antifriction-table along which the scarfed or beveled plate may be drawn with the exertion of little force into position to be grasped by and drawn through the skelping-die.

The skelping-die L is mounted in the skelping-frame $l$, resting on the bed-plate just back of the platform and secured to and forming the front part of the draw-bench platform $m$. The skelping-frame $l$ has the gallows $l'$ extending up therefrom, from which the skelping-mandrel $l^2$ is suspended by the chain $l^3$ in position to be swung within the die as soon as the plate to be skelped has been drawn into the same by the tongs P. The special skelping-die and skelping-mandrel can of course be changed as desired, according to the different sizes of skelp to be produced. The draw-bench platform extends backwardly from the skelping-die frame $l$, which supports its forward end, to the rear end of the machine, as shown more particularly in Figs. 1, 2, 7, and 8, and it is connected at its rear end to the rear section $B^2$ of the bed-plate $b$, being braced at intervals in its length by the standards $m'$, which also carry the chain-supporting rollers $m^2$ for the draw-chain, these standards extending between the bed-plate $b$ to the draw-bench platform $m$. Mounted in the rear section $B^2$ of the bed-plate is the driving-sprocket $n$ of the draw-chain, and mounted in the skelping-die frame $l$ is the guide-wheel $n'$ of the draw-chain, the draw-chain N extending along the draw-bench platform $m$ in the guide-way $m^3$ thereof between the wheels $n$ and $n'$, and thence over the supporting-wheels $m^2$, above referred to.

As it is desirable in the operation of the machine to drive the draw-chain N continuously and at a proper speed, a very considerable power is required for the drawing of the skelp on account of the great friction on such heavy plates within the skelping-die in bending. I find that I am enabled to obtain the necessary power from the same motor which drives the scarfing or beveling rolls G G', and thus to carry on the main carriage all power necessary for the running both of the beveling-rolls and the skelping mechanism. For this purpose I connect to the cross-shaft $e^3$ a series of gearing leading from the motor to the rolls above described, the bevel-pinion $r$ on said cross-shaft $e^3$ meshing with the bevel-gear $r'$ on the longitudinal power-transmitting shaft R, which extends for the full length of the machine back to the rear bed-plate section $B^2$ thereof and is there connected up so as to drive the sprocket-wheel $n$. For this purpose the shaft R carries the pinion $r^2$, which meshes with the gear-wheel $s'$ on the longitudinal shaft $s$, this shaft also carrying the bevel-pinion $s^2$, meshing with the bevel-

gear $s^3$ on the sprocket-wheel shaft $n^2$, the power being thus transmitted from the motor E through the gearing $e'$ $e^2$, shaft $e^3$, bevel-gearing $r$ $r'$ and longitudinal shaft R, gearing $r^2$ $s'$, shaft $s$, and bevel-gearing $s^2$ $s^3$ to the sprocket-wheel $n$, and said sprocket-wheel being continuously rotating and the sprocket-chain traveling continuously along the drawing-bench $m$. For the purpose of drawing the tubing I employ the buggy P, above referred to, which travels on the draw-bench $m$ and has the hooked arm $p'$, which engages with the draw-chain N, the nose of the buggy being adapted to pass through the skelping-die and grasp the plate, so as to draw it through the die.

When the apparatus above described is employed in connection with the beveling or scarfing of skelped plate and the bending of the same into skelp, the plates are charged into the furnace either in single plates or in piles, as desired, and when a plate is to be scarfed and skelped by means of the steam-motor D the entire carriage is drawn in line with that plate, the carriage being moved from one side to the other through the mechanism turning the shaft C, driving the wheels $c$, &c., on said shaft, and in that way drawing the whole frame opposite to any part of the opening of the furnace desired. The motor E runs continuously, and the scarfing or beveling rolls G G' and the draw-chain N of draw-bench are driven continuously thereby by the mechanism above described. When the plate is ready, by suitable pushing mechanism operating through the furnace—such as that illustrated in the companion application filed by me of even date herewith, Serial No. 685,219—the plate is pushed from the furnace into the rolls G G', and when the rolls grasp the plate they draw it through and its edges are rolled down to beveled or scarfed form, as shown in Fig. 12, while the plate itself may be brought to the exact gage desired. As the plate passes through the rolls it passes onto the supporting-roller platform K, traveling over the idle rollers thereon, and passing in its course close to the skelping-die. The operator can then move it into position for grasping by means of the skelping-tongs P, and he passes the tongs through the skelping-die L and grasps the plate, grips it by the tongs, and draws it through the skelping-die, as illustrated in Fig. 9, the skelping-tongs and the buggy being connected to the continuously-traveling draw-chain N and the beveled plate being thus skelped at the same heat at which it was beveled and before there is an appreciable loss of heat therein, the apparatus thus providing for the beveling and skelping of the very wide and heavy plates used in the formation of the larger diameters of tubing at the same heat and with practically no manual labor. As soon as that skelp has been formed other plates as they are brought to the proper heat in the furnace can be fed to the rolls, the carriage either remaining stationary if a pile of plates is to be beveled and skelped until that pile is done or being moved transversely of the furnace where single plates are being skelped, or after each pile is done, as found desirable.

By means of the apparatus I am thus enabled to provide for the rapid and easy handling of the wide and heavy plates used in making large sizes of tubing with practically no manual labor and to provide for both beveling and skelping the same at the same heat, thus doing away with much loss occasioned from the double heating of the plate, once for beveling and once for skelping. The whole apparatus is at the control of an engineer, while the only other workmen necessary are for directing the plate into the rolls and for the operation of the skelping-dies.

What I claim as my invention, and desire to secure by Letters Patent, is—

1. In combination with a heating-furnace, a carriage moving transversely in front of the same, and carrying scarfing or beveling rolls close to the furnace, a receiving-platform back of the rolls, a skelping-die back of the platform and in line with the rolls, and drawing mechanism back of the skelping-die, a driving-motor mounted on said carriage and gearing connecting said motor both to the scarfing rolls and to the drawing mechanism, substantially as set forth.

2. In combination with a heating-furnace, a carriage moving transversely in front of the same and carrying scarfing or beveling rolls close to the furnace, a receiving-platform back of the rolls, a skelping-die back of the platform and in line with the rolls, and drawing mechanism back of the skelping-die, a motor mounted on the carriage at one side of the driving-rolls, gearing connecting the motor and rolls, a shaft extending longitudinally of the frame and driven by beveled gearing from the motor, and gearing connecting said shaft with the drawing mechanism, substantially as set forth.

3. In combination with a heating-furnace, a carriage moving transversely in front of the same and carrying scarfing-rolls close to the furnace, a receiving-platform back of the rolls, a skelping-die back of the platform and in line with the rolls, and drawing mechanism back of the skelping-die, a motor E mounted on the carriage at one side of the scarfing-rolls, the gearing $e'$ $e^2$, shaft $e^3$ and gearing $e^4$ $e^5$ connecting the armature-shaft and rolls, a longitudinally-extending power-shaft R, the bevel-gearing $r$ $r'$ connecting the shaft $e^3$ and shaft R, and connections from said shaft R to the drawing mechanism, substantially as set forth.

4. In combination with a heating-furnace, a carriage movable transversely in front of the same, said carriage having a continuous bed-plate supporting a receiving-platform, a skelping-die and drawing mechanism in line with each other, and said platform having the platform-section B' carrying the motor E

and scarfing-rolls G G', and gearing mounted on said bed-plate and connecting the motor and rolls, substantially as set forth.

5. In combination with a heating-furnace, a carriage movable transversely in front of the same and having a bed-plate supporting scarfing-rolls, a receiving-platform, skelping-dies and drawing mechanism back of the same, said bed-plate having a rear end section supporting the sprocket-wheel of the drawing mechanism, a motor mounted at the front end of the bed-plate, power mechanism extending from said motor to the rear end of said platform, and gearing connecting said power mechanism to said sprocket-wheel, substantially as set forth.

6. In combination with a heating-furnace, a carriage movable transversely in front of the same and having a bed-plate supporting scarfing-rolls, a receiving-platform, skelping-dies and drawing mechanism back of the same, said bed-plate having a rear end section supporting the sprocket-wheel of the drawing mechanism, a motor mounted at the front end of the bed-plate, power mechanism extending from said motor to the rear end of said platform, and gearing connecting said power mechanism to said sprocket-wheel, said gearing having the pinion $r^2$ on the main power-shaft R, pinion $s'$, shaft $s$ and bevel-gear $s^2 s^3$, substantially as set forth.

7. In combination with a heating-furnace, a scarfing and bending apparatus having a carriage movable transversely in front of the same, said carriage being provided with a bed-plate supporting a motor and scarfing-rolls at the front end of the same, a receiving-platform back of the rolls, skelping-dies and drawing mechanism back of the platform, and carrying on the bed-plate between the ends thereof a reversible motor geared to and driving a longitudinal shaft connected to driving-wheels for moving said carriage transversely, substantially as set forth.

8. In combination with a heating-furnace, a series of tracks extending transversely thereof in front of the same, a scarfing and bending apparatus carried on wheels traveling on said track in front of the furnace, said apparatus having scarfing-rolls and skelping-dies back of the same, and carrying between the ends the reversible motor D and having the longitudinally-extending shaft C carrying the power-driven wheels $c$ on said tracks, and connections between said motor and shaft, substantially as set forth.

In testimony whereof I, the said PETER CHARLES PATTERSON, have hereunto set my hand.

PETER CHARLES PATTERSON.

Witnesses:
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ROBT. D. TOTTEN.