No. 774,228. PATENTED NOV. 8, 1904.

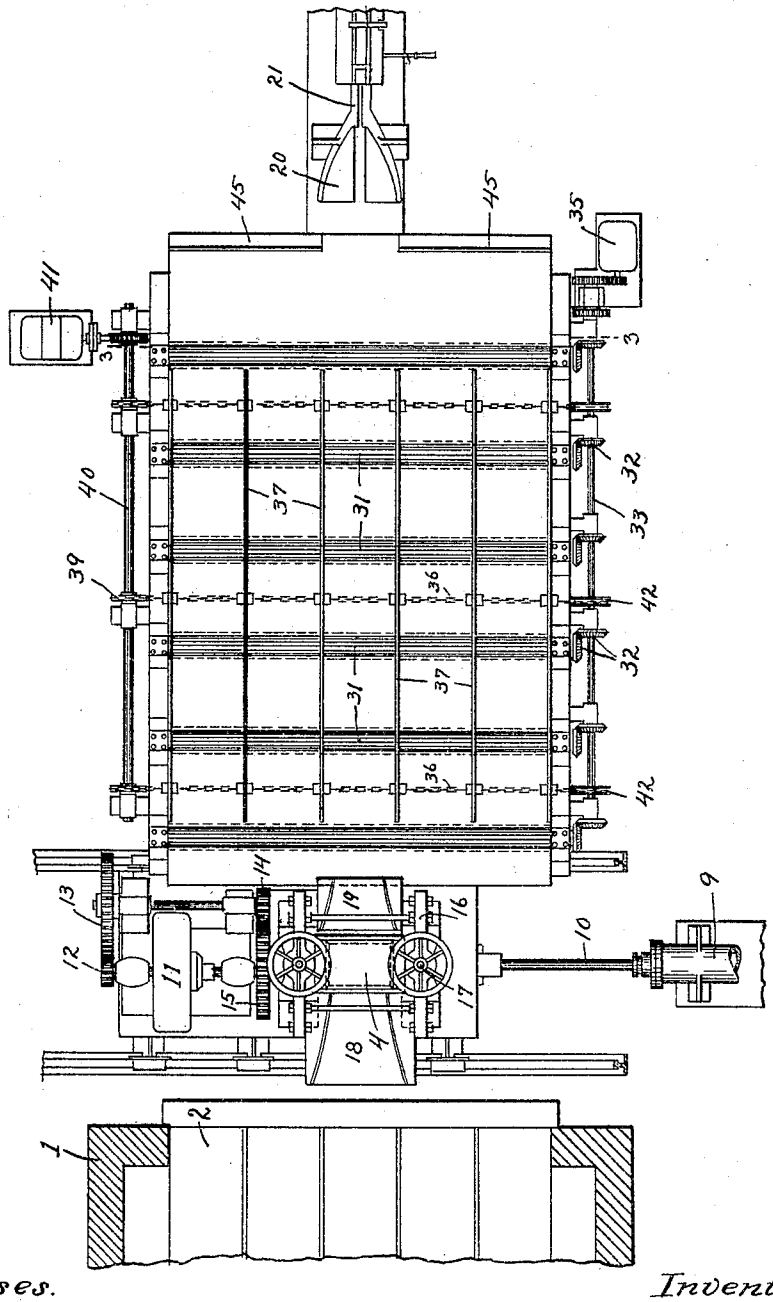
J. F. BOAX.

SCARFING AND BENDING DEVICE WITH TRANSFER TABLE.

APPLICATION FILED FEB. 15, 1902.

NO MODEL. 2 SHEETS—SHEET 1.

Fig. 1



Witnesses.
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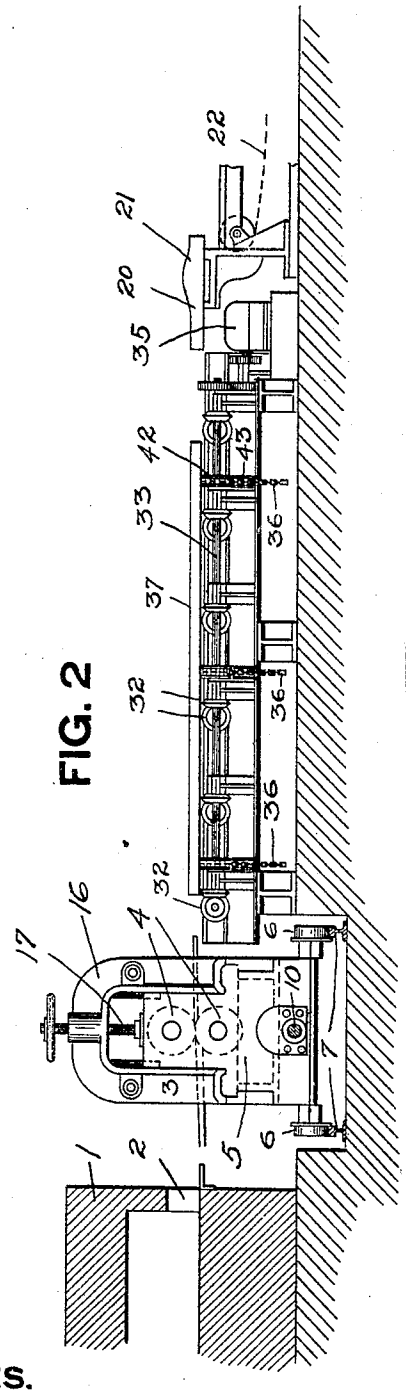


FIG. 2

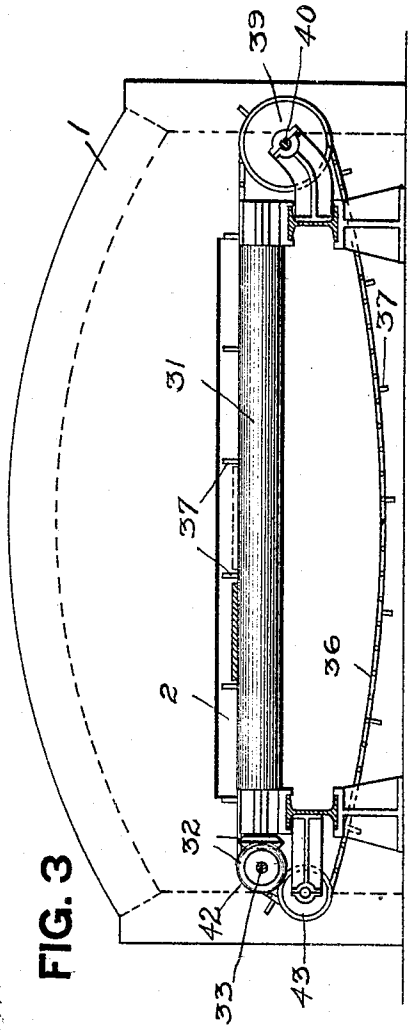


FIG. 3

WITNESSES.

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No. 774,228. Patented November 8, 1904.

UNITED STATES PATENT OFFICE.

JAMES F. BOAX, OF McKEESPORT, PENNSYLVANIA, ASSIGNOR TO NATIONAL TUBE COMPANY, OF PITTSBURG, PENNSYLVANIA, A CORPORATION OF NEW JERSEY.

SCARFING AND BENDING DEVICE WITH TRANSFER-TABLE.

SPECIFICATION forming part of Letters Patent No. 774,228, dated November 8, 1904.

Application filed February 15, 1902. Serial No. 94,274. (No model.)

To all whom it may concern:

Be it known that I, JAMES F. BOAX, a resident of McKeesport, in the county of Allegheny and State of Pennsylvania, have invented a new and useful Improvement in Scarfing and Bending Devices with Transfer-Tables; and I do hereby declare the following to be a full, clear, and exact description thereof.

My invention relates to scarfing and bending apparatus for use in connection with a heating-furnace; and its object is to provide apparatus for this purpose which can be used in conjunction with a wide furnace and without the necessity of moving the entire apparatus, thus making it much simpler to handle and keep in repair.

My invention is especially adapted for use in connection with what are known as "bending-furnaces" for bending plates into skelp for subsequent welding into tubing. The furnaces for this purpose are usually constructed quite wide, so as to receive a series of plates side by side. This is necessary because the heat in bending-furnaces must necessarily be low in order to soak into the body of the plates, and in order to get the necessary output a number of plates must be simultaneously heating in the furnace. These plates after being heated to a bending temperature are drawn out of the furnace and passed through suitable scarfing devices, usually power-driven rolls, which scarf the edges of the plates, so that when they are bent into tubular form, with the edges overlapped and welded, it will not necessarily thicken the walls of the tube. From the scarfing-rolls the plates pass to the bending devices, which may consist of suitable rolls, but preferably comprise a funnel or bell shaped die and suitable drawing apparatus, such as tongs, attached to a continuously-traveling chain, whereby the plate is drawn through the die and bent thereby practically into tubular form. In order to conveniently feed the plates from each of the positions in the furnace to the scarfing and bending devices, it is the practice to make the latter movable transversely in front of the furnace, so that they can be brought into line with each of the plates in the furnace. The scarfing and bending devices are therefore mounted on a carriage and suitable power mechanism, such as an electric or hydraulic motor, is connected thereto, so as to move the same transversely. This requires considerable power by reason of the weight of the scarfing-rolls and bending devices and also complicates the driving connection for the scarfing-rolls and bending devices. As a consequence the apparatus is difficult to handle and liable to get out of repair. It also necessitates expensive apparatus, such as a trolley, for transferring the skelp from the bending devices to the welding-furnace.

The object of my invention is to overcome the foregoing difficulties in devices of this kind, and to this end I make use of a stationary bending device and move only the scarfing-rolls and provide a suitable transfer-table intermediate the scarfing-rolls and bending device, whereby the plate, no matter from which position in the furnace it is received, will be transferred to the stationary bending device.

In the accompanying drawings, Figure 1 is a plan view of the apparatus. Fig. 2 is a side view of the same, and Fig. 3 is a cross-section on the line 3 3, Fig. 1.

The bending-furnace is shown at 1, and it is or may be of the usual construction, preferably being heated by gas. This furnace has a hearth of sufficient width to receive a number of tube-plates side by side, the particular furnace shown being arranged for receiving five such plates, although this number may vary, depending upon the width of the plates and the size of the furnace. These plates are usually charged into the furnace at the rear and drawn out of the furnace at the front. The furnace shown is provided in its front end with an opening 2, through which the plates are pushed by an incoming plate into the scarfing-rolls.

The scarfing device is shown at 3, and this may be of any of the usual constructions for this purpose, and the drawings show the usual rolls 4 employed for this purpose. These are

mounted upon a carriage 5, having wheels 6, running on tracks 7 in front of the furnace. This carriage may be moved on said tracks by any suitable mechanism, and I have shown for this purpose a hydraulic cylinder 9, having its piston-rod 10 connected to said carriage. By means of this cylinder the carriage will be moved to bring the scarfing-rolls in line with any one of the plates in the furnace, as will be readily understood. These scarfing-rolls must be power-driven, and any suitable mechanism for this purpose may be employed. For convenience in making the connections, however, I prefer to use an electric motor mounted directly on the carriage, said motor being shown at 11, having its armature-shaft provided with a pinion 12, connected by suitable intermediate gearing 13, 14, and 15 with the scarfing-rolls. Any suitable gearing for this purpose may be used, and as it forms no part of my invention further description thereof is not necessary. The scarfing-rolls are mounted in the usual housings 16 and adjusted by the screws 17. Both in front of and behind these scarfing-rolls are suitable guides or tables 18 and 19, the former projecting toward the furnace and the latter toward the transfer-table.

The bending device is shown at 20, and this also may be of any of the usual forms now in common use. I have shown for this purpose a die 21, which is substantially bell-shaped and through which the plate is drawn to bend the same up into practically tubular shape. The plate may be drawn through this guide by any appropriate mechanism, and I have shown for this purpose a draw-chain 22, which runs over a table or bench 23, passing over sprocket-wheels 24 at the ends thereof. The plate will be connected to this draw-chain by any suitable gripper and buggy, all of which are so common in the art that further description is not necessary. The chain 22 preferably runs continuously, and any suitable mechanism for driving the same may be employed.

The bending device 20 is preferably in line with the central line of the furnace, so that plates received from this position in the furnace can be fed directly from the scarfing-rolls to the bending device. Plates received from either side of this central position in the furnace must, however, be transferred laterally in order to bring them in line with the bending device. To transfer them laterally, I provide a transfer-table 30 of a width equal to the width of the hearth of the furnace, so that it can receive the plates from any position in the furnace. To move the plates forward on said table and toward the bending device, suitable power-driven means may be used, and I have shown for this purpose the rollers 31, journaled in said table and extending for the full width thereof. These rollers may be driven by any suitable mechanism—such, for instance, as sprocket-wheels and chains; but I prefer to use beveled gears 32 on the shafts of said rollers, which are engaged by similar pinions on a shaft 33, mounted on the side of the table and extending longitudinally thereof, said shaft being driven from any suitable source—such, for instance, as the electric motor 35. By means of this motor and the gearing shown the rollers 31 will be positively driven, thus feeding the plates forward toward the bending device, and if the plate is received from the central position in the furnace no further movement thereof is necessary. The plates received from either side of this central position must, however, be moved laterally on the table into line with the bending devices. Various mechanisms for this purpose may be employed; but I prefer to use one or more sprocket-chains 36, arranged transversely of the table and having their upper reaches lying on top of said table and shown and provided with one or more fingers or projections which will engage the plate and move the same sidewise. When a series of such chains are used, as shown, these fingers or projections may suitably be united to form the bars 37, thus engaging the plate for the full length thereof. This, however, is not necessary. These chains will be driven from any suitable source of power and by such mechanism that they can be driven intermittently and in either direction, if desired or necessary. I have shown the same at one side of the table passing over sprocket-wheels 39 on a shaft 40, mounted on the side of the table and extending longitudinally thereof. This shaft may be driven from any suitable source of power; but I prefer to use an electric motor 41 of the reversing type, so that said chains can be driven in either direction and stopped at pleasure. This motor will preferably be provided with a solenoid-brake, so as to quickly stop the travel of the chains. On the opposite side of the table the chains pass over pulleys or sprocket-wheels 42, loosely mounted on the shaft 33, and thence around guide pulleys or wheels 43, as shown in Fig. 3. At the forward end of the table 30 and at each side of the central line thereof are suitable stops 45, formed by bolting angle-bars to the table.

In the use of the apparatus described the scarfing-rolls will be moved by the hydraulic cylinder 9 into line with any one of the plates in the furnace, and said plates will be pushed out of the furnace and passed through the scarfing-rolls. From these they pass onto the table 30 and are fed forward by the rollers 31 toward the bending device. From the central position in the furnace the plate will be transferred directly to the bending device. The plates at the sides of this central position will be fed forward by the rollers 31, the sprocket-chains 36 being at rest meanwhile until they have cleared the scarfing mechanism. The chains 36 will then be put in motion by the electric motor 41 being driven in either

one or the other direction, depending upon which side of the central line of said table the plate has been received. The chains will move the plate to the central line of the table, and then the rollers 31 will feed it to the bending device. The stops 45 will prevent the plate being fed too far forward until it has been moved into line with the bending device. The plates will be drawn through the bending devices in the ordinary way.

The motors for operating the draw-chain and the scarfing-rolls may run continuously and likewise the motor 35 for operating the rollers 31 on the transfer-table. The motor 41, however, for operating the chains 36 will be periodically reversed and preferably will run only intermittently. The hydraulic cylinder for moving the scarfing-rolls will also be operated at intervals. The controlling devices for all of these motors and the hydraulic cylinder and especially of the motors will preferably be brought to one place—such, for instance, as the pulpit—so that a single attendant can operate all of these mechanisms.

In case of injury to the transfer-chains 36 or their actuating mechanism they will be removed, and in that case the plates will be fed through the scarfing-rolls until their rear ends clear the furnace. Then the scarfing-rolls will either be stopped or slowed down, and said rolls will be moved laterally by the power-cylinder 9, thus carrying the plate which is in the bite of the rolls laterally and into line with the bending-die 20. Inasmuch as the power-driven rolls 31 are smooth from end to end they will offer no resistance to such lateral movement of the plate.

By the arrangement of the mechanism shown all the parts are stationary except the scarfing-rolls, thereby reducing the power necessary to move the mechanism to a minimum and rendering said mechanism much less liable to get out of repair than heretofore. It also greatly simplifies the power-connecting means for all of these mechanisms except to the scarfing-rolls and makes it possible to use simple and practically automatic mechanism to convey away the pipes from the draw-bench, which with the movable draw-benches heretofore used was an impossibility.

While I have shown the invention applied to a bending-furnace—that is, for scarfing and bending up plates to form lap-weld tubing—it is not entirely limited thereto, as the transfer-table might be used for transferring a tube from the movable draw-bench for forming butt-weld tubing to the sizing-rolls. Other uses of the transfer-table will occur to those skilled in the art.

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

1. In apparatus for bending tube-plates or the like, the combination with a furnace adapted to contain a number of plates side by side, of scarfing-rolls laterally movable in front of said furnace and adapted to be brought into line with any of said plates, a stationary bending device and laterally-movable mechanism intermediate the scarfing-rolls and bending device arranged to receive the plate from said scarfing-rolls and move the same laterally into line with the bending device.

2. In apparatus for bending tube-plates or the like, the combination with a furnace adapted to contain a number of plates side by side, of scarfing-rolls laterally movable in front of the furnace, a stationary bending device, devices intermediate the scarfing-rolls and bending device adapted to receive the plates from the rolls and feed them to the bending device, and mechanism for moving said plates laterally on said feeding device.

3. In apparatus for bending tube-plates or the like, the combination with a furnace adapted to contain a plurality of plates side by side, of scarfing-rolls laterally movable in front of the furnace, a bending device, a transfer-table intermediate the scarfing-rolls and bending device, and reversible power-driven means adapted to move the plate laterally on said feed-table into line with the bending device.

4. In apparatus for bending tube-plates or the like, the combination with a furnace adapted to contain a plurality of plates side by side, of scarfing-rolls laterally movable in front of said furnace, a stationary bending device, a transfer-table intermediate the scarfing-rolls and bending device, said table comprising a series of positively-driven rollers for receiving the plates from the scarfing-rolls and feeding them toward the bending device, and a reversible power-driven means for moving the plates laterally on said rollers into line with the bending device.

5. In apparatus for bending tube-plates or the like, the combination with a furnace adapted to contain a plurality of plates side by side, of scarfing-rolls laterally movable in front of said furnace, a stationary bending device, and a series of chains or the like intermediate the scarfing-rolls and bending device and extending transversely thereof and arranged to receive the plates from the scarfing-rolls and move them laterally into line with the bending device.

6. In apparatus for bending tube-plates or the like, the combination with a furnace adapted to contain a plurality of plates side by side, of scarfing-rolls laterally movable in front of said furnace, a stationary bending device, a transfer-table intermediate the scarfing-rolls and bending device, said table comprising a series of positively-driven rollers adapted to receive the plates from the scarfing-rolls and feed them toward the bending device, a series of chains or the like extending transversely of the table and having means for engaging the plates, means for driving said chains, and stops on the end of the table at each side of the path of the plate to the bending device.

7. In apparatus for bending tube-plates or the like, the combination with a furnace adapted to contain a plurality of plates side by side, of scarfing-rolls laterally movable in front of said furnace, a stationary bending device, a receiving-table intermediate the scarfing-rolls and bending device, and means for moving the plates laterally into line with the bending device.

8. In apparatus for bending tube-plates or the like, the combination with a furnace adapted to contain a plurality of plates side by side, of scarfing-rolls laterally movable in front of said furnace, a stationary bending device, a series of power-driven rolls intermediate the scarfing-rolls and bending device arranged to receive the plates from the scarfing-rolls and feed them toward the bending device, and means for moving the plates laterally into line with the bending device.

9. In apparatus for bending tube-plates or the like, the combination with a furnace adapted to contain a plurality of plates side by side, of scarfing-rolls laterally movable in front of said furnace, a stationary bending device, and a stationary transfer-table intermediate the scarfing-rolls and bending device, said table comprising a series of positively-driven cylindrical rollers of substantially the length of the travel of the movable scarfing-rolls and arranged to receive the plates from the scarfing-rolls and feed them toward the bending device.

In testimony whereof I, the said JAMES F. BOAX, have hereunto set my hand.

JAMES F. BOAX.

Witnesses:
RICHARD D. JAMES,
GEO. T. SNYDER.