To all whom it may concern:

Be it known that I, JAMES D. ADAMS, a resident of Monessen, in the county of Westmoreland and State of Pennsylvania, have invented a new and useful Improvement in Machines for Piercing Billets; and I do hereby declare the following to be a full, clear, and exact description thereof.

My invention relates to apparatus for piercing ingots or billets in connection with the manufacture of seamless tubing, the chief object of my invention being to provide a simple form of apparatus by means of which the ingot may be readily pierced and the tube-blank stripped from the piercing mandrel by mechanical means, thereby dispensing with the manual labor hitherto necessary for this operation.

To these ends my invention comprises, generally stated, in conjunction with the rolls, a movable frame supporting the piercing mandrel, means for moving said frame to and from the rolls and a stop in the path of the tube-blank to hold the same while the said frame is withdrawn to withdraw the piercing mandrel from the tube and allow the same to drop into position to be removed for further finishing or rolling.

In the accompanying drawings Figure 1 is a plan view of my improved apparatus showing the piercing mandrel, the ingot and housings partly in section; Fig. 2 is a side elevation showing the piercing mandrel and the ingot partly in section; Fig. 3 is a section on the line 3--3 Fig. 2 looking in the direction of the arrows; Fig. 4 is a section on the line 4--4 Fig. 2 looking in the direction of the arrows; and Fig. 5 is a longitudinal section of the mandrel and the water connections.

Referring to the drawing the numeral 2 designates a suitable base or platform. Bolted to said base by means of the bolts 3 is the stripper-frame or stop 4 with the notches or grooves 5, 6 and 7 formed therein. In the rear of the stripper-frame 4 is the sliding frame 8 which is adapted to move in the guides 9. This sliding frame 8 is moved back and forth by means of the hydraulic cylinder 10 whose piston rod 11 is connected to said frame 8. Guide-rods 12 and 13 are connected at their outer ends by the cross-head 14 and said guide-rods enter the guide grooves 5 and 7 of the stripper-frame 4 which also acts as a guide-frame for said rods. The rear ends of the guide-rods 12 and 13 pass through guide-ways 15 in the frame 8 and are adapted to move freely back and forth in said guide-ways.

The piercing mandrel 16 is supported by the frame 8 at its inner end and secured to said mandrel is the collar 17 which rests within the recess 18 formed in said frame. This permits of the free rotation of the piercing mandrel 16 and in order to drive said mandrel I provide said mandrel with the pinion 19 which is driven by the gear wheel 20 driven in turn by the pinion 21 on the shaft of a suitable electric motor 22 supported on the bracket 23 on the frame 8.

The piercing mandrel 16 is hollow and in order to supply water thereto for cooling purposes I employ the block 24 with the opening 25 and a pipe 26 screwed into said block and leading into the hollow mandrel 75 and extending to the front end of same. The opening 25 may be connected up by flexible pipe to a suitable water supply. This provides for a circulation of water through the mandrel to reduce the temperature of same. The mandrel 16 is further supported by the cross-head 14 through which said mandrel passes.

The rolls 27 may be of any suitable construction mounted in bearings 27a and I have not deemed it necessary to illustrate them further than in the diagrammatic form shown.

In front of the stripper-frame 4 is the inclined plane 30 to deliver the pipe to the platform 31 when stripped from the mandrel as hereinafter set forth.

When my improved apparatus is in use and it is desired to pierce an ingot, the ingot 32, which is circular in cross-section, is fed to the rolls and the frame 8 is advanced into the position shown in Fig. 2 to bring the piercing mandrel up into proper position with reference to the rolls. The cross-head 14 is moved into contact with the abutment 27b in the housings. The piercing mandrel is provided with the ordinary piercing point or pipe-ball 33. As the ingot is fed forward it is pierced by the mandrel and the pipe blank is forced around the mandrel 105 in the position indicated in Fig. 2. The mandrel is supported against buckling in its outermost position by the cross head. As the pipe blank advances it comes in contact with the cross-head 14 and said cross-head...
moves back, the rods 12 and 13 moving in the grooves 5 and 7 and in the guides 15 of the frame 8. By means of the motor and the connections between said motor and the pinion 19 a rotary motion may be imparted to the piercing mandrel during the piercing operation and the rate of rotation of said mandrel may be controlled so as to correspond with the rotation given to the ingot during the piercing operation. When the tube-blank passes from the rolls power is then applied to operate the hydraulic cylinder 10 and the frame 8 is withdrawn to the position indicated in dotted lines Fig. 2.

In this manner the cross-head is brought into engagement with the stripper-frame or stop and brought to a stand-still, while the piercing mandrel is withdrawn through the tube-blank and when entirely stripped therefrom the blank will fall upon the inclined plane 30 and roll to the platform 31 where stops 34 bring it to a stand-still whence it may be delivered to the rolls for further rolling in the ordinary manner to elongate the same. The piercing mandrel is again advanced into position to pierce another ingot and the operation above described is repeated.

By my improved apparatus I provide for the rapid and accurate piercing of the ingot while provision is also made for the supporting of the mandrel and stripping of the ingot without manual labor, thereby doing away with the handling by hand of these piercing mandrels which in the larger sizes are of great weight and are only handled with difficulty by several men.

By my improved apparatus no manual labor is required and the machine only requires one attendant to operate it.

What I claim is:

1. In apparatus for piercing ingots, billets, etc., the combination with rolls, of a mandrel in cooperative relation thereto, means for advancing and withdrawing said mandrel, and means for stripping the tube blank therefrom as said mandrel withdraws in the direction of feed of the ingot, billet, etc.

2. In apparatus for piercing ingots, billets, etc., the combination with rolls, of a frame moveable to and fro, a mandrel in cooperative relation with said rolls carried by said frame, and means for stripping the tube blank therefrom as said mandrel is withdrawn in the direction of the feed of the ingot, billet, etc.

3. In apparatus for piercing billets, ingots, etc., the combination with rolls, of a frame moveable to and fro, a mandrel carried thereby, a stop in the path of the tube blank, and means for withdrawing the mandrel beyond said stop.

4. In apparatus for piercing ingots, billets, etc., in combination with rolls, of a frame moveable to and fro, a mandrel carried thereby, and a movable support for said mandrel between said frame and said rolls and moved by the contact of the pipe therewith.

5. In apparatus for piercing ingots, billets, etc., the combination with rolls, of a frame moveable to and fro, a mandrel carried thereby, a movable support for said mandrel connected to said frame between said frame and said rolls, said movable support and frame independently movable the one with relation to the other, and a stop for said movable support.

6. In apparatus for piercing ingots, billets, etc., the combination with rolls, of a frame moveable to and fro, a mandrel carried thereby, a movable support of said mandrel between said frame and said rolls, guide rods on said support in sliding engagement with said frame, and a stop for said support.

7. In apparatus for piercing ingots, billets, etc., the combination with rolls, of a frame moveable to and fro, a mandrel carried thereby, a support for said mandrel between said frame and said rolls, guide rods in sliding engagement with said frame, and a stationary guide frame between said first named frame and said support.

8. In apparatus for piercing ingots, billets, etc., the combination with rolls, of a piercing mandrel, means for advancing and withdrawing said mandrel, a yielding support for the inner end of said mandrel in the path of the tube blank, and a stop in the path of said support.

In testimony whereof, I the said JAMES D. ADAMS have hereunto set my hand.

JAMES D. ADAMS.

Witnesses:

ROBERT C. TOTTEN,
ROBT. D. TOTTEN.