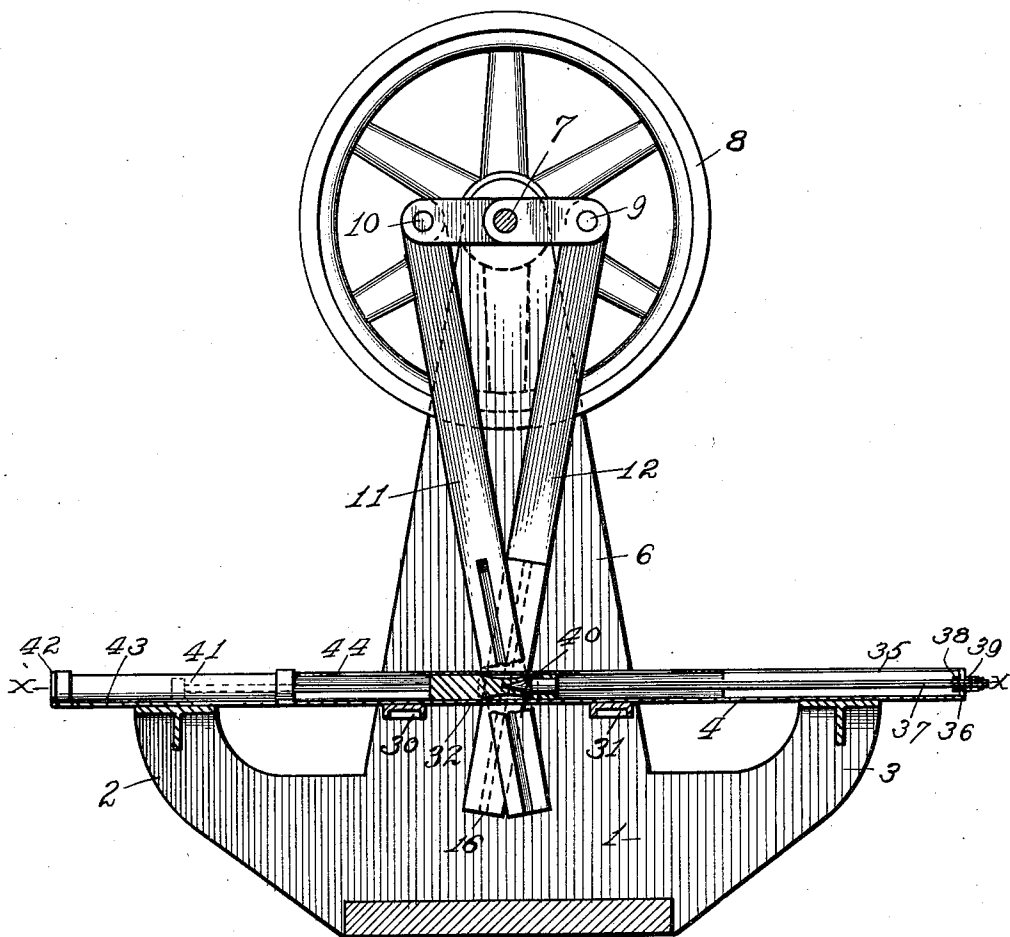


M. U. WIKSTRÖM.
 MECHANISM FOR PIERCING METALLIC INGOTS OR BILLETS.
 APPLICATION FILED JULY 9, 1909.

1,022,524.

Patented Apr. 9, 1912.
 3 SHEETS—SHEET 1.

Fig. 1.



Malcolm Urban Wikström ^{Inventor}

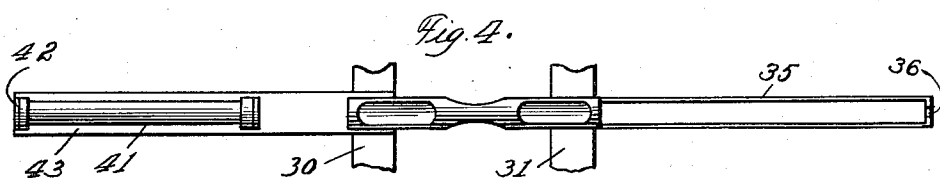
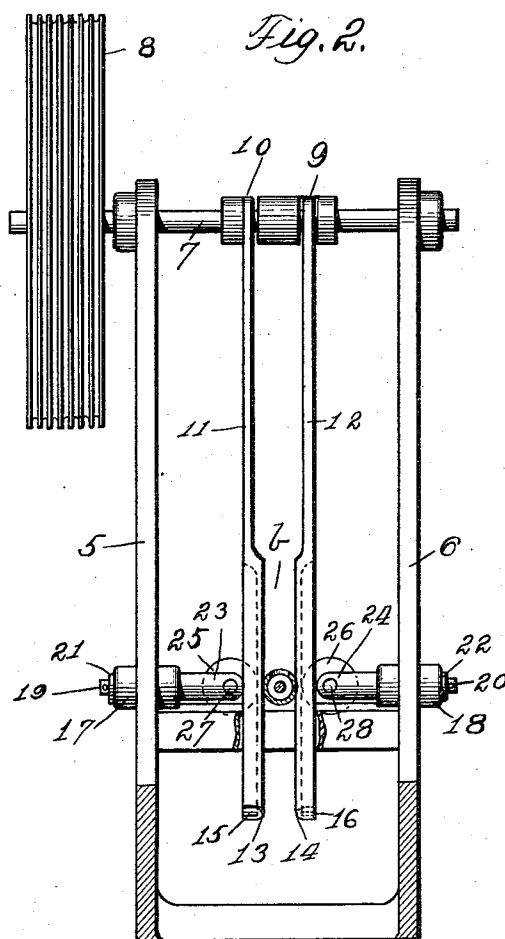
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3 SHEETS—SHEET 2.



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3 SHEETS—SHEET 3.

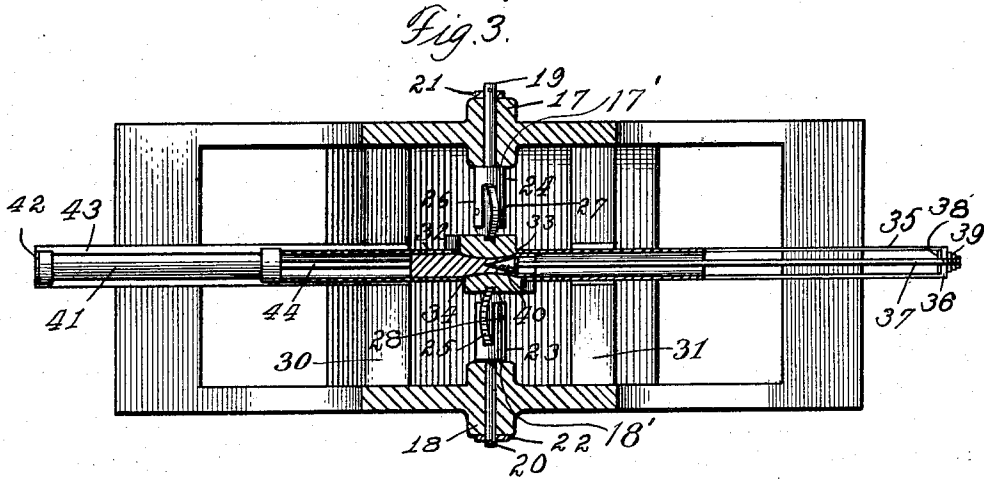


Fig. 5.

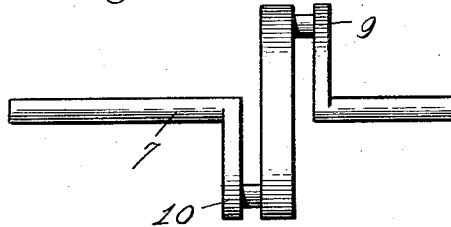


Fig. 6.

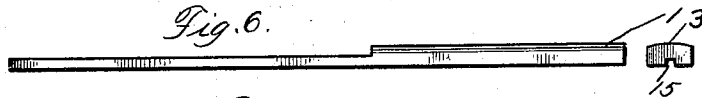


Fig. 7.

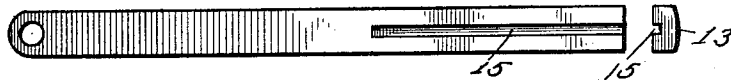
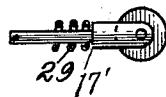


Fig. 8.



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UNITED STATES PATENT OFFICE.

MALCOLM URBAN WIKSTRÖM, OF STORFORS, SWEDEN.

MECHANISM FOR PIERCING METALLIC INGOTS OR BILLETS.

1,022,524.

Specification of Letters Patent.

Patented Apr. 9, 1912.

Application filed July 9, 1909. Serial No. 506,735.

To all whom it may concern:

Be it known that I, MALCOLM URBAN WIKSTRÖM, engineer, a subject of Sweden, residing at Storfors, in the Province of Wermland, Kingdom of Sweden, have invented new and useful Improvements in Mechanism for Piercing Metallic Ingots or Billets, of which the following is a specification.

My invention relates to improvements in piercing mills for producing hollow billets and is especially adapted to be used for the purpose of piercing solid ingots in a heated state which are afterward used for producing what is known as "seamless drawn tubing."

In the use and the operation of what is now known in the art as "piercing mills," one of the disadvantages has been that in the use of the types consisting of disks or rollers or the like for piercing purposes the speed at which the billet or ingot is rotated and moved forward against the piercing plug is not the same at all points of the contact surfaces of the disks or rollers causing a twisting or torsional strain of the fibers of the billet with a tendency to tear off.

In accordance with the present invention two rods forming an angle with each other are employed which are adapted to move upward and downward in such a manner that their inclination is reversed so that a rod which is inclined forward during its upward stroke obtains an opposite inclination during the downward stroke and vice versa. By this arrangement the billet is acted upon by the rods during their upward as well as during their downward stroke and becomes thus worked intermittently.

One of the objects of my invention is to provide means to obviate said twisting or torsional strain.

A further object is to provide means for feeding and forcing the billet forward against and unto the piercing mandrel and at the same time rotating the billet in one direction for a certain period and then causing the rotation of the billet for the same period in the opposite direction which operation is continued during the drawing and piercing of the billet whereby excessive torsional or twisting strain is obviated.

Another object is to construct a piercing mill that will rotate the billet and force and feed it against the piercing plug at a

uniform intermittent speed throughout its entire length until finished.

In the accompanying drawings Figure 1 shows a longitudinal section of the machine. Fig. 2 is an end view of Fig. 1 showing the guide and pressure rollers engaged in grooves formed in the reciprocating reducing rods. Fig. 3 is a plan view of Fig. 1 partly in section taken on the line X X of Fig. 1 showing cross-sectional end view of the reciprocating reducing rods. Fig. 4 is a plan view of mandrel rod and billet support, and air cylinder. Fig. 5 is a detail view of the double crank shaft. Figs. 6 and 7 are detail side and plan views of one of the reciprocating reducing rods. Fig. 8 is a plan view of a modified form of one of the side pressure rollers showing a coil spring surrounding the stud.

In the construction of my device, I preferably use a frame 1 which is provided with upwardly extending arms 2 and 3 to support a table 4. The frame 1 is provided with standards 5 and 6 having bearings formed adjacent to their upper ends in which a crank shaft 7 is journaled. A cable driven pulley 8 is mounted on and rigidly secured to one end of the crank shaft. The crank shaft is provided with two cranks 9 and 10 arranged one hundred and eighty (180) degrees apart. Reciprocating reducing rods 11 and 12 are journaled to the cranks leaving the free ends depending between the standards 5 and 6 (see Fig. 2). The free or depending ends of the reciprocating reducing rods are enlarged and the inner faces 13 and 14 curved or rounded leaving the pass between the bars wider at the edges where the billet enters and leaves the pass. The shape of the inner faces of the free ends of the reciprocating reducing rods follows closely the contour of the faces of the disks or rollers that are used in the ordinary piercing mill. Longitudinal grooves 15 and 16 are formed in the opposite faces of the enlarged portions of the reducing rods.

Bearings 17 and 18 are provided in the standards in which the studs 19 and 20 are journaled and secured by any well-known fastening means with the washers 21 and 22 interposed between the boss on the frame and the fastening means. The ends 23 and 24 of the studs 19 and 20 are bifurcated and pressure rollers 25 and 26 journaled therein

on the pins 27 and 28. The rollers engage with and contact with the bottom of the grooves and are adapted to maintain a uniform pass between the faces of the reciprocating reducing rods and guide them at the required angle. The studs 19 and 20 are located on the standards at such a point as will bring the axis of the pressure rollers on a line with the axis of the piercing plug and billet. The studs can be yieldingly mounted on the standards if desired by placing a coil spring 29 between the faces of the bearings 17 and 18 and the shoulders 17' and 18' formed on the studs.

The width of the space or pass (*b*) between the faces of the reducing rods can be varied for the purpose of making a light or heavy draw on the billet by adjusting the studs 19 and 20 in any well known manner.

A frame comprising cross-bars 30 and 31 and a tubular support 32 with openings 33 and 34 in each side adjacent to the faces of the reciprocating reducing rods is provided.

A yoke shaped supporting frame 35 open at the top and bottom is secured to the frame of the piercing mill and extends outward from the frame and rests upon the table 4. The end of the yoke 35 is slotted at 36 to engage with a groove in the mandrel rod 37 which is held in place by nuts 38 and 39. A piercing plug 40 is secured to the opposite end of the mandrel rod 37 the conical point of which projects between the faces of the reciprocating reducing rods. Upon the opposite side of the frame 1 and standards 5 and 6, an air cylinder 41 is mounted resting on the table 4 and held against end movement or end thrust by the end 42 of the support 43. A plunger 44 extends from the cylinder in direct alinement with the center of the tubular support 32 and is adapted to push the billet forward onto and over the plug.

The operation of my device is as follows: The billet (*a*) (heated preparatory to piercing it) is placed on the tubular support 32 in front of the plunger 44 and the end of the plunger is brought in contact with the end of the billet forcing it in the direction of and between the faces of the reciprocating reducing rods which grip it and gradually force it forward against and over the conical point of the piercing plug until it is forced through the pass *b* reducing it to the desired dimensions and piercing it. Movement is imparted to the reciprocating reducing rods through the medium of the double crank shaft 7. The cranks are formed opposite each other on the crank shaft and at the same distance from the axis to provide for uniform throw and to give the rods a mutual inclination with reference to each other whereby a mutual opposite motion of the rods is obtained which is reversed periodically while at the same time their mutual inclination to each other is reversed.

ally while at the same time their mutual inclination to each other is reversed.

In Fig. 1 the reciprocating reducing rods are shown in a neutral position with reference to moving up or down from the center of their stroke. When the reducing rods are in the position shown in Fig. 1 and movement is imparted to the crank shaft, the reciprocating reducing rod 12 is given an upward movement which rotates and feeds the billet forward against the piercing plug 40 in one direction and simultaneously therewith the reciprocating reducing rod 11 is given a downward movement rotating and forcing the billet against the piercing plug until the cranks of the crank shaft are opposite each other when the movement of the rods is reversed and the billet rotated in the opposite direction. This operation is repeated intermittently until the billet is pierced.

The change in the inclination of the rods and the direction of their motion takes place every half revolution of the crank shaft always, however, feeding the billet forward against the plug and rotating it and reversing its rotation periodically. The mutual inclination of the reducing reciprocating rods with reference to the axis of the billet is such that they impart an intermittent forward and rotating movement to the billet as it is being fed through the pass changing the direction of the rotation of the billet every half revolution of the crank shaft.

While I intend to use the rods disclosed for first piercing a billet and then reducing the thickness of the walls of the pierced billet, it is obvious that the mill may be used for merely enlarging or reducing the thickness of the walls of the pierced billet.

Having fully described my invention, what I claim and desire to secure by Letters Patent is:

1. In a piercing mill, a double crank driving mechanism, reciprocating reducing rods journaled to said driving mechanism at an inclination to each other; said bars having their inner faces curved leaving the entrance and exit of the pass between the rods wider than the central portion of the pass.

2. In a piercing mill, a frame, a driving mechanism, reciprocating rods journaled to said driving mechanism leaving their free ends depending between the standards of the frame; said rods having grooves formed therein, rollers to engage with grooves formed in the depending ends of said rods to exert a pressure against the rods and guide them in their movements.

3. In a piercing mill for piercing billets, a double crank driving mechanism, reducing rods connected to said driving mechanism; said driving mechanism being adapted to impart reciprocating movement to the rods whereby the rods are made to assume an in-

clination in opposite directions to the axis of the piercing mill every half revolution of the driving mechanism and at the same time periodically change the direction of the rotation of the billet.

4. In a piercing mill for piercing billets, a driving mechanism, reducing rods connected to said driving mechanism; said driving mechanism being adapted to impart a reciprocating inclined movement to the rods which is reversed every half revolution of the driving mechanism thereby changing the rotation of the billet; said reducing rods operating on the billet to reduce its size in the upward and downward movements of the reducing rods.

5. In a piercing mill, a frame, a driving mechanism journaled to said frame, a tubular support for the billet having openings on each side, reciprocating reducing rods connected to the driving mechanism and adapted to assume a mutual inclination to the billet and each other which is periodi-

cally reversed, said reciprocating rods working the billet on the downward and on the upward strokes.

6. The herein described method of piercing solid billets with a plug by pushing and simultaneously rotating them between reducing rods arranged to travel at mutual angles to each other which angles are mutually reversed periodically while the billet is being rotated; said billet being intermittently rotated in opposite directions and fed forward against the plug in the direction of the rotation of the billet and the reducing rods working upon the billet on the upward and downward strokes.

In testimony whereof I have signed my name to this specification in the presence of two subscribing witnesses.

MALCOLM URBAN WIKSTRÖM.

Witnesses:

T. K. AURMAN,
HUGO NYBLÖM.

Copies of this patent may be obtained for five cents each, by addressing the "Commissioner of Patents, Washington, D. C."