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B. BANNISTER

2,148,675

CONDITIONING METAL STOCK

Filed Aug. 30, 1937

FIG. 1.

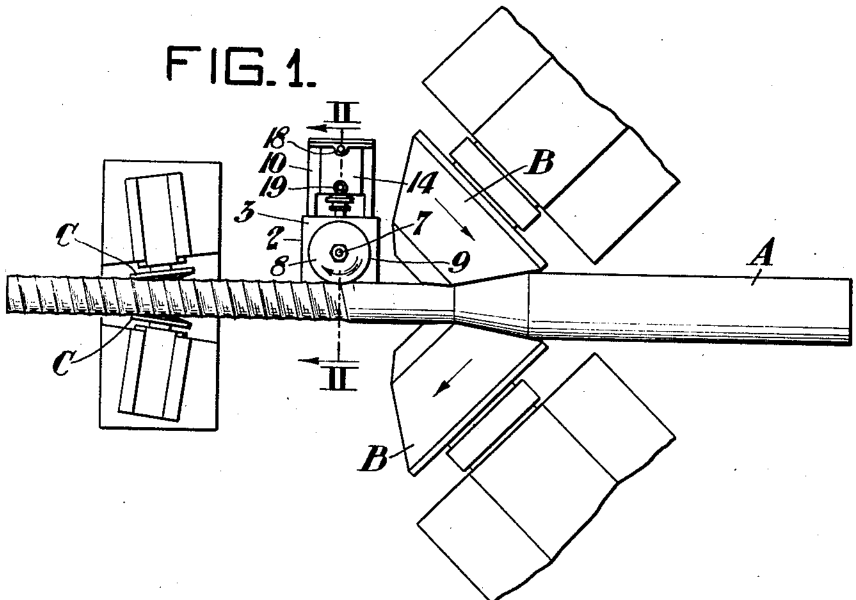


FIG. 2.

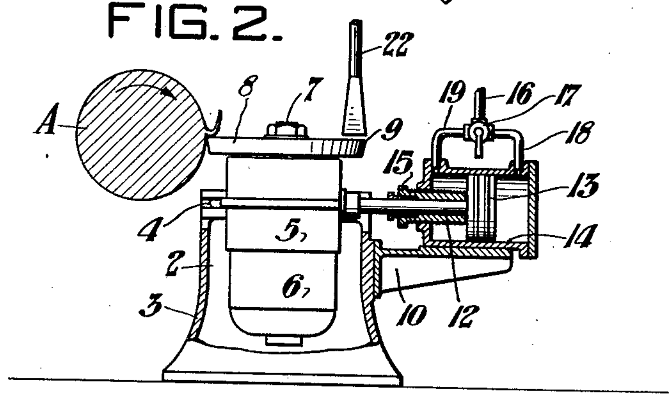
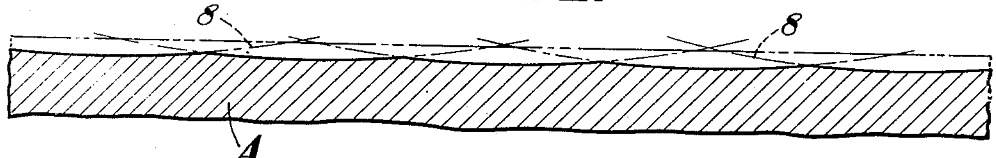


FIG. 3.



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UNITED STATES PATENT OFFICE

2,148,675

CONDITIONING METAL STOCK

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2 Claims. (Cl. 29—33)

This invention relates to a method and apparatus for conditioning metal stock.

In the manufacture of many steel products such as pipe, sheets and wire, it is necessary to remove a thin layer of metal from the semi-finished metal stock, commonly referred to as billets, blooms or slabs, before rolling or forging to final shape. This procedure is essential as it is necessary to remove the numerous slight seams, scabs and other surface imperfections from the semi-finished material in order to obtain defect-free surfaces on the finished product. This removal of the thin layer from the metal stock is generally known as "conditioning" and the apparatus as a "peeler". It is customary to perform this operation on the material while it is cold; that is, at approximately atmospheric temperature.

It is obvious that this procedure entails a serious loss of sensible heat since, after conditioning, the metal stock must be again heated to forging temperature, whereas if the conditioning were not required, or could be performed on hot metal, the sequence of rolling operations could be uninterrupted and this loss of heat avoided. It is equally obvious that a considerable expenditure of energy and labor is involved in performing this separate operation.

It is accordingly an object of the present invention to provide an improved method and apparatus for conditioning metal stock.

It is a further object of the present invention to provide an improved method and apparatus for conditioning heated metal stock.

It is another object of the present invention to provide a method and apparatus for conditioning metal stock while it is being processed in a rolling mill.

The foregoing and further objects will be apparent after referring to the drawing in which:

Figure 1 is a plan of the apparatus of the invention;

Figure 2 is an enlarged sectional view on the line II—II of Figure 1; and

Figure 3 is a working diagram.

Referring more particularly to the drawing wherein, for the purpose of illustration, my improved method and apparatus for conditioning metal stock is shown as applied to a rotary blooming mill: In this type of apparatus a cylindrical ingot A is processed by a pair of rotary rolls B which reduce the ingot A to a suitable size for subsequent processing operations. In practice the ingot A is heated to a suitable forging temperature of about 2100 to 2400 degrees Fahrenheit before introduction into the pass of the rolls B. The rolls B, while rotating and feeding the ingot A forwardly, reduce its diameter to a size suitable for piercing and conversion into seamless pipe. After leaving the rolls B the work-piece A is severed into desired lengths by a conventional "hot-saw" (not shown) and, according to the usual practice, resulting billets or rounds are then allowed to cool to atmospheric temperature whereupon they are prepared for further processing to convert them into seamless pipe by "peeling" the outer surface therefrom to insure a defect-free surface in the finished product. The billets are then reheated to a forging temperature and converted into seamless pipe by conventional piercing and rolling practice.

In accordance with the teachings of my invention the heated work-piece A, as it emerges from the blooming rolls B, is conditioned for further processing by removing its outer surface and without any sensible loss of heat. The reduced work-piece then passes to the hot-saws and from thence to the piercers in a continuous operation without allowing the billets to cool, thereby entailing a big saving in the time and expense ordinarily required for reheating them to forging temperature.

The numeral 2 designates the novel work-piece surface-conditioning device or billet-peeler of my invention. This comprises a housing 3 in which is reciprocably mounted, on slide-ways 4 in a housing 5, a motor 6 adapted to drive a substantially vertical shaft 7 carrying a disk or cutting member 8. The disk 8, which rotates in a generally horizontal plane, has a cutting edge 9 that may be continuous or serrated in the manner of a milling cutter and is positioned by means of an automatic feed device 10 with its cutting edge in engagement with the helically advancing work-piece A so as to obtain the depth of cut desired, which is generally about an eighth of an inch. The automatic feed device 10 is mounted in the housing 3 and is connected to the housing 5 by means of a piston-rod 12 carrying a piston 13 adapted to reciprocate in a cylinder 14. The limit of travel of the piston 13 toward the work-piece A is limited by an adjustable gland-nut 15. The piston 13 is reciprocated in the cylinder 14 by means of fluid under pressure delivered thereto from a suitable source of supply through a pipe 16, two-way valve 17, and pipes 18 and 19.

In the usual working position, fluid under pressure will be admitted to the cylinder 14 through the pipes 16 and 18 and valve 17 and exhausted from the opposite side through the pipe 19 and two-way valve 17. The piston 13 is thereby forced against the adjusting gland-nut 15 to properly position the cutting disk 8 with respect to the work-piece A. When it is desired to withdraw the cutting disk 8 the valve 17 is reversed to admit fluid under pressure to the cylinder through the pipe 19 and exhaust the fluid from the opposite end through the pipe 18.

It will be noted that the cutting disk 8 is yieldingly and not rigidly held against the work-piece A, thereby preventing damage to the cutting disk in case the work-piece A, delivered by the rolls B, should happen to be cobbled or warped.

In operation, the disk 8 is rotated by the motor 6 at such speed that the duration of contact with the hot metal of any portion of the cutting edge 9 is a small fraction of a second. By so regulating the speed of rotation of the disk 8 the cutting surface 9 is prevented from becoming overheated by its frictional engagement with the metal and because of the high temperature to which the work-piece is heated, which is approximately 2300 degrees Fahrenheit. The diameter of the disk 8 is such that the width of cut is considerably more than the advance of the work-piece A per revolution, as is shown in Figure 3 of the drawing. Consequently any portion of the cutting edge is in contact with the metal of the work-piece for only a small part of a revolution of the disk 8.

Normally the cutting edge 9 will cool during the time it is not engaging the metal of the work-piece. However, for certain kinds of metal it may be necessary to supply a cooling agent to the cutting edge 9, which can be done by means of the spray-head 22 shown on Figure 2 of the drawing. Water or other suitable cooling medium from a suitable source of supply may be delivered onto the edge 9 through the spray-head 22.

A pair of guide-disks C may be provided for steadying the work-piece A and, in addition, cooperate with the rolls B to helically advance it.

The combination of a rotating disk and the relative longitudinal movement of the rotating work-piece with respect to the rotating disk provides the essential elements for the successful functioning of my device and method for conditioning metal stock. No portion of the cutting edge is in contact with the metal long enough to reach an objectionably high temperature and between heating contacts there is sufficient time to cool the cutting edge effectively. Also, the rotation of the disk provides a true cutting or slicing action instead of a substantially plain shearing action that would occur if the disk were stationary. This is a definite advantage as it is much more satisfactory to slice a plastic material such as steel and particularly hot steel than it is to shear it.

While I have shown and described a specific embodiment of my invention it will be understood that I do not wish to be limited exactly thereto but various modifications may be made within the scope of the following claims.

I claim:

1. Apparatus for conditioning metallic blanks comprising, in combination, a plurality of metal working rolls which are constructed and arranged to helically advance a work-piece, and at least one rotatable disk having a cutting edge constructed and arranged to remove the outer surface of said work-piece as it is helically advanced by said metal-working rolls.

2. Apparatus for conditioning metallic blanks comprising, in combination, a plurality of metal-working rolls which are constructed and arranged to helically advance a work-piece, and at least one rotatable cutting member having an annular cutting edge disposed adjacent said metal-working rolls, said rotatable cutting member being disposed to present a portion of its cutting edge to the outer surface of the work-piece and adapted to remove the outer surface of the said work-piece as it is helically advanced by said metal-working rolls.

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