June 16, 1936. W. S. BIDLE 2,044,561

STEEL TREATING

Filed Oct. 18, 1934

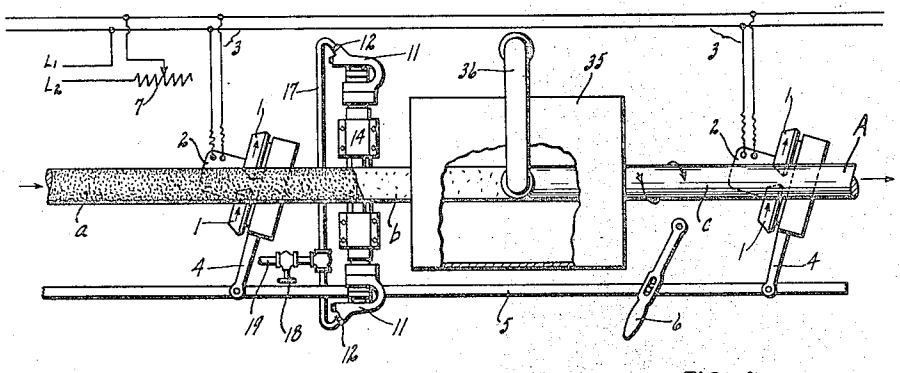


FIG.-1

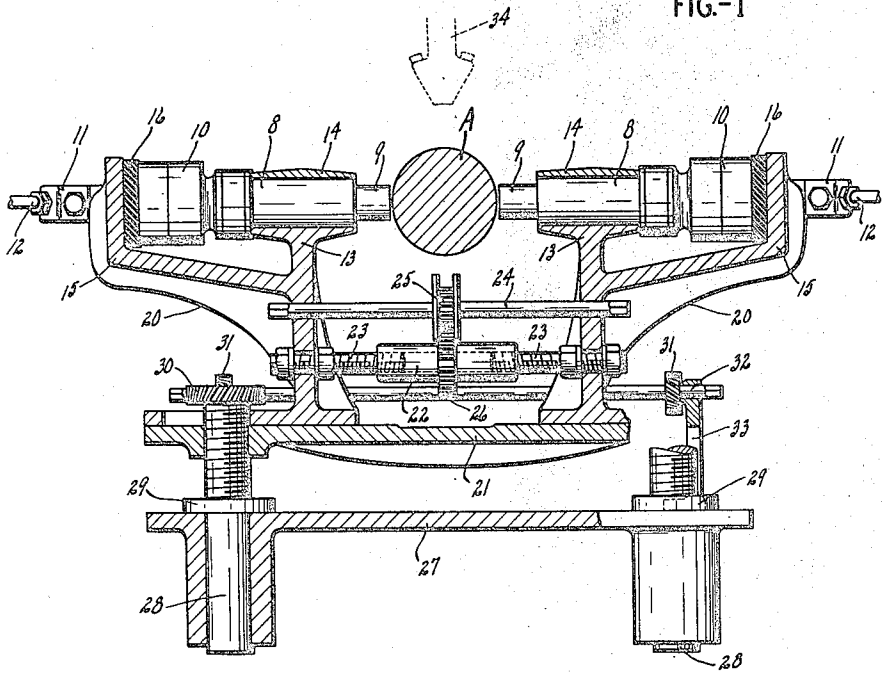


FIG.-2

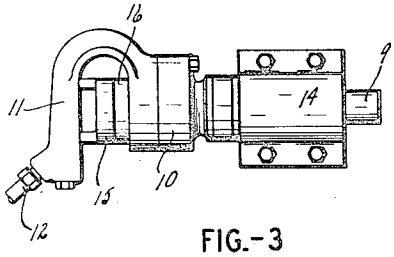


FIG.-3

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STEEL TREATING

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8 Claims. (Cl. 29—81)

This invention relates to treatment of hot-rolled bar steel, received as a rolling mill product, to produce therefrom a bar stock suitable for feeding to machine tools such as turret lathes.

The hot-rolled bar, as will be appreciated by one familiar with the art, is received from the rolling mill encrusted with tough scale which is particularly heavy if the bar has been annealed; so that it is unsuitable for immediate machining or even accurate centering in the collet of a machine tool. It is the primary object of this invention to remove this scale from the hot-rolled bar, by novel means including an inexpensive method and improved apparatus therefor, and the invention comprises generally improvements over that of Patent No. 2,038,204 issued to me April 21, 1936.

More specifically, this invention contemplates first hammering the scale-bearing surface of the stock, with blows distributed over said surface, to loosen the scale therefrom and thereby remove part of the scale, and thereafter subjecting said surface to a blast stream containing abrasive particles, to remove such scale as remains after the hammering.

The invention includes improved apparatus for practicing the described method; and the apparatus includes, as will appear, stationary hammer means having power-actuated striker means and arranged to deliver repeated blows laterally against the round bar stock, stationary nozzle means arranged to deliver a blast stream laterally against the stock at a location spaced from the hammer means longitudinally of the stock, and means for rotating the stock about its longitudinal axis and coincidentally advancing the stock along said axis in the direction from the hammer means toward the blast means whereby the effect of both hammer and nozzle means will be effectively distributed over the entire cylindrical surface of the stock, the rotating and advancing rates of stock feed being suitably proportioned for the latter purpose.

A further object of the invention comprises the provision of novel adjusting means for the hammers employed in the preferred apparatus.

The exact nature of the invention together with further objects and advantages thereof will be apparent from the following description taken in connection with the accompanying drawing, in which Fig. 1 is a conventionalized plan view showing the general arrangement of an embodiment of parts, illustrative of the invention; Fig. 2 is an enlarged sectional detail in elevation, taken in a plane transverse to the work and illustrating hammer mounting and adjusting means, parts being broken away to show details of construction; and Fig. 3 is a similarly enlarged plan view of one of the hammers appearing in Figs. 1 and 2, together with the immediate adjacent parts by which it is mounted.

With reference now to the drawing, a bar of stock A is horizontally disposed along a straight trough defined by a plurality of aligned pairs of rollers 1 supporting the stock. Each pair of rollers 1 is disposed in spaced relation to form a crotch, and the rollers of each pair are driven in unison by a motor 2 as in the direction of the arrows. All of these stock-driving unit— each comprising a motor 2 and a pair of rollers 1—have electrical connections for their common drive as by the indicated wiring 3. It will be appreciated that in practice a greater number of stock-supporting and driving units will be employed—at least four and probably more, dependent upon the lengths of the bars to be treated, although but two such units are here shown as necessary for operative disclosure of the apparatus. All of the units are disposed in parallel vertical planes and arranged for simultaneous adjustment about vertical axes in these planes and intersecting the center line of the stock, by means here indicated as an arm 4 extending from each unit, a link bar 5 interconnecting the arms 4 of all the units, and a lever 6 providing lengthwise adjustment of the link 5.

It will be apparent that when the stock driving and supporting gear just described is in the adjusted position of Fig. 1 and the motors 2 operating to drive the rollers 1 as indicated by the arrows on the latter, the stock A resting upon the rollers 1 will be caused to advance along its longitudinal axis from left to right, Fig. 1, and at the same time rotate about such axis as indicated by the arrows, Fig. 1, so that units of the cylindrical surface of the bar will travel a helical path. It will also be apparent that by adjustment of the lever 6 the pitch of this helical path may be adjusted from zero to maximum in either direction, and by adjustment of a controller 7 in the common circuit of the motors 2, the speed of travel of the cylindrical surface may be adjusted.

What has thus far been described has been more fully disclosed in my copending application to which reference has been made herein.

According to the present invention I provide stationary power-actuated hammer means to be effective upon the stock as the latter is caused to travel through the apparatus by the feeding means above disclosed. To this end and for con-

venience, such hammer means may be simply the usual small pneumatic chipping hammer to be found upon the market and intended for use in the hands of an operator. The hammer comprises a cylindrical body part 8 in which a striker 9 is actuated reciprocally by automatic valve mechanism within a head part 10 to which is connected a handle 11 with a connection 12 for the compressed air supply. Such a hammer is usually provided with a trigger control valve in its handle 11 but for the present purpose such control valve is preferably removed so that the striker 9 will operate whenever the hammer is supplied with compressed air at its inlet connection 12; or such trigger control valve may simply be secured in the open position for the same purpose.

Preferably two such pneumatic hammers are employed mounted in aligned relation on opposite sides of the stock A to strike radially against the stock.

Each hammer is conveniently mounted in a bearing block 13 having a removable cap 14, a bracket 15 extending from the bearing blocks 13 into the crook of the handle 11 of the hammer. To conserve the hammer, its mounting preferably simulates the effect of support by the hands of an operator, so that the fit of the hammer in the bearing black 13 is not tight, and a yieldable pad 16 of rubber or the like is arranged between the head part 10 of the hammer and the bracket 15. A common control for both hammers is provided, including a manifold 17 interconnecting the two hammer inlets 12 and a valve 18 in the compressed air supply line 19 for the hammers.

That both hammers may have coincidental adjustment for different sizes of stock and to some extent for characteristic of blow, a carriage arrangement such as illustrated in Fig. 2 may be employed. Each hammer being mounted as described on one of the two carriages 20, the carriages are arranged for sliding adjustment toward and from each other on a base 21. For this purpose the carriages 20 are interconnected by a turn-buckle having a central member 22 interconnecting oppositely threaded screw members 23 each associated with one of the carriages, and a shaft 24 is provided having a pinion 25 meshing with a gear 26 on the member 22. The shaft 24 bears in the carriages 20 and extends therebeyond with squared ends as illustrated, to receive an adjusting crank or wrench by which the shaft may have rotational adjustment. Obviously by the arrangement just described, turning the shaft 24 in one direction will slide the carriages 20 apart, moving the two hammers from each other along their common center line, and vice versa. Both hammers will move equally from or toward the work, preserving their equidistance from the stock A by this adjustment.

It will be appreciated that stock of different diameters will vary in elevation above their supporting rollers 1, so that vertical coincidental adjustment of the hammers is desirable. For this purpose the base 21 is mounted upon a sub-base 27 to be adjusted vertically toward and from the latter. A pair or more of posts 28 are rotatably mounted in the base 27 and have supporting flanges 29 bearing against the base. Above the flanges 29 the posts 28 have threaded engagement with suitable openings in the base 21. At their upper extremities the posts 28 have fixed gears 30 which are interconnected by pinions 31 carried by a shaft 32. The shaft 32 is mounted in brackets 33 carried by the sub-base 27 and the shaft 32 has squared ends adapted to receive an adjusting wrench or crank. Obviously by the arrangement just described rotative adjustment of the shaft 32 will cause similar rotation of both posts 28, which in turn will raise or lower the base 21 and with it the hammers.

Operation of the hammers upon the work will be apparent. The hammers being suitably adjusted so that their common center line intersects the center line of the work, and the two center lines being at right angles, when the hammers are set into operation by opening the valve 18, their strikers 9 will deliver very rapidly repeated blows to the scale-bearing surface of the work, at a rate in the neighborhood of over three thousand blows per minute each. By adjustment of the controller 7 and lever 6, the work is caused to travel at such a rate that substantially every elemental unit of its cylindrical surface is struck by one or the other of the hammers as the work progresses therebetween. The hammer blows thus distributed over the scale-bearing surface of the work, all of the scale is loosened and in fact most of the scale drops off. Thus, at *a*, ahead of the hammers, the bar A is indicated as substantially covered with scale, as it comes from the rolling mill or annealing furnace, and at *b*, following the hammers, the bar is shown as having but an occasional piece of loosened but clinging scale. To remove these few pieces of scale still remaining as at *b*, a blast of abrasive particles is provided as by nozzle means conventionally indicated at 34 in Fig. 2, and enclosed within a housing 35, Fig. 1, with a supply line 36 thereto. Such blast device is more fully illustrated and described in my above identified copending application. The blast of the present application need be but slight, however, to remove all of the scale particles shown at *b*, since the latter have already been substantially loosened by the hammers.

At any rate the bar emerges from the blast, entirely free and clean of scale, and with a bright finish, as indicated at *c*, Fig. 1.

By the method and arrangement of this application, all scale is removed from the stock much faster and hence much more economically than by any method or apparatus heretofore employed. An operator observing the condition of an incoming bar or run of stock, and the effect of the apparatus upon the leading end thereof, may quickly adjust the hammers by the valve 18 and particularly the shaft 24, and adjust the drive by the controller 7 and particularly the lever 6, to combine entirely clean results with the greatest speed. The operator observing any occasional spot not thoroughly cleaned at that maximum speed, may easily slow down the speed to increase the cleaning effect, or even reverse the stock to repeat the cleaning effect on a part thereof, simply by adjusting the lever 6.

What I claim is:

1. The method of preparing a hot rolled section of the class described for machine tool operations, comprising hammering the scale-bearing surface of said section to loosen said scale therefrom, and subjecting said surface to a blast stream to remove such scale as remains after said hammering.

2. Means for preparing hot-rolled round bar stock for machine tool operations, comprising stationary hammer means having power-actuated striker means and arranged to deliver repeated blows laterally against said stock, stationary nozzle means arranged to deliver a blast

stream laterally against said stock at a location spaced from said hammer means longitudinally of said stock, and means for rotating said stock about its longitudinal axis and coincidentally advancing said stock along said axis in the direction from said hammer means toward said blast means.

3. Means for preparing hot-rolled round bar stock for machine tool operations, comprising a pair of hammers having power-actuated strikers and arranged on opposite sides of said stock to deliver repeated oppositely directed blows against the latter, and means for moving said stock between said hammers to distribute said blows entirely over the scale-bearing surface of said stock.

4. Means for preparing hot-rolled round bar stock for machine tool operations, comprising a pair of hammers having power-actuated strikers and arranged on opposite sides of said stock to deliver repeated blows against the latter, means for moving said stock between said hammers to distribute said blows over the scale-bearing surface of said stock, and means for simultaneously adjusting both said hammers, toward and from said stock.

5. Means for preparing hot-rolled round bar stock for machine tool operations, comprising a pair of hammers having power-actuated strikers and arranged on opposite sides of said stock to deliver repeated blows against the latter, means for moving said stock between said hammers to distribute said blows over the scale-bearing surface of said stock, and means for simultaneously adjusting both said hammers, in a plane transverse of said stock and similarly with respect to the stock axis.

6. Means for preparing hot-rolled round bar stock for machine tool operations, comprising a pair of hammers having power-actuated strikers and arranged on opposite sides of said stock to deliver repeated blows against the latter, means for moving said stock between said hammers to distribute said blows over the scale-bearing surface of said stock, means for simultaneously adjusting both said hammers, toward and from said stock, means for simultaneously adjusting both said hammers in a plane transverse of said stock and similarly with respect to the stock axis, each said adjusting means being arranged to operate independently of the other.

7. In apparatus for removing scale from hot-rolled bar stock, means mounting a power hammer, said hammer having a body part with a striker reciprocably mounted therein, and a head with a handle opposite and spaced from said body part, said mounting means comprising means disposed about said hammer body part for support of the hammer, and associated bracket means extending between said handle and the head end of said body part to receive the reaction of operation of the hammer.

8. In apparatus for removing scale from hot-rolled bar stock, means mounting a power hammer, said hammer having a body part with a striker reciprocably mounted therein, and a head with a handle opposite and spaced from said body part, said mounting means comprising means loosely fitting about said hammer body part for support of the hammer, and having rigidly associated bracket means extending between said handle and the head end of said hammer body part to receive the reaction of operation of the hammer, and yieldable means disposed to be effective between said head end and said bracket means for damping said reaction.

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