Aug. 15, 1933. L. C. REIS 1,922,980

BILLET SURFACING MACHINE

Filed Jan. 30, 1929 2 Sheets-Sheet 1

Fig. 1

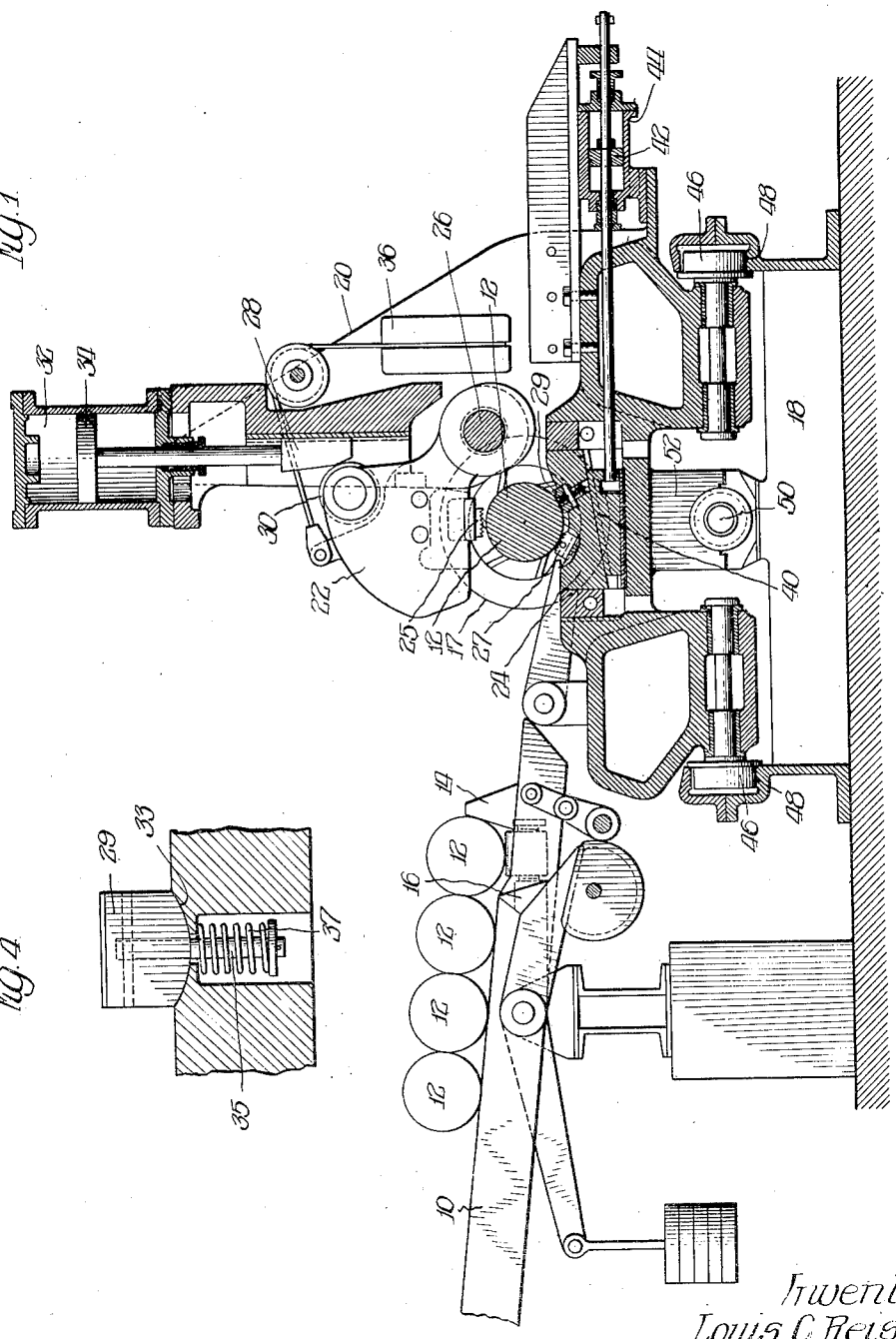


Fig. 4

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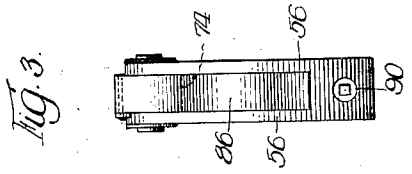


Fig. 3.

Fig. 2.

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BILLET SURFACING MACHINE

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15 Claims. (Cl. 82—20)

This invention relates to machines for use in surfacing and resurfacing steel billets and the like, and is herein illustrated as embodied in a machine of the same general character as that disclosed in United States Letters Patent No. 1,669,264, granted May 8, 1928, upon my application.

Machines of the type disclosed in the said Letters Patent comprise, generally speaking, a cutter head having a central opening through which cylindrical billets are passed in order to free the billets of surface imperfections. There is provided mechanism for feeding billets one at a time to the surfacing machine, and apparatus for grasping a billet which has been presented and advancing it in the direction of the cutter. The apparatus continues to advance the billet until a substantial portion thereof passes through the cutter whereupon the said apparatus disengages itself automatically and returns to its starting position preparatory to grasping and advancing a succeeding billet, and at the same time additional apparatus on the opposite side of the cutter grasps the surfaced end of the billet and exerts a pulling action thereon to advance the unsurfaced portion of the billet on through the cutter. Mechanism for use in conducting the surfaced billets away from the machine is also provided.

In a great number of instances, the billets which are presented to the surfacing machine are not absolutely straight as they come from the rolls and it would be a matter of considerable, in fact too considerable, expense to straighten them. On the other hand, it is not necessary to true these billets for the use to which they are subsequently put does not demand that they be of straight cylindrical formation, but merely that the surfaces be free from imperfections and somewhat regular in outline.

Accordingly, in my former invention it was proposed to provide a machine which would surface a billet a uniform amount over all regardless of the fact that such billets might be warped or otherwise irregular in formation. To this end there was provided a rotary cutter of the central opening type, feeding apparatus which would grasp and advance the billet partially through the cutter, and additional feeding apparatus which would later grasp a surfaced portion of the billet and pull it on through the cutter, and meanwhile the axis of the billet was permitted to oscillate and thus follow a path of feeding movement which was characteristic of its shape. Thus, if a billet were warped, the path through which it would move in advancing through the cutter would be a correspondingly curved path, whereby the billet would be surfaced substantially uniformly throughout its entire length regardless of irregularities in contour.

Although the construction disclosed in my prior patent permits considerable flexibility of movement on the part of the billet as it advances through the cutter, it is an important object of the present invention to provide apparatus for use in feeding and guiding a billet through a surfacing machine which will permit greater flexibility of movement on the part of the billet than has heretofore been obtained.

It has been found that after the billet is fed part way through the machine and is grasped by the feeding apparatus which conducts it the remaining distance, there is a tendency on the part of the finished extremity to wiggle, or jerk about laterally, and inasmuch as this extremity is grasped by a clamping device with which the feeding apparatus is provided, a highly flexible connection must be provided in order that the clamping device will continue firmly to grasp the billet notwithstanding the rapidity of lateral, or wiggling, movement on the part of the grasped portion. In view of this fact, an important feature of the invention consists in the provision of a clamping device which will grasp the free end of the billet and hold it firmly and also will allow the extremity of the billet to move bodily laterally, back and forth, as it is being held. In the illustrated embodiment of the invention, the clamping device comprises a clamping head, and means carried by the head for supporting a plurality of clamping jaws. The supporting means is susceptible of being displaced laterally in the event that wiggling movement is imparted to the billet, and also is provided with yieldable means normally operative to hold the support against lateral displacement.

It is to be noted at this point that the tendency on the part of the billet to wiggle may be the result of feeding to the cutter a billet of irregular lengthwise contour, it may be the result of friction generated by the cutting operation imparting vibration to the billet, or it may be from other causes. In any event it exists; and the present invention is concerned not with the cause of such motion, but with the provision of a clamping device which will operate firmly to hold the billet and allow it to wiggle during the surfacing operation.

Another feature of the invention consists in the provision of improved clamping jaws for engaging directly with the surface of the billet for holding the latter as it is being fed.

Still additional objects relate to clamping jaw operating mechanism as will become apparent from a reading of the following specification in the light of the accompanying drawings, in which—

Figure 1 is a view in side elevation in section showing the entering side of a surfacing machine

of the same general type as that disclosed in my former patent;

Figure 2 is a view similar to Figure 1 showing the discharge side of the surfacing machine;

Figure 3 is a detailed view showing the manner in which certain parts of the work holding and feeding apparatus are constructed; and

Figure 4 is an enlarged detail view showing the manner in which certain work engaging members are mounted.

In view of the fact that the machine disclosed herein is in many respects identical to the machine disclosed in my former patent there will be given herewith only a brief description of the construction of the machine, it being understood that the invention disclosed herein does not reside in the general arrangement of the machine parts and that reference may be had to the former patent for details of design and construction not specifically shown or described herein.

As shown in Figure 1 there is provided a sloping skid-way 10 across the upper surface of which a plurality of cylindrical billets 12 are adapted to be fed. A stop 14 controls the passage of billets from the skid to the surfacing machine, and a supplemental stop 16 which works alternately with the main stop 14 to control the passage of billets to the main stop. By reason of the combined stops only one billet is fed to the machine at a time.

The surfacing machine comprises a pedestal or base 18 having an upwardly extending arm 20 which carries a vertically movable clamping head or lever 22. A lower clamping base 24 is mounted on the pedestal 18 directly beneath the clamping head 22 and is adapted to cooperate therewith in supporting the billet 12 as it is advanced lengthwise through a cutter 17 with which the machine is provided.

To the end of bringing the clamping lever or head 22 and base 24 into operative engagement with the billet 12, the head is mounted for pivotal movement about an axis 26, and a wedge block 28 is provided for engaging a roll 30 carried by the clamping head to depress the latter according to the admission of a suitable fluid to a cylinder 32 located above the templet 28 and enclosing an operating piston 34. To the end of restoring the clamping head 22 to its original position upon relieving the pressure in the cylinder 32 there is provided a counter-weight 36.

It is to be observed at this point that the clamping base 24 is capable of being adjusted vertically to accommodate billets of various diameters, in order to present them properly to the central opening in the cutter regardless of their height, and to this end the base 24 is provided with a sloping lower surface beneath which there is inserted a wedge-shaped adjusting block 40 controlled by a piston 42 moving within a cylinder 44. As indicated by the dotted line the clamping base 24 and the adjusting block 40 are joined together by means of a dovetail joint which permits raising and lowering of the base, but prevents its accidental displacement from the recess in which the two parts are normally located.

The portion of the machine that has been described may be called the entering side by reason of the fact that it picks up the billet when that member is first fed to the machine and advances it in the direction of the cutter. From so much of the description as has already been given, it will be appreciated that in operation the billet is deposited on the clamping base 24 which has been previously adjusted by means of the block 40 to accommodate a billet of the particular height of that delivered, and thereafter pressure is admitted to the cylinder 32 to force the clamping head 22 downwardly into firm engagement with the top of the billet. To the end of advancing the billet in the direction of the cutter the upwardly extending arm 20 is slidable along the shaft 26, and, by means of the wheels 46 running over tracks 48, the base of the machine is likewise movable in the direction of the lengthwise axis of the billet 12. In order to impart such movement to the clamping blocks or levers 22 and 24 there is provided a rotary screw 50 having threaded engagement with a downwardly depending portion 52 carried by the slidable base. Thus, as the screw turns the base moves toward or away from the cutter depending upon the direction of rotation of the screw.

The actual means for engaging and holding the work as it is fed in the direction of the cutter comprises an upper serrated member 25, adjustable with respect to the clamping head 22, and a plurality of yieldingly mounted members 27 and 29 converging in the direction of the central axis of the engaged billet. As shown in Figure 4, each of the members 27 and 29 comprises a body portion 31 having a cylindraceous lower face 33, and a shank member 35 disposed within a suitable recess formed in the lower clamping block 24. A compression spring 37 encircles the shank 35 and tends normally to retain the clamping member firmly seated in engagement with the lower clamping block 24.

In operation, a billet supported and clamped by the members 25, 27 and 29 may be tilted vertically by causing the body portions to pivot about upon their cylindraceous lower surfaces, and may by means of the adjustable mountings of the said members be moved in other directions as the billet passes through the cutter following a course corresponding to its surface contour.

Thus, as the end of the billet emerges on the discharge side of the cutter it may be pointed downwardly, upwardly, to the right, or the the left, and if the work engaging clamp on the discharge side were fixed for movement in a straight line, it might be that the billet would be insecurely grasped by the clamp, or that if firmly grasped the billet would be cramped in its subsequent passage through the cutter with the result that waste cutting would take place. To the end of overcoming such objections the work clamp on the discharge side, as disclosed herein, is constructed and arranged for lateral displacement in a manner presently to be described.

Turning now to Figure 2, the discharge side of the machine is provided with a pedestal 60 and an upwardly extending arm 54 which carries a clamping head 56 also referred to as a lever, mounted for pivotal and slidable movement with respect to the shaft 58. The base member 60 is provided with a downwardly depending portion 62 having screw threaded engagement with a rotary shaft 64 whereby rotation of the shaft causes movement to be imparted to the base 60, and the upwardly extending arm 54, toward or away from the cutter depending upon the direction of rotation of the shaft.

On this side of the machine also rollers 66 are provided for supporting the feeding apparatus during movement thereof, and likewise a cylinder 68 is equipped with a piston 70 for actuating a

cam 72 having engagement with a roller 74 carried by the cutter head 56. Thus, in operation, a suitable fluid may be admitted to the cylinder 68 to cause downward movement of the piston 70 whereby the clamping head 56 is swung downwardly about its axis of pivot 58 to engage the billet 12.

On the discharge side of the machine, the clamping base comprises a wedge-shaped block 76 that is mounted upon a base plate 78. The top of the wedge-shaped block is provided with serrations, as are all of the work engaging members, and movement of the wedge-shaped block 76 is controlled by means of a cylinder and piston arrangement 80. By means of such a provision, the block 76 may be adjusted to raise or lower the serrated upper surface of the block in order to accommodate billets of different diameters and in this respect the clamping base on the discharge side of the machine is similar to the clamping base on the charging or entering side of the machine.

The clamping head comprises a bolster 82 also referred to as a plate of circular form or as an adapter that is pivoted to the head about an axis 84, and a yoke member 86 that is pivoted to the shaft 58 and is arranged to straddle the pivoted bolster 82. The yoke 86 has secured to its upper extremity a connector leading to a counterweight 88 which tends normally to maintain the pivoted bolster 82 in a predetermined position of adjustment. The opening in the yoke 86, into which the bolster 82 fits, is of greater width than the bolster and of approximately the same depth. Thus, the bolster is free to pivot about the axis 84 between either of two extreme positions which are defined by engagement of the bolster with the inner side walls of the legs of the yoke. Normally the bolster is maintained in a position approximately centrally of its two extreme positions and to this end the opposite lower corners of the clamping head are bored out as indicated by the reference numerals 90 and 92 to provide recesses for the reception of compression springs 94 and 96. These springs bear against the opposite sides of the bolster 82 and being of equal strength they tend normally to maintain the bolster in its central position.

The bolster proper comprises a body portion, which for the sake of convenience may be designated by the same reference character 82 as designates the bolster itself, and a plurality of clamping jaws 98 and 100 that are carried by the body portion in the manner shown in Figure 4.

In the operation of the feeding means on the discharge side of the machine, the base clamping member 76 is first adjusted to accommodate billets of the particular size being surfaced and then, as billets pass through the cutter, the piston 70 is lowered to swing the clamping head 56 downwardly and move the clamping jaws of the bolster into firm engagement with the billet 12. Owing to the cylindraceous lower surfaces of the clamping jaws 98 and 100 and the narrowness of the clamping base 76, the billet 12 may be oscillated about the point of gripping engagement, and the serrated portions on the gripping members hold the billet against rotation. To the end of facilitating the oscillation of the billet 12 the work engaging surface formed on the upper section 76 of the clamping base may be curved widthwise to avoid straight line contact between the serrations and the billet.

Furthermore, owing to the fact that the bolster 82 can be displaced relatively to the clamping head 56 a certain amount of free bodily movement of the billet 12 relatively to the other parts of the surfacing machine is permitted. Thus, if there is a tendency on the part of the gripped end of the billet to wiggle it is free to do so, and during such movement the bolster 82 will merely rock back and forth. The provision of the resilient mounting for the clamping jaws 27 and 29, and 98 and 100, permit a certain amount of give on the part of the jaws in the event that the cutters bite sufficiently deep into the billet to exert a strong force tending to rotate the billet against the action of the gripping means.

It is to be appreciated and understood that numerous parts of this machine may be substituted one for the other, or interchanged with one another, as desired. For example, on the entering side of the machine, the gripping member 25, carried by the clamping head, could be placed beneath the billet 12 instead of being retained above it. On the discharge side a similar change could be effected, and carrying this idea further the griping mechanism on both the discharge and entering sides of the machine could, if desired, be identical. Thus, both gripping mechanisms could be made to correspond to that illustrated herein on the discharge side of the machine or to that illustrated herein on the entering side of the machine. Other changes are equally obvious to persons possessed of the proper mechanical skill and it is to be appreciated that such changes as the foregoing, or one, for example, which would consist in placing the springs of the clamped jaws in such a manner that the jaws would normally be positioned outwardly from the clamping head or base and would be provided with a resilient backing whereby upon sufficient pressure being applied they would retract in the direction of the head or base, do not constitute departures from the scope of the invention as set forth herein and are intended as the full equivalent of the structure disclosed and claimed herein.

Although the invention has been illustrated with particular reference to surfacing machines it is to be appreciated that in many respects the invention is obviously capable of a wider application.

Having thus described my invention, what I claim as new and desire to secure by United States patent is:

1. A work holding clamp for use in billet surfacing machines and the like, having, in combination, a clamping head, a pivoted bolster carried by the clamping head and arranged for displacement relatively thereto, said bolster comprising a body portion and a work engaging member carried by the body portion and arranged for displacement relatively thereto.

2. A work holding clamp for use in billet surfacing machines and the like, having, in combination, a clamping head, a bolster carried by the head and movable between either of two extreme positions, said bolster being constructed and arranged to apply clamping pressure to a billet being surfaced, and means tending normally to maintain the bolster in a position located approximately centrally of its two extreme positions.

3. A work holding clamp for use in billet surfacing machines and the like, having, in combination, a clamping head, a bolster pivoted to the head and arranged for swinging movement between either of two extreme positions, said bolster being comprised of a body portion and means carried thereby for imparting clamping pressure

to a billet being surfaced, together with resilient means tending normally to maintain the bolster in a position located approximately centrally of its two extreme positions.

4. A work holding clamp for use in billet surfacing machines and the like, having, in combination, a clamping head, and a bolster pivoted to the head and arranged for displacement relatively thereto, said bolster comprising a body portion and a plurality of yieldingly mounted clamping jaws adapted to apply clamping pressure to a billet during the resurfacing operation.

5. A work holding clamp for use in billet surfacing machines and the like, having, in combination, a clamping head, a bolster mounted for pivotal movement thereon, said bolster comprising a body portion and a plurality of clamping jaws for applying clamping pressure to a billet, and a clamping base positioned below the clamping head and arranged for adjustment relatively to the head, said base being adapted to cooperate with the jaws in applying clamping pressure to the billet.

6. A work holding clamp for use in billet surfacing machines and the like, having, in combination, a clamping head, billet engaging means carried by the clamping head, and a clamping base adapted to cooperate with the head in firmly gripping a billet being surfaced, said clamping base comprising an upper section provided with a billet engaging surface and a lower section, one of said sections being of wedge-shaped formation, and one of said sections being movable relatively to the other whereby movement imparted to said section causes raising and lowering of the billet engaging surface.

7. In a work grip for a billet peeling machine, the combination with an adapter detachably mounted and provided with a jaw for engaging the billet to be operated upon, of a pivoted lever, an adapter on the lever provided with another jaw which is removable and replaceable for engaging the other side of the billet, means always active for normally drawing the lever away from the first named adapter so as to allow a billet to be placed between the jaws, and means for forcing the lever back against the resistance of the first named means and pushing the jaw thereon into contact with the billet.

8. In a work grip for a billet peeling machine, the combination with an adapter detachably mounted and provided with a jaw for engaging the billet to be operated upon, of a lever pivoted on an axis and having an adapter provided with another jaw which is removable and replaceable for engaging the other side of the billet, means always active for normally drawing the lever away from the first named adapter so as to allow a billet to be placed between the jaws, and a piston and cylinder having a wedge movable along a surface of the machine for forcing the lever back against the first named means and pushing the jaw thereon into contact with the billet in contact with the lower jaw.

9. In a work grip for a billet peeling machine or the like, the combination with a stationary jaw and a movable jaw, of a lever on which the movable jaw is mounted, means for drawing the lever back away from the work, a roll carried by the lever, and a reciprocable wedge arranged in contact with the roll, whereby the movement of the wedge in one direction will transmit pressure from the wedge to the roll and force the movable jaw into contact with the work.

10. In a work grip for a billet peeling machine or the like, the combination with a stationary but adjustable jaw and a movable jaw, of a lever on which the movable jaw is mounted, a freely oscillatable plate on which the movable jaw is mounted, means for drawing the movable jaw back away from the work, a roll carried by the lever, a piston and a cylinder, the piston having a wedge shaped end, the frame having ways for supporting and guiding the wedge, said wedge being arranged in contact with the roll, whereby the movement of the piston in one direction will transmit pressure from the wedge to the roll and to the movable jaw and force the same into contact with the work.

11. In a work grip for a billet peeling machine or the like, the combination with a jaw and a movable jaw, of a lever, a freely oscillatable plate on the lever on which the movable jaw is mounted, means for constantly urging the movable jaw back away from the work, and power operated means for forcing the lever toward the work in opposition thereto, said plate being self centering.

12. In a work grip, the combination with a lower jaw, having a flat rough gripping surface, means for adjusting the elevation of the lower jaw to accommodate the position of the work, a lever above the lower jaw, a power operated wedge for moving the lever down positively, a plate carried by said lever of a circular form mounted to turn freely on its axis, and a pair of jaws individually movable but mounted on said plate, whereby when the plate is brought down on the work supported by the lower jaw, the plate is free to swing on its axis to equalize the pressure of the two jaws against the work and clamp the work against said lower jaw even if the work is out of concentric position.

13. In a work grip, the combination with a jaw, having a flat rough gripping surface, means for adjusting the elevation of the jaw to accommodate the position of the work, a lever, a power operated wedge for moving the lever positively, and a pair of jaws individually movably carried by said lever, whereby when the lever is brought down toward the work supported by the jaw, the two jaws are free to swing to equalize the pressure of the two jaws against the work and clamp the work against said jaw even if the work is out of concentric position.

14. In a work grip for a billet peeling machine, the combination with a jaw for engaging the billet to be operated upon, of a clamping head provided with another jaw and movable toward and away from the first-named jaw and for engaging the other side of the billet, means always active for normally drawing the clamping head away from the first-named jaw so as to allow a billet to be placed between the jaws, and means for forcing the clamping head back against the resistance of the first-named means and pushing the jaw thereon into contact with the billet.

15. In a work grip for a billet peeling machine the combination with a jaw for engaging the billet to be operated upon, of a clamping head pivoted on an axis and having another jaw, means always active for normally drawing the clamping head away from the first named jaw so as to allow a billet to be placed between the jaws, and a piston and cylinder having a wedge movable along a surface of the machine for forcing the clamping head against the first-named means and pushing the jaw thereon into contact with the billet in contact with the lower jaw.

LOUIS C. REIS.