

[54] MACHINE FOR PROCESSING BILLET OR BAR STOCK

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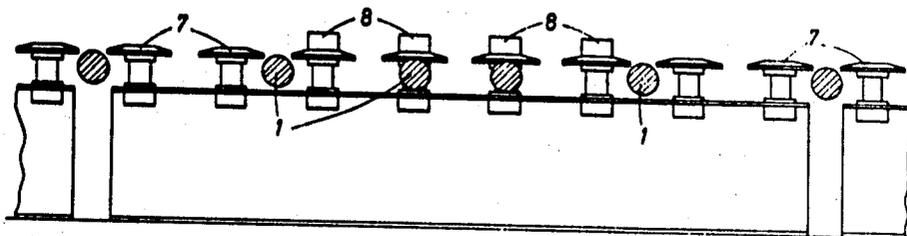
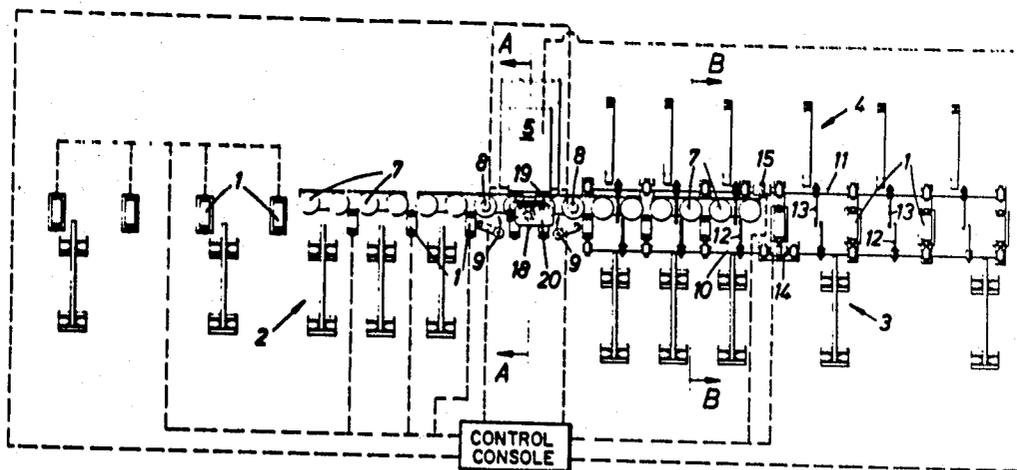
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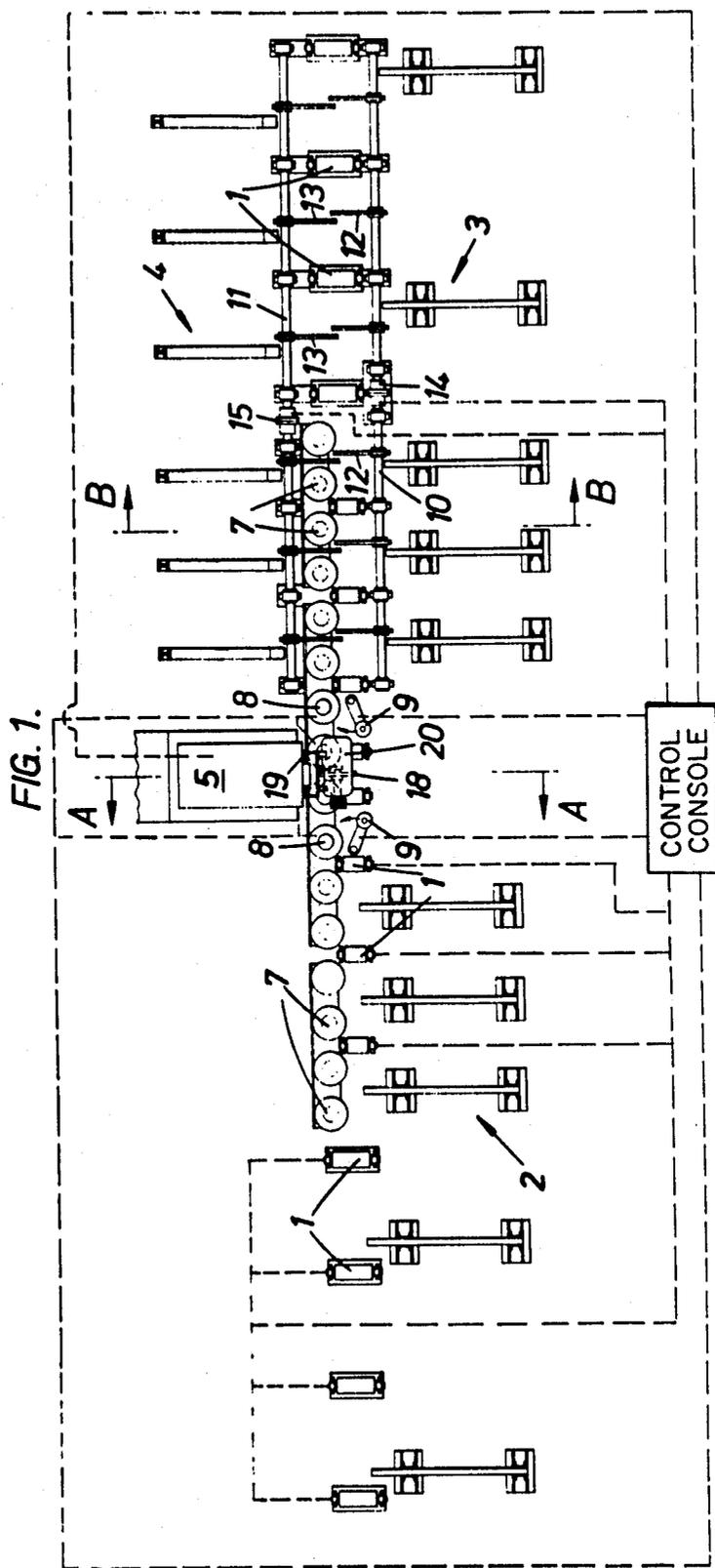
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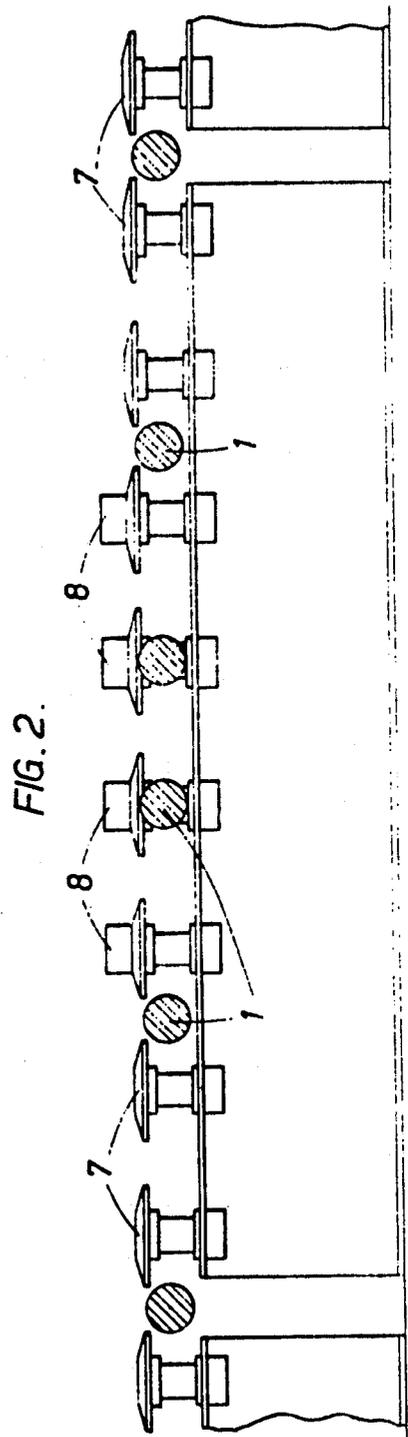
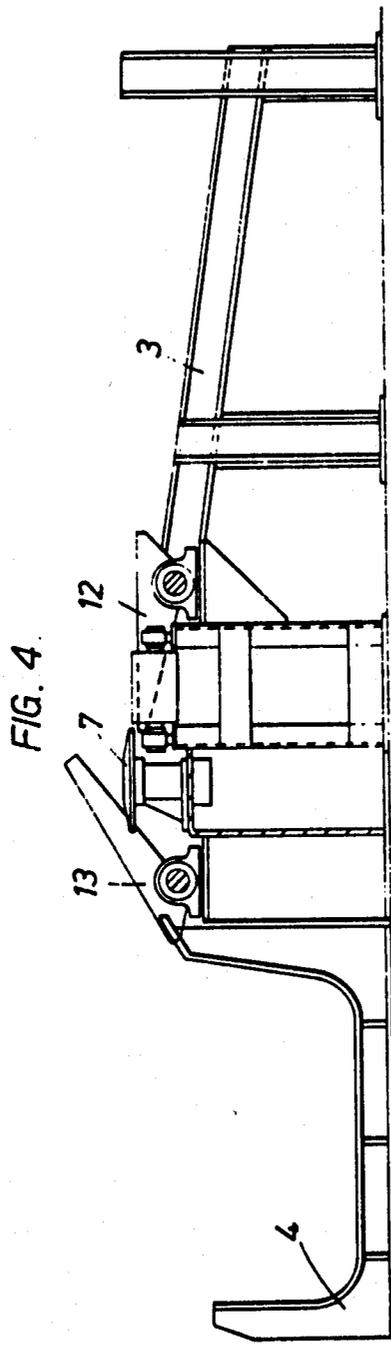
[57] ABSTRACT

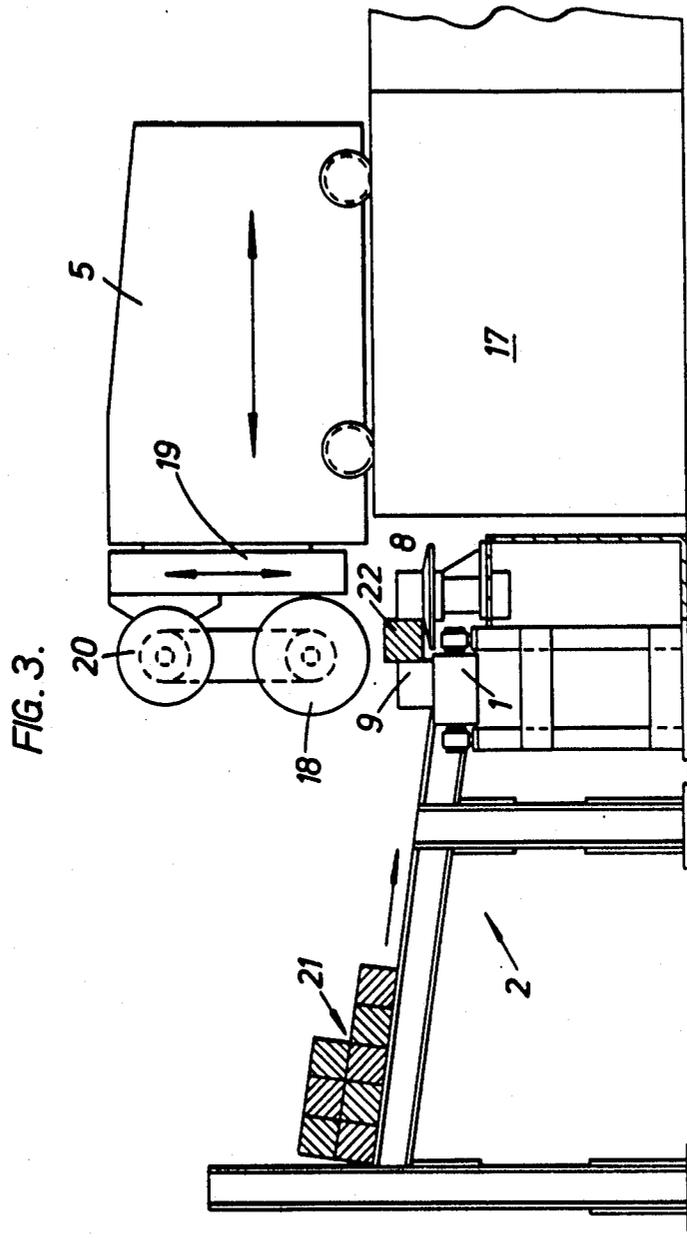
A billet grinder comprises a grinding head and a roller mechanism including horizontal table rollers for reciprocally driving a billet into and out of the head. The mechanism further includes co-operating sets of rollers on each side of the head for laterally gripping the billet at least one roll in each set and a number of rolls in the roller mechanism aligned therewith having horizontally inclined surfaces to provide edge support on the leading and trailing edges of the billet.

9 Claims, 4 Drawing Figures









MACHINE FOR PROCESSING BILLET OR BAR STOCK

This invention relates to a machine for processing billet or bar stock, and particularly, but not exclusively, relates to a machine for selectively grinding metal billets or bars in order to remove surface defects in them.

Hitherto such defects have been removed by manually manipulating a swing grinder (a suspended counterbalanced grinding head) over the surface of a stationary billet, the operator bringing the grinding head in contact with selected areas to be ground, by hand grinding or by pneumatic chippers — mainly on blooms. Alternatively, arrangements exist for grinding the whole surface of the billet by clamping it to a carriage which is reciprocally movable past the grinding head.

Swing grinders and the other hand-held implements suffer from the obvious disadvantage that they are manually operated and the other grinding technique can handle only a limited range of billet lengths on the carriage, is costly in power and metal consumption and is time-consuming since it is not selective.

In accordance with this invention there is provided a machine for processing billet or bar stock, comprising a machine head, a roller mechanism including horizontal table rollers for driving stock into and out of the head, and control means for controlling the rate of drive of the stock and the operation of the machine head, the roller mechanism further including co-operating sets of rolls on each side of the head for laterally gripping the stock, at least one roll in each set and a plurality of other rolls in the roller mechanism aligned therewith having horizontally inclined surfaces to provide edge support for the stock on its leading and trailing ends in dependence on the stock shape.

Preferably, the table rollers are operable to reciprocally drive the stock into and out of the head.

The provision of the inclined surface rollers ensures edge support to prevent bent stock from executing a sharp undulating motion along its path of travel such as would be caused, for example, by the leading edge striking the upstream table rollers in succession or its trailing end being successively dropped off the trailing roller.

The co-operating sets of rolls may include plain (cylindrical) vertically-disposed pressure rollers on one side of the stock and driving rollers on the opposite side incorporating a vertical shaft portion upstanding from the horizontally inclined surface, i.e., in the manner of a 'top hat.' The other rollers in alignment with the latter may also be of 'top hat' form but preferably they are simply disc-like structures; unlike the first rollers mentioned, these other rollers are not driven.

The control means is operative to drive the table rollers so as to advance the stock towards, e.g., the grinding head, and is operator-controlled to cause the co-operating rollers to grip the stock and hold it firmly adjacent the head, the movements of the grinding head also being governed by the control means whereby the grinding wheel may be positioned on, and laterally traverse, a marked surface defect whilst the stock is driven forward. A similar sequence may be controlled on a return (reciprocal) drive depending on the degree and magnitude of the defect.

The stock may be deposited on to the roller table from a side gantry at an input station, e.g., manually,

and it may be discharged on to a side gantry or a pocket on the remote side of the head (output station). Preferably, the discharge of stock at the output station is effected from the control means, an appropriate set of arms being activated at the output station for this purpose.

In order that the invention may be fully understood, one embodiment thereof will now be described by way of example with reference to the accompanying drawings in which:

FIG. 1 is a schematic plan view of the machine;

FIG. 2 is a longitudinal section adjacent the grinding head showing details of some of the rollers with various parts omitted for clarity;

FIG. 3 is a section through A — A in FIG. 1 showing billets in position; and

FIG. 4 is a section through B — B.

Referring now to FIGS. 1 and 2, the machine comprises a horizontal roller table having a plurality of driven spindle rollers 1 extending between an input station — including a gantry 2 for supporting billets — and an output station including a similar gantry 3 to one side and a pocket 4 on the other. A grinding head 5 is provided between the input and output stations.

Mounted in line with one another on the far side of the table is a plurality of vertically disposed rollers 7, 8. The rollers 7 are in the form of discs having inclined surfaces whilst the rollers 8 have a similar inclined disc portion surmounted by a shaft or body portion so as to define a 'top hat' structure. All the disc rollers 7 lie between the axes of adjacent spindle rollers 1 and are idlers. The 'top hat' rollers 8, of which there are four, are driven. They are arranged in pairs on opposite sides of the grinding head and co-operating with each pair are two pivotal idler pressure rollers 9 the function of which will be described below.

Extending alongside the output station are shafts 10 and 11 on which are secured a number of arms 12, 13 extending inwardly between the spindle rollers 1 and normally lying beneath the path of travel of the stock. Each of the shafts is independently pivotally movable through control mechanisms 14 and 15, so that the appropriate arms lift the stock off the roller table for discharge to the gantry 3 or the pocket 4.

The grinding head (FIG. 3) is reciprocally movable horizontally on a supporting carriage 17 and the grinding wheel itself (18) is vertically movable on a slide 19 which also carries the driving motor 20. The horizontal and vertical movements are effected in a plane normal to the direction of travel of the stock.

More particularly, referring now to all the Figures, billets 21 which have been marked where surface defects occur are stacked on the gantry 2 and are manually discharged on to the spindle rollers 1 at the input station. These rollers are driven from a control console and the billet is advanced towards the grinding head, the edge of the billet overlying the disc rollers 7 by which shock wave-like or undulating motion of the billet is avoided, the inclined surface gently taking up the leading edge of the billet as it travels forward.

When the leading end of the billet enters the head the pressure rollers 9 are operated by control means so that the billet is gripped between these rollers and the co-operating 'top hat' rollers 8, the billet (22) riding up over the inclined portion and being firmly gripped by its sides. The leading pressure roller 9 is operated in advance of the 'upstream' roller so that the billet is firmly held at all times alongside the head.

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As a marked defect approaches, the head is activated by the control console and the grinding wheel 18 is brought into contact with the billet surface and laterally traversed across the billet face over the defective area.

Any other marked defects in the billet may be dealt with in a similar manner, the speed of the billet travel being varied for this purpose — i.e., the billet will travel faster in the 'dwell' period between defects as compared with its speed whilst grinding is in progress. Two discrete speeds can in fact be employed, one during 'dwell' travel periods and another slower one during grinding.

Just as is the case at the input station, the inclined surfaces on the disc rollers 7 gently take up the leading faces of the billet at the 'remote' end of the machine.

Any defects not dealt with by the first pass, e.g., because of the depth of the fault, may be dealt with by a reverse pass, the roller drives being reversed for this purpose. Any other sides of the billet having defects are then dealt with in the same manner.

When the billet finally settles at the output station, the control mechanisms 14 or 15 are operated from the console so that the billet is discharged by the arms 12, 13 to the gantry 3 or the pocket 4 respectively. In FIG. 4 the arms 13 are shown lifted for discharge in this manner.

The gantry is suitable for magnetic removal facilities whereas the pocket is suitable for chain slings. Alternatively one of these receptacles could be used for rejects.

The drive rollers, the pressure rollers and the discharge arms may be hydraulically driven under control from the operator's console. The grinding head may also be controlled, hydraulically or hydraulic and pneumatic means may be used for the horizontal and vertical drives respectively. Pneumatic means are particularly advantageous for the vertical drive since this medium then controls the grinding wheel load during grinding.

Billets used on the machine should be 'commercially' straight, i.e., better than 1 in 250 to ensure vibration-free travel.

We claim:

1. A machine for processing billet or bar stock, comprising;
 - a machine head,
 - a roller mechanism including a plurality of driven, horizontally disposed table rollers for driving said stock into and out of engagement with the head, and
 - co-operating sets of rolls on each side of the head for laterally gripping the stock, at least one roll in each set and a plurality of other rolls in the roller mechanism aligned therewith having surfaces inclined to the horizontal plane to provide edge support for

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the stock on its leading and trailing ends in dependence on the stock shape, and control means for controlling both the rate of drive of the stock along the roller mechanism and the operation of the machine head.

2. A machine according to claim 1, in which the drive for the table rollers is reversible.

3. A machine according to claim 2, in which the co-operating sets of rolls include cylindrically vertically disposed pressure rolls on one side of the stock, and driving rolls on the opposite side incorporating a cylindrical, vertical shaft portion upstanding from the said inclined surface.

4. A machine according to claim 3, in which the said other rolls having said inclined surfaces are disc-like idler structures.

5. A machine according to claim 3, comprising a pivotal arm on which each pressure roll is carried.

6. A machine according to claim 5, in which the machine head includes

a grinding wheel for laterally traversing the stock.

7. A machine according to claim 6, comprising a first side gantry for depositing stock on the roller table at one end of the machine, and

a second side gantry for receiving discharged stock from the roller table at the other end of the machine.

8. A machine for removing surface defects from billet or bar stock, comprising;

a grinding head,

a grinding wheel in said head,

a roller mechanism including a plurality of driven, horizontally disposed table rollers for reciprocally driving said stock into and out of engagement with the grinding head, and

co-operating sets of rolls on each side of the head for laterally gripping the stock, at least one roll in each set and a plurality of other rolls in the roller mechanism aligned therewith having load bearing surfaces inclined to the horizontal plane to provide edge support for the stock on its leading and trailing ends in dependence on the stock shape, and

control means for controlling both the rate of drive of the stock along the roller mechanism and lateral traversal of the grinding wheel over the stock as the stock is advanced past the head.

9. A machine according to claim 8, in which the co-operating sets of rolls each include

a cylindrical, vertically disposed pressure roll on one side of the stock, and

driving rolls on the opposite side, each of said driving rolls incorporating a cylindrical, vertical shaft portion upstanding from a load bearing surface inclined to the horizontal plane.

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