Aug. 17, 1943. W. F. JONES, JR 2,327,110

BILLET NOTCHER

Filed Nov. 15, 1941 6 Sheets-Sheet 1

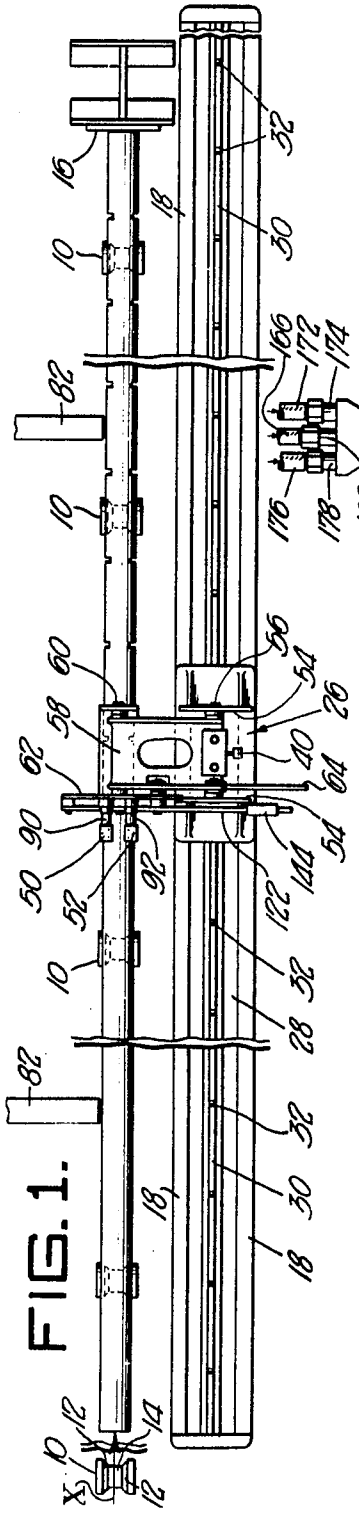


FIG. 1.

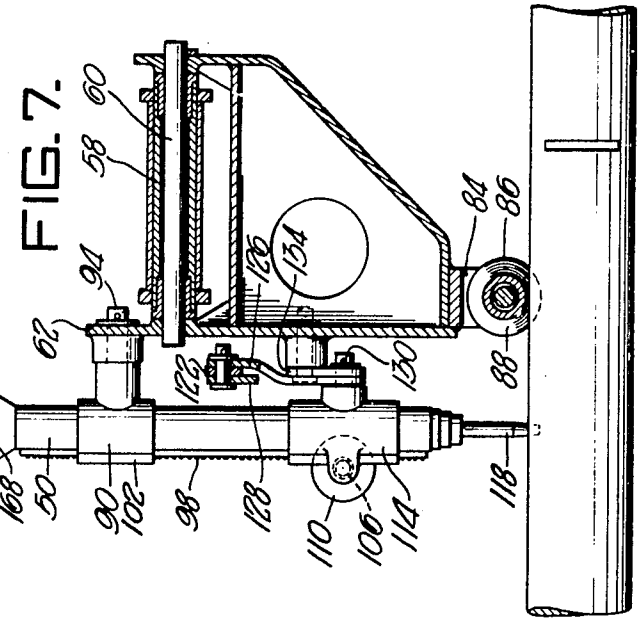


FIG. 7.

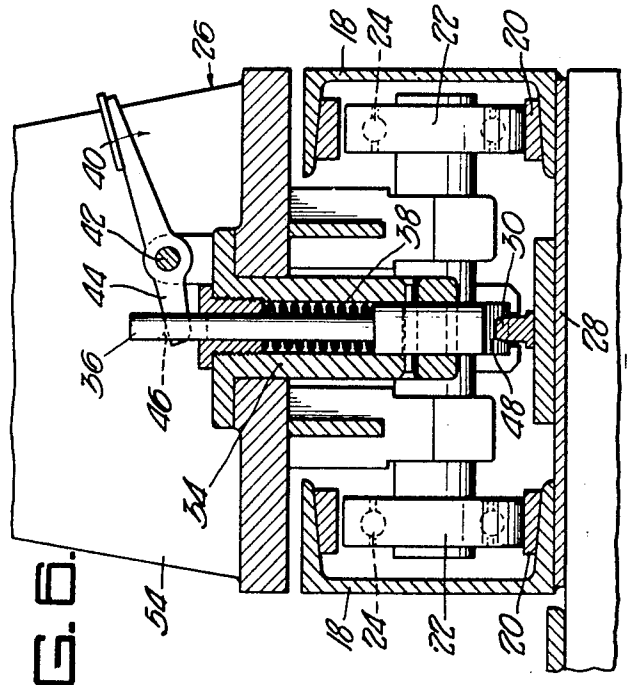


FIG. 6.

Inventors:
WILLIAM F. JONES, JR.,
and AUGUST MELLER,
by: John E. Jackson
their Attorney.

Aug. 17, 1943. W. F. JONES, JR 2,327,110

BILLET NOTCHER

Filed Nov. 15, 1941 6 Sheets-Sheet 2

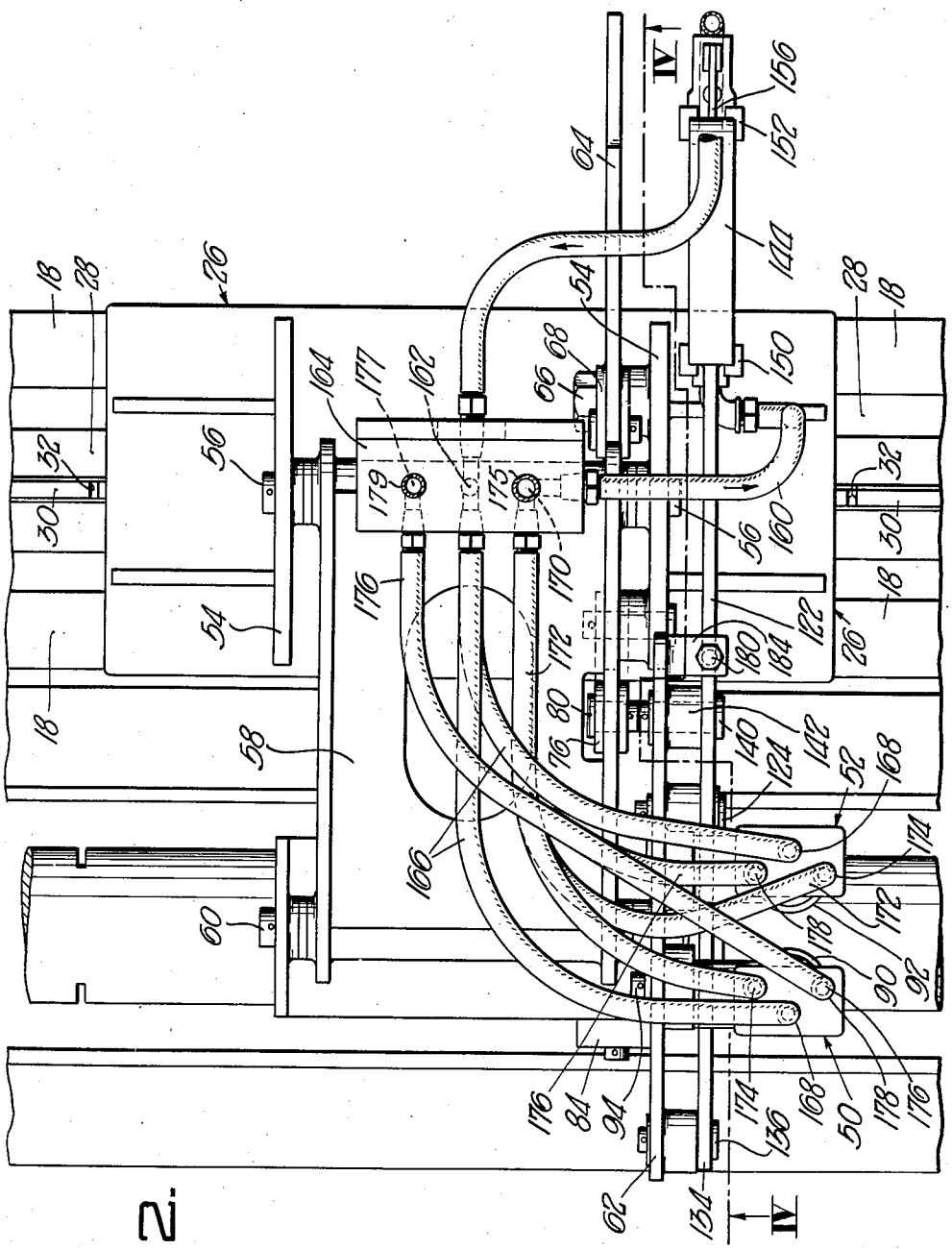


FIG. 2.

Inventors:
WILLIAM F. JONES, JR.,
and AUGUST MELLER,
by: John E. Jackson
their Attorney.

Aug. 17, 1943. W. F. JONES, JR 2,327,110

BILLET NOTCHER

Filed Nov. 15, 1941 6 Sheets-Sheet 3

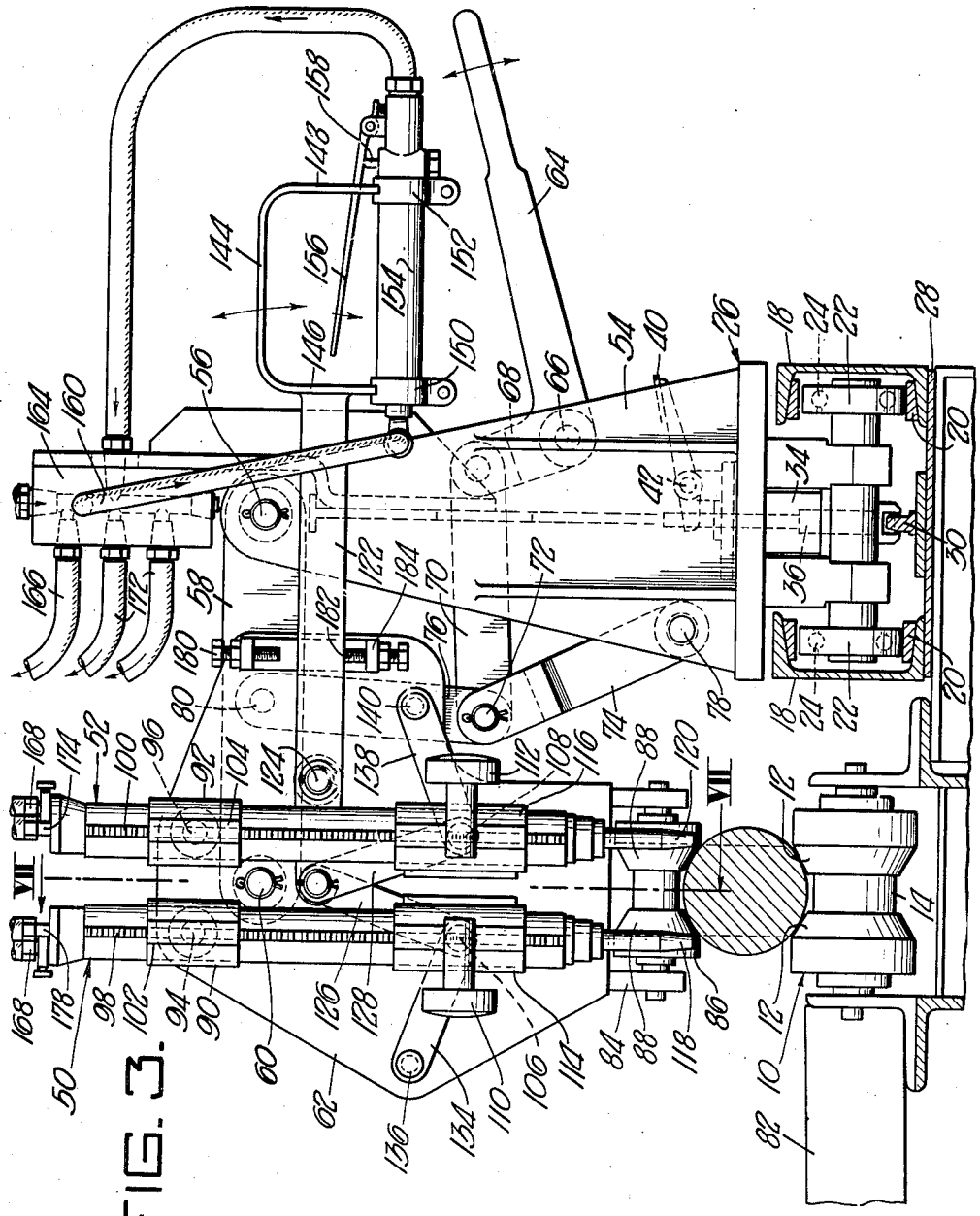


FIG. 3.

Inventors:
WILLIAM F. JONES, JR.,
and AUGUST MELLER,
by: John E. Jackson,
their Attorney.

Aug. 17, 1943. W. F. JONES, JR 2,327,110

BILLET NOTCHER

Filed Nov. 15, 1941 6 Sheets-Sheet 4

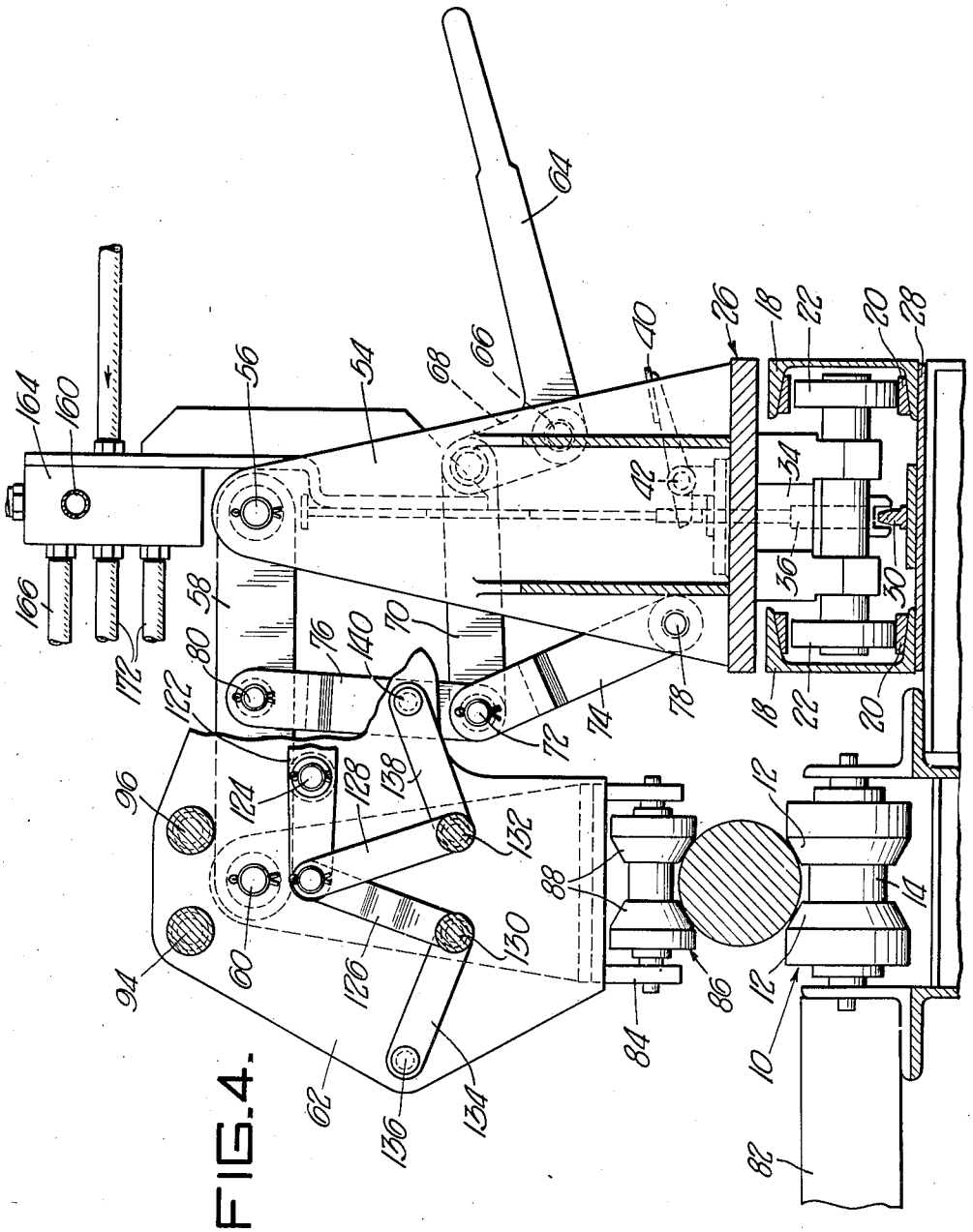


FIG. 4.

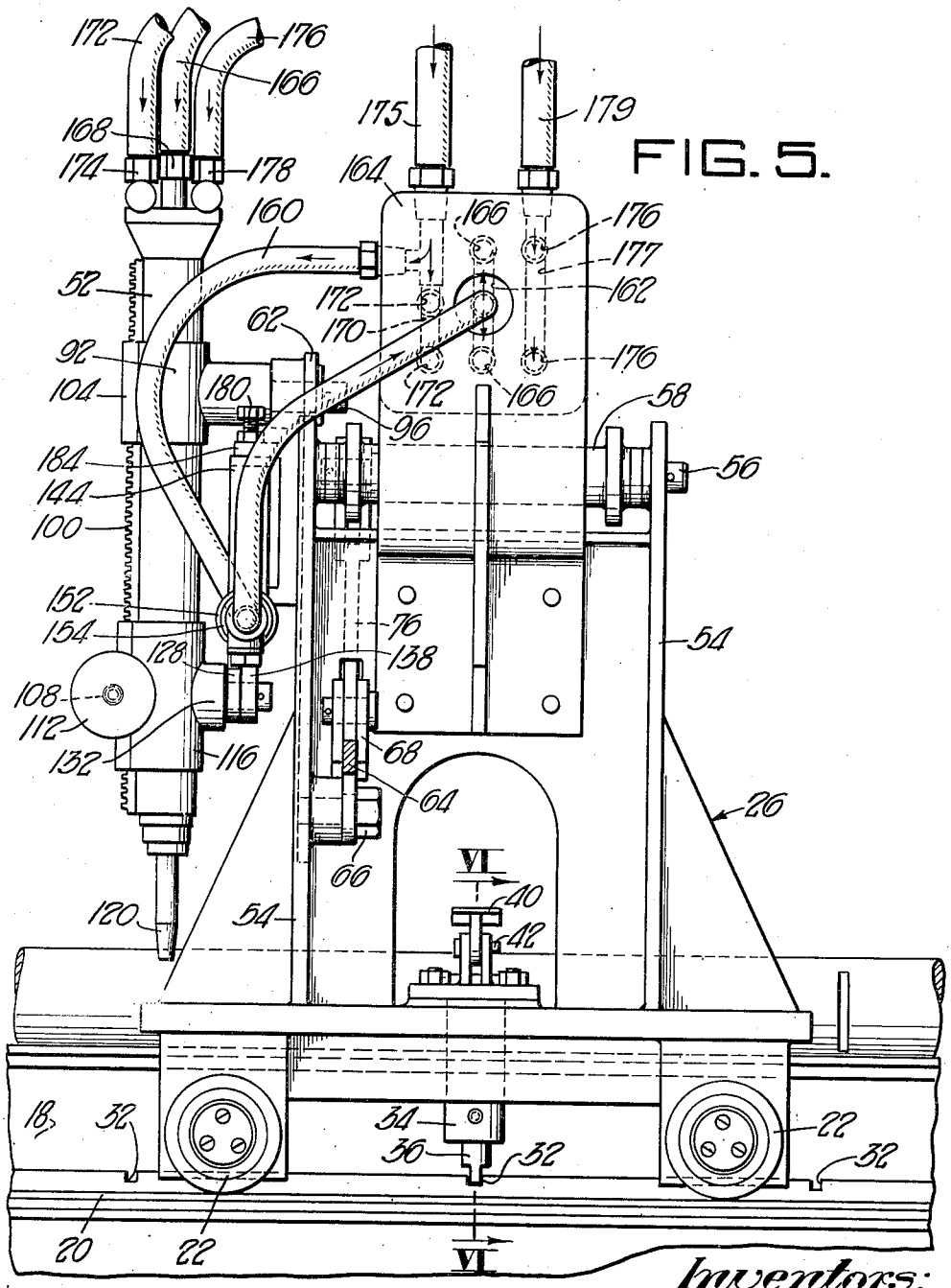
Inventors:
WILLIAM F. JONES, JR.,
and AUGUST MELLER,
by: John E. Jackson
their Attorney.

Aug. 17, 1943. W. F. JONES, JR 2,327,110

BILLET NOTCHER

Filed Nov. 15, 1941 6 Sheets-Sheet 5

FIG. 5.



Inventors:
WILLIAM F. JONES, JR.,
and AUGUST MELLER,
by: John E. Jackson
their Attorney

Aug. 17, 1943. W. F. JONES, JR 2,327,110

BILLET NOTCHER

Filed Nov. 15, 1941 6 Sheets-Sheet 6

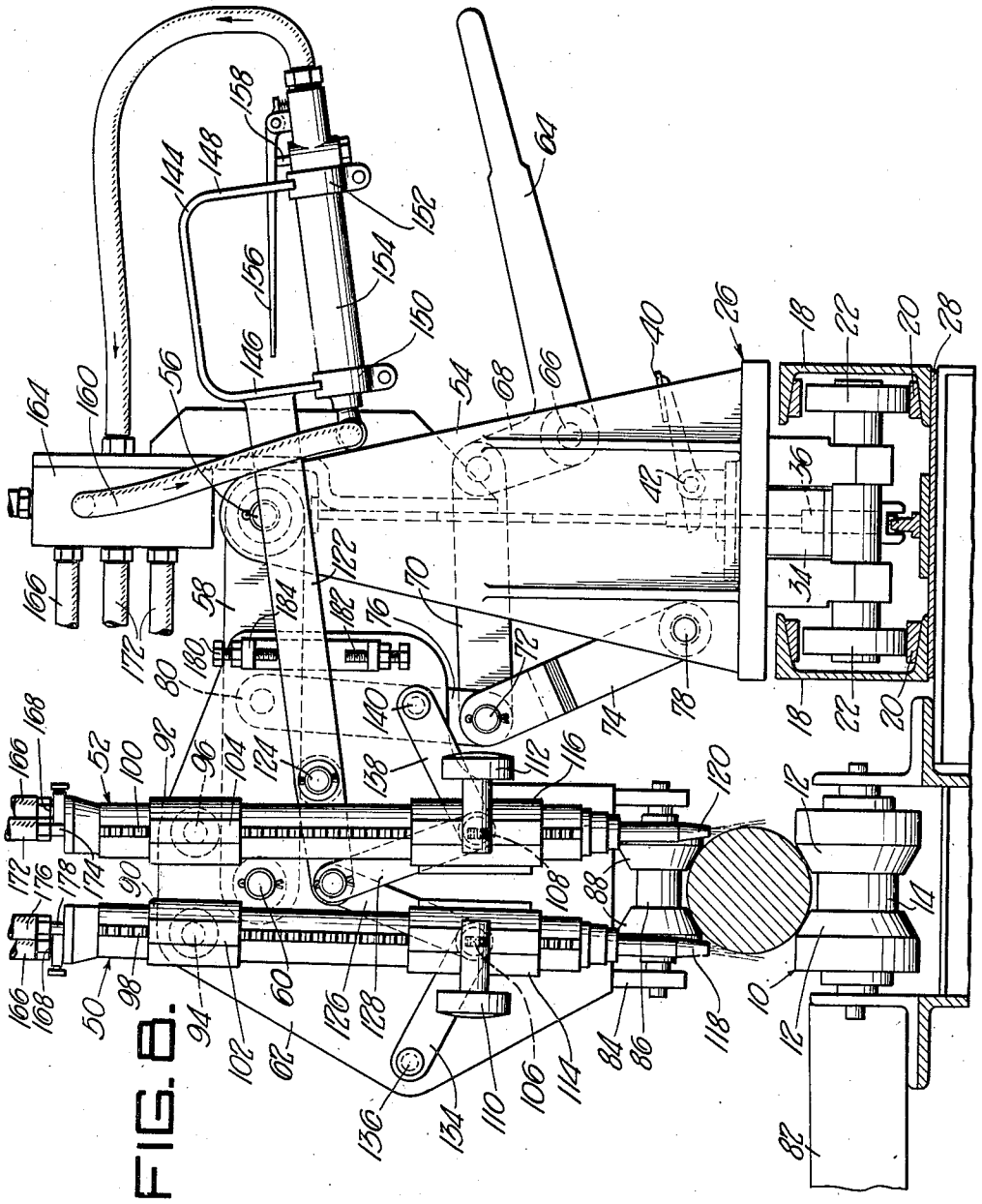


FIG. 8.

Inventors:
WILLIAM F. JONES, JR.,
and AUGUST MELLER,
by: John E. Jackson,
their Attorney.

Patented Aug. 17, 1943 2,327,110

UNITED STATES PATENT OFFICE

2,327,110

BILLET NOTCHER

William F. Jones, Jr., and August Meller,
Birmingham, Ala.

Application November 15, 1941, Serial No. 419,357

7 Claims. (Cl. 266—23)

The present invention relates to improved apparatus peculiarly well suited for notching billets at diametrically opposite sides by burning so as to facilitate the fracturing of the billet along a cleavage plane substantially perpendicular to the axis thereof.

While not limited thereto, the apparatus of the present invention is of special utility in notching billets which are to be used in the manufacture of shells. This is for the reason that, as is well known to those skilled in the art, it is not advisable to cut, shear or sever the billets into lengths suitable for shell blanks by burning. The notching apparatus of the present invention facilitates the breaking along a plane of cleavage at right angles to the axis of the billet, which is desirable since it facilitates the examination of the grain structure at the fracture and the subsequent forming of the shell blank.

The improved apparatus includes a conveyor formed of grooved rollers along which the billet moves longitudinally until the end thereof comes to rest against a suitable stop. Paralleling the conveyor rollers there is an elongated track which is traversed by the truck of the billet notching machine of the present invention, there being provided in association with the track and the notching machine a slotted spacer bar effective to automatically stop the notching machine truck at predetermined spaced intervals to suit the length of the sections into which the billet blank is to be severed. The notching of the billet at diametrically opposite points is effected by oxyacetylene torches of known type. However, special problems are involved for the reason that as the billets come from the mill, they are of great length and are somewhat irregular, having slight lateral bulges at irregular intervals, as well as vertical irregularities.

Our improved apparatus takes these factors and irregularities into consideration and makes provision for special type of mounting which will permit the cutting torches to partake of a lateral swinging movement to compensate for these irregularities, provision also being made for lifting and lowering the torch supporting structure.

The above and further detailed features of the invention will be fully apparent from the following detailed disclosure when read in connection with the accompanying drawings, and the features of novelty will be defined with particularity in the appended claims.

In the drawings:

Figure 1 is a general plan view of the billet notching apparatus embodying our invention;

Figure 2 is a plan view of the billet cutting machine which traverses the track shown in Figure 1;

Figure 3 is an elevation of parts shown in Figure 1 also illustrating in cross section the supporting track for the billet notching machine and a billet supported on a conveyor table in position to be notched;

Figure 4 is a fragmentary detail section taken approximately on line IV—IV of Figure 2;

Figure 5 is an elevation viewed from the right side of Figure 3;

Figure 6 is a detail section on line VI—VI of Figure 5;

Figure 7 is a detail section on line VII—VII of Figure 3; and

Figure 8 is a skeleton view similar to Figure 3 showing the torches in starting or preheating position.

Referring in detail to the drawings, there is provided a billet conveyor comprising a plurality of spaced rolls 10—10 along which the billet is fed in the direction of the arrow X from a storage yard, the rollers 10 being of the shape best shown in Figure 3 to provide beveled portions 12—12 flanking the central annular depressed portion 14. This form of conveyor roller is well suited for handling of circular billets. The billet is fed forward from the storage yard in the direction of its length until its end comes to rest against a fixed stop 16.

Paralleling the conveyor rollers there is a track composed of parallel channel bars 18—18. The flanges of these channel bars face inwardly and they are provided with tread strips 20 which coact with wheels 22 mounted in suitable roller bearings 24 as shown, which movably support the truck 26 of the notching machine.

Located between the track channels 18—18 there is fixedly mounted on the same base plate 28 to which the rails are secured, a spacing bar 30 having a plurality of slots 32 cut in the upper face thereof. These slots are spaced at predetermined intervals corresponding to the length of sections into which the billet is to be broken in forming shells of a desired length.

Secured to the truck 26 of the machine there is a vertically disposed bearing guide 34 within which there is slidably mounted a plunger 36 pressed downwardly by a spring 38 and adapted to be manually lifted by means of an operating lever or treadle 40 pivoted at 42 and having a finger 44 projecting through a slot 46 in the

plunger. At its lower end the plunger carries a tongue 48 adapted to enter the slots 32 in the spacing bar 30. After one pair of notches have been burned in diametrically opposite sides of the billet, the plunger 36 is elevated by actuation of the lever or treadle 40. This withdraws the tongue from the slot and the truck is then pushed along the track toward the next slot in the spacer bar. After movement of the truck has been initiated, the operator releases pressure on the treadle 40 and the tongue of the plunger slides along the top of the spacer bar and is forced into the next slot automatically by the spring 38, thus again positioning the truck of the machine for the next notching operation. The stop 16 at the end of the billet conveyor is so located with relation to the slots 32 in the spacer bar that the first notches burned will provide a length of billet suitable for a shell or for a crop, whichever may be desired.

The burners or torches 50—52 utilized to burn the notches in the diametrically opposite sides of the billet are mounted in such a way that they can be readily brought into proper position regardless of irregularities due to either lateral deflections in the billet or to vertical irregularities thereof. The parts are so arranged that regardless of such irregularities the active portions of the torches will be positioned for proper burning or cutting cooperation therewith.

The machine truck 26 has extending upwardly therefrom a pair of standards 54—54 in the upper extremities of which are pivotally mounted studs 56—56 which constitute a pivotal support for a rocker arm 58 which at its outer extremity carries a supporting pin 60 from which a burner holder frame 62 is pivotally hung.

A bell crank lever 64 pivoted at 66 to the standard 54 has an arm 68 which is connected by a link 70 to a pin 72 which passes through the free ends of respective toggle links 74 and 76. The link 74 is pivoted at 78 to the standard 54 and the link 76 is pivoted at 80 to a point on the arm 58 intermediate the journal 56 and pin 60. As thus arranged it is apparent that by manually rocking the bell crank lever 64 the toggle links may be straightened out so as to rock the arm 58 about its pivot 56 and thus slightly elevate the burner frame 62 bodily. Motion in the opposite direction will of course lower the burner frame. This permits of easy and quick adjustment at the time the billets are to be removed from the roller conveyor and discharged or rolled away laterally on the skids 82 provided for the purpose.

Near the lower end thereof, the burner frame has a depending bracket 84 in which is mounted a roller 86 having oppositely beveled faces 88 flanking a central grooved portion, the faces 88 making a firm engagement with the periphery of the circular billet. Because the burner frame is pivotally hung on the movable rocker arm in the manner described, it will be appreciated that the burner frame will bodily rise and fall to thus compensate for any irregularities or upward deformations in the billet.

To automatically compensate for horizontal or lateral irregularities or deformations in the billet, the torch guides are pivotally mounted in the manner to be now described. These torch guides, indicated at 90 and 92, are pivoted at 94 and 96 respectively to the burner frame. One torch 50 adapted to burn a notch on one side of the billet is mounted in the guide 90, and another torch 52 is similarly mounted in the guide 92. Splines 98 and 100 respectively are formed on the torches and they are slidable through grooved extensions 102 and 104 formed in the guides 90 and 92. These splines may have rack teeth formed in them for engagement with suitable pinions 106 and 108 adapted to be actuated by suitable adjusting knobs 110 and 112, the pinions and knobs being carried by sleeve portions 114 and 116 surrounding the lower portions of the torches 50 and 52.

Means are provided for swinging the sleeves 114 and 116 laterally so as to thus rock the torches about their pivotal mountings 94 and 96 to thereby laterally move the lower extremities of the nozzles 118 and 120 of said torches toward and from the billet. This lateral swinging of the torches is effected by the hand operated lever 122 pivoted at 124 to the burner frame 62, this lever being connected at one extremity with links 126 and 128 whose lower ends connect respectively with pivot pins 130 and 132 (see Figure 4).

The pin 130 also connects with a link 134 pivoted at 136 to a suitable bearing in the burner frame 62. In a similar manner the pin 132 in the lower end of the link 128 is connected with a link 138 whose outer extremity is pivoted at 140 in a similar bearing 142 carried by the burner frame 62. Because of the relative position of the links 126 and 128 and the manner of connection with the pivotally mounted links 134 and 138, it will be understood that when the operating lever 122 is rocked on its pivot 124 the burners will be caused to swing laterally about the pivots 94 and 96. The lever 122 is provided at its outer extremity with an operating handle 144. This handle is of bale-like form and the lower legs 146 and 148 thereof are provided with holder portions 150 and 152 within which is mounted an oxygen lance 154 provided with a suitable control lever 156. When the lever 156 is depressed it will actuate a valve pin 158 which will cause a flow of oxygen from the lance by way of a hose 160 to a chamber 162 formed in a chambered block 164. From the chamber 162 there is a respective oxygen hose connection 166 leading to the respective oxygen inlet fitting 168 of each of the torches.

For preheating the billet each torch is supplied with oxygen by a hose 172 which communicates with a chamber 170, these small hose connections connecting to respective fittings 174. The chamber 170 is supplied with oxygen by pipe 175 leading to a supply tank, not shown. The chamber 177 formed in the block 164 is supplied with acetylene gas by pipe 179 from a suitable container, not shown, and a respective hose 176 leads from this chamber to a respective acetylene gas connection fitting 178 for each torch.

As shown in Figure 8, the burner tips or torches are set for the beginning of the burning operation. With the tips in this position the gas is permanently regulated to supply a preheating flame and this flame burns continuously. After the billet has been sufficiently preheated, the lever 156 on the oxygen lance is depressed, thus supplying oxygen through the hose 160. This changes the flame to an oxidizing flame for burning the notches. After this lever 156 has been pushed down, using the lance as a hand hold, the lever 122 is pushed down gradually, thus bringing the burner tips to the upper position of Figure 3. After the burning of the notches has been completed, pressure on the lever 122 and pressure on the valve lever 156 are released. Thereupon the tips 118 and 120 of the torches drop by gravity to the lower position of Figure 8 and the preheating

flame is automatically restored. The machine is then pushed forward to position for burning the next pair of notches in the billet.

From the foregoing it will be understood that the torch supporting means is so arranged that the burner tips will follow the contour of the billet regardless of its irregularities or wavy contour. The in and out or lateral movement of the tips as they are raised or lowered is permitted by the swivel connections **94** and **96** between the billet guides **90** and **92** and the frame **62**. The up and down movement of the torches is limited by adjustable stop screws **180** and **182** mounted in extensions of a bracket **184**.

From the foregoing it will be apparent that although the billet is inherently non-uniform or slightly wavy both vertically and laterally, the torch holder will be automatically slightly lifted and lowered to take care of such vertical irregularities and the torches will individually swing laterally about their pivots **94** and **96** to compensate for the horizontal or lateral irregularities. When a billet is to be initially positioned or removed, the bell crank lever **64** will be manually depressed so as to lift the tips of the torches to such elevation that the billet can be rolled sidewise over the skids **82** above referred to, and thus clear such tips, it being understood that at this time the toggle links **74** and **76** are straightened out to elevate the frame on which the torches are hung.

The billet illustrated is of substantially circular form suitable for use in forming shells such as used for ordinance. However, it will be understood that by making appropriate changes in the contour of the billet conveyor rollers and similar changes in the bearing portions **88** of the upper engaging rollers, billets of other shapes may be quickly and effectively notched by the described apparatus.

The mechanism described is peculiarly well suited for quickly yet accurately notching billets at opposite points and is of such simple and rugged construction that the parts thereof will not readily be disabled. Thus the described parts individually and jointly cooperate effectively to serve their intended functions and will not easily be gotten out of order by the rough handling to which equipment of this character is of necessity subjected.

While we have described quite precisely the embodiment of the invention herein illustrated, it is to be understood that various modifications and substitutions of equivalents may be made by those skilled in the art without departure from the invention as defined in the appended claims.

We claim:

1. Apparatus for notching billets comprising a truck adapted to be moved lengthwise of a billet to be notched, notching torches, a torch supporting frame carrying a roller which rides on the billet, means for pivotally supporting the torches therefrom on diametrically opposite sides of the billet, a rocker arm from which said frame is pivotally hung, a pivotal support on the truck for said rocker arm, means carried by the truck for manually swinging the rocker arm about its pivotal support so as to lift or lower the torches with respect to the billet, and means for laterally swinging the torches toward or from the billet about their respective pivotal supports.

2. Apparatus for notching billets comprising a truck adapted to be moved lengthwise of a billet to be notched, notching torches, a torch supporting frame carrying a roller which rides on the billet, means for pivotally supporting the torches therefrom on diametrically opposite sides of the billet, a rocker arm from which said frame is pivotally hung, a pivotal support on the truck for said rocker arm, means carried by the truck for swinging the rocker arm about its pivotal support so as to lift or lower the torches with respect to the billet, means for laterally swinging the torches toward or from the billet about their respective pivotal supports, and a billet engaging roller journaled in said frame for properly positioning the frame and torches carried thereby regardless of vertical irregularities in the billet.

3. Apparatus for notching billets comprising a truck adapted to be moved lengthwise of a billet to be notched, notching torches, a torch supporting frame carrying a roller which rides on the billet, means for pivotally supporting the torches therefrom on diametrically opposite sides of the billet, the truck carrying a rocker arm from which said frame is pivotally hung, manually operable means for rocking said arm so as to lift or lower the torches, and an operating lever pivoted on said frame operatively connected with the torches and adapted when manually rocked to swing the torches laterally toward or from the billet.

4. Apparatus for notching billets comprising billet positioning means, a track extending lengthwise thereof, a truck movable along the track, spacing means extending lengthwise of the track, means on the truck coacting with the latter for positioning the truck at predetermined spaced points lengthwise of the billet, torches adapted to burn notches at diametrically opposite points on the billet, supporting means for the torches including a torch holder frame, a rocker arm pivotally supported from the truck and carrying a pivot from which said frame is hung, means for rocking said arm to thus raise or lower said frame, torch guides pivotally supported on said frame so as to permit the torches to move laterally toward or from the billet, and means for swinging the torches laterally about their respective pivotal supports.

5. Apparatus for notching billets comprising billet positioning means, a track extending lengthwise thereof, a truck movable along the track, spacing means extending lengthwise of the track, means on the truck coacting with the latter for positioning the truck at predetermined spaced points lengthwise of the billet, torches adapted to burn notches at diametrically opposite points on the billet, supporting means for the torches including a torch holder frame, a rocker arm pivotally supported from the truck and carrying a pivot from which said frame is hung, toggle links, one of which is connected to said rocker arm and the other of which is pivoted to the truck, and a manually operable bell crank having a link connection with said toggle links whereby said rocker arm can be swung on its pivotal support to thus lift or lower said torch frame and the torches hung therefrom.

6. Apparatus for notching billets comprising billet positioning means, a track extending lengthwise thereof, a truck movable along the track, spacing means extending lengthwise of the track, means on the truck coacting with the latter for positioning the truck at predetermined spaced points lengthwise of the billet, torches adapted to burn notches at diametrically opposite points on the billet, supporting means for the torches including a torch holder frame, a

rocker arm pivotally supported from the truck and carrying a pivot from which said frame is hung, toggle links, one of which is connected to said rocker arm and the other of which is pivoted to the truck, a manually operable bell crank having a link connection with said toggle links whereby said rocker arm can be swung on its pivotal support to thus lift or lower said torch frame and the torches hung therefrom, and a manually operable lever having link connections with the torches effective to swing the latter laterally toward and from the billet about the pivots of said torch guides.

7. Apparatus for notching billets comprising billet positioning means, a track paralleling the latter, a truck movable along said track, notching torches, a frame from which said torches are pivotally hung in a substantially upright position, a rocker arm from which the frame is pivotally hung, a pivotal support on the truck for said rocker arm, said frame at its lower end carrying a roller which rests on the billet and is adapted to properly position the torches regardless of vertical irregularities in the billet, the pivotal supports for the torches being adapted to compensate for horizontal irregularities in the billet, means for manually swinging the torches laterally about their respective pivots, and means for manually rocking said rocker arm about its pivotal support on the truck so as to vertically move the torches to a position where they clear the billet so as to facilitate the removal thereof from said positioning means.

WILLIAM F. JONES, JR.
AUGUST MELLER.