April 12, 1932. J. Q. HOLMES 1,853,048

CUTTING AND PIERCING APPARATUS

Filed Oct. 14, 1929 3 Sheets-Sheet 1

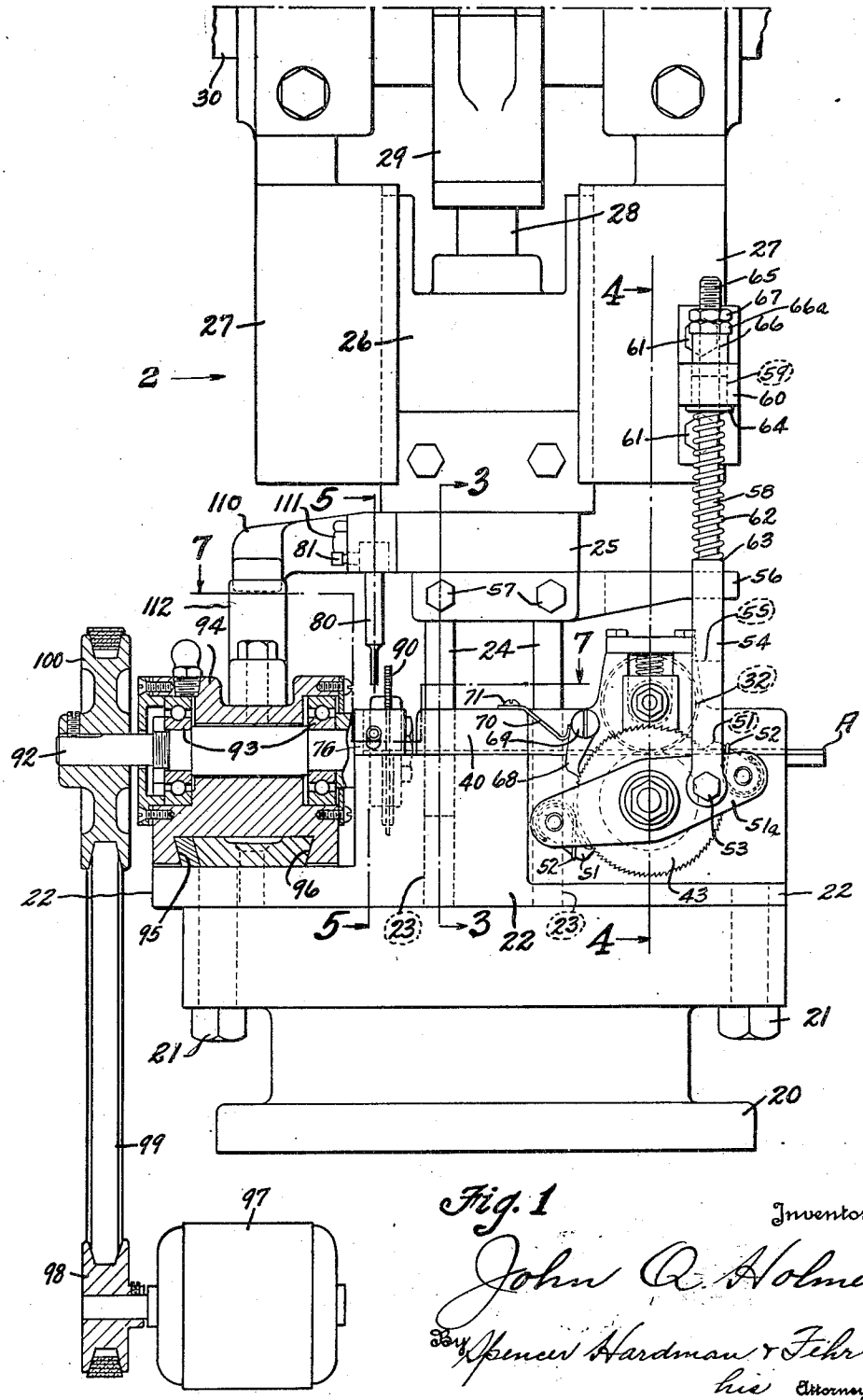

Fig. 1

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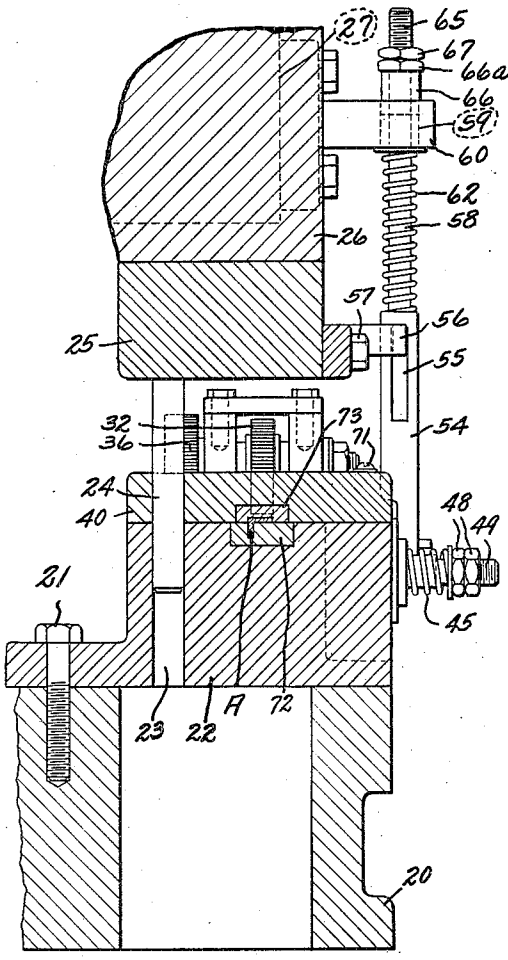

Fig. 3

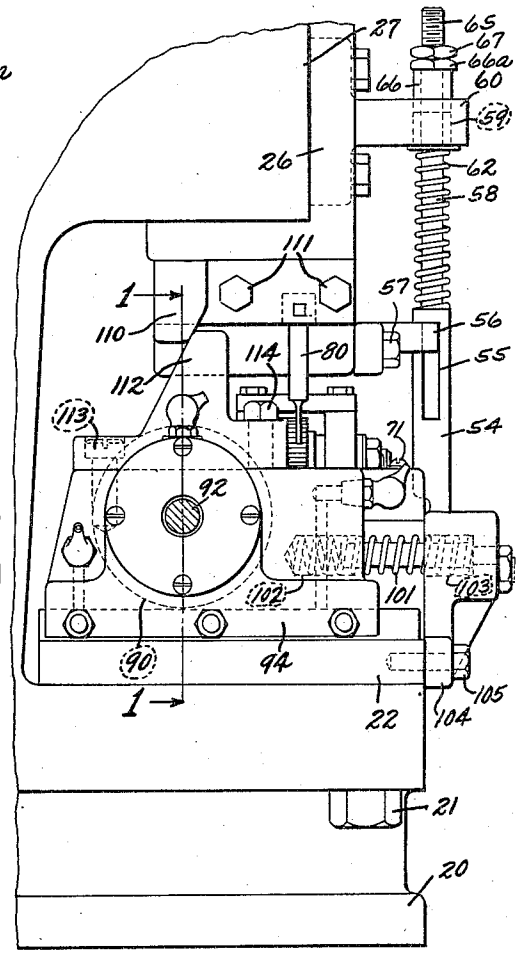

Fig. 2.

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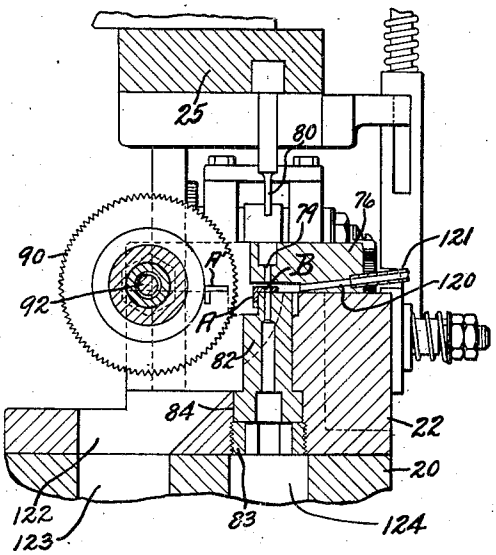

Fig. 5

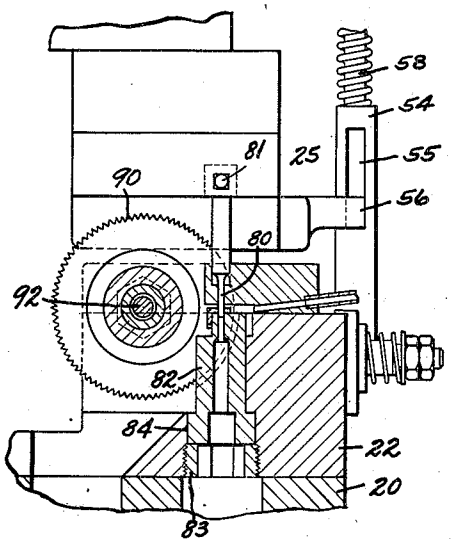

Fig. 6

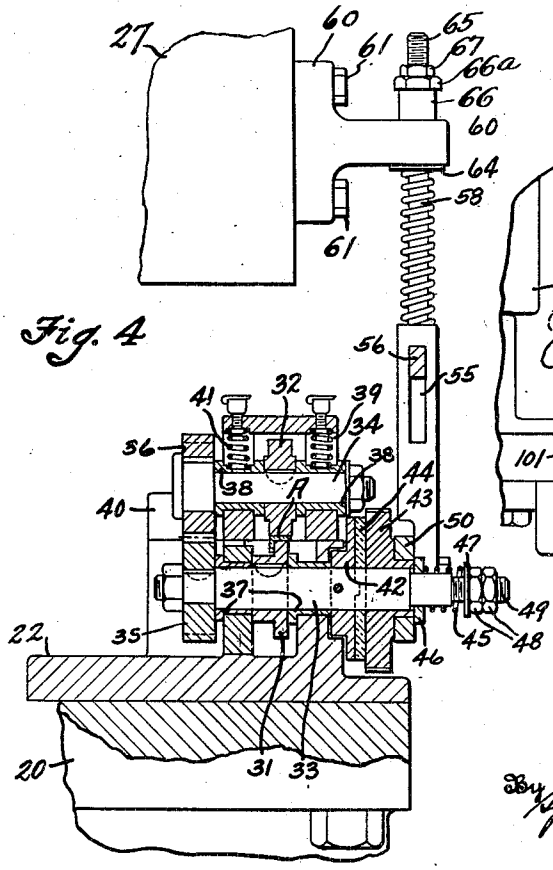

Fig. 4

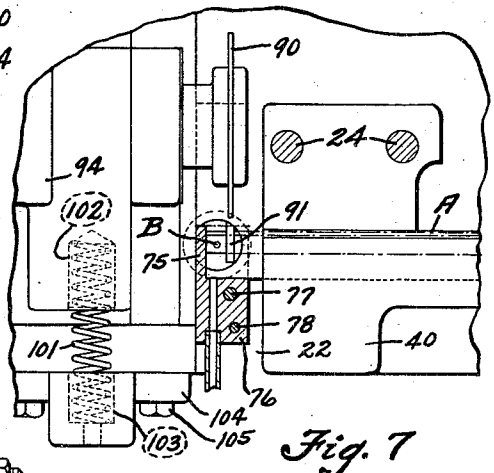

Fig. 7

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UNITED STATES PATENT OFFICE

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CUTTING AND PIERCING APPARATUS

Application filed October 14, 1929. Serial No. 399,534.

This invention relates to apparatus for cutting and piercing sheet material and more particularly for dividing a strip of material into short lengths or pieces and to provide each piece with a hole or holes located in a definite relation to the side edges of the piece.

It is one of the objects of the present invention to provide a machine of a simple and durable construction for economically producing pieces of the kind described. This aim of the present invention is accomplished by mechanism which may be attached to a punch press and operated by its reciprocating cross head.

Further objects and advantages of the present invention will be apparent from the following description, reference being had to the accompanying drawings wherein a preferred embodiment of one form of the present invention is clearly shown.

In the drawings:

Fig. 1 is a front elevation partly in section taken on line 1—1 of Fig. 2 showing a preferred form of the present invention.

Fig. 2 is a side elevation looking in the direction of the arrow 2 of Fig. 1.

Fig. 3 is a sectional view on the line 3—3 of Fig. 1.

Fig. 4 is a sectional view on the line 4—4 of Fig. 1.

Fig. 5 is a sectional view on the line 5—5 of Fig. 1, showing the piercing punch and the cutting saw in retracted position.

Fig. 6 is a sectional view similar to Fig. 5 showing the saw and punch in operating position.

Fig. 7 is a fragmentary plan view partly in section, the sectional view being taken on the line 7—7 of Fig. 1.

The punch press which supports and operates the various mechanism which form the present invention comprises, a base 20 to which screws 21 secure a frame 22 provided with holes 23 for receiving pilot rods 24, which are attached to a block 25 attached to the cross head 26 or vertically reciprocating slide of the punch press. The head 26 is guided by ways 27 and is reciprocated by a connecting rod 28 hingedly connected with the head 26, and cooperating with an eccentric 29 operated by the main shaft 30 of the punch press.

The bar of stock A, which may be L-shaped in cross-section or any other shape, is fed toward the tools for cutting and piercing by an automatic feeding mechanism which, as shown in Figs. 1 and 4, comprises feed rolls 31 and 32 driven by shafts 33 and 34 respectively which are connected respectively with meshed gears 35 and 36. The shaft 33 is supported by bearings 37, carried by the frame 22. The shaft 34 is journalled in bearings 38, which are guided for vertical sliding movement by surfaces which define the notches 39 provided by a block 40 resting upon and attached to the frame 22. Springs 41 urge the bearings 38 downwardly and cause the roller 32 to press the bar A against the roller 31. The shaft 33 is connected with a friction clutch-disc 42 and supports a ratchet wheel 43 loosely journalled on the shaft 33. A friction disc 44, which is drivingly connected with the disc 42, is located between the disc 42 and the ratchet 43. These friction members are held into engagement by spring 45 located between washers 46 and 47 surrounding the shaft 33. The washer 46 is urged against the hub of the ratchet 43. The washer 47 is urged against nuts 48 threaded on the extension 49 of the shaft 33. The hub of the ratchet 43 supports a lever 51*a* which pivotally supports pawls 51 urged by springs 52 against the ratchet 43. The lever 51*a* is connected by a screw 53 with a rod 54. The rod 54 is provided with a slot 55 for receiving the bar 56 attached by screws 57 to the block 25. The bar 54 includes a cylindrical portion 58 which extends through a hole 59 in a bracket 60 attached by screws 61 to the way 27. A spring 62 is located between the shoulder 63 of the bar 54 and a washer 64 bearing against the bracket 60. The part 58 is threaded at 65 for receiving nuts 66 and 67. When the head 26 moves downwardly the spring 62 will be permitted to expand in order to move the rod 54 downwardly until the flange 66*a* of the nut 66 rests upon the bracket 60. Further downward movement

of the rod 54 will not take place since the notch 55 provides clearance for the bar 56. Thus, the notch 55 cooperates with the bar 56 to provide a lost motion connection between the head 26 and the rod 54. This is desirable since the amount of motion required for operating the tools is greater than that necessary for feeding the strip A toward the tools. During the downward movement of the rod 54 the lever 51*a* moves clockwise in order to back the pawls 51 away from the teeth of the ratchet 43. The ratchet 43 is prevented from rotating clockwise by a pawl 68 pivoted upon a screw 69 attached to the block 40 and urged against the pawl by the spring 70 attached by screw 71 to the block 40. The angular distance through which the pawls are backed up can be varied by adjusting the nut 66 along the rod 54. This same adjustment varies the angular distance through which the ratchet 43 is rotated when the head 26 moves upwardly. When the head 26 moves upwardly the bar 56 will at first move free of the rod 54, but finally will engage the rod 54 at the upper end of notch 55 in order to cause the pawls 51 to rotate the ratchet 43 counterclockwise as viewed in Fig. 1. This motion is accompanied by similar motion of feed wheel 31 and consequent clockwise rotation of the feed wheel 32 in order to cause the strip A to be fed toward the left in Fig. 1.

The strip A is fed through a suitable channel provided by hard metal wear pieces 72 and 73 which, as shown in Fig. 3, are carried respectively by the frame 22 and the block 40. The strip A is fed toward the left until its left hand end as viewed in Fig. 7 engages a stop 75 provided by a block 76 which is attached by a screw 77 to the frame 22 and is held in position by dowel 78.

The block 76 provides a hole 79 for piloting a punch 80 attached to the block 25 by a screw 81. The punch 80 cooperates with a die member 82 secured by a nut 83 within a suitable recess 84 provided by a frame 22 as shown in Figs. 5 and 6. The block 76 provides both the stop surface 75 and the pilot hole 79 for the punch 80, and hence provides for accurate location of the hole B, pierced by the punch 80 in the bar A as shown in Fig. 7, with relation to one of the side surfaces of the piece which is to be cut off from the bar A. In order to provide accurate location of the hole B with respect to the other side edge of the piece to be cut off, the strip severing saw 90 is located in a plane as close as possible to the punch 80. To provide clearance for the saw 90 the die 82 is provided with a notch 91.

Saw 90 is mounted upon and driven by a shaft 92 journalled in bearings 93 provided by a saw shaft frame 94, which is slidable along ways 95 and 96 secured to the frame 22, and is slidable in a direction parallel to a plane of the saw. The shaft 92 is rotated by an electric motor 97 which drives a pulley 98 connected by a belt 99 with a pulley 100 connected with the shaft 92. Referring to Figs. 2 and 7 the saw shaft frame 94 is normally maintained in the position shown also in Fig. 5 by a spring 101 having one end received by a spring socket 102 in the saw frame 94 and having its other end received by a socket 193 in a bracket 104 attached by screws 105 to the frame 22. The saw 90 is moved from the position shown in Fig. 5 to that shown in Fig. 6 by a cam bar 110 attached by screws 111 to the block 25 which is actuated by the head 26. The cam 110 cooperates with a follower 112 secured by screws 113 and 114 to the saw frame 94.

The strip A, having been fed against the stop surface 75 of the block 76 during a preceding upward movement of the head 26, the next succeeding downward movement of the head 26 will cause the punch 80 to cooperate with the die 82 to punch the hole B in the strip A, and the rotating saw 90 will move from the position shown in Fig. 5 to that shown in Fig. 6 in order to cut off from the strip A that small portion A′ adjacent its end which has been punched. After this piece A′ has been cut off it will be ejected from its previous location between the die 80 and the block 76 by a jet of compressed air issuing from a nozzle orifice 120 connected by a tube 121 with a source of compressed air. The piece will be blown at least as far as the position A′ shown in Fig. 5. From this position it may fall into a suitable receptacle located below the holes 122 and 123 provided by the frame 22 and the base 20 respectively. The slugs punched out descend through openings centrally located in the die 82 and nut 83 and through a hole 124 in the base 20.

During the upward movement of the punch press head 26 the saw 90 and the punch 80 are retracted from the strip A and the strip A is fed toward the left against the stop surface 75. In order to assure that the strip A will have been moved against the surface 75 the travel of the ratchet 43 is made greater than necessary. After the strip A has engaged the surface 75 the ratchet 43 may continue to move counterclockwise as viewed in Fig. 1. This over-travel of the ratchet 43 is permitted by reason of the friction clutch connection between the ratchet 43 and shaft 33.

While the form of embodiment of the present invention as herein disclosed, constitutes a preferred form, it is to be understood that other forms might be adopted, all coming within the scope of the claims which follow.

What is claimed is as follows:

1. Apparatus for cutting and piercing a length of material comprising, in combination, a base adapted to be supported by the table of a punch press, and providing a support along which the material is movable, a

rotary cutter carried by the base and guided for bodily movements laterally of its axis, a hole piercing device movable at right angles to the plane of the material, means for moving the cutter toward the work and including a bar cam movable in a direction parallel to the movement of the piercing device, and a block for carrying the bar cam and piercing device and adapted to be attached to the head of a punch press.

2. Apparatus according to claim 1 further characterized as having material feeding means comprising feed rolls and feed roll operating mechanism adapted to be actuated by the head of a punch press.

3. Apparatus for cutting a length of material and comprising a rotary cutter, means for moving the cutter edgewise into the material, a stop located at a certain position relative to the plane of the cutter, and means for feeding the work against the stop while the cutter is retracted and comprising feed rolls, means for intermittently rotating the feed rolls and a friction clutch for transmitting motion from said means to the rolls, said means being operated to an extent greater than necessary for feeding the material, the clutch slipping after the material has engaged the stop.

4. Apparatus for cutting a length of material and comprising a rotary cutter, means for moving the cutter edgewise into the material, a stop located at a certain position relative to the plane of the cutter, means for feeding the work against the stop while the cutter is retracted, and means for ejecting the piece cut off.

5. Apparatus for cutting a length of material and comprising a rotary cutter, means for moving the cutter edgewise into the material, a stop located at a certain position relative to the plane of the cutter, means for feeding the work against the stop while the cutter is retracted, and means including an air nozzle located between the cutter and stop to direct a jet of air against the piece cut off in order to remove it.

In testimony whereof I hereto affix my signature.

JOHN Q. HOLMES.