June 23, 1942. H. G. KELLOGG 2,287,254

METALWORKING MACHINE

Filed May 19, 1941 2 Sheets-Sheet 1

FIG.1.

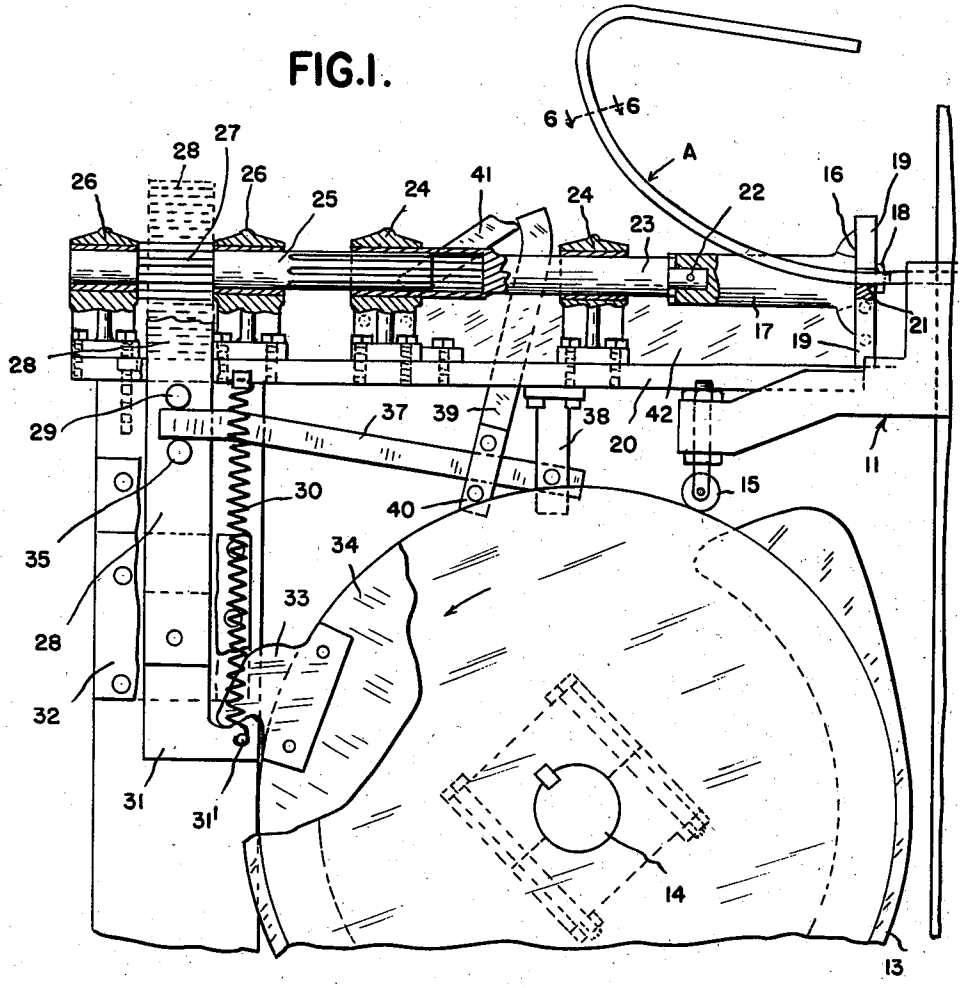
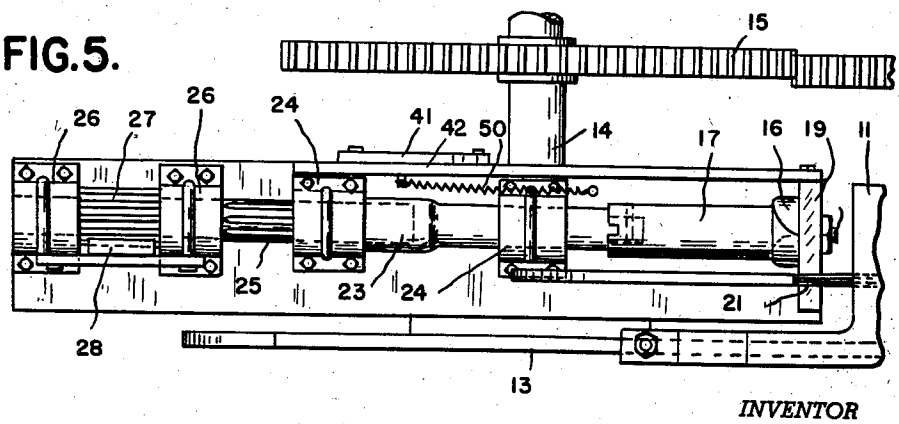


FIG.5.



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FIG.2.

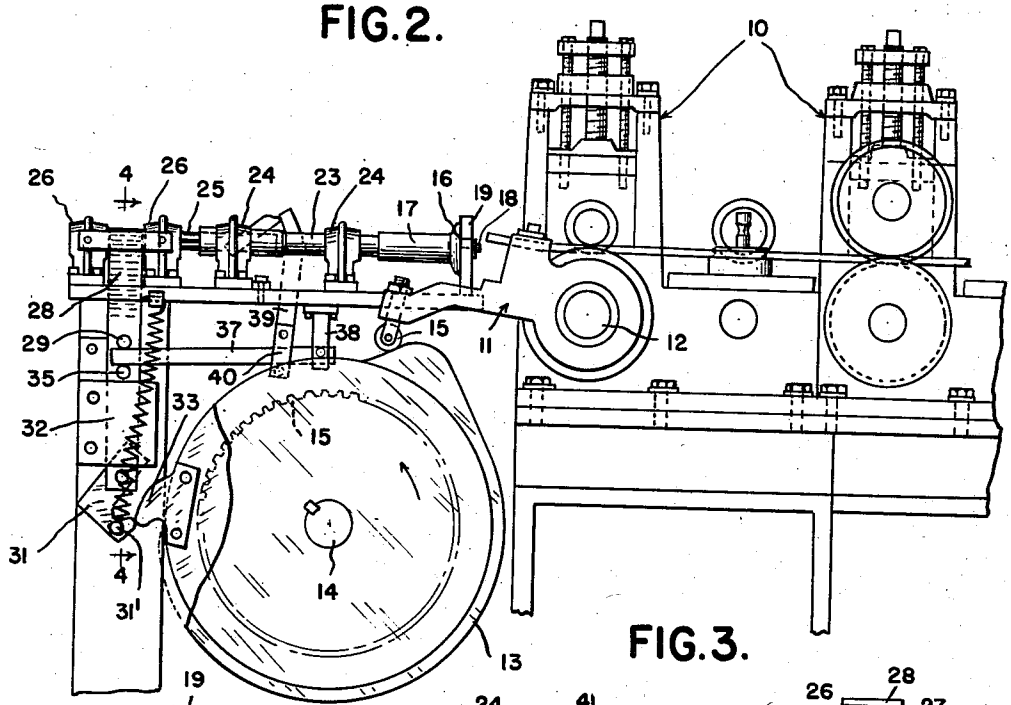


FIG.3.

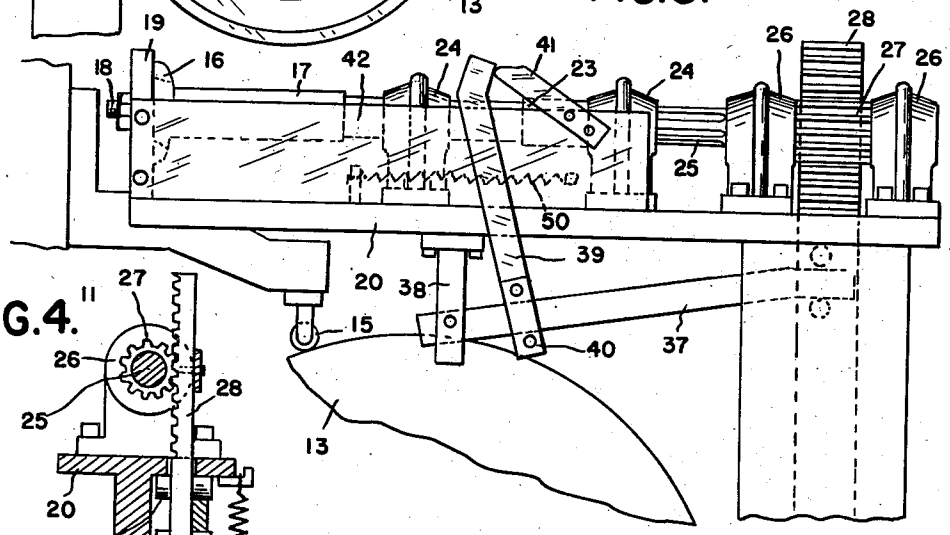


FIG.4.

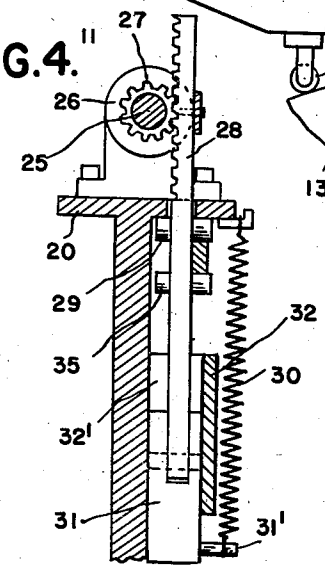


FIG.6.



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METALWORKING MACHINE

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Application May 19, 1941, Serial No. 394,216

7 Claims. (Cl. 164—68)

This invention relates generally to metal working machines and refers more particularly to improvements in cut-off devices employed in connection with metal working machines.

One of the principal objects of this invention is to provide a metal working machine having means for advancing a continuous length of stock along a predetermined path of travel and having a cut-off device operable to periodically sever strips of predetermined length from the stock while the latter is moving along its path of travel.

Another object of this invention is to provide a metal working machine having power operated means for simultaneously operating the cut-off device to sever the stock and for moving the cut-off device in the direction of movement of the stock at a rate predetermined to permit severing the stock while the latter is moving along its path of travel.

Another advantageous feature of this invention is to provide a metal working machine having a cut-off device in the form of a revoluble knife supported to one side of the path of travel of the stock for movement across the path of travel to sever the stock and having means for advancing the cut-off device at substantially the same rate as the stock during the interval the knife operates to sever the stock.

A further object of this invention is to provide a metal working machine having means for periodically bending a strip of stock as it is advanced along a predetermined path of travel and having a cut-off device operable in timed relation to the bending operation to sever the bent portion of the stock without interrupting movement of the stock along its path of travel.

The foregoing, as well as other objects, will be made more apparent as this description proceeds, especially when considered in connection with the accompanying drawings, wherein:

Figure 1 is a fragmentary side elevational view partly in section of a metal working machine equipped with a cut-off device constructed in accordance with this invention;

Figure 2 is a fragmentary side elevational view of the metal working machine showing the parts thereof in a different position;

Figure 3 is an enlarged elevational view of the side of the machine opposite to the side shown in Figures 1 and 2;

Figure 4 is a sectional view taken substantially on the plane indicated by the line 4—4 of Figure 2;

Figure 5 is a fragmentary plan view of the construction shown in Figure 3; and

Figure 6 is a cross sectional view through the strip formed by the metal working machine.

For the purpose of illustrating the present invention, I have selected a metal working machine particularly designed for fashioning a channel-shaped window frame of the type commonly used in connection with the pivoted panel of a vehicle body ventilating window. However, it will be understood from the following description that my improved cut-off device may be advantageously used in practically all cases where it is desired to sever strips of predetermined length from a continuously advancing strip of stock, and, therefore, the specific embodiment of the invention illustrated herein should not be considered as limiting the scope of the invention.

With the above in mind, reference will be made to Figure 1 of the drawings wherein it will be noted that the reference character A designates a frame of the type commonly used on the pivoted panel of a vehicle body ventilating window. The frame A is shown in its inverted position in Figure 1 and is fashioned from a length of channel-shaped stock in such a manner that when applied to a pivoted panel, it extends along the bottom, front and top edges of the panel. When the frame A is used for the above purpose, the rear side thereof is left open in order to permit the rear edge of the panel to be engaged by the usual division bar which is either permanently secured in the window opening or is carried by the front edge of the vertically slidable panel of the ventilating window.

Referring now more in detail to the metal working machine selected herein for the purpose of illustration, it will be noted that this machine comprises a plurality of sets of forming rolls 10 cooperating with each other to form a strip of flat stock to the desired cross sectional contour shown in Figure 6. The forming rolls are driven in a manner not shown herein so as to not only cooperate with one another to fashion the strip of stock to the desired cross sectional contour but to, also, advance the strip of stock along its path of travel through the machine.

As the stock leaves the last set of forming rolls, it is engaged by a bending fixture 11 pivotally supported on a transverse shaft 12 at the delivery end of the machine for swinging movement in a vertical plane across the path of travel of the stock. The bending fixture 12 is periodically operated to bend the stock to the longitudinal contour illustrated in Figure 1, and this operation

is affected automatically by a cam 13. The cam 13 is keyed to a drive shaft 14 which is connected to a suitable source of power (not shown) and has a driving gear 15 secured thereto for operating the forming rolls through a suitable gear train (not shown). The periphery of the cam 13 is engaged by a follower 15 secured to the forward end of the bending fixture 11 and cooperating with the cam to swing the bending fixture about the axis of the shaft 12 in a manner to bend the stock to the longitudinal contour shown in Figure 1. It follows from the above that the shape of the periphery of the cam controls the contour to which the stock is bent and, accordingly, the stock may be bent to various different contours by merely providing correspondingly shaped cams 13.

The above construction is such that a portion of the stock is bent to the contour shown in Figure 1 during each revolution of the cam 13, and the bent portion of the stock is severed from the remainder after each bending operation. It has been proposed to interrupt advancement of the stock by stopping the machine after each bending operation and to sever the stock during this interval of rest. The above procedure is not only objectionable because it slows down the production of the machine but, also, because the inertia of the revoluble parts of the machine tends to carry the strip beyond the point of cut-off and thereby renders it difficult to provide strips of uniform lengths.

This invention eliminates the above objections by providing a cut-off device which operates subsequent to each bending operation to sever the stock without interrupting advancement of the stock along its path of travel. In detail, the cut-off device is shown in the several figures of the drawings as comprising a knife 16 supported beyond the bending fixture 11 to one side of the path of travel of the stock for rocking movement in a manner to permit the knife to move across the path of travel of the stock and sever the same. As will be presently set forth, the cut-off device is moved in the direction of advancement of the stock at substantially the same rate as the stock during the interval the knife 16 is rocked in a direction to sever the stock. As a result, the stock is severed while it is being advanced by the forming rolls and, accordingly, the severed strips will be of uniform length.

In detail, it will be noted that the knife 16 extends radially outwardly from a shaft 17 having a stud 18 at the rear end rotatably supported in a backing plate 19. The plate 19 is slidably supported on a frame member 20 of the machine and is provided with a recess 21 through which the stock is moved as it is advanced beyond the bending fixture 11. The arrangement is such that the backing plate 19 holds the stock against lateral displacement during the severing operation and insures obtaining a clear cut across the stock.

The forward end of the shaft 17 is removably connected at 22 to an intermediate shaft 23 having axially spaced portions rotatably supported in suitable bearings 24 which, in turn, are secured to the frame member 20. Upon reference to Figure 1, it will be noted that the forward end of the intermediate shaft 23 telescopically engages a drive shaft 25 and is splined on the latter in a manner to provide a slidable, nonrotatable connection therebetween. The rear end of the drive shaft 25 is rotatably supported in bearings 26 spaced from each other axially of the shaft and secured to the frame member 20. Upon reference to Figure 4, it will be noted that a pinion 27 is secured to the drive shaft 25 between the bearings 26 and meshes with the teeth on a vertically extending rack 28. The rack 28 is supported on the frame structure 20 for vertical sliding movement and carries a stop in the form of a pin 29 which engages the bottom surface of the frame structure 20 to limit the upward movement of the rack relative to the frame structure. When the rack is in its uppermost position, shown in Figure 4, the knife 16 on the cut-off device is in its inoperative position, shown in Figure 5.

The rack is held in its uppermost position by means of a relatively strong spring 30 having the upper end anchored on the frame structure 20 and having the lower end connected to a hook 31 which, in turn, is pivotally connected to the lower end of the rack 28. As shown in Figure 1, the lower end of the spring 30 is connected to the free end of the hook 31 by a pin 31' offset rearwardly with respect to the pivotal connection between the hook and rack. As a result, the spring tends to swing the lower end of the hook rearwardly relative to the rack and this movement of the hook is prevented by means of a channel-shaped guide 32, shown in Figure 4. The channel-shaped guide is so positioned that the base portion 32' slidably engages the front edge of the hook in a manner to cooperate with the spring 30 in normally holding the hook against swinging movement.

The hook 31 is adapted to be engaged by a tooth 33 extending outwardly from the periphery of a disc 34. The disc 34 is secured to the drive shaft 14 to one side of the cam 13 and the tooth 33 is angularly positioned with respect to the cam to engage the hook 31 on the rack 28 as the bending fixture 11 completes one bending operation of the strip of stock.

The tooth 33 coacts with the hook 31 to move the rack 28 downwardly against the action of the spring 30. This movement of the rack 28 rocks the knife 16 relative to the plate 19 across the path of travel of the stock and severs the bent portion of the stock from the remainder of the latter. The extent of downward movement of the rack 28 and, consequently, the angular travel of the knife 16 is limited by engagement of a stop 35 on the rack with the upper end of the vertical guide 32. Consequently, continued rotation o fthe disc 34 in the direction of the arrow in Figure 2 swings the hook 31 forwardly against the action of the spring 30 and permits the tooth 33 to move beyond the hook. As soon as the tooth 33 moves beyond the hook, the spring 30 returns the hook to its initial position and moves the rack 28 to its uppermost position, shown in Figure 4. This operation, of course, rocks the cut-off device in the opposite direction and returns the knife 16 to its inoperative position, shown in Figure 5.

As pointed out above, the cut-off device together with the knife 16 is moved in the direction of advancement of the stock at the same rate as the latter during the operation of the knife to sever the stock. For accomplishing this result, I provide a link 37 having the rear end pivoted to the frame structure 20 by means of a bracket 38 and having the other end extending between the stops 29 and 35 on the rack 28 in engagement with both stops. A lever 39 is clamped to the link 37 intermediate the ends thereof by means of a clamp 40 and the upper end of the lever is

engaged by a member 41 secured to a plate 42. The plate 42 slidably engages the frame member 20 and is secured at its rear end to the plate 19 for movement therewith as a unit.

As a result of the above construction, it will be noted that as the rack 28 is moved downwardly by the tooth 33 on the disc 34, the link 27 swings downwardly about its pivotal connection with the bracket 38 and swings the upper end of the lever 39 in a forward direction. Inasmuch as the upper end of the lever 39 engages the member 41, and in view of the fact that the member 41 is connected to the plate 19, it follows that the latter is correspondingly moved in a forward direction. It will also be noted that the cut-off device is secured to the plate 19 and is splined on the drive shaft 25 with the result that the cut-off device is moved by the plate 19 in the direction of advancement of the stock during the interval the rack 28 functions to rotate the cut-off device to sever the stock. The proportion of the parts is so determined that the cut-off device is moved forwardly by the rack 28 at substantially the same rate as the rate of travel of the stock so that the bent portion of the stock is severed without interrupting the operation of the machine. It may be pointed out at this time that when the hook 31 is released by the tooth 33 on the disc 34, the cut-off device and associated parts are returned to their rearwardmost positions by means of a spring 50 having the forward end secured to the frame structure 20 and having the rear end suitably connected to the plate 42.

Operation

While it is believed that the operation of the machine will be clearly understood from the foregoing description, nevertheless, a brief summary of the operation will be given at this time.

In Figure 1 of the drawings, parts of the machine are illustrated in the positions they assume immediately after the fixture 11 completes one bending operation. As the drive shaft 14 continues its rotation in the direction of the arrow shown in this figure, the tooth 33 engages the hook 31 and moves the rack 28 downwardly. Downward movement of the rack 28 performs a dual function in that it simultaneously rocks the cut-off device to swing the knife 16 across the path of travel of the stock and moves the cut-off device in the direction of the path of travel of the stock. As a result, the bent portion of the stock is severed from the remainder of the stock by the knife 16 on the cut-off device without the necessity of interrupting the movement of the stock through the machine. In other words, this construction renders it possible to form the bent frame members A by a continuous operation of the machine, and this is advantageous in that it materially increases the production of the machine. It is also important to note that by severing the stock during the interval the cut-off device is moved as a unit with the stock in the direction of advancement thereof, the severed portions of the stock will all be of uniform length.

As the hook 31 is released by the tooth 33, the spring 30 returns the rack 28 to its uppermost position determined by the stop 29 and also returns the cut-off device to its inoperative position adjacent the path of travel of the stock. At the same time the cut-off device is rocked to its inoperative position by the spring 30, the upper end of the lever 39 is swung in a rearward direction and the cut-off device is moved axially rearwardly by the spring 50 to its initial starting position adjacent the bending fixture 11.

What I claim as my invention is:

1. In a metal working machine, means for advancing a strip of stock along a predetermined path of travel, a cut-off device supported to one side of the path of travel of the stock for rocking movement and having a cutting portion movable across the path of travel of the stock to sever the stock, a rack supported for reciprocation transversely of the axis of rocking movement of the cut-off device, means for periodically reciprocating the rack, and a connection between the rack and cut-off device operable upon movement of the rack in one direction to simultaneously rock the cut-off device to sever the stock and to move the cut-off device in the direction of advancement of the stock.

2. In a metal working machine, means for advancing a strip of stock along a predetermined path of travel, a plate supported at the delivery end of the machine and having a groove therein for receiving the stock as it is delivered from the machine, a rockable cut-off device supported on the plate at one side of the path of travel of the stock for rocking movement about a fixed axis and having a portion movable across the path of travel of the stock to sever the latter, means for periodically rocking the cut-off device relative to the plate to sever the stock, and means for moving said plate and cut-off device in the direction of travel of the stock during the operation of the cut-off device to sever the stock.

3. In a metal working machine, means for advancing a strip of stock along a predetermined path of travel, a cut-off device supported to one side of the path of travel of the stock for rocking movement and having a cutting portion movable across the path of travel of the stock to sever the latter, a rack mounted for reciprocation transversely to the axis of rocking movement of the cut-off device and having a hook at one end, a revoluble member having a tooth engageable with the hook to move the rack in one direction, means responsive to movement of the rack in said one direction for rocking the cut-off device to sever the stock and for moving the cut-off device as a unit with the stock in the direction of advancement thereof, means pivotally supporting the hook on the rack permitting the hook to swing out of engagement with said tooth upon continued rotation of said revoluble member, and means operable upon releasing the hook from said tooth to move the rack in the opposite direction and return the cut-off device to its original starting position.

4. In a metal working machine, means for advancing a strip of stock along a predetermined path of travel, a shaft supported for rotation about a fixed axis parallel to the path of travel of the stock and positioned to one side of said path of travel, a rack supported for reciprocation transversely of the axis of the shaft and connected to said shaft for rotating the latter in opposite directions, a cut-off device slidably and non-rotatably connected to said shaft for operation by the latter to sever the stock, and means operated by said rack upon movement of the latter in one direction to advance the cut-off device in the direction of the path of travel of the stock.

5. In a metal working machine, means for advancing a strip of stock along a predetermined path of travel, a cut-off device supported at one side of the path of travel of the stock for rocking

movement about a fixed axis extending parallel to the path of travel of the stock, a shaft supported for rotation in axial alignment with the cut-off device and having a slidable non-rotatable connection with the cut-off device, means for rotating said shaft in opposite directions to impart a corresponding rotative movement to the cut-off device, and means operated by said shaft rotating means upon rotation of the shaft in one direction to advance the cut-off device relative to the shaft in the direction of the path of travel of the stock.

6. In a metal working machine, means for advancing a strip of stock along a predetermined path of travel, a cut-off device supported to one side of the path of travel of the stock for rotation in opposite directions about a fixed axis extending parallel to the path of travel of the stock, a shaft supported for rotation in opposite directions in alignment with the cut-off device and having a slidable non-rotatable connection with the cut-off device, a rack supported for reciprocation in opposite directions and operatively connected to said shaft, means for reciprocating the rack to successively move the cut-off device across the path of travel of the stock to sever the latter and to return the cut-off device to its inoperative position, and means operated by said rack as the latter is moved in a direction to effect severing of the stock by the cut-off device to advance the cut-off device in the direction of the path of travel of the stock.

7. In a metal working machine, means for advancing a strip of stock along a predetermined path of travel, a slide supported for movement in opposite directions parallel to the path of travel of the stock, a cut-off device rotatably supported on said slide to one side of the path of travel of the stock, a shaft supported for rotation in opposite directions in axial alignment with the cut-off device and having a slidable non-rotatable connection with the cut-off device, a rack supported for reciprocation transversely of the axis of rotation of said shaft and connected to the shaft for rotating the latter in opposite directions, means for reciprocating the rack to successively move the cut-off device across the path of travel of the stock to sever the latter and to return the cut-off device to its inoperative position, and means operatively connecting the rack to said slide for moving the slide in the direction of the path of travel of the stock as the cut-off device is moved across said path of travel by the stock.

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