Sept. 26, 1961 S. L. NITKIEWICZ 3,001,680

AUTOMATIC STRIP GUIDE AND CENTERING DEVICE

Filed Oct. 30, 1959 3 Sheets-Sheet 1

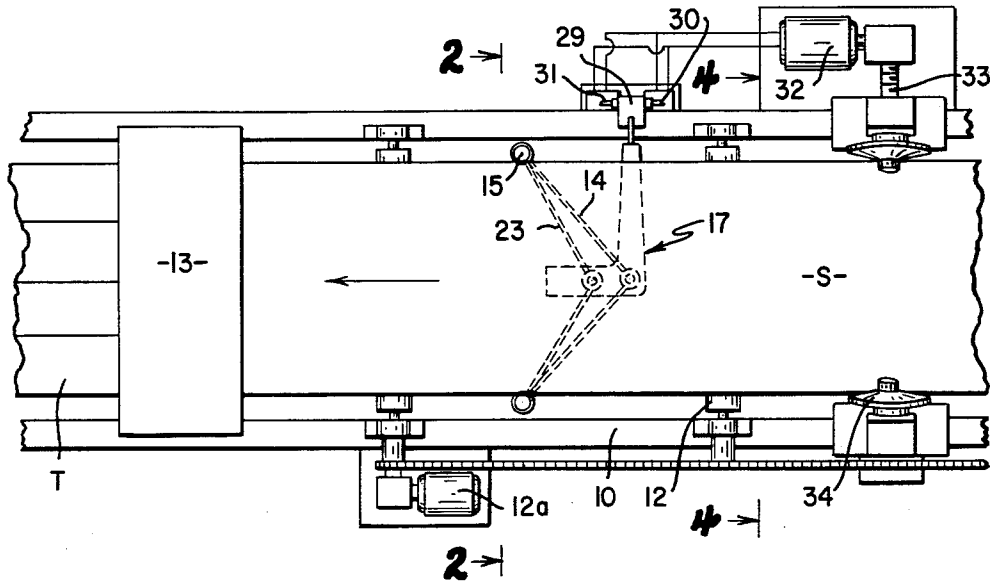


Fig. 1

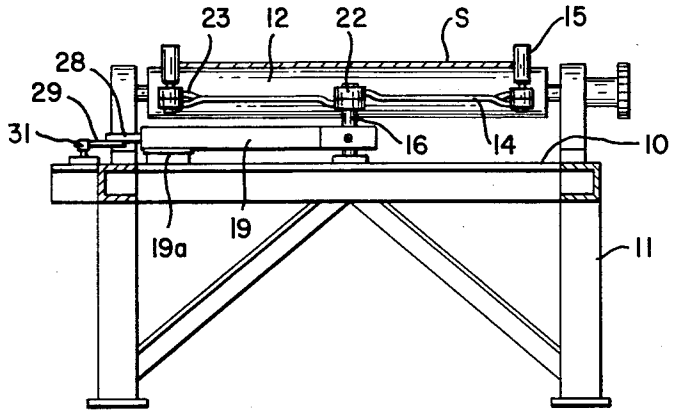


Fig. 2

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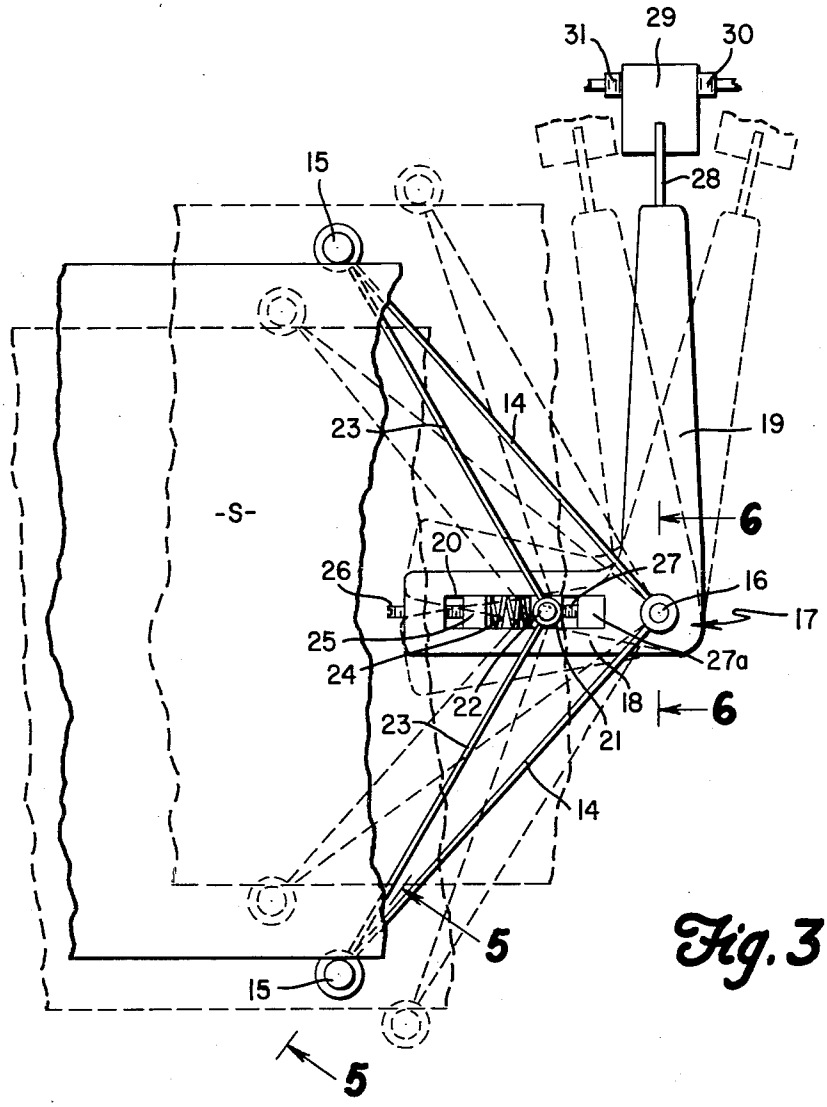


Fig. 3

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AUTOMATIC STRIP GUIDE AND CENTERING DEVICE

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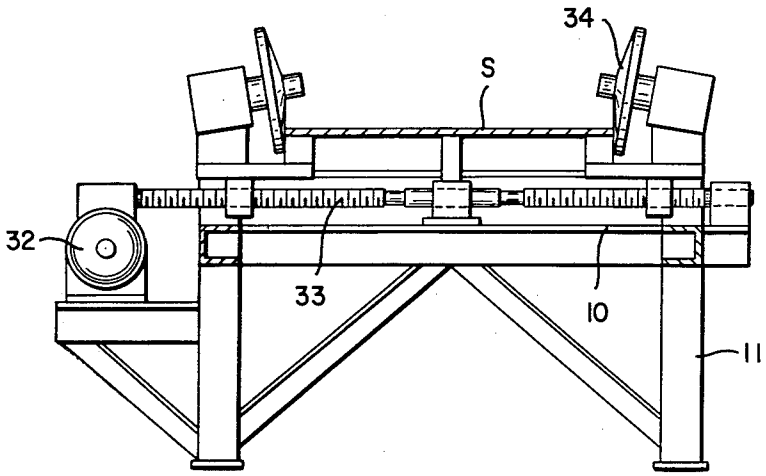


Fig. 4

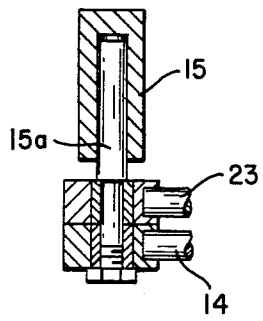


Fig. 5

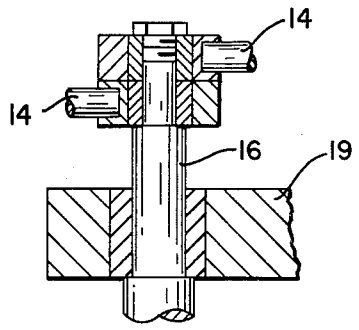


Fig. 6

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AUTOMATIC STRIP GUIDE AND CENTERING DEVICE

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6 Claims. (Cl. 226—15)

This invention relates to devices for centering an advancing endless strip of sheet material and an object is to produce a new and improved automatic device which operates laterally to shift the strip in one direction or the other in a positive manner in the event it creeps to one side or the other from a central position, thereby to maintain the strip at all times in a predetermined position relative to a slitter or other instrumentality to which the strip is fed. This is of particular importance in cases where the strip is being fed to a cutting mechanism for severing the strip into severed sections of predetermined width so that the sections will be of uniform width at all times.

Another object is to produce an automatic strip centering device which is adjustable to compensate for wider or narrower strips.

A further object is to provide a simple and efficient strip centering device having the novel features of construction and operation hereinafter described.

Other objects and advantages of the invention will hereinafter appear and, for purposes of illustration but not of limitation, an embodiment of the invention is shown on the accompanying drawings in which:

FIGURE 1 is a fragmentary top plan view somewhat diagrammatic of a machine for advancing and slitting an endless strip of sheet metal and showing the automatic strip centering device;

FIGURE 2 is a transverse sectional view substantially on the line 2—2 of FIGURE 1;

FIGURE 3 is an enlarged top plan view of centering device mechanism and illustrating the mode of operation;

FIGURE 4 is a transverse section on the line 4—4 of FIGURE 1 showing the electric-motor means for transverse shifting of the sheet strip;

FIGURE 5 is an enlarged vertical sectional fragment taken on the line 5—5 of FIGURE 3 of one of a roller assembly for strip edge engagement; and

FIGURE 6 is an enlarged vertical sectional view on the line 6—6 of FIGURE 3 showing the bell crank mounting and the pivotal mounting of the respective arms.

The illustrated embodiment of the invention comprises an elongate feed table 10 which is suitably mounted upon a supporting strandard 11 in order to space the table conveniently above the floor level. Mounted on the table is a series of transversely arranged spaced rollers 12 which are suitably driven by an electric motor 32 through suitable gear reduction and sprocket and chain connection in order to impart traveling or translatory movement to an endless strip or ribbon of sheet material S (such as sheet metal) which is advanced to a suitable cutter or slitter mechanism 13 for slitting the strip S into relatively narrow sections T of predetermined width.

It is important that the strip S be properly positioned with respect to the slitter mechanism 13 in order that accurate cutting of the strip is achieved. Not infrequently the strip S creeps laterally to one side or the other of the feed table and this is ordinarily comprensated for by manual means to effect the lateral shifting movement of the strip but this requires constant attention by an operator for this purpose. In accordance with this invention, an automatic centering device is provided which is disposed essentially in a plane beneath the feed rollers 12

and includes a pair of relatively long oppositely extending arms 14 arranged in V-like formation. Carried at the outer ends of the arms 14 (on a post 15*a*), as shown for example on FIGURE 5, are vertically disposed elongate rollers 15 which engage opposite edges of the strip S as the latter advances. The arms 14 are mounted for relative rocking movement on the post 15*a*. The inner ends of the arms 14 are suitably mounted for rocking movement as shown on FIGURE 6 upon a vertically disposed post 16. As shown, the arms 14 are in the form or relatively rigid rods and are so mounted on the pivot post 16 as to rock about a vertical axis independently of each other. The lower end of the pivot post 16 is suitably carried by a block fixed to the table 10, the post 16 being disposed centrally of the traveling strip S.

Pivotally mounted at its apex upon the post 16 is a relatively heavy, metallic bell-crank 17, the short arm 18 of which generally bisects the transverse dimension of the strip S and extends forwardly of the post 16. The other or longer arm 19 of the bell crank is disposed at substantially right angles to the short arm 18 and extends in a direction transversely of the strip S with the outer end thereof extending beyond the adjacent edge thereof. As shown, the end portion of the arm 19 slidably engages a bearing 19*a* on the table 10.

Formed in the short arm 18 of the bell-crank is a longitudinally elongate slot 20, generally rectangular in shape and containing a slide block 21 which carries an upwardly extending pivot pin 22 to which are pivotally mounted in a manner similar to the mounting of the arms 14 on the post 16, a pair of oppositely extending arms 23 similar to the arms 14 but of shorter length and with their outer ends suitably connected to the outer ends of the arms 14. Disposed within the slot 20 is a helical coil spring 24, one end of which bears against the slide block 21 and the opposite end of which engages a bearing block 25 shiftable in the slot by an adjusting screw 26 which is accessible for adjusting purposes at the outer end of the arm 18. Engaging the opposite end of the slide block 21 and for regulating the inward movement thereof is an adjusting screw 27 which provides an adjustable stop for the block 21. The screw 27 is carried by a stop block 27*a*.

Fixed to the outer end of the relatively long arm 19 of the bell-crank is a rod 28 to which is fixed a transverse plate 29 to engage a spring biased switch 30 or 31 arranged respectively on opposite sides of the plate 29 depending upon which direction of movement is imparted to the arm 19. It will be understood that the plate 29 has wiping engagement with one or the other of the switches 30 and 31 sufficient to hold same in operative position so long as the plate is in engagement therewith. The switches 30 and 31 are connected by suitable leads to a source of electric current and also to a reversible electric motor 32 which is operatively connected through suitable gear reduction to a screw shaft 33 which extends transversely of the table 10 beneath the strip S and has oppositely inclined thread portions for engagement with vertical support members for inclined disk-like rollers 34 to engage opposite edges of the strip S as the latter advances.

In operation it will be understood that in the event that the strip S creeps laterally in one direction or the other, beyond a certain tolerance of approximately 1/16", the bell-crank 17 is rocked about its pivot 16 in one direction or the other. If it is rocked in a clockwise direction (FIGURE 3) the plate 29 moves over and depresses the spring switch 30 for engergizing the motor 32 in such manner as automatically to cause the strip S to be shifted back to its proper predetermined or centered position. Upon movement of the strip S back to its normal position, then the arm 19 is rocked in a counterclockwise

direction and as soon as the plate **29** has passed over the spring switch **30**, the latter operates to deenergize the motor **32**. Manifestly if the strip S creeps in the opposite direction a sufficient extent to depress the spring switch **31**, then the electric motor **32** is operated in a reverse direction for properly shifting and aligning the strip S with the slitter mechanism **13**.

In the event a wider or narrower strip S is employed, then the spring loaded block **21** may be readily adjusted to compensate for the difference in the width of the strip S by adjustment of the screws **26** and **27**. Manifestly the coil spring **24** urges the rollers **15** into engagement with the edges of the strip S at all times. It will also be understood that in the event that the strip S has any camber in it, this will not cause any movement of the bell-crank **17** unless the distance between the center of the strip S and the rollers **15** is of unequal distance.

Numerous changes in details of construction, arrangement and choice of materials may be effected without departing from the spirit of the invention, especially as defined in the appended claims.

What I claim is:

1. In a machine for horizontally advancing a strip of sheet material which has a tendency to creep laterally, a device for maintaining the strip in a predetermined path of travel, said device comprising a bell-crank lever pivotally mounted at its apex centrally of the path of travel of the strip and spaced vertically from same, one arm of said lever being parallel to the longitudinal axis of the strip and the other arm extending toward a side edge thereof, strip edge engaging means along which the strip passes during advancing movement thereof, arm means extending from said strip engaging means to the pivotal axis of said bell-crank lever, other arm means extending from said strip engaging means to an intermediate point on said first bell-crank arm, motor means for effecting lateral bodily shifting movement of the strip, and means responsive to predetermined rocking movement of said bell-crank lever due to lateral shifting of the strip from a normal position for energizing said motor means for causing the strip to be shifted back to a normal position.

2. The organization as claimed in claim 1, in which the strip edge engaging means comprises elements respectively engaging each side edge of the strip, and the arm means comprises rigid arms extending from each element to the bell-crank lever.

3. The organization as claimed in claim 2 in which the rigid arms are adjustable for engaging strips of different widths, and adjustable spring means for urging the arms toward the edges of the strip.

4. The organization as claimed in claim 2 in which the strip edge engaging elements comprise rollers having vertical axes.

5. The organization as claimed in claim 2 in which the longitudinal bell crank arm has an elongate guide, a block slidable in said guide, a spring tensioning said block, an adjustable stop for said block, and a pivotal mounting on said block for one set of arms.

6. In a machine for horizontally advancing a strip of sheet material which has a tendency to creep laterally, a device for maintaining the strip in a predetermined path of travel, said device comprising a bell-crank lever pivotally mounted at its apex centrally of the path of travel of the strip and spaced vertically from same, one arm of said lever being parallel to the longitudinal axis of the strip and the other arm extending toward a side edge thereof, strip edge engaging means along which the strip passes during advancing movement thereof, a pair of rigid arms radiating in opposite directions respectively from the pivotal axis of said bell-crank to said strip edge engaging means, a second pair of rigid arms radiating in opposite directions from an intermediate point on the first bell-crank arm to said strip edge engaging means respectively, means to adjust the connection between said second arms and said first bell-crank arm in a direction longitudinally thereof, means including a reversible electric motor for bodily shifting the strip laterally in one direction or the other, and means responsive to rocking movement of said other bell-crank arm for energizing said electric motor for operation in one direction or the other, thereby to cause lateral strip movement in the desired direction back to normal position.

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