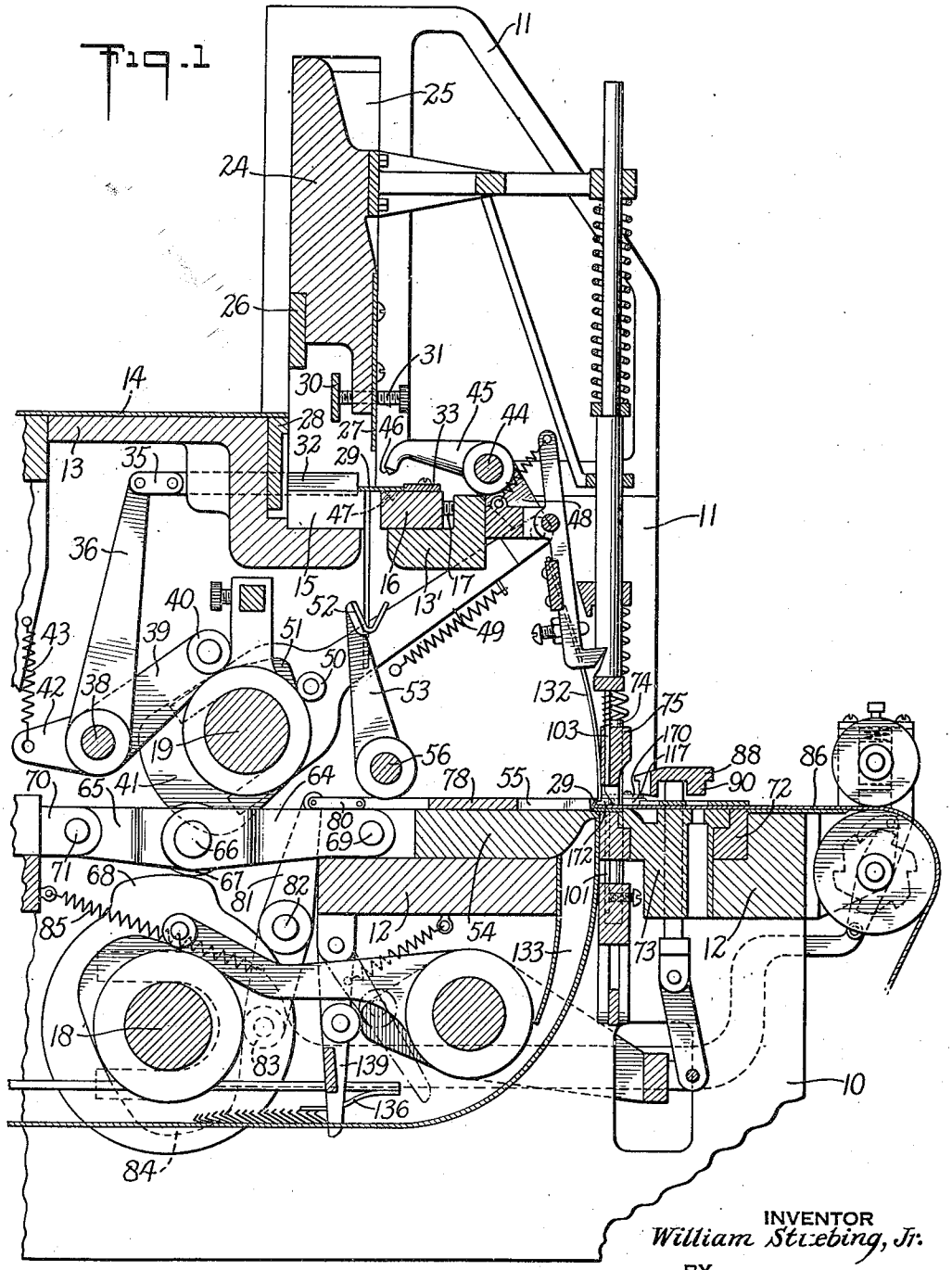
Nov. 27, 1945. W. STUEBING, JR 2,389,699

BINDING STRIP APPARATUS

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Fig. 1



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Fig. 2.

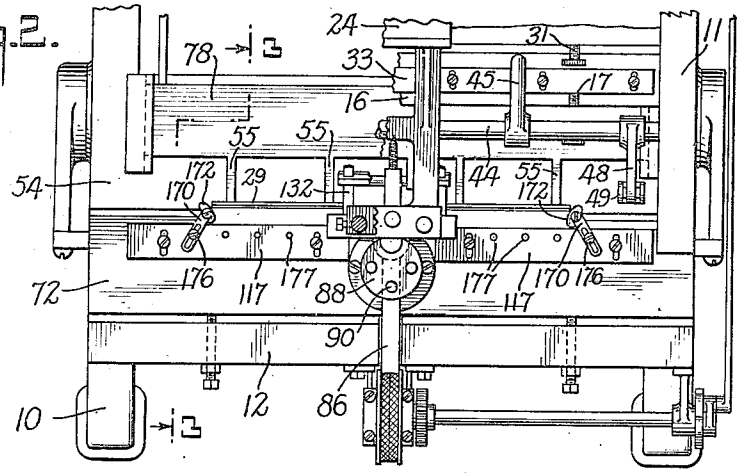


Fig. 3.

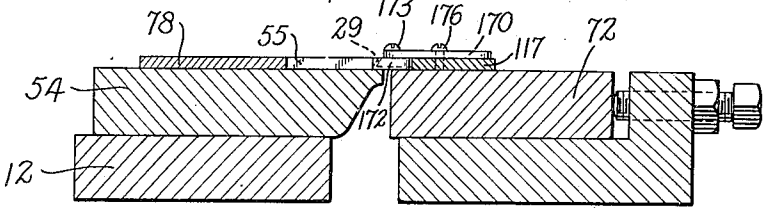


Fig. 4.

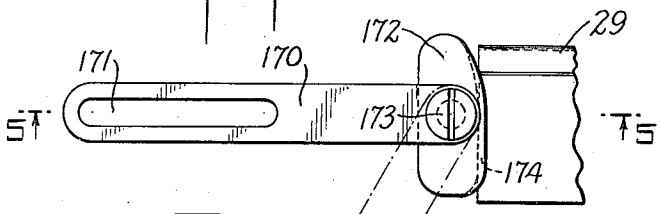
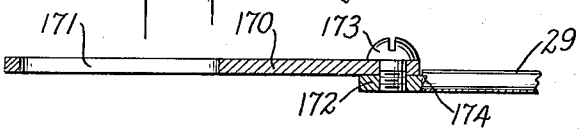


Fig. 5.



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UNITED STATES PATENT OFFICE

2,389,699

BINDING STRIP APPARATUS

William Stuebing, Jr., Cincinnati, Ohio

Application January 5, 1942, Serial No. 425,627

1 Claim. (Cl. 153—1)

This invention relates to the making of binding strips for calendars, display cards and the like, and more particularly to accurately handling the strips during manufacture.

A binding strip of the above character is shown in U. S. Patent No. 1,906,024, and a machine for mounting metal strips of this character on the edges of cards, calendars, etc., is shown in U. S. Patent No. 1,057,295. An improved machine is shown in my U. S. Patent No. 2,042,912 and the present invention is an improvement upon the machine of this latter patent. The present invention relates particularly to the handling of the binding strips during the manufacturing process so that the strips are accurately held with the result that a uniform product is produced.

An object of the present invention is to provide means for accurately handling strips of the above character particularly during the manufacture thereof. A further object is to provide a guide means for automatically centering the binding strips when the eyelet tabs are being attached to the strip. A further object is to provide a gauge which will automatically center each binding strip and which is adaptable for use under a variety of conditions. Another object is to provide apparatus of the above character which is sturdy in construction, dependable in operation and thoroughly practical in all respects.

The invention accordingly consists in the features of construction, combinations of elements, and arrangements of parts as will be exemplified in the structure to be hereinafter described and the scope of the application of which will be indicated in the following claim.

In the drawings:

Figure 1 is a vertical section of the machine;

Figure 2 is a plan view of the machine shown in Figure 1 with certain portions broken away;

Figure 3 is a vertical section on the line 3—3 of Figure 2;

Figure 4 is an enlarged plan view of one of the gauges showing its relationship to the end of a binding strip; and,

Figure 5 is a sectional view on the line 5—5 of Figure 4.

Similar reference characters refer to similar parts throughout the various views of the drawings.

This machine comprises sheet metal feeding mechanism; a strip cutting and folding device and its operating mechanism; a strip indenting device and its operating mechanism; a strip pusher for feeding the cut strip to the device for indenting and folding, and its operating mechanism; a second strip pusher or feeding device and its operating mechanism; a movable strip-receiving table and its operating mechanism; eyelet tape feeding mechanism; an eyelet punch and die unit and its operating mechanism; a pressure bar and its operating mechanism; a fin punching device and its operating mechanism; a fin clinching device and its operating mechanism; means and mechanism for delivering the finished strips from the machine in nested formation; and main driving and control mechanisms. The present invention relates particularly to the strip delivery device and the strip-receiving table and to means for insuring coordinated action between the various parts of the machine.

The details of the machine and its operation are discussed in my U. S. Patent No. 2,042,912, and except as pointed out herein, the details of construction and operation are the same as in that patent. The structure of the machine and its operation will be discussed below and the details will be explained in so far as they are involved directly in the present invention. The broader aspects of the machine will be discussed in reference to Figure 1, and the details of construction will then be discussed in connection with the other figures.

Referring to Figure 1, the machine is provided with suitable side-frame leg members 10 and supporting upper side-frame members 11. These frame members are connected together by means of a lower transverse frame-plate 12, and upper transverse frame-plates 13 and 13'. Plate 13 provides an upper surface for supporting the metal sheet 14 as it is fed from the rear of the machine (the left of Figure 1) to the strip cutting and folding mechanism. At the right-hand side, plate 13 has a depending L-shaped projection forming a ledge to support a block 15, and similarly plate 13' supports a block 16. Block 16 is movable toward block 15 to adjust the gap therebetween, with the adjustment being accomplished by turning a plurality of adjustment screws 17 mounted in plate 13' and adjusted from the right at the front of the machine.

The drive and control mechanism comprises a cam shaft 18 and an eccentric shaft 19 both extending across the machine and rotatably mounted in the side-frames. Cam shaft 18 is driven through a gear assembly from a motor, and cam shaft 19 is driven from cam shaft 18 through gearing (not shown). Mounted to slide vertically in suitable raceways 25 in the side-frame members 11 is a sheet cutting and folding bar 24. At the left, bar 24 carries a movable

cutting knife 26 which cooperates with a fixed cutting knife 28 rigidly mounted on plate 13, and at the right, bar 24 carries a folding blade 27 which moves downwardly between blocks 15 and 16 to fold the strip. Bar 24 also carries a gauge plate 30 which is adjustably supported by a pair of adjusting screws 31. Prior to each cutting operation the metal sheet 14 is moved to the right with its extreme end overhanging the edge of cutter knife 28 and into engagement with gauge plate 30. As bar 24 moves downwardly, the cutting edges of cutting knives 26 and 28 cooperate to shear off the overhanging end of the metal sheet, and this cut-off portion forms the strip 29. By adjusting the position of gauge plate 30 with respect to the cutting edge of cutting knife 28, the width of the binding strip is regulated. After being cut off, the strip falls upon block 15, and bar 24 moves up again.

Slidably mounted and extending across the top of block 15 are two pusher fingers 32 which are oscillated between the position shown and a retracted position wherein the right-hand ends of the fingers are flush with the right-hand side of cutter knife 28. Thus, when the strip 29 falls on block 15, the left-hand side of the strip is engaged by the adjacent ends of the pusher fingers, and when the pusher fingers slide to the right to the position shown, the strip is slid over the gap between blocks 15 and 16. The strip is then held between the ends of pusher fingers 32 and the edge of adjustable gauge plate 33 mounted on block 16. In this position the strip is operated upon to produce therein suitable indentations and then is folded by the folding plate 27 upon the next descent of bar 24.

The pusher fingers 32 are oscillated by a cam and spring assembly with the left-hand end of each finger connected through a link 35 to the upper end of an arm 36 rigidly mounted on a rock shaft 38. Shaft 38 is mounted at its ends in the side-frames and carries an arm 39 having a roller 40 riding upon a cam 41 on the cam shaft 19. Arm 39 has a rearward extension 42 to which is connected one end of a tension spring 43, the other end of which is attached to the frame of the machine. Spring 43 biases arm 39 and rock shaft 38 in a clockwise direction, with the result that roller 40 follows the contour of cam 41. Thus, as shaft 19 rotates, shaft 38 is rocked, with the result that pusher fingers 32 are oscillated to and from their retracted position where they receive a new strip 29 of sheet metal.

Bar 24 is connected at its ends to a pair of adjustable connecting rods (not shown) which are mounted at their lower ends on eccentrics on shaft 19. These eccentrics are so positioned with respect to cam 41 that fingers 32 are withdrawn immediately after the folding blade 27 engages strip 29 to force it downwardly in the gap between blocks 15 and 16, thereby folding the strip and giving it its V-shaped form. Thus, the pusher fingers release the strip and move backward into their rear position ready to carry forward the next strip at the time the strip is cut off.

In the upper side-frames, there is rotatably mounted a rock shaft 44 which carries a pair of embossing arms 45. These arms have pin-shaped or cone-shaped tips 46 which are adapted to form indentations in the metal strip when the arms 32 are rocked into engagement with the strip. Suitable cooperating recesses 47 are formed in the upper face of block 16, and the movement of each tip 46 downwardly displaces metal from the strip into the cooperating recess. The shaft 44 is rocked by an arm 48 which is connected to a cam link 49 with a roller 50 carried by cam link 49 riding in contact with a cam 51 mounted on the eccentric shaft 19. Cam 51 is so positioned with respect to cam 41 that the embossing arms 45 are rocked downwardly to emboss the strip immediately prior to the engagement of each strip by the folding blade 27. The embossing arms 45 immediately return to the position shown and do not interfere with the folding operation.

Rockably mounted in the side-frames below block 16 is a rock shaft 56 which carries a pair of delivery fingers 53, each of which is provided with a V-shaped end 52. Rock shaft 56 is mechanically connected with shaft 18, and its action is synchronized with the action of folding blade 27 so that when the folding blade forces a folded strip downwardly, fingers 53 are in the position shown, and the strip falls into the fingers. The fingers are then rocked clockwise to a lowered, substantially horizontal position where they deposit the strip on a movable table 54. Table 54 is slidably mounted upon cross plate 12 and is moved toward and away from the front of the machine by a pair of toggle mechanisms, each of which is composed of a set of parts 64 and 65 connected together by a pin 66 upon which a cam roller 67 is rotatably mounted. The right-hand end of each of the toggle members 64 is connected to table 54 by a pin 69, and the left-hand end of each of toggle members 65 is connected by a pin 71 to a suitable stationary support 70 carried by plate 12. Each of cam rollers 67 rides in contact with a cam 68 rigidly mounted upon cam shaft 18, with the result that when cam shaft 18 rotates, table 54 is reciprocated.

Mounted in plate 12 to the right of sliding table 54 is a cross member 72 in which is seated the punch and die unit 73. The details of construction and of operation of this portion of the apparatus are explained in my Patent No. 2,042,912, there being secured to and extending upwardly from the cross member 72 two guide rods 74 which guide the pressure plate 75. When a strip 29 is deposited on movable table 54, the strip is pushed to the right beneath pressure plate 75 to the position shown by fingers 55 extending from a pusher plate 78. At the left, pusher plate 78 is connected through links 80 to a pair of rock levers 81 mounted on studs 82 carrying at their lower ends cam rollers 83 which are maintained by springs 85 in engagement with cams 84 on shaft 18. Thus, when shaft 18 rotates, fingers 55 are reciprocated in timed relationship with respect to the other operations of the machine.

Referring to the right of the figure, at the time a strip 29 is being positioned beneath pressure plate 75, the end of eyelet tape 86 moves from the right over the top of the center portion of the strip. The pressure plate 75 then descends and resiliently holds the folded strip and the end of the eyelet tape in proper juxtaposition. At this time the die member 88 of the punch and die unit 73 moves downwardly, pinning the end of the eyelet tape. The downward movement of the die member 88 also causes the round punch 90 to cut a hole in the eyelet tape which is to form the next successive eyelet. As explained in my Patent No. 2,042,912, a pair of punches 101 are at this time operated to pierce from below the strip 29 and the eyelet tab to cause upstanding metal

fins. These metal fins are subsequently clinched or riveted by means of a pair of hammer pins 103 which reciprocate in the pressure plate 75. While these operations of punching the fins and clinching the same are being carried on, the pressure plate 75 rests with resilient force upon the eyelet tab and folded strip holding them in position. The mechanism for operating the punching and clinching pins and the pressure plate 75 is shown in part in the accompanying drawings, and a detailed description may be found in my Patent No. 2,042,912.

The clinching of the fins securely fastens the eyelet to the metal strip so that the finished product is a substantially unitary structure. The metal strip is released by the lifting of the pressure plate 75, and the flat springs 132 react to flip the finished binding strip to the left. At this time the movable table 54 has been drawn back to the left, causing a gap to exist between the forward edge of the table and the die block 72, and the finished binding strip falls through this gap into the mouth of a hopper 133. The hopper guides each individual binding strip downwardly, and its advance is stopped by contact with a pair of flat springs 136. A pair of fingers 139 then moves from the broken line position to the full line position, thereby delivering the binding strip to the nested position shown at the left.

These binding strips are adapted to act as supports for sheets of material such as calendars, maps, etc., and it is important that the eyelet tab be accurately positioned upon each strip; that is, if the eyelet tab were off center, this would not be discovered until the calendar or the like was finished. Then, in all probability, the calendar or the like would be discarded. In carrying out the present invention, each binding strip is automatically centered with respect to its eyelet tab in a manner which is tied up with the operation of the other portions of the machine. Accordingly, as the binding strips are moved along the surface of the table 54 by pusher fingers 55 (see Figures 2 and 3), the strip is moved between a pair of end gauges adjustably held by screws 176 to the stop gauge 117. Each end gauge is formed by a link 170 having a slot 171 at one end and carrying a guide finger 172 at the other end. Each guide finger 172 has a beveled edge 174 shown best in Figure 5, and it is adjustably held to link 170 by a screw 173. Referring again to Figure 2, screws 176 are received in holes 177 spaced along the top of stop gauge 117, and by providing a number of these holes and the elongated slot 171, each link 170 may be positioned to hold its guide finger in any desirable position.

To adjust the two end gauges, a sample strip 29 is placed in its true position with relation to the center of the eyelet-attaching mechanism. A pair of holes 177 is then selected such that the end gauges may be clamped to approximate the relation to strip 29 which is shown in Figure 2. Guide fingers 172 are then placed in alignment with the ends of the strip and locked in place by tightening screws 173, and links 170 are then secured in the proper adjusted position by tightening screws 176.

The beveled edge 174 of each guide finger 172 (see Figure 5), and each guide finger is resiliently held by link 170 so that this beveled engages and presses downwardly on the end edge of the strip. As shown best in Figure 4, the beveled edge 174 of each guide finger is cut away at the end of the guide finger which first engages the strip so that if the strip is not in perfect alignment with the finger, the strip will be deflected longitudinally into proper alignment. The guide fingers are adjusted in accordance with the conditions of use, depending upon the type of strip and upon the leeway which must be given for the strips to be out of alignment when they are pushed between the end gauges. Thus, for example, in Figure 2 the guide fingers are adjusted at a wide angle.

As many possible embodiments may be made of the above invention and as many changes might be made in the embodiment above set forth, it is to be understood that all matter hereinbefore set forth, or shown in the accompanying drawings, is to be interpreted as illustrative and not in a limiting sense.

I claim:

In apparatus for attaching metal eyelets on folded metal strips wherein the strips are fed transversely of their length beneath a pressure plate in overlapping relationship with respect to the eyelets and wherein each eyelet is automatically attached to said strip, the combination with means for moving and holding the strips of a pair of gauges positioned at the respective ends of the strip, each of said gauges comprising a finger member adjustably held against the working surface upon which the strip is positioned, said finger member having a beveled side edge beneath which the respective end of each successive strip is moved, and a resilient link providing the support for said finger member with the finger member attached at one end of the link and with the link adjustably clamped to a stationary support adjacent its other end.

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