Oct. 26, 1943. M. P. JUNKIN 2,332,644

BOX STAYING MACHINE

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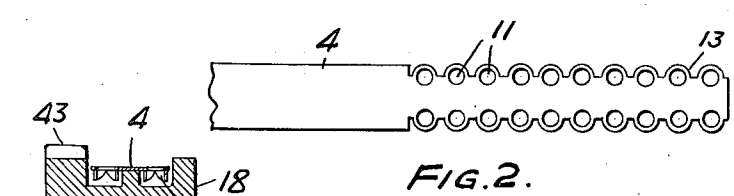


FIG. 2.

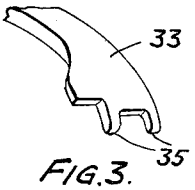


FIG. 3.

FIG. 4.

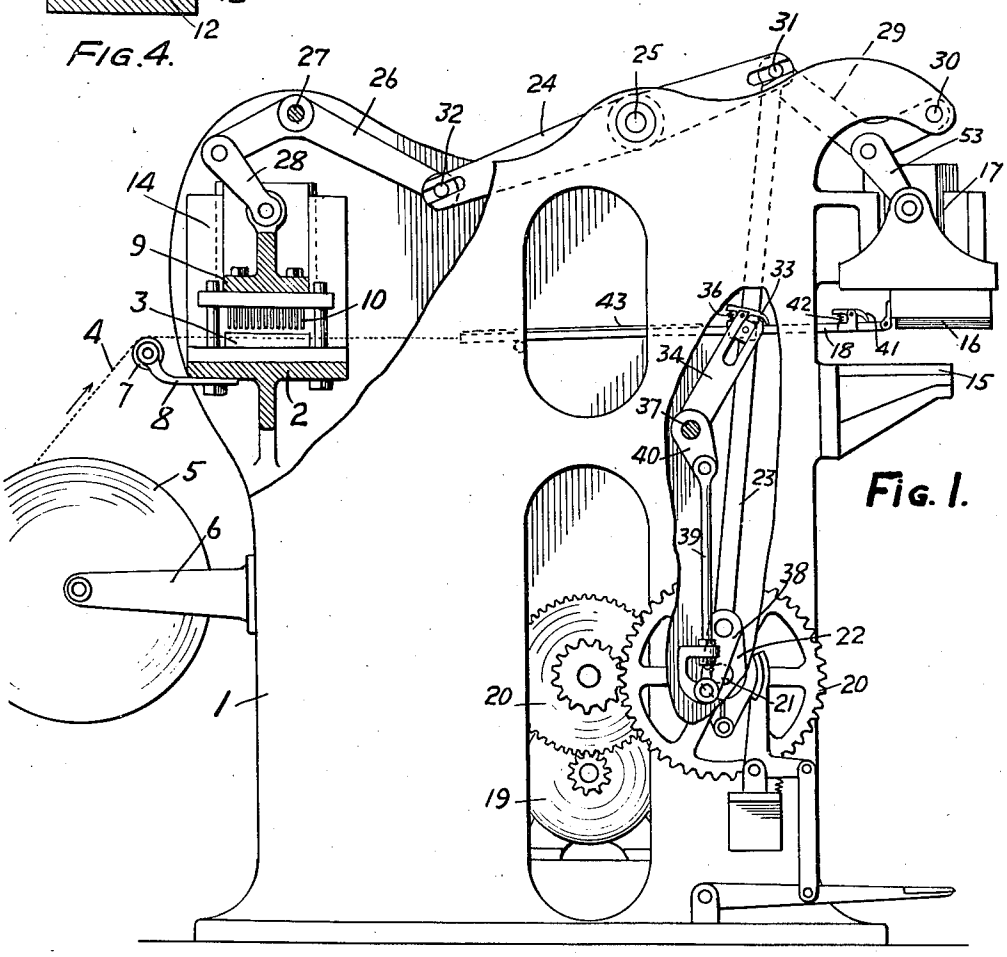
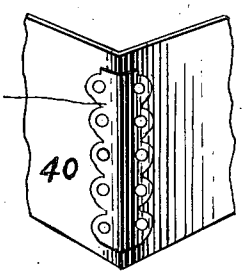


FIG. 1.

FIG. 5.



WITNESS:

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BOX STAYING MACHINE

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5 Claims. (Cl. 1—12)

This invention relates to an improvement in box staying machine and more particularly to a machine of the type indicated which will efficiently and economically prepare and apply staying strip to boxes.

As is well known, an efficient type of box is produced from a blank formed from cardboard, the corners of the box being secured and reinforced by means of metal staying strips. The metal strips overlie the corners of the box and are secured to the box walls adjacent to the corners.

Heretofore it has been customary to prepare the metal staying strip from a ribbon of metal by punching to form securing spuds and winding into a roll. Then, to apply the prepared strip, in the production of boxes, a mechanism including an anvil and die is used.

The procedures and mechanisms heretofore used in preparing and applying metal staying strip are relatively expensive and time consuming and present various problems to the manufacturer of the so-called metal stayed boxes.

Now in accordance with this invention there is provided a mechanism for the preparation and application of metal staying strip, which is at once relatively inexpensive to produce, maintain and operate and, at the same time, of high efficiency in operation.

Having now indicated in a general way the nature and purpose of this invention, I will proceed to a detailed description of an embodiment thereof with reference to the accompanying drawing in which:

Figure 1 is a side view, partly broken away and partly in section, of a staying machine according to this invention.

Figure 2 is a plan view of a length of staying strip partly prepared for application.

Figure 3 is a perspective view of an element of the strip feeding mechanism included in the machine shown in Figure 1.

Figure 4 is a sectional view of an element of the apparatus showing a detail of construction.

Figure 5 is a fragmentary view showing a corner of the box with staying strip such as indicated in Figure 2 applied.

In the several figures 1 indicates a frame for the support of the various elements of the machine.

At one end of the frame 1 is formed a support 2, on which is mounted a die 3, provided with a channel for the passage and guidance of a metal ribbon 4 extending from a roll 5, carried by a bracket 6, extending from the frame 1. Adjacent to the die 3 and serving to support the ribbon 4 and guide it into the channel in the die 3 is a roller 7 carried by a bracket 8. Above the die 3 is a punch head 9 carrying a series of punches 10, adapted to cooperate with the die 3 to form the openings 11 in the strip 4, with the production of triangular spuds 12, and to scallop the edges of the strip as shown at 13, Figure 2.

The punch head 9 and punches 10 are guided by means of guides 14 to the end that the punches in operation will register with the openings in the die 3.

Mounted on the frame opposite to the die 3 and at a somewhat lower level is an anvil 15 with which a hammer 16, mounted for reciprocation in guides 17, is adapted to cooperate for the application of a staying strip to a box. The working face of the hammer 16 in its upper position is in line with channel in the die 3. Leading to the hammer 16, and carried thereby is a guide 18, which extends toward the die 3 and is adapted to receive and guide to the hammer the strip 4, after its passage through the die 3 and the formation of the openings 11 and spuds 12 by the punches 10.

The punch head 9 with punches 10 and the die 16 are adapted to be reciprocated by power from a motor 19 transmitted through gearing 20 to a shaft 21, on which is secured a crank 22 connected to a rod 23. The rod 23 is connected, by a slot and pin connection 31, to an end of a lever 24, mounted between its ends on a pivot 25 in the frame 1. The pivot 25 serves as a fulcrum.

As will now be obvious, the lever 24 will be rocked when the motor 19 is operated.

The punch head 9 is reciprocated by the lever 24 through a lever 26, mounted on the frame 1 on a pivot 27 between its ends. The lever 26 is connected at one end to an end of lever 24, through a slot and pin connection 32, and at its other end to the punch head 9 through a link 28. The form of lever 26 and length of link 28 are such that on the working stroke of the punch head the link 28 is straightened out, as in a toggle, to give maximum pressure on the punches 10.

The hammer 16 is reciprocated by the lever 24 through a lever 29 mounted on the frame 1 on a pivot 30 at its end, and connected to an end of lever 24 through the slot and pin connection 31. The die 16 is connected to the lever 29 intermediate its ends by a link 53. The lever 29 and link 53 are so arranged that in the working stroke of the die 16 the link 53 will straighten out, as in a toggle, to give maximum pressure on the die.

It will now be clear that operation of the motor 19 effects a rocking of lever 24, which in turn ef-

fects reciprocation of the punch head 9 and the hammer 16; and that, by virtue of the classes of levers used and their connections to the punch head and die, these elements will be operated to punch the strip 4 and apply it to a box on anvil 15 in synchronism.

The strip 4, led from the rolls 5 over the roller 7, through the channel in the die 3 and through the guide 18 to the die 16, is fed to the die for application to a box by means of a feed pawl 33, pivotally mounted on an arm 34, mounted on a shaft 37. The pawl 33 is provided with a pair of fingers 35 adapted to engage opposite holes 11 in the strip formed by the punches 10, under the influence of a spring 36.

For feeding a strip the feed pawl 33 is reciprocated through the medium of an arm 38 connected to crank 22, an adjustable rod 39 connected to arm 38 and a crank 40 mounted on shaft 37, the cranks 22 and 40 being arranged oppositely.

A holding pawl 41 of the form of the feed pawl 33 is pivotally mounted in the guide 18 and backed by a spring 42, is adapted to engage in opposite holes 11 in the strip 4.

As will now be obvious, when the shaft 21 is rotated by motor 19, the feed pawl 33 will be reciprocated, its driving connection being such that it will move backward idly, when the punch head 9 and hammer 16 are moved downwardly on their working strokes, and forward with feed of strip 4 when the punch head 9 and hammer 16 move upward on the idle strokes. When the feed pawl 33 moves backward, the holding pawl 41 will hold the strip 4, but will not obstruct feeding of the strip when the feed pawl advances the strip.

For adjustment of the feed of the strip 4, a rider strip 43 is placed on the top of the guide and is adjustable to and away from the feed pawl 33. With a given adjustment of the rider strip the feed pawl rides up on it in its backward movement and in its forward movement engages the strip and feeds it to the hammer 16. The length of strip 4 fed to the hammer 16 is governed by the position of the rider strip 43.

In view of the above description with various description of the operations of the parts of the mechanism described, it is believed that procedure involving use of the mechanism for the staying of boxes will be clear. However, assuming that a reel of metal ribbon is supported from the bracket 6, the ribbon is led over the roller 7, through the channel in the die 3 and into the guide 18, and drawn out of the throat adjacent the hammer 16.

The mechanism is then put into operation by starting the motor 19, which, as has been described, effects operation of the punch head and supported punches 10 and of the hammer 16. When the punches are operated, they punch the holes 11 in the strip 4, with the formation of the spuds 12 and scalloping of the edges of the strip. When the machine is put in operation, the strip is fed along by hand until holes 11 have been punched in the strip for a sufficient length to enable the feed to be taken up by the feed pawl 33. When the feed is taken up by the feed pawl 33, it will operate as described to advance to the die the desired length of punched strip. As will be understood, the feed pawl operates to feed strip to the hammer 16 when the hammer 16 is in motion away from the anvil 15 and the punch head 9 is in motion away from the hammer 16. The feed pawl will be idle when punches 10 and hammer 16 are operative. The holding pawl 41 acts, as has been indicated, to hold the strip in the idle movement of the feed pawl 33 and to tend to push the strip rearwardly or buckle it. It will be understood that the hammer 16 is fitted with a knife (not shown) for severing the lengths of strip as applied to the corners of boxes supported on the anvil 15, as is usual in staying machines; and that the punches 9 are sufficient in number to punch the maximum length of strip which can be applied to a box on the anvil 15. Where a shorter length of strip is fed more or less of the punches merely pass through previously punched holes in the strip.

Figure 5 illustrates the stay produced by the mechanism above described applied to the corner of a box. In Figure 5, 40 indicates the body of the box and 44 indicates stay about the corner of the box, the spuds 12 (see Figure 4) being engaged in the body of the box.

While in the above description of this application reference has been made to metal stripping, it will be understood that the mechanism in accordance with this invention may be used for the preparation and application of staying strip of other material suitable for the purpose.

It is not contemplated that this invention shall be limited by the above detailed description of the embodiment thereof, since various modifications in detail may be made without departing from the scope of the claims appended hereto.

What I claim and desire to protect by Letters Patent is:

1. A box staying machine comprising, in combination, a frame, a die and an anvil mounted on the frame, a series of punches mounted on a head and adapted to cooperate with the die, a hammer adapted to cooperate with the anvil, means for intermittently feeding a continuous strip over the die and anvil and driving means including a lever fulcrumed between its ends and means for operably connecting said lever to said head and to said hammer respectively for effecting reciprocation of said series of punches and said hammer in synchronism.

2. A box staying machine comprising, in combination, a frame, a die and an anvil mounted on the frame, a series of punches mounted on a head and adapted to cooperate with the die, a hammer adapted to cooperate with the anvil, means for intermittently feeding a continuous strip over the die and anvil and driving means including a lever fulcrumed between its ends and means connected to said lever on opposite sides of said fulcrum for connecting said lever to said head and said hammer respectively for effecting reciprocation of said series of punches and said hammer in synchronism, said series of punches extending over a length of strip equal to the maximum intermittent feed thereof.

3. A box staying machine comprising, in combination, a frame, a die and an anvil mounted on the frame, a series of punches mounted on a head and adapted to cooperate with the die, a hammer adapted to cooperate with the anvil, means for intermittently feeding a continuous strip over the die and anvil and driving means for effecting reciprocation of said series of punches and said hammer in synchronism, comprising a lever fulcrumed between its ends, a pair of levers fulcrumed on the frame and respectively connected to opposite ends of said first mentioned lever, and links connecting the levers of said pair to said head and to said hammer respectively whereby said head and the punches mounted thereon will be actuated in synchronism.

4. A box staying machine comprising, in com-

bination, a frame, a die and an anvil mounted on the frame, a series of punches mounted on a head and adapted to cooperate with the die, a hammer adapted to cooperate with the anvil, means for intermittently feeding a continuous strip over the die and anvil, driving means for effecting reciprocation of said series of punches and said hammer in synchronism, comprising a lever fulcrumed between its ends, a pair of levers fulcrumed on the frame and respectively connected to opposite ends of said first mentioned lever through slot and pin connections, and links connecting the levers of said pair respectively to said head and to said hammer whereby said head and the punches mounted thereon will be actuated in synchronism.

5. A box staying machine comprising, in combination, a frame, a die and an anvil mounted on the frame, a series of punches mounted on a head and adapted to cooperate with the die, a hammer adapted to cooperate with the anvil, means for intermittently feeding a continuous strip over the die and anvil, driving means for effecting reciprocation of said series of punches and said hammer in synchronism, comprising a lever fulcrumed between its ends and a pair of levers and respectively connected to opposite ends of said first mentioned lever through slot and pin connections, one of the levers of said pair being fulcrumed at one end on the frame and the other being fulcrumed between its ends on the frame, and links connecting the levers of said pair respectively to said head and to said hammer whereby said head and the punches mounted thereon will be actuated in synchronism.

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