Feb. 16, 1937. N. A. ANDERSON 2,070,704

BOX MAKING MACHINE

Filed April 13, 1936 5 Sheets-Sheet 1

FIG. 1

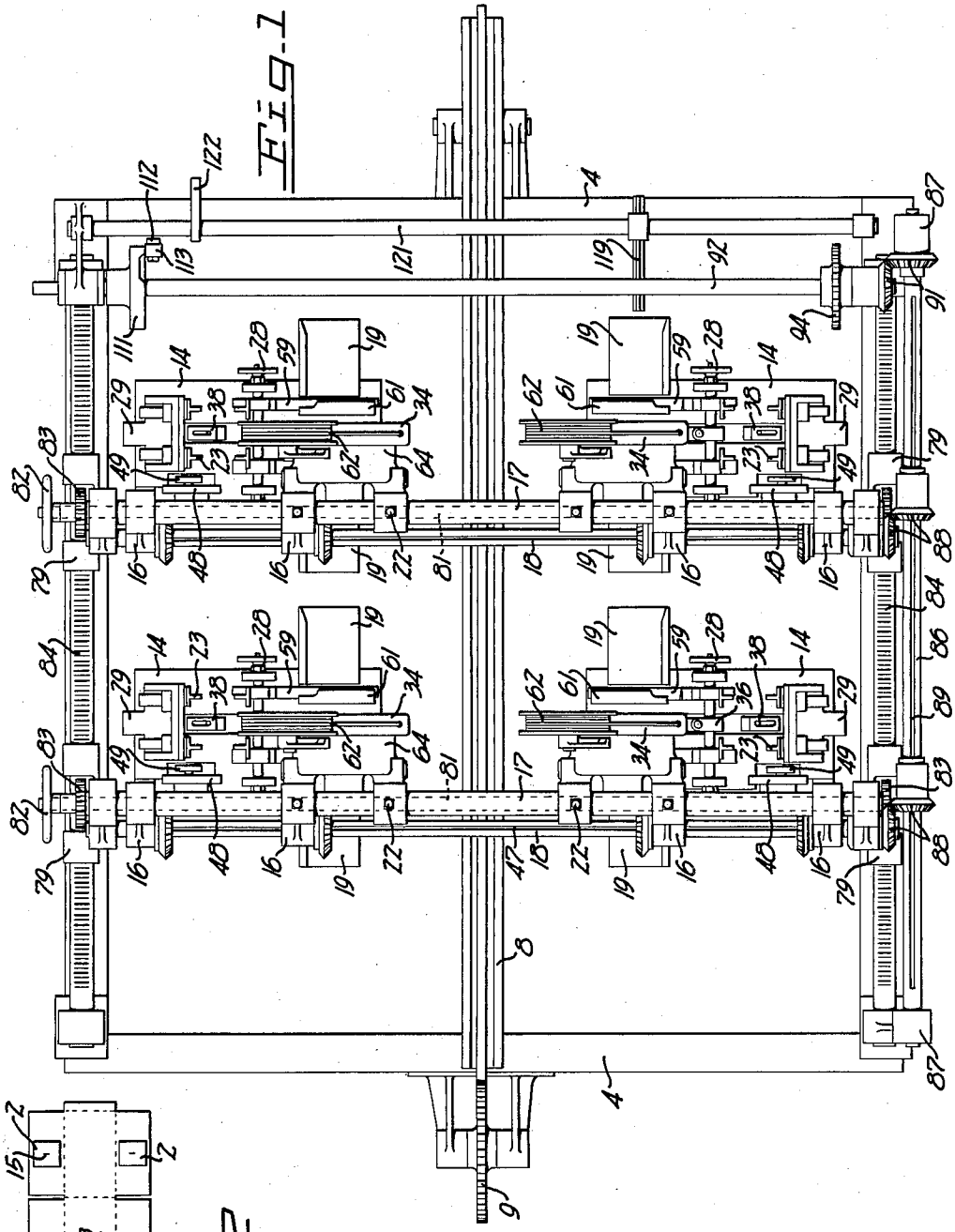
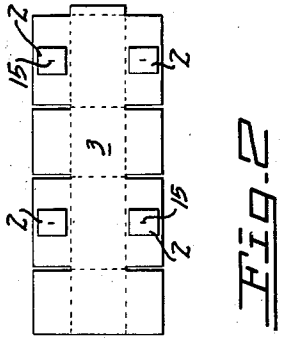


FIG. 2



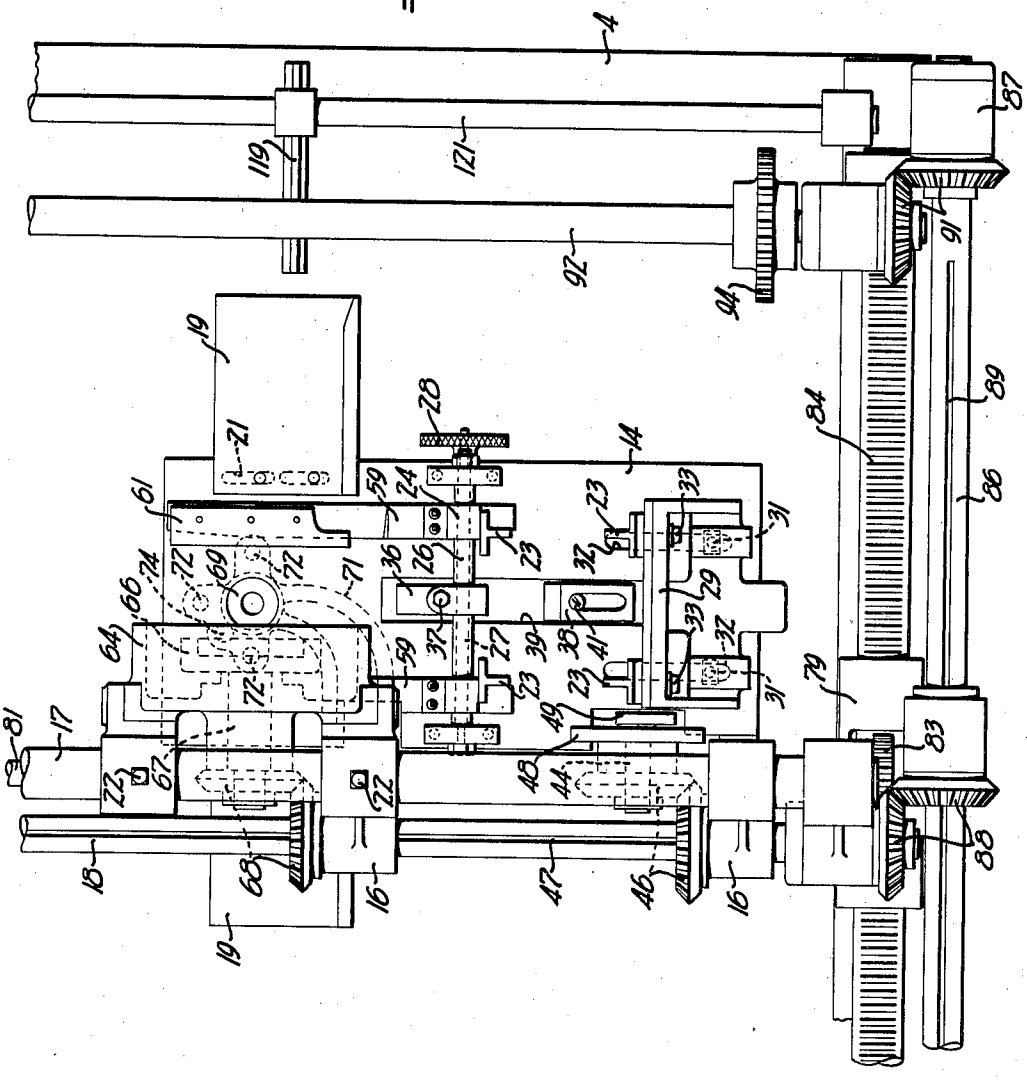
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BOX MAKING MACHINE

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Fig. 3



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BOX MAKING MACHINE

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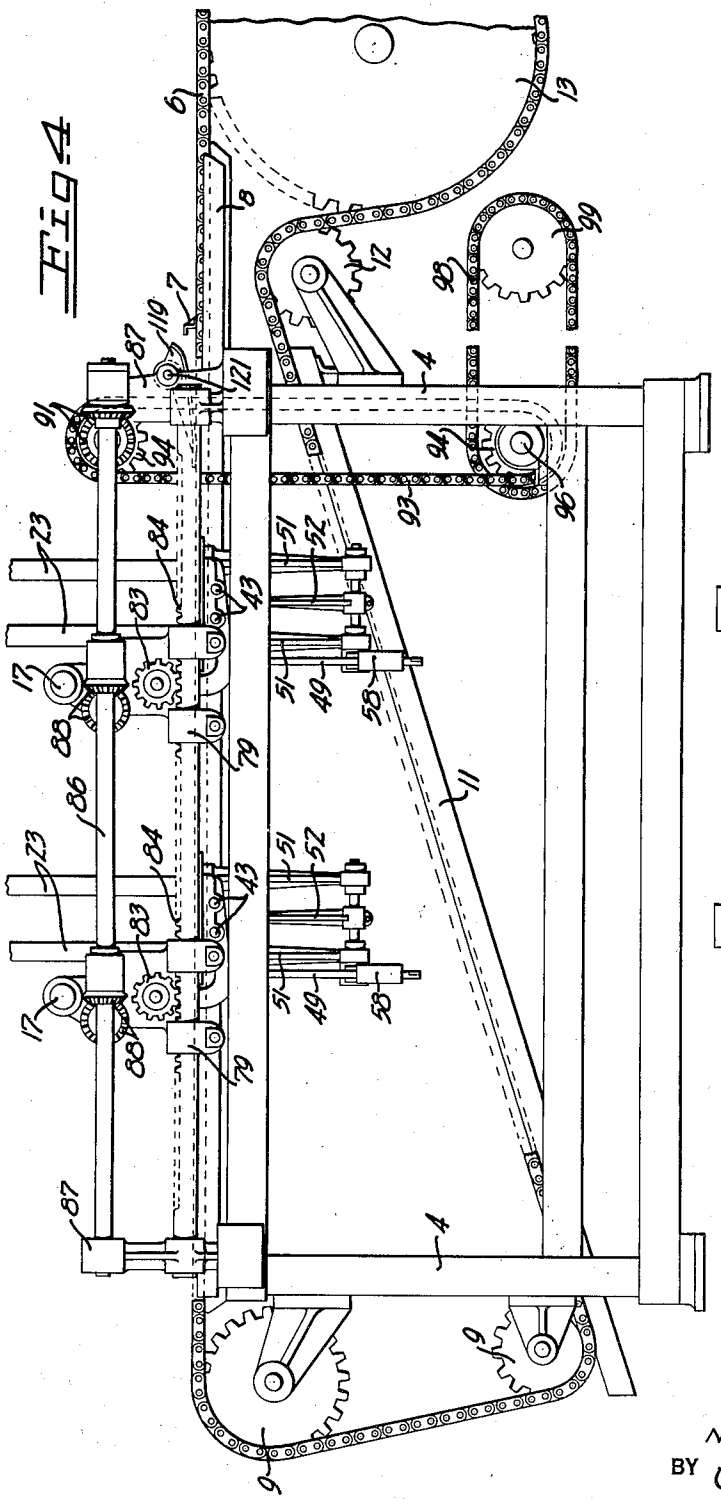


Fig. 4

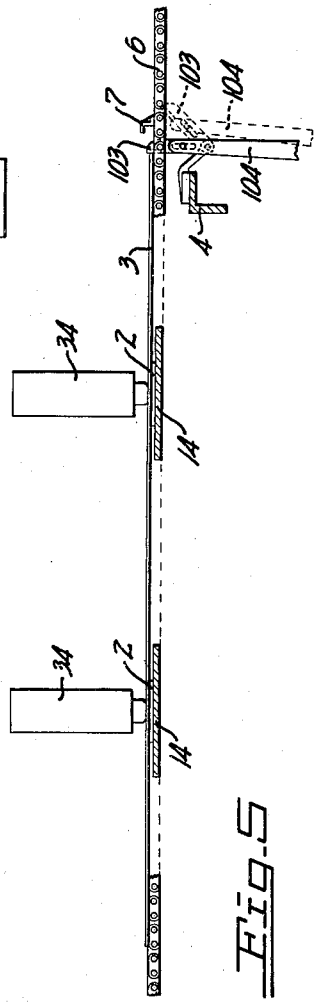


Fig. 5

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BOX MAKING MACHINE

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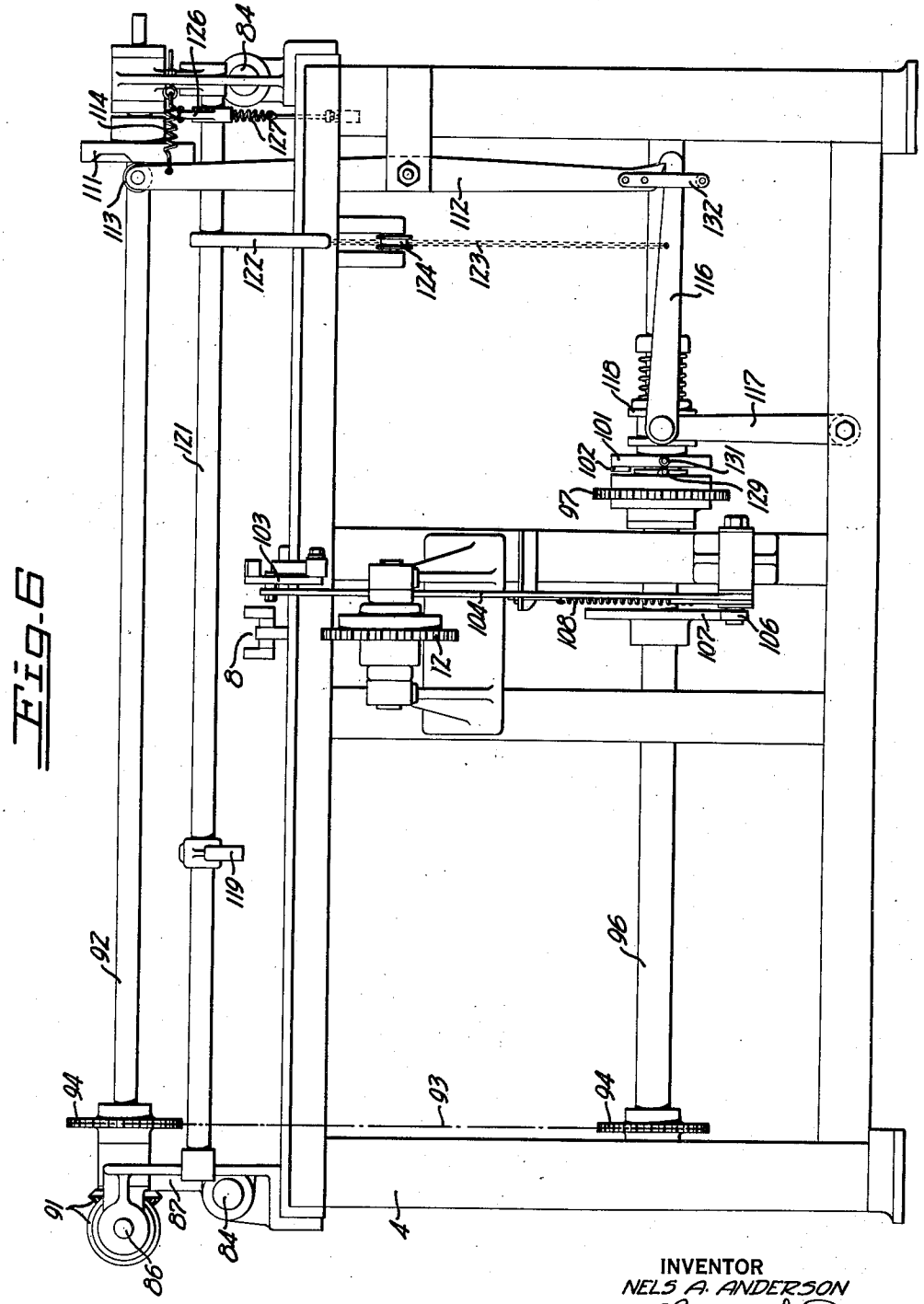


Fig-6

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BOX MAKING MACHINE

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Fig. 8

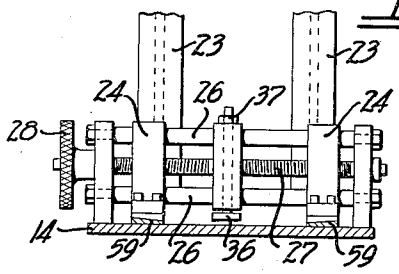


Fig. 7

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Patented Feb. 16, 1937 2,070,704

UNITED STATES PATENT OFFICE

2,070,704

BOX MAKING MACHINE

Nels A. Anderson, Stockton, Calif., assignor to Fibreboard Products, Inc., San Francisco, Calif., a corporation of Delaware

Application April 13, 1936, Serial No. 74,118

14 Claims. (Cl. 93—36)

My invention relates to box making machines, and more particularly to a machine for applying tabs to box blanks.

The broad object of my invention is to provide a machine for applying separate tabs to the inner surfaces of a box blank such as the tabs in the box construction disclosed in the patent to David H. Patterson, No. 2,001,850, issued May 21, 1935.

Another object of the invention is to provide a machine of the character described which will operate in conjunction with other machines performing operations on the blank, so that the blanks are formed and the tabs applied in one direct line of operation.

The invention possesses other objects and features of advantage, some of which, with the foregoing, will be set forth in the following description of my invention. It is to be understood that I do not limit myself to this disclosure of species of my invention, as I may adopt variant embodiments thereof within the scope of the claims.

Referring to the drawings:

Figure 1 is a plan view of a machine embodying the improvements of my invention; and

Figure 2 is a plan view on smaller scale, showing one of the box blanks with the tabs fastened in position.

Figure 3 is a fragmentary plan view on larger scale, showing one of the tab fastening units.

Figure 4 is a side elevational view of the machine.

Figure 5 is a side view, largely diagrammatic, showing the blank and tabs in position for fastening.

Figure 6 is a rear elevational view of the machine; and

Figure 7 is a detail view on larger scale showing the tab feeding and stapling mechanism.

Figure 8 is a fragmentary sectional view looking toward the tab chute and showing the adjusting features.

In terms of broad inclusion, the box making machine for applying tabs to a box blank embodying my invention comprises means for feeding a tab into a fastening position, means for feeding a blank into the machine, means for moving the blank into registration with the tab, and means for fastening the tab to the blank. The blank feeding means is preferably an extension of the same intermittently moving conveyor which feeds the blanks through the creasing and slotting machines; and means are provided in my machine for timing the various operations with this conveyor.

In greater detail, and referring particularly to Figure 2 of the drawings, the box making machine of my invention is designed to apply separate tabs 2 on the inner flap surfaces of a box blank 3, so that when the latter is set up the tabs lie in the spaces between the flaps to provide a flat or level bottom. The advantage of such a box construction is that articles, such as cans, may be packed without the tilting which occurs in the usual packing box.

As best shown in Figure 4, my machine comprises a frame 4 adapted to be positioned at the end of the line containing the creasing and slotting machines. The conveyor chain 6 having pusher lugs 7 which feeds the blanks through the creasing and slotting machines is extended to also provide the means for feeding the blanks through my machine. A track 8 is mounted on frame 4 for the chain, and sprockets 9 are journaled on the end of the frame over which the chain may run. An inclined return track 11 is also provided on the frame, along with a return guide sprocket 12.

From the latter sprocket the conveyor chain passes under the large drive sprocket 13 on the slotting machine. Sprocket 13 rotates periodically to drive the conveyor chain 6 with an intermittent motion through the machines. This motion is required in the slotter to provide a period of rest for the blanks when the knives descend. These rest periods are utilized in my machine for fastening the tabs to the blanks, and the machine is preferably designed to fasten each tab with a single staple 15 positioned centrally of the tab. See Figure 2.

As shown in Figure 1, there are four tab placing units, two being arranged on each side of the centrally disposed conveyor track 8. These units, as better shown in Figure 3, are each mounted on a plate 14 suspended by brackets 16 slidable on cross rod 17 and shaft 18 extending transversely of the frame. As shown in Figure 1, a guide plate 19 is provided on each unit for directing the edges of the blanks as the latter are pushed through the machine by the conveyor. These plates are permitted a certain degree of separate adjustment by slots 21 in the supporting plate, through which the fastening studs pass. See Figure 3.

The units as a whole are adjustable toward and away from each other and transversely of the frame by the slidable mounting of brackets 16. Each unit may be locked in a selected position of adjustment by set screws 22 threaded in the brackets and bearing against the cross rods

17. This adjustment permits the machine to accommodate blanks of different size.

Referring to Figures 3 and 7, a supply of tabs 2 are held on each of the placing units in a vertical chute formed by corner bars 23. Since tabs of different size may be used, the inside corner bars are fastened to blocks 24 slidable on rods 26. See Figure 8. Adjustment is effected by a screw 27 having right and left hand threads and rotatable by a knob 28. This simultaneous adjustment keeps the two corner bars accurately centered.

After adjusting these bars to the width of a tab, the outside corner bars are brought up to the other two corners of the tab. This adjustment is permitted by a mounting bracket 29 fastened by studs 31 extending through slots 32 provided in the base plate 14. Slots are also provided in the block through which studs 33 extend, so that the corner bars may also be adjusted toward and away from each other.

The tabs are removed one at a time from the bottom of the chute and fed to a tab fastening position under the stapling head 34. Removal of one tab at a time is insured by a block 36 adjustable by a screw 37 so that but a single tab can pass out under it. The tab feeding means comprises a shoe 38 having a notched toe for engaging behind a tab, and also having a sloping surface free to slide back under the stack in the chute. This shoe is mounted under the chute in a slot 39 provided in the base plate 14, and is adjustably held by a screw 41 on a reciprocating block 42 slidably mounted under the plate on rods 43.

Means are provided for reciprocating shoe 38 to feed the tabs out of the chute. For this purpose a short shaft 44 is journaled in the bracket 16, and is connected to shaft 18 by a pair of bevel gears 46, one of which is slidably mounted on the cross shaft in a keyway 47. A face plate 48 is provided on the inner end of shaft 44, on which a depending rod 49 is eccentrically mounted.

An operative connection between the lower end of this rod and the slidable block 42 is provided by a bell crank journaled on legs 51 depending from the base plate 14. The long arm 52 of the bell crank is connected to block 42 by a link 53; while the shorter arm 54 is fastened to the lower end of rod 49 by a pin 56. By this arrangement the tab feeding shoe 38 is reciprocated whenever shaft 18 is rotated.

Means are provided for disconnecting the shoe in the event a tab should become stuck or the mechanism otherwise fouled. For this purpose pin 56 on the bell crank is releasably held between arm 49 and a pivoted spring closed jaw 57. If the shoe is stopped, pin 56 merely slips down into the lower slot. This frees the bell crank and connected shoe. If desired a bell 58, or a switch for ringing a bell, may be mounted on the rod 49 to signal when the driving connection has been broken.

As shown in Figure 7, a tab lies between the one in the fastening position and the chute. When a new tab is fed from the chute this intermediate tab is advanced to the fastening position. If a wider tab is used this intermediate tab is unnecessary, and if a smaller tab is used there may be two intermediate tabs.

Means are provided for guiding the tab into its fastening position. As shown in Figure 3, a pair of guide rails 59 are arranged to extend over the base plate 14 under the stapling head. These rails are fastened to the supporting blocks 24, so that they are adjusted simultaneously with the chute corner bars. The forward rail has a sloping surface on which a thin steel plate 61 is secured to overlie the edge of the tab. This insures that the leading edge of the blank will be directed over the edge of the tab as the blank is fed into the machine.

The stapling head 34 which functions to fasten the tab to the blank may be of any suitable type. The type shown in outline is of standard design fed by a wire reel 62 and having a reciprocating stapling element 63. Head 34 is secured to a suitable mounting 64 provided on the bracket 16. Figure 3 shows the mounting with the head removed. The mounting is recessed to receive an operating cam 66 which engages a following roller on the back side of the stapling head case.

Cam 66 is mounted on a short shaft 67 which is connected with the cross shaft 18 by a pair of bevel gears 68; one of which is also slidable along the cross shaft. Rotation of shaft 18 therefore also operates to drive the stapling head; and cam 66 is designed to effect the stapling operation in time with the tab feeding mechanism. The timing is such that the stapling head operates after the feeding shoe 38 has advanced a tab into its fastening position under the head, as shown in Figure 7.

Figure 3 shows the anvil 69 under the stapling head for clinching the staples. This anvil extends through a hole in the base plate 14 and is supported by an arm 71 cast as part of the bracket 16. This arm also serves as a support for the plate 14, screws 72 being provided for fastening the plate to the arm. As shown in Figure 7, a pin 73 is also arranged under the plate and is adapted to project through the latter through a hole 74.

The pin is mounted on the end of a rocker arm 76 pivoted to leg 51 and held in retracted position by a spring 77. A roller 78 on the rod 49 serves to engage the rocker arm and elevate pin 73 when rod 49 comes down after a stapling operation. Pin 73 functions to lift the leading edge of the fastened tab over the forward guide rail 59, so that the tab will clear the rail when the blank is moved ahead.

The stapling units are connected in pairs, as shown in Figure 1, and means are provided for adjusting the pairs toward and away from each other. For this purpose the end brackets 79 for supporting the ends of cross rod 17 and shaft 18 are slidably mounted on the frame 4. Adjustment is effected by a second cross shaft 81 journaled in the brackets and having a hand wheel 82. This shaft also carries gears 83 meshed with racks 84 provided along the sides of the frame. By this adjustment the units may be brought together or spread apart, longitudinally of the frame.

Means are provided for simultaneously driving all four of the tab feeding and stapling units. This is done through a shaft 86 journaled along a side of the frame on standards 87. Each of the cross shafts 18 is connected to the side shaft 86 by a pair of beveled gears 88, one of which is slidable along the cross shaft in a keyway 89 to allow for adjustment. Shaft 86 is in turn connected by gears 91 to another cross shaft 92 at the head end of the frame, which latter shaft is driven by chain 93 and sprockets 94 from a lower shaft 96.

Lower shaft 96 is driven from a loose sprocket 97 connected by a chain 98 to a continuously

running sprocket 99 connected with the drive shaft in the adjacent slotting machine. Sprocket 97 therefore is always running in time with the conveyor chain 6. A spring pressed clutch disk 101 is slidably mounted for rotation on shaft 96, and is provided with teeth 102 for engaging complementary teeth on the loose sprocket 97. When this clutch is engaged the various mechanisms in my machine are brought into operation.

Means are provided for moving the blank 3 into accurate registration with the tabs 2 after the conveyor chain 6 comes to rest. This is accomplished by an arm 103 pivoted on the head end of frame 4 and adapted to move from a retracted position behind the trailing edge of the blank when the conveyor is at rest to an upright position ahead of the conveyor lug 7. See Figure 5. This insures that the blank will always be shifted into a predetermined position, and once the tab placing units are adjusted to the blank in this position, the arm 103 subsequently operates to accurately register succeeding blanks with the tabs.

As shown in Figure 6, registering arm 103 is actuated by a bell crank having a long arm 104 connected with the registering arm, and having a short forwardly extending arm carrying a following roller 106 engaging a cam 107 on the shaft 96. A spring 108 serves to hold the following roller against the cam. Cam 107 is designed to move the registering arm 103 from retracted to upright position with a comparatively slow motion, so that the blank is not kicked forwardly, but is brought up slowly to a definite position as determined by the extended position of the registering arm.

Since cam 107 is on shaft 96, the registering arm operates in synchronism with the tab placing and fastening mechanisms, and the cam is designed to time the arm movement so that it is retracted when the tab feeding shoe 38 is retracted.

Means are provided for controlling the operation of my machine so that the several devices come into operation only when a blank is being fed into the machine. For this purpose a clutch disengaging cam 111 is mounted on one end of the upper shaft 92, against which a rocker arm 112 having a following roller 113 is held by a spring 114. The lower end of this arm is shaped to provide a pointed tooth for engaging a notch in the end of a clutch operating bar 116 which is pivotally supported on a lever 117 and carries a suitable roller engaging an annular groove in the clutch sleeve 118. When bar 116 is pulled back by rocker arm 112, as shown in Figure 6, the clutch is disengaged. This stops the machine; and cam 111 is designed to disengage the clutch only at such times when the tab feeding shoe 38 and blank registering arm 103 are retracted.

Means actuated by the entrance of a blank into the machine are provided for conditioning the mechanism to permit engagement of the clutch. This control is effected by a finger 119 lying in the path of movement of the blank and fixed on a cross shaft 121. An oppositely extending arm 122 is also provided on shaft 121, and carries a chain 123 passing over a roller 124 and connected to the clutch operating bar 116. A second lever 126 on shaft 121 is pulled down by a spring 127, which keeps chain 123 taut and holds bar 116 up into engagement with the pointed end of arm 112. This is the condition when no blank is in the machine and is the condition when cam 111 can operate to disengage the clutch and stop the mechanism.

As a blank is fed into the machine, the leading edge of the blank engages finger 119 and presses it up. This slackens chain 123. Bar 116 will not drop from engagement with arm 112 however, because of the tension in the arm caused by the clutch spring. Slackening of chain 123 merely conditions the arm so that it is free to drop at such time when the clutch sleeve is backed up slightly to relieve the spring pressure.

Means timed with the conveyor movement is provided for relieving the spring pressure on arm 116 to allow it to drop from engagement with its holding arm 112. This means is associated with sprocket 97 which is being driven by and in time with the machine which imparts the intermittent motion to the conveyor chain; and comprises a lug 129 mounted on the sprocket and adapted to engage a roller 131 on the clutch disk 101. When the lug rides under this roller the clutch disk and connected sleeve 118 are forced back slightly to relieve the tension in bar 116. The latter then drops from the holding arm 112 into a yoke 132 suspended from the arm, and the clutch immediately engages.

The positioning of the clutch engaging lug 129 on the sprocket 97 is adjusted to engage the clutch at the instant the conveyor stops moving; and the relative speeds of the mechanical parts are so proportioned that the operations in my machine are completed during the rest period of the conveyor.

As soon as the tabs are fastened, the conveyor picks up the blank and discharges it from the machine. The first effect of advancing the blank of course is to allow the control finger 119 to drop down and pull up the bar 116. At this time the rocker arm 112 is back and ready to engage the bar for disengaging the clutch.

In brief review, the operation of the machine is as follows: A scored and slotted box blank 3 is fed into the machine during a period of advancement in the intermittent motion of conveyor 6. As the blank enters the machine it presses up the control finger 119, which conditions the clutch mechanism for operation. This control therefore allows the stapling units to operate only at such times when a blank is in the machine.

When the conveyor comes to rest clutch operating lug 129 has moved up to and presses out on roller 131, whereupon holding bar 116 is released and the clutch engaged. During the first half revolution of the shafts cam 107 advances registering arm 103 to shift the blank forwardly into accurate registration with the tab placing and stapling units; which latter are previously adjusted to the particular size of blank being treated.

Simultaneous with the shifting of the blank the tab feeding shoes 38 advance to feed a set of tabs 2 into their fastening positions under the stapling heads 34.

During the last half revolution of the shafts, tab feeding shoes 38 and blank registering arm 103 are retracted, and the stapling heads are operated to fasten the tabs to the blank. Toward the end of this portion of the operation the tab release pin 73 is also elevated to press up the leading edges of the tabs, so that the latter are free to move ahead with the blank.

By this time, conveyor 6 has started its advancing movement and lug 7 picks up the blank, advancing it out of the machine. Finger 119 immediately drops to pull up bar 116 for engagement

by arm 112, which at this time is positioned ready to engage it. During the final portion of the shaft revolution, cam 111 presses out the following roller 113 to disengage the clutch and stop the machine. With the advancement of succeeding blanks into the machine this cycle of operation is automatically repeated.

If desired the switch 58 may be used to stop the machine. By such an arrangement the machine will be automatically stopped whenever a blank feeding shoe 38 is accidentally blocked. Also, a stop 136 may be provided on plate 14, as shown in Figure 7, to block shoe 38 and stop the machine in the event a tab in the fastening position is not stapled to and carried away by the blank.

I claim:

1. A machine for applying tabs to a blank, comprising means for feeding a tab into a fastening position, an intermittently moving conveyor for feeding a blank into the machine, means operative during a rest period of the conveyor for moving the blank into registration with the tab, and means for fastening the tab to the blank.

2. A machine for applying tabs to a blank, comprising means for feeding a tab into a fastening position, an intermittently moving conveyor for feeding a blank into the machine, means operative during a rest period of the conveyor for moving the blank into registration with the tab, and means for fastening the tab to the blank, said conveyor operating to remove the blank and connected tab from the machine during a subsequent period of the conveyor movement.

3. A machine for applying tabs to a blank, comprising an intermittently moving conveyor for feeding a blank thru the machine, means for feeding a tab transversely of the path of movement of the blank and into a fastening position underlying the blank, a guideway for the tab, means for fastening the tab to the blank during a rest period of the conveyor, and means for lifting the tab from its guideway prior to subsequent movement of the conveyor.

4. A machine for applying tabs to a blank, comprising means for feeding a tab into a fastening position, an intermittently moving conveyor for feeding a blank into the machine, means operative during a rest period of the conveyor and timed with the tab feeding means for moving the blank into registration with the tab, and means for fastening the tab to the blank.

5. A machine for applying tabs to a blank, comprising means for feeding a tab into a fastening position, an intermittently moving conveyor for feeding a blank into the machine, means operative during a rest period of the conveyor and timed with the tab feeding means for moving the blank into registration with the tab, and means timed with the tab feeding means and said blank registering means for fastening the tab to the blank.

6. A machine for applying tabs to a blank, comprising means for feeding a tab into a fastening position, an intermittently moving conveyor for feeding a blank into the machine, a movably mounted element having a retracted position behind the trailing edge of the blank in the rest position of the conveyor, means timed with the tab feeding means for moving the element forwardly to shift the blank into registration with the tab, and means for fastening the tab to the blank.

7. A machine for applying tabs to a blank, comprising means for feeding a tab into a fastening position, an intermittently moving conveyor for feeding a blank into the machine, means operative during a rest period of the conveyor for moving the blank into registration with the tab, means for fastening the tab to the blank, drive mechanism for said means, a clutch interposed in said drive mechanism, and a control finger mounted in the path of movement of the blank for controlling the engagement of the clutch.

8. A machine for applying tabs to a blank, comprising means for feeding a tab into a fastening position, an intermittently moving conveyor for feeding a blank into the machine, means operative during a rest period of the conveyor for moving the blank into registration with the tab, means for fastening the tab to the blank, drive mechanism for said means, a clutch interposed in said drive mechanism, a cam moving in time with said means for disengaging the clutch, and a finger mounted in the path of movement of the blank for controlling the operation of said clutch disengaging means.

9. A machine for applying tabs to a blank, comprising means for feeding a tab into a fastening position, an intermittently moving conveyor for feeding a blank into the machine, means operative during a rest period of the conveyor for moving the blank into registration with the tab, means for fastening the tab to the blank, drive mechanism for said means, a clutch interposed in said drive mechanism, and means timed with the conveyor for engaging the clutch.

10. A machine for applying tabs to a blank, comprising means for feeding a tab into a fastening position, an intermittently moving conveyor for feeding a blank into the machine, means operative during a rest period of the conveyor for moving the blank into registration with the tab, means for fastening the tab to the blank, drive mechanism for said means, a clutch interposed in said drive mechanism, means timed with the conveyor for engaging the clutch, and a finger mounted in the path of movement of the blank for controlling the operation of said clutch engaging means.

11. A machine for applying tabs to a blank, comprising means for moving a tab into a fastening position, an intermittently moving conveyor for feeding a blank into approximate registration with the tab, means operative during a rest period of the conveyor for moving the blank into accurate registration with the tab, and means for fastening the tab to the blank.

12. A machine for applying tabs to a blank, comprising means for moving a tab into a fastening position, a conveyor having a lug for moving a blank toward the fastening position, means for advancing the blank ahead of the lug and into registration with the tab, and means for fastening the tab to the blank.

13. A machine for applying tabs to a blank, comprising means for feeding a blank longitudinally through the machine, a plurality of movable brackets adjacent each side of the blank feeding means and arranged in pairs spaced longitudinally of the machine, means on said brackets for feeding tabs to the blank, means on the brackets for fastening the tabs to the blank, means mounting the brackets of each pair for adjustment transversely of the machine, and means mounting the pairs of brackets for adjustment longitudinally of the machine.

14. A machine for applying tabs to a blank, comprising means for feeding a blank longitudinally through the machine, a stapling head mounted in the path of movement of said blank,

a chute for holding tabs located alongside the head, said chute and head being arranged along a transverse axis at right angles to the path of movement of said blank, whereby a tab may be fed with a straight line motion from the chute to the head, means for feeding a tab from the chute to a position underlying the head, and means timed with said tab feeding means for operating the stapling head.

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