Nov. 2, 1937. G. C. PAXTON 2,097,774

BOX FEEDING DEVICE FOR STRAPPING MACHINES

Filed Feb. 10, 1937 3 Sheets-Sheet 1

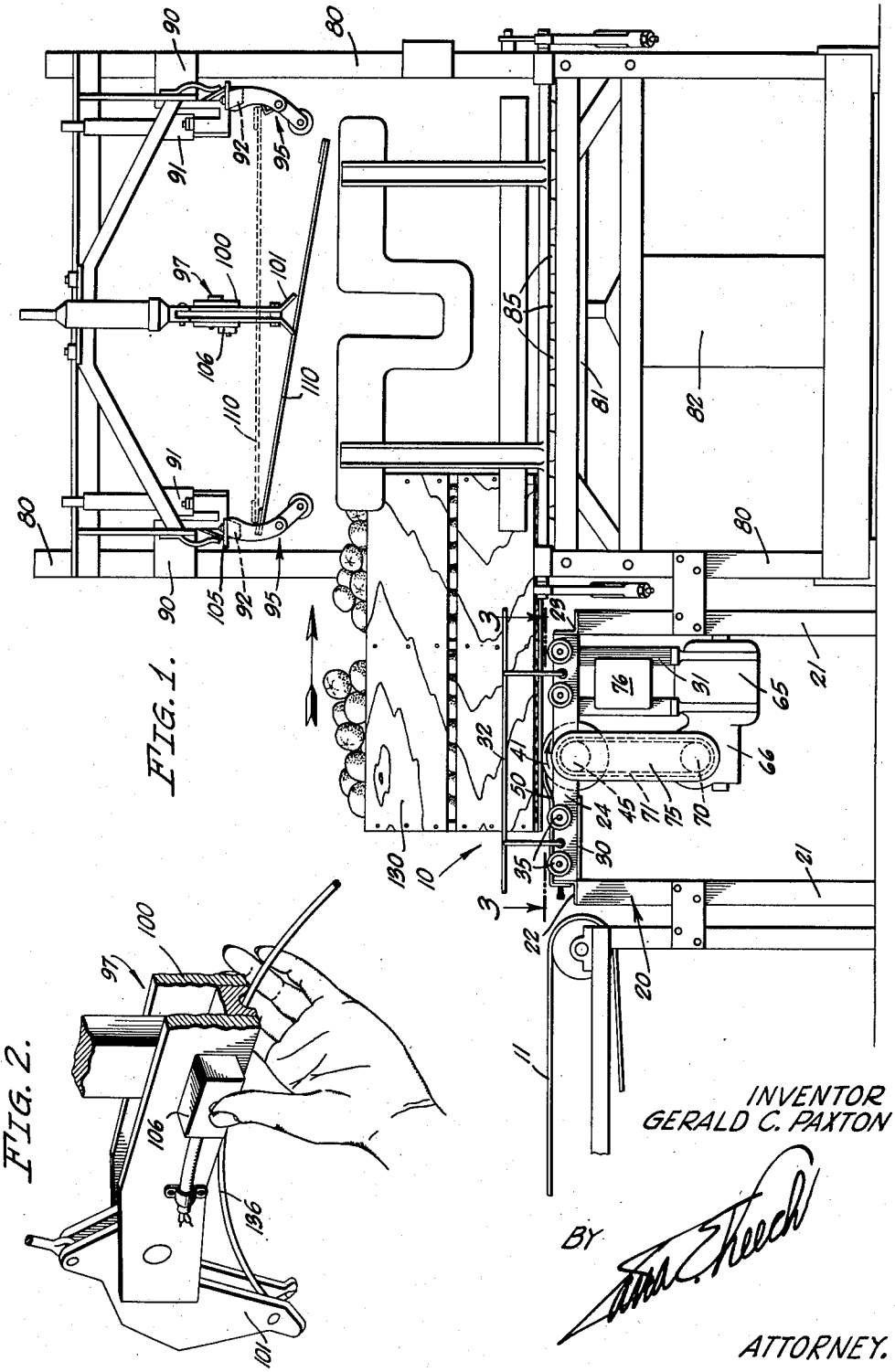


FIG. 1.

FIG. 2.

INVENTOR
GERALD C. PAXTON

BY

ATTORNEY.

Nov. 2, 1937. G. C. PAXTON 2,097,774

BOX FEEDING DEVICE FOR STRAPPING MACHINES

Filed Feb. 10, 1937 3 Sheets-Sheet 2

FIG. 3.

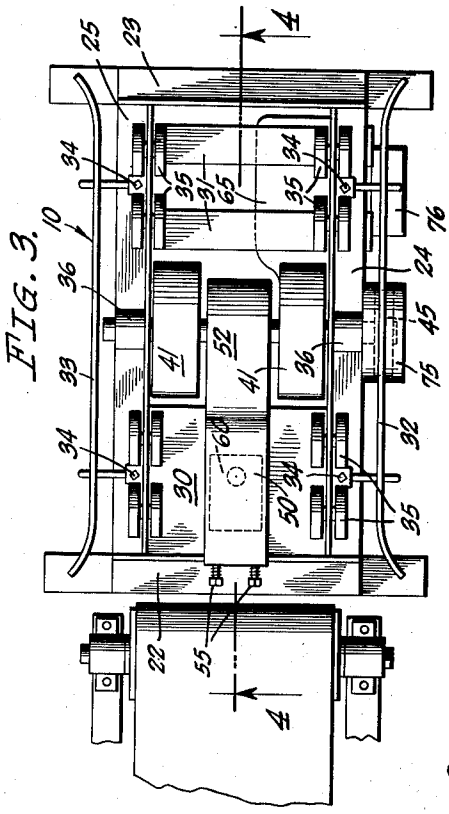


FIG. 4.

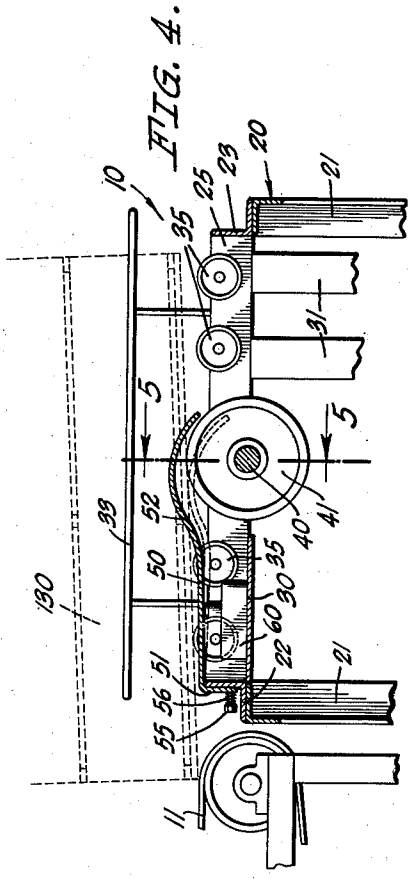


FIG. 5.

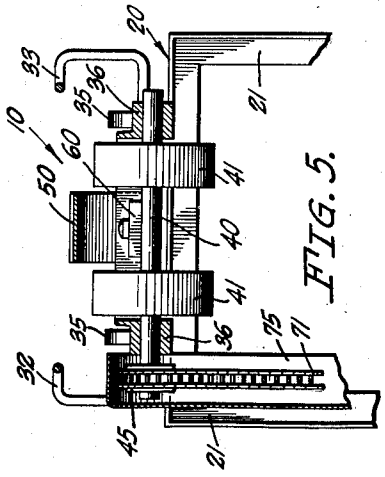
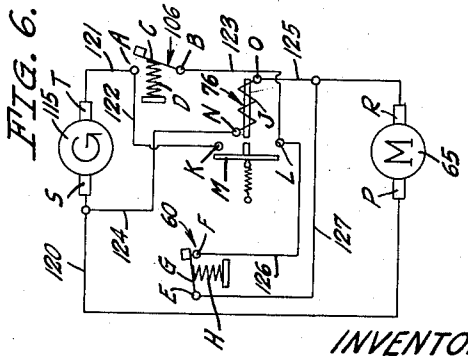


FIG. 6.



INVENTOR
GERALD C. PAXTON

BY

ATTORNEY.

Nov. 2, 1937. G. C. PAXTON 2,097,774

BOX FEEDING DEVICE FOR STRAPPING MACHINES

Filed Feb. 10, 1937 3 Sheets-Sheet 3

FIG. 8.

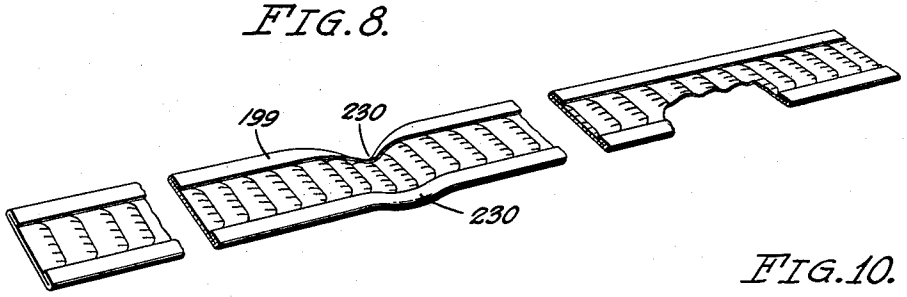


FIG. 10.

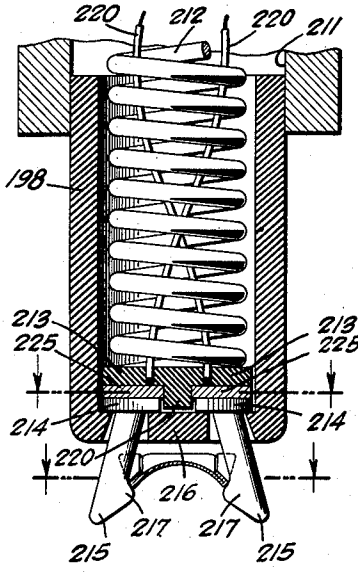


FIG. 9.

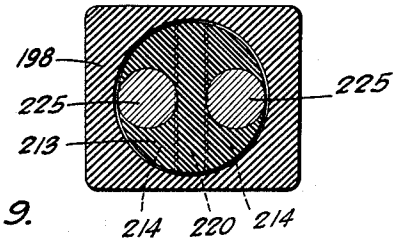


FIG. 11.

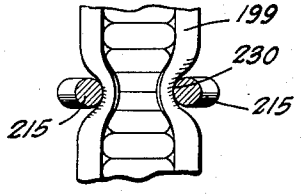
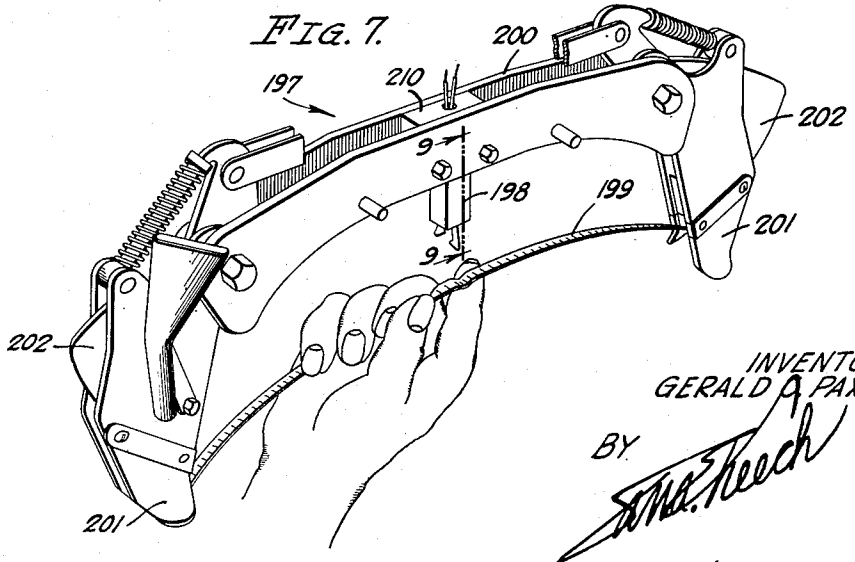


FIG. 7.



INVENTOR
GERALD C. PAXTON
BY
Wm. Reech
ATTORNEY.

Patented Nov. 2, 1937

2,097,774

UNITED STATES PATENT OFFICE

2,097,774

BOX FEEDING DEVICE FOR STRAPPING MACHINES

Gerald C. Paxton, Santa Ana, Calif., assignor to Acme Steel Company, Chicago, Ill., a corporation of Illinois

Application February 10, 1937, Serial No. 125,097

5 Claims. (Cl. 1—10)

This application is a continuation in part of my copending application for U. S. Letters Patent, Ser. No. 613,225, which was filed May 24, 1932, on a Box feeding device for lidders, now Patent No. 2,075,053, dated March 30, 1937.

The invention relates to devices for feeding boxes to machines for applying straps to said boxes.

In the citrus industry fruit is packed in wooden shipping boxes with what is known as an overpack, the fruit extending as much as 3 or 4 inches above the upper limits of the box. When the lid is applied it is necessary to press it downwardly to bring the ends of the lid against the ends of the box, the middle of the lid being left bulging upwardly to accommodate this overpack. To hold down the side edges of the cover thus applied to the box a strap is placed across the cover under tension, and the ends of the strap are secured to the sides of the box. For the application of this strap, machines have been developed, these originally being separate from the lidders, but more recently being incorporated therewith so as to strap the box at the time it is being lidded.

The boxes to be lidded and strapped are delivered to the lidder and strapper from a packed box conveyor, these usually being drawn into the lidder and strapper one box at a time by the operator. The necessity for the operator giving attention to this feeding slows up the lidding of each box and reduces the capacity of the machine.

It is therefore an object of my invention to provide an automatic box feeding machine for delivering boxes to the machine for applying straps to said boxes.

In most of the combined lidders and strappers at present in use, the strap to be applied to each box is separately fed into the machine by the operator just before the machine performs its lidding and strapping operation on that box.

It is another object of my invention to provide an automatic box feeding mechanism for delivering boxes to the machine for applying straps to the same, and which is adapted to be controlled in conjunction with the feeding of straps to the machine, so that a box is fed into the machine promptly after a strap has been placed therein.

The manner of accomplishing the foregoing objects as well as further objects and advantages, will be made manifest in the following description taken in connection with the accompanying drawings, in which:

Fig. 1 is a front elevational view of a preferred embodiment of my invention shown in conjunction with a combined lidder and strapping machine.

Fig. 2 is a fragmentary perspective view illustrating the manner of placing a strap in one form of strapping machine so as to set in motion the feed device of my invention.

Fig. 3 is a plan view of the apparatus of my invention taken on line 3—3 of Fig. 1.

Fig. 4 is a longitudinal sectional view taken on line 4—4 of Fig. 3.

Fig. 5 is a vertical sectional view taken on line 5—5 of Fig. 4.

Fig. 6 is a diagrammatic view of the electrical system employed in my invention and comprising the compound control means thereof.

Fig. 7 is a perspective view of a modified form of strapping machine which is adapted to be used in my invention.

Fig. 8 is an enlarged fragmentary view illustrating the strap adapted to be used in the strapping machine shown in Fig. 7.

Fig. 9 is an enlarged fragmentary sectional view taken on line 9—9 of Fig. 7 and illustrating the strap receiving fingers for holding the strap and comprising the contacts for a control switch in my invention.

Fig. 10 is a horizontal sectional view taken on line 10—10 of Fig. 9.

Fig. 11 is a horizontal sectional view taken on line 11—11 of Fig. 9.

In referring specifically to the drawings it is to be noted that my invention includes a feed conveyor 10 which, as shown in Fig. 1, is positioned between a packed box conveyor 11 and a lidding and strapping machine 12.

As shown in Figs. 1, 3, 4 and 5, the feed conveyor 10 includes a suitable frame 20 having angle iron legs 21, horizontal transverse angle iron members 22 and 23, and longitudinal angle iron members 24 and 25, the ends of the latter being secured to the transverse members 22 and 23. Secured to the under sides of the members 24 and 25 at opposite ends of the feed conveyor 10 is a plate 30 and a motor supporting hanger 31. Adjustably mounted in suitable holes in the angle iron members 24 and 25 are box aligning rails 32 and 33 which are held in any desired position by set screws 34. Rotatably mounted at suitable intervals on the upstanding sides of the angle iron members 24 and 25 are pairs of idle rollers 35, as best shown in Fig. 3. Journalled in suitable bearings 36 provided on the angle iron members 24 and 25 is a shaft 40 to

which is keyed a pair of box conveying rollers 41, it being noted in Figs. 1 and 4 that the top level of the rollers 41 is disposed slightly above the top level of the idle rollers 35. Keyed to one end of the shaft 40 is a sprocket wheel 45.

Yieldably mounted on the transverse angle iron member 22 is an arm 50. The arm 50 is downwardly bent at one end to form a flange 51 and is provided at its opposite end with an arcuate portion 52. Extending through suitable holes in the flange 51 are cap screws 55, these being screw threaded into the transverse member 22. Mounted on the cap screws 55 are compression springs 56 which yieldably urge the flange 51 of the arm 50 into contact with the upstanding side of the member 22. The normal position of the arm 50 is best shown in Fig. 4, it being noted that the arcuate portion 52 thereof extends above the level of the rollers 41. Mounted on the plate 30 directly below the arm 50 is a conventional button switch 60 which is positioned to be contacted by the arm 50 when the arm is depressed to the dotted line position shown in Fig. 4.

Secured to the hanger 31 is a combined electric motor 65 and a worm and gear speed reduction unit 66. This unit drives a sprocket 70 positioned in alignment with the aforementioned sprocket 45. Trained about the sprockets 45 and 70 is a chain 71, the chain and sprockets being enclosed by a suitable housing 75. Secured to one side of the hanger 31 is a conventional magnetic switch 76.

The lidding and strapping machine 12 shown in Fig. 1 in conjunction with the feed conveyor 10 is substantially of the same type as is disclosed in U. S. Letters Patent to Harry D. Benson, No. 1,938,244, issued December 5, 1933 on a Method of and apparatus for securing covers to containers.

The machine 12 includes a frame 80 to which is secured the feed conveyor 10. Slidable vertically on the frame 80 is a box supporting carriage 81 which is adapted to be raised and lowered by a hydraulic cylinder 82. Rotatably mounted on the carriage 81 are box conveying rollers 85 which are horizontally aligned with the rollers 35 of the feed conveyor 10 when the carriage 81 is at rest in its lowermost position.

Mounted on opposite sides of the frame 80 are brackets 90 which carry a plurality of lid nailing devices 91. Secured to the under sides of the brackets 90 are lid positioning bars 92 and end tucking mechanisms 95.

Centrally mounted on the frame 90 is a strapper 97 which includes a strapping saddle bar 100 and strap supporting jaws 101 suspended therefrom.

On strapper saddle bar 100 is a conventional button switch 106 positioned to be momentarily contacted by a strap as the latter is fed into the machine or by the hand carrying the strap as shown in Fig. 2.

Referring particularly to Fig. 6, the electrical apparatus and wiring system employed for controlling the feed conveyor 10 includes the button switches 60 and 106, the magnetic switch 76, the motor 65, and a suitable source of electrical current such as a generator 115.

The strap responsive button switch 106 is provided with a pair of terminals A and B, an arm C, and is adapted to be urged out of contact by a compression spring D. The box responsive button switch 60 is identical with the switch 106, and is provided with terminals E and F, an arm G, and a compression spring H. The magnetic switch 76 is of conventional design including a magnet J, a pair of terminals K and L, and a spring returned bar M which is adapted to be drawn against the terminals K and L by the magnet J. The magnet J is provided with suitable terminals N and O. The motor 65 is provided with conventional terminals P and R, and the generator 115 with terminals S and T.

Terminals S and P are connected by a wire 120; terminals T and A by a wire 121; terminals A and K by a wire 122; terminals L and B by a wire 123; terminals N and S by a wire 124; terminals O and R by a wire 125; terminals F and L by a wire 126; and terminal E is connected to the wire 125 by a wire 127.

Operation

The usual manner of operation of the lidder and strapper 12 is as follows: Just before the lidding of each box it is necessary that a strap 136 and a lid 110 be fed into the machine, and in the type of machine illustrated this feeding is done manually. The strap is usually fed by the left hand and is inserted in the machine before the lid. In feeding the strap, it is lifted up beneath the saddle bar 100 with opposite ends of the strap engaging the lower guide lugs of the jaws 101, so that opposite ends of the strap become lodged in the lower ends of these jaws.

As soon as the strap has thus been inserted in the strapper 97 the lid 110 is swung inwardly in the right hand so that this lid moves leftwardly into the position in which it is shown in full lines in Fig. 1, after whch the right-hand end of the lid is lifted, permitting it to assume the position in which it is shown in dotted lines in this view.

With the lidder 12 thus supplied with a strap and a lid, these are applied to a packed box by positioning this box on the supporting carriage 81 which is then elevated to press the lid onto the fruit and bring the ends of the lid against the ends of the box just beneath the nailing devices 91. These nailing devices and the strapper 97 are then actuated and the supporting carriage 81 with the lidded packed box automatically drops downwardly and the box, lidded and strapped, is discharged in a rightward direction therefrom.

The principal function of the present invention is to automatically feed packed boxes of fruit onto the supporting carriage 81 so that a packed box will be positioned on the carriage 81 in readiness for completing the lidding and strapping function with as little delay as possible after the strap has been fed to the machine. The feed conveyor 10, therefore, is adapted to feed a packed box into the machine 12 in the following manner:

When a packed box 130 is discharged onto the feed conveyor 10 by the packed box conveyor 11, it comes to rest in its dotted line position shown in Fig. 4 due to frictional engagement of the box with the rollers 41, these being normally locked against rotation by the worm and gear unit 65. As the box 130 slides onto the conveyor 10 the arm 50 is depressed to its dotted line position shown in Fig. 4 and the switch 60 is contacted, thus closing the circuit between the strap operated switch 106 and the magnet J through wires 126, 127, 123, and 125. When, after the switch 60 is thus closed, the switch 106 is momentarily contacted by a strap 131 during manual placement of the strap in the lidding and strapping machine 12 (as shown in Fig. 1) this energizes the magnet J of the switch 76 bringing the bar M

in contact with the terminals K and L, thus completing the circuit between the generator 115 and the motor 65.

When thus energized, the motor 65 rotates the rollers 41 through the speed reduction unit 66 and the chain 71, and the box 130 is discharged from the feed conveyor 10 onto the box supporting carriage 81 of the lidding and strapping machine 12, as shown in Fig. 1. As the box passes from the feed conveyor 10, the arm 50 returns to its normal position and the switch 60 breaks the circuit between the generator 115 and the magnet J, and the bar M of the magnetic switch 76 then returns to its normal position, and breaks the circuit between the generator 115 and the motor 65. It is thus evident that the conveyor 10 is automatically stopped upon the opening of the box responsive switch 60 as the box passes into the lidder and strapper 12. It is also to be noted that closing of the switch 60 by a box riding over the lever 50 does not start the conveyor 10 in operation until the strap responsive switch 106 is also contacted.

The feed conveyor 10 is thus seen to feed a box into the lidder and strapper 12 as the feeding of the strap and lid into this machine is being completed. Owing to the fact that the operation of the conveyor 10 does not commence until the switch 106 is actuated, there is no danger of a box being prematurely fed into the machine. On the other hand, it is not necessary for the operator to consciously set the feed conveyor in operation, as this is automatically accomplished in connection with the feeding of the strap into the lidder and strapper.

Referring now to Fig. 7, I have here shown a modified form of strapping machine 197 which is similar to the strapping machine 97 hereinbefore described and embodies a vertically shiftable strap supporter 198 which is adapted to support a strap 199 when the latter is fed thereto by hand as shown in Fig. 7.

The strapper 197 includes a strapping saddle bar 200 and strap guiding jaws 201, hammers 202 for nailing the ends of the strap 199 to the sides of the box being pivotally mounted in the jaws 201. The strap supporter 198 is supported in a block 210, which is provided in the middle of the saddle bar 200. The supporter 198 is free to slide upwardly in a recess 211 provided in the block 210, but is held downwardly in its lowermost position therein by a light expansion spring 212. The lower end of the spring 212 bears against an insulated block 213, which in turn rests upon a crescent shaped head 214 of a pair of strap supporting fingers 215, which extend downwardly through holes in a bottom wall 216 of the strap supporter 198. The fingers 215 have heels 217.

The insulating block 213 has a middle wall 220 which extends downwardly between the finger heads 214. As the shell of the strap supporter 198 is also made of insulating material, it is seen that the fingers 215 are entirely insulated from each other.

Mounted on the insulating block 213 are metal terminals 225 which rest upon and make electrical contact with the heads 214 of the fingers 215. Electrically connected with the terminals 225 are wires 220 which, when this form of strapper is used, are connected respectively to the wires 121 and 123 of the electrical circuit illustrated in Fig. 6. Each of the straps 199 is provided centrally with a pair of recesses 230, bent in the sides thereof, and when the strap is placed in the strapper 197 it is lifted upwardly so that the fingers 215 slide over the edges of the strap at these recesses, so that as the strap is caught and held upwardly by the heels 217, it is accurately centered in the strapper.

Another result of thus placing strap 199 in the strapper 197 is to form an electrical connection between the fingers 215, which, with the wires 226 connected as aforesaid, has the same effect as is hereinabove described as following closing of switch 106. In fact, for practical purposes the strap supporter 198 may be considered as a modified form of the switch 106.

From the foregoing description it is evident that in carrying out my invention, the placing of a strap in the strapping machine of a combined lidder and strapper sets in motion the box feeding device of the invention so as to quickly feed a box into the machine. This, of course, entirely eliminates the necessity of the operator paying attention to the feeding of boxes into the machine and insures that by the time the strap has been placed in the strapper and the lid fed into the lidder, the box to be strapped and lidded will be in the machine in readiness to start the operation of the latter.

What I claim is:

1. In combination with a box strapper: a power actuated feed conveyor adapted to receive boxes one at a time and discharge them one at a time into said strapper; and means on said strapper for starting said feed conveyor simultaneously with the placement of a strap in said strapper.

2. In combination with a box lidder and strapper: a power actuated feed conveyor adapted to receive boxes one at a time and discharge them one at a time into said lidder and strapper; and means on said lidder and strapper for starting said feed conveyor simultaneously with the placement of a strap in said lidder and strapper.

3. In combination with a box strapper: a power actuated feed conveyor adapted to receive boxes one at a time and discharge them one at a time into said strapper; means on said strapper for starting said feed conveyor simultaneously with the placement of a strap in said strapper; and box responsive means on said feed conveyor for stopping said conveyor.

4. In combination with a strapper: a power actuated feed conveyor adapted to receive boxes one at a time and discharge them one at a time into said strapper; and means adapted to be engaged by a strap in placing the latter into said strapper for automatically starting said feed conveyor upon the placement of a strap in said strapper.

5. In combination with a box strapper: a power actuated feed conveyor adapted to receive boxes one at a time and discharge them one at a time into said strapper; and electro responsive means forming a circuit which is adapted to be closed by contact with a strap when the latter is placed in said strapper, the closing of said circuit starting said feed conveyor to feed a box into said machine.

GERALD C. PAXTON.