Dec. 8, 1936. A. L. ROSENMUND 2,063,124

MACHINE FOR CLOSING WIREBOUND BOXES

Filed May 11, 1934 8 Sheets-Sheet 1

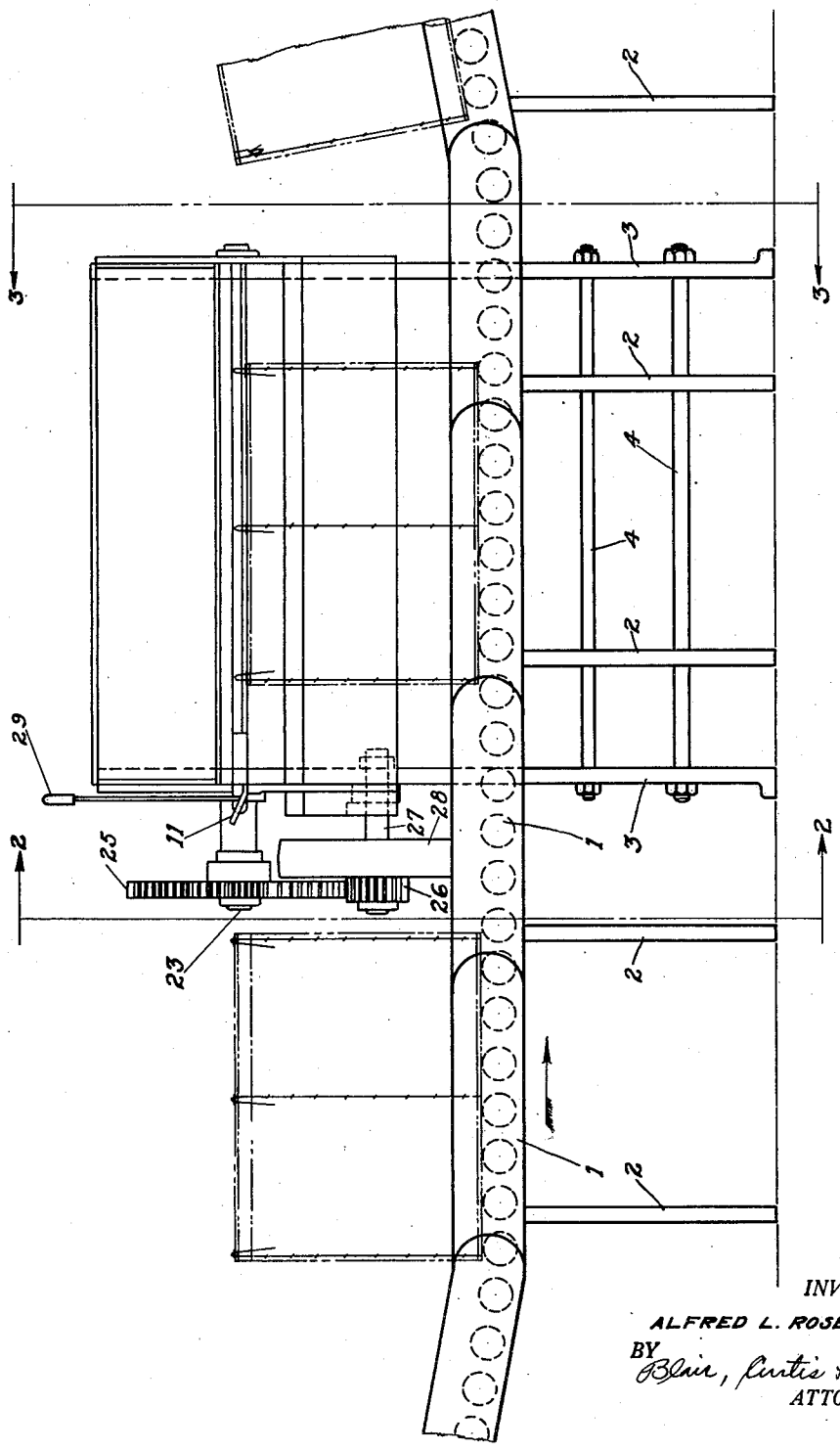


Fig. 1.

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Filed May 11, 1934 8 Sheets-Sheet 2

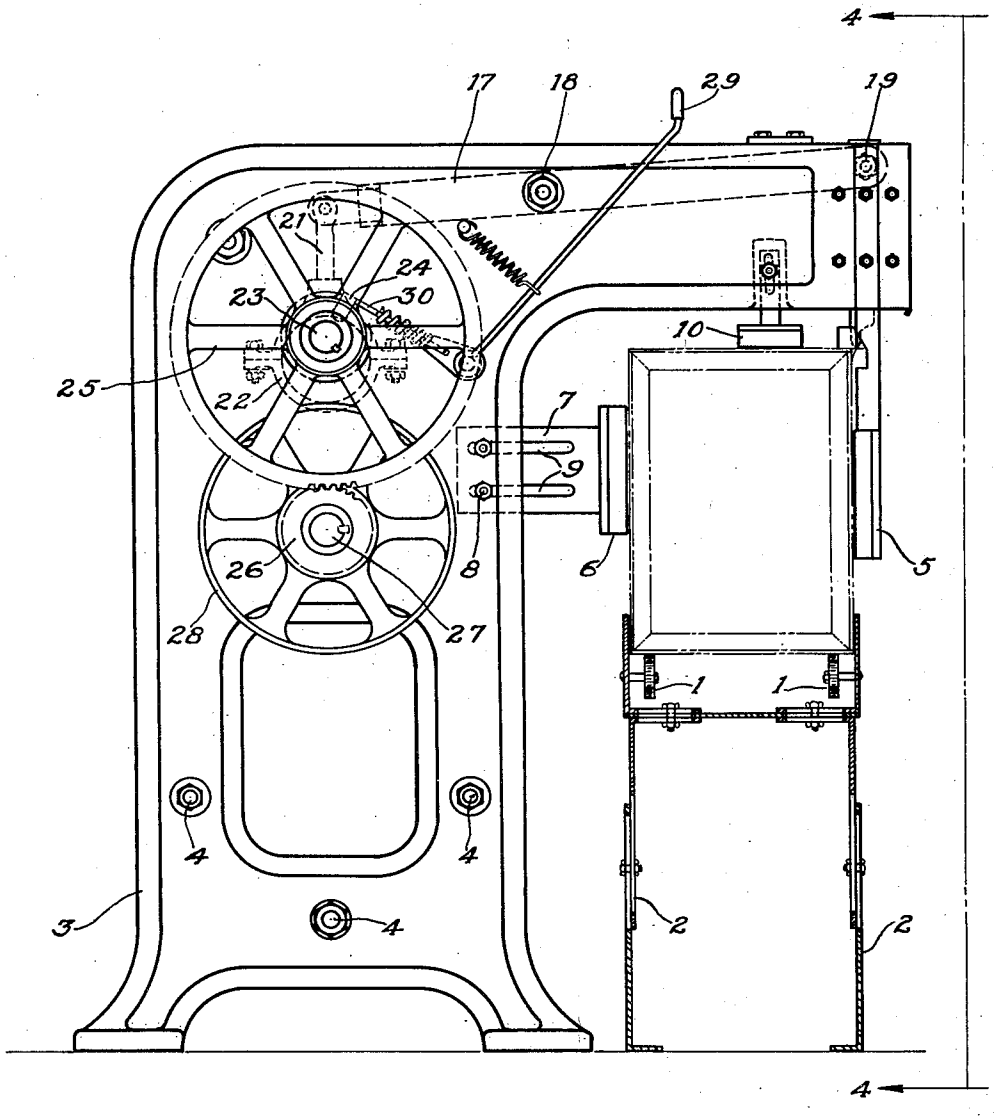


Fig. 2.

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MACHINE FOR CLOSING WIREBOUND BOXES

Filed May 11, 1934 8 Sheets-Sheet 3

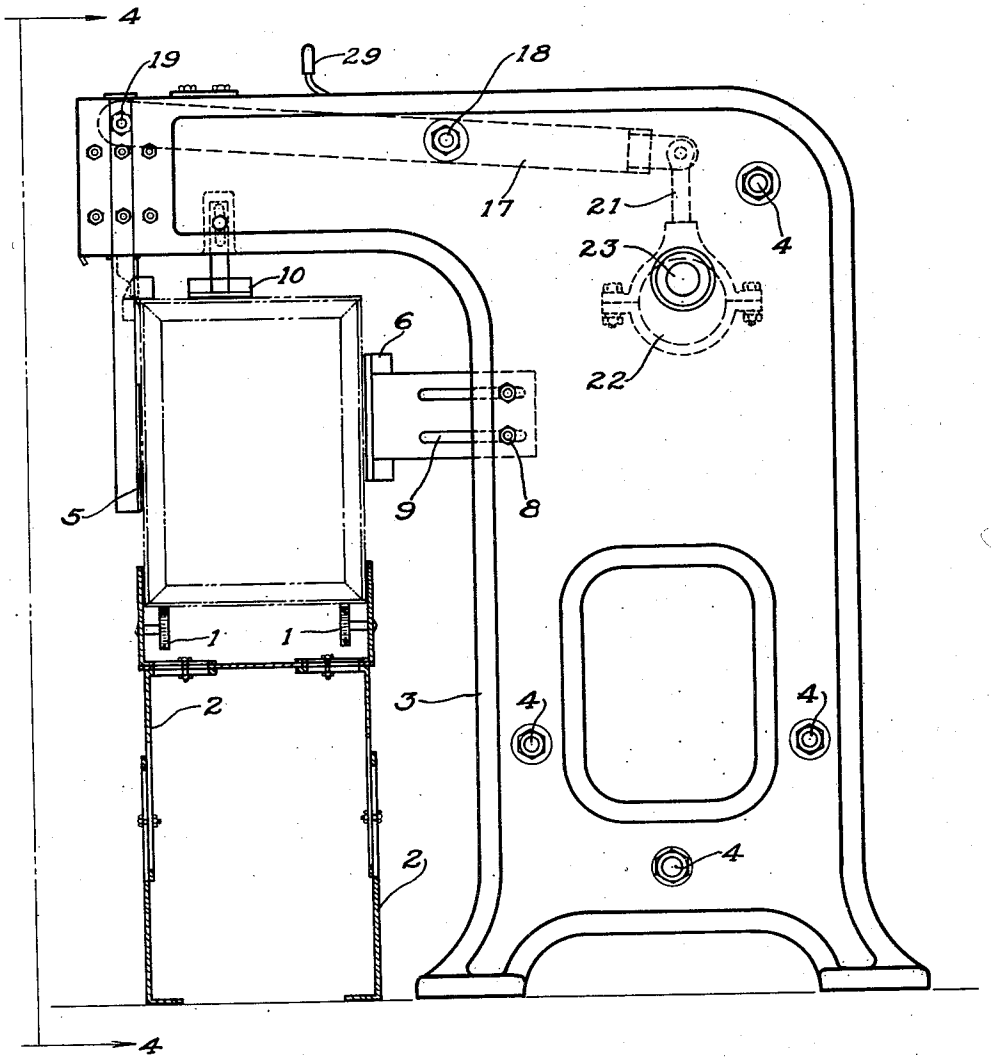


Fig. 3.

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MACHINE FOR CLOSING WIREBOUND BOXES

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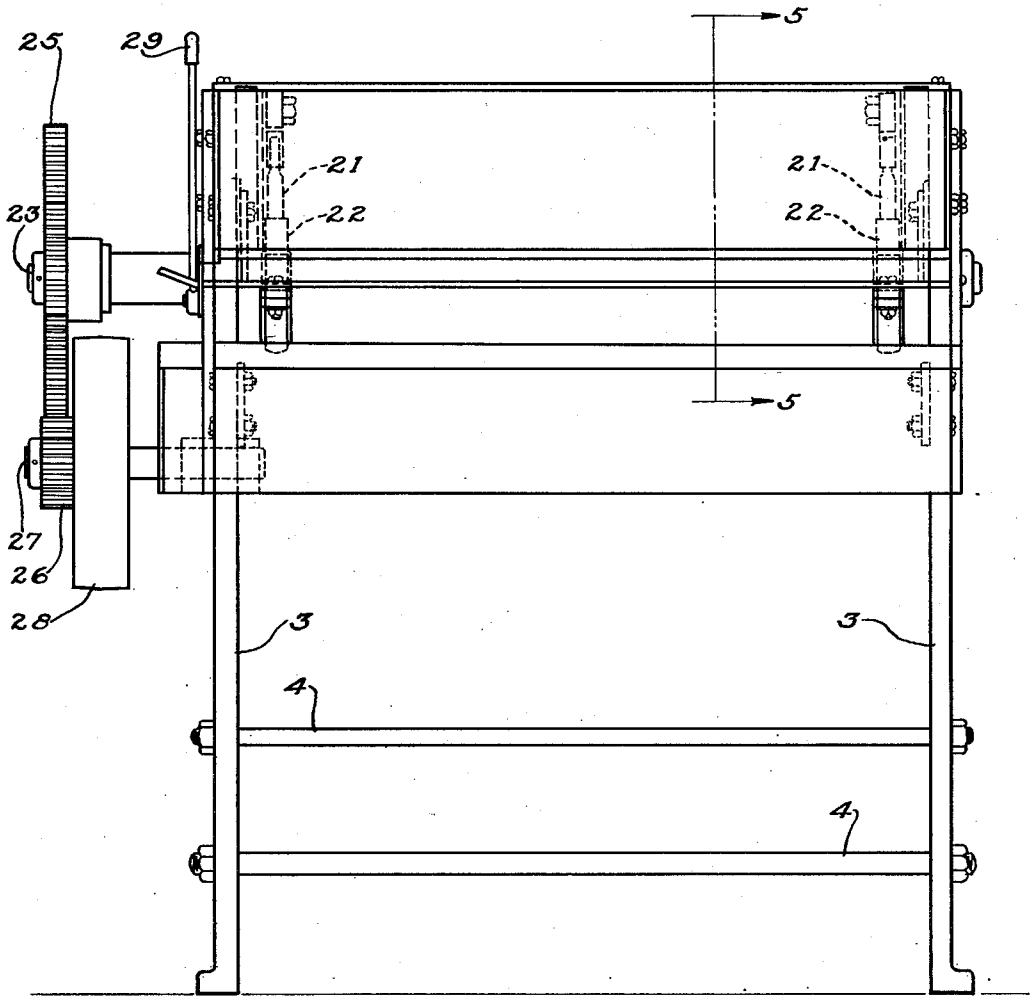


Fig. 4.

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MACHINE FOR CLOSING WIREBOUND BOXES

Filed May 11, 1934 8 Sheets-Sheet 5

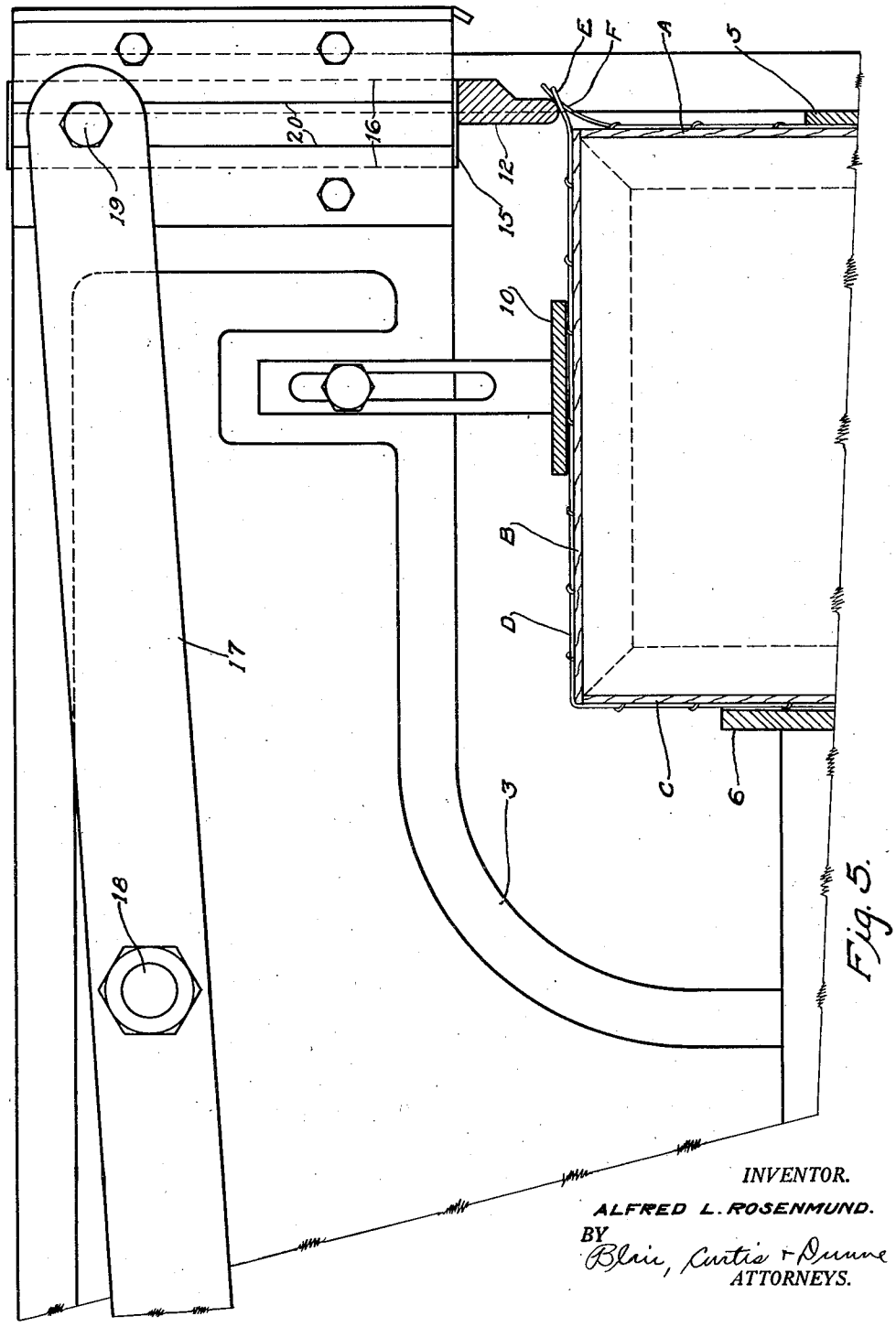


Fig. 5.

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MACHINE FOR CLOSING WIREBOUND BOXES

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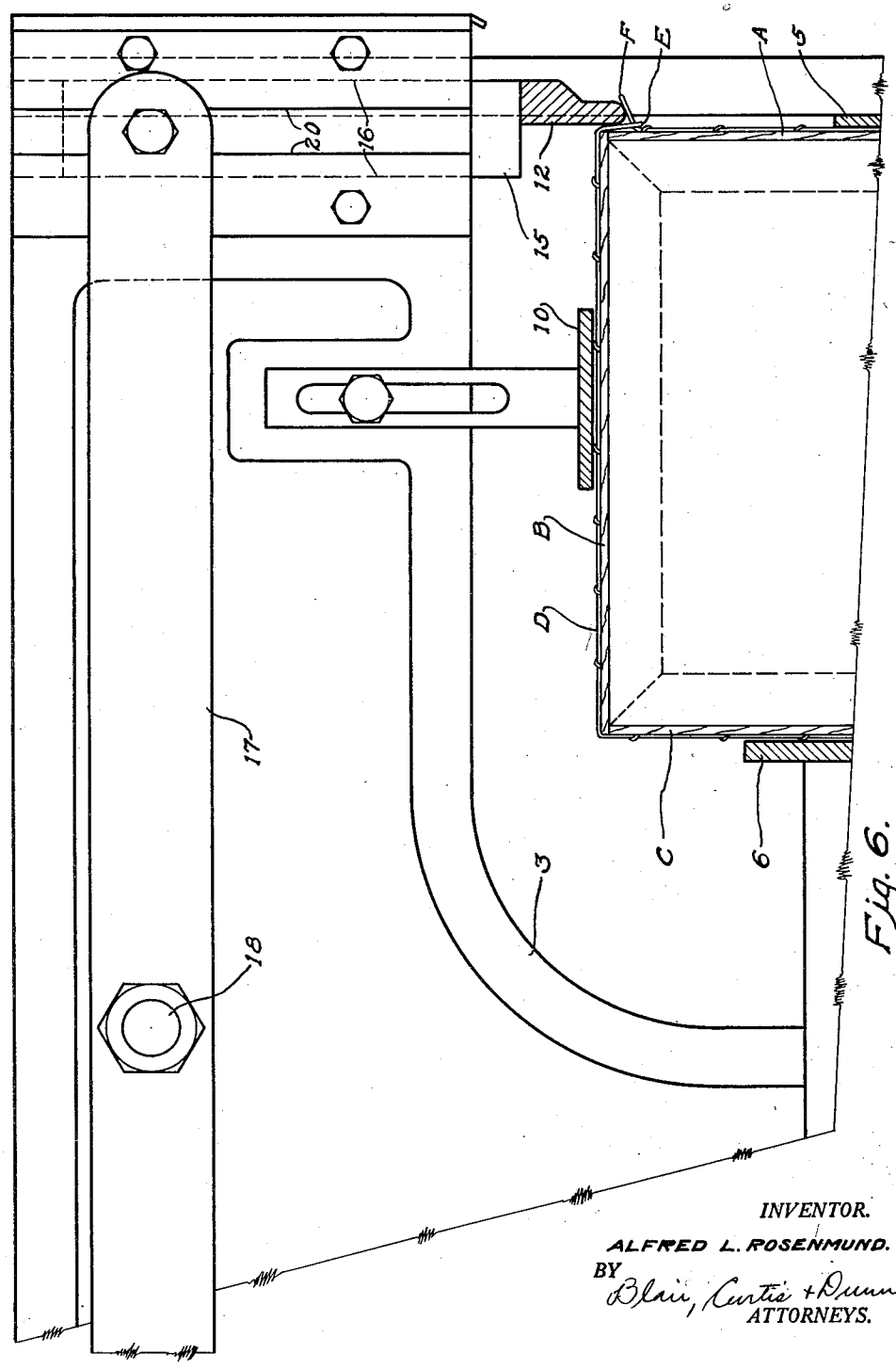


Fig. 6.

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Dec. 8, 1936. A. L. ROSENMUND 2,063,124

MACHINE FOR CLOSING WIREBOUND BOXES

Filed May 11, 1934 8 Sheets-Sheet 7

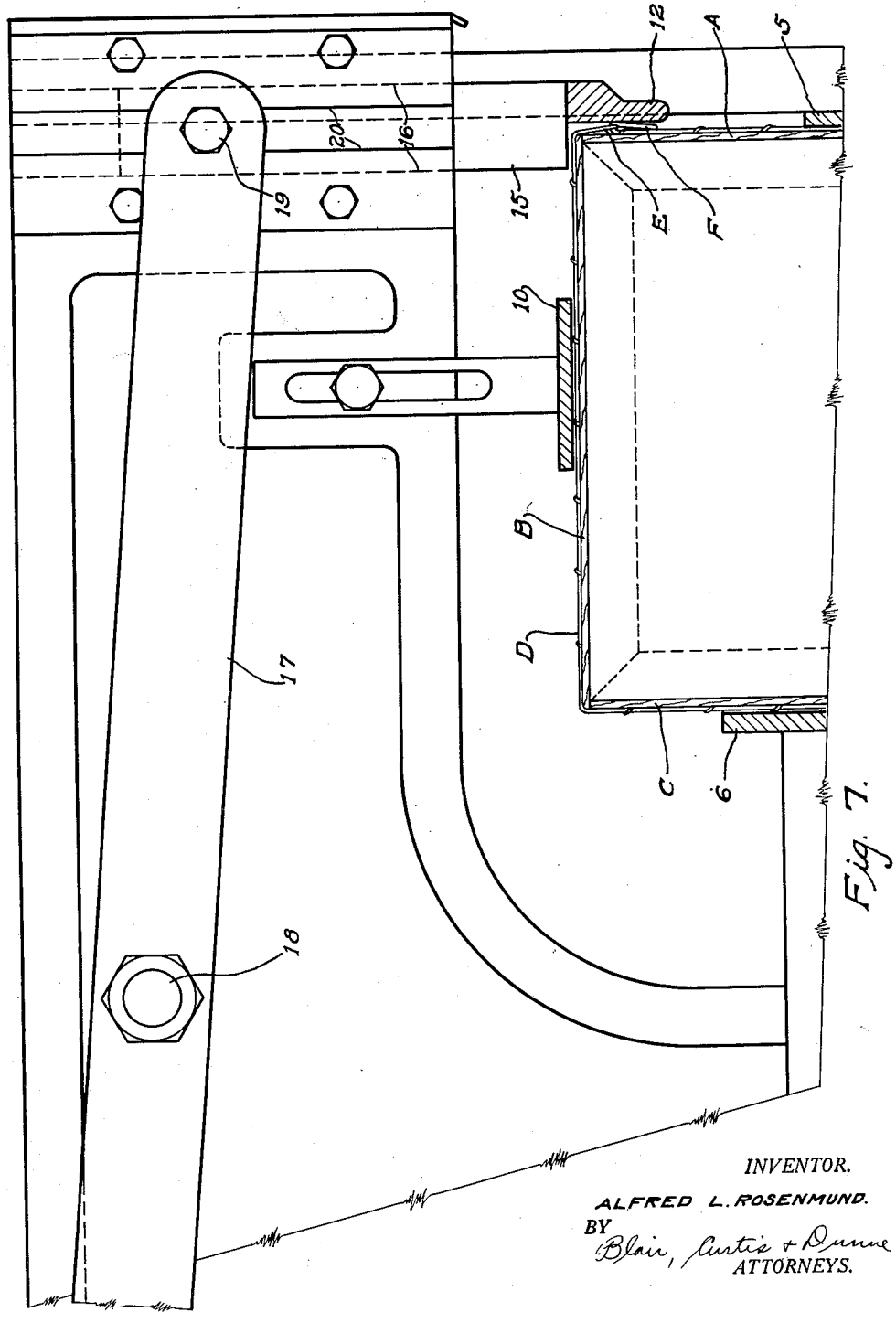


Fig. 7.

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MACHINE FOR CLOSING WIREBOUND BOXES

Filed May 11, 1934 8 Sheets-Sheet 8

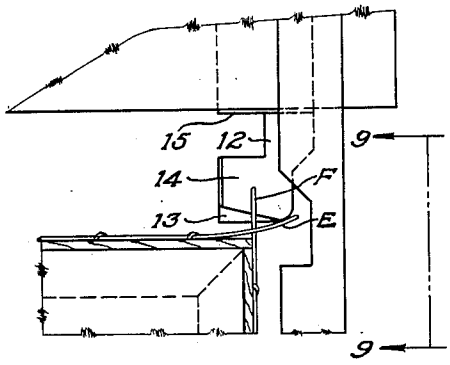


Fig. 8.

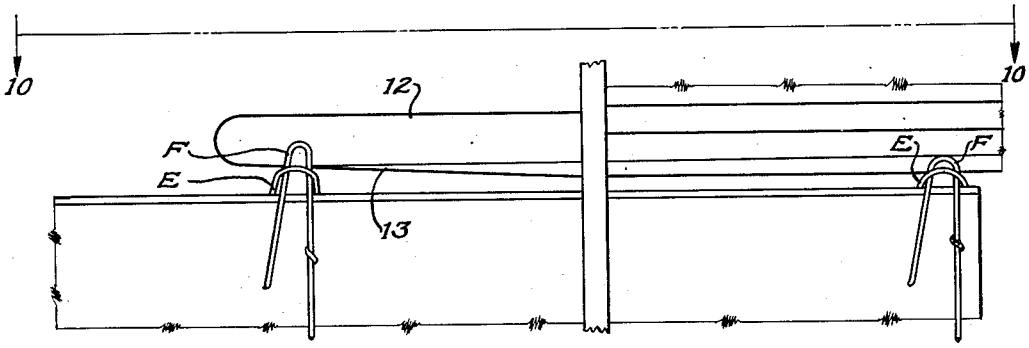


Fig. 9.

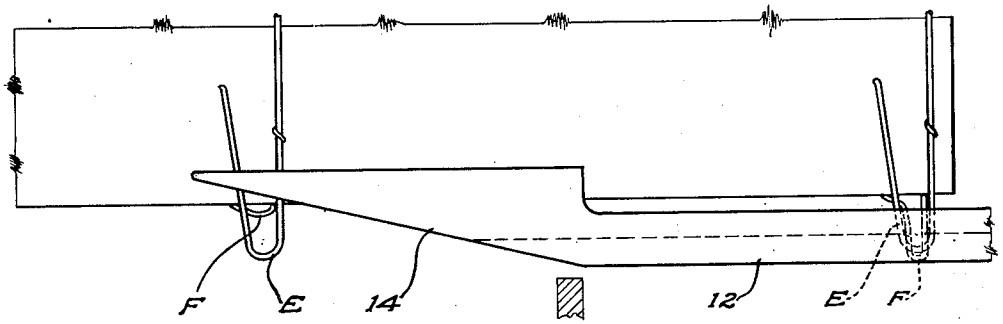


Fig. 10.

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Patented Dec. 8, 1936 2,063,124

UNITED STATES PATENT OFFICE

2,063,124

MACHINE FOR CLOSING WIREBOUND BOXES

Alfred L. Rosenmund, Rockaway, N. J., assignor to Stapling Machines Co., a corporation of Delaware

Application May 11, 1934, Serial No. 725,171

12 Claims. (Cl. 140—93)

This invention relates to a machine for closing wirebound boxes and particularly to a machine for closing wirebound boxes of the type disclosed in my Patent No. 1,933,030 dated October 31, 1933, which patent discloses a wirebound box having loops or bights formed on the ends of the encircling wire bindings and hooked one through the other to hold the lid or cover in closed position.

It is an object of the invention to provide a high speed machine for operating on the loops or bights of the several binding wires at one operation to bend them into hooking engagement.

It is a further object of the invention to provide a machine of the character described in association with an automatic conveyor upon which the boxes to be closed may be placed and fed automatically to the closing machine.

It is a further object to provide a closing machine of the character referred to which is constructed and arranged to engage the cover or lid of a box presented to it on the conveyor, properly press the cover or lid into closing position and then bend and tension one loop or bight over the other to firmly hold the lid or cover in closed position.

One illustrative embodiment of the invention is shown in the accompanying drawings, in which:—

Figure 1 is a front elevation of the closing machine shown in association with a conveyor of the roller type and showing the manner in which the conveyor feeds the boxes to the closing machine.

Fig. 2 is an enlarged end view of the closing machine seen from the line 2—2 of Fig. 1 and showing the conveyor in section.

Fig. 3 is an end view of the other side of the closing machine seen from the line 3—3 of Fig. 1 and also showing the conveyor in section.

Fig. 4 is a front elevation of the closing machine seen from the line 4—4 of Fig. 3 but omitting the conveyor and the box.

Fig. 5 is an enlarged section taken on the line 5—5 of Fig. 4 and including a box positioned in the machine for the start of the closing operation.

Fig. 6 is a similar view at a different point in the cycle of the closing operation.

Fig. 7 is a similar view showing completion of the closing operation.

Fig. 8 is an enlarged front view of a portion of the machine shown in Fig. 2 and showing the manner in which the top and side loops are positioned for the closing operation.

Fig. 9 is an enlarged partial front elevation taken on the line 9—9 of Fig. 8 and showing the form and construction of the closing bar which is formed to engage and bend the loops into correct position for the closing operation.

Fig. 10 is an enlarged plan view taken on the line 10—10 of Fig. 9 and showing further the form and construction of the closing bar which enables it to correctly position the loops for the final closing operation.

Referring to Fig. 5, there is shown a wirebound box having loops or bights at the closing corner which the machine of the application engages and bends into hooking engagement. As there shown, the box consists of a front section A, a top section B, a rear section C, and a bottom section, not shown. The top section B is hinged to the rear section C by binding wires D which are stapled to the sections. A plurality of binding wires D encircle the four sides of the box and meet at the closing corner edge. The end of the wire secured to the top section B is provided with a loop or bight E and the end of the wire which is secured to the front side section is provided with a loop or bight F. To interengage the bights, the bight F on the front section is preferably passed through the bight E on the top section (as best shown in Fig. 9) and is then bent down against the front side of the box (as shown in Fig. 7) thereby bending the loop E down over the closing corner of the box and holding it under tension to firmly retain the lid or cover B in closed position.

As shown in Fig. 1, the boxes to be operated upon by the machine may be placed on a conveyor 1 suitably supported in proper relation to the closing machine by supports 2. The conveyor travels in the direction of the arrow in Fig. 1. The box on the left hand side of the conveyor is moving toward the machine, the box in the center is being operated upon, and the box at the right has been operated upon and is being moved from the machine.

Before placing a loaded box on the conveyor 1 or while it is on the conveyor and before it reaches the machine, an attendant threads each loop F on the front side of the box through loop E on the lid or cover of the box, so that each pair of loops E and F will be in the position shown at the left in Fig. 9 when the box reaches the machine.

Referring to Fig. 2, the machine proper is supported by side frames 3 united by suitable tie rods 4. The upper portion of the frames 3 extends over the conveyor 1 and carry the mecha-

nism for performing the closing operation on the box positioned on the conveyor.

As best shown in Fig. 2, the box on the conveyor when it enters the machine is guided by front and rear guides 5 and 6, front guide 5 being secured to the overhanging portion of the frames 3 and the rear guides 6 being carried by a plate 7 adjustably secured by bolts 8 to the frames 3. The bolts 8 pass through slots 9 in the support 7 to permit adjusting the guide 6 to accommodate different sized boxes.

Secured to the overhanging portion of the frames 3 is a presser guide bar 10 for the top of the box. The forward end of this guide bar is upturned as at 11 (see Fig. 1) to facilitate the entry of the box into the machine. The presser bar 10 is adjustably secured to the overhanging portions of the frame 3 and may be spring-pressed to exert sufficient pressure on the lid of the box to hold it in closed position without interfering with the passage of the box into the machine.

Referring to Figs. 9 and 10, the loops E and F as they enter the machine are engaged by a bar 12 having on its under side a beveled surface 13 and on its front face a beveled surface 14. The purpose of the beveled surfaces 13 and 14 is to insure engagement of the loops E and F by the bar 12 regardless of variations in the positions of the loops E and F as threaded by the attendant and also for the purpose of positioning the loops for the closing operation. As shown at the left in Fig. 9, the under beveled surface 13 of the bar 12 will engage the top loop E and, as the box is fed into the machine, will press the loop E downwardly until it assumes the position shown at the right in Fig. 9 and also shown in Fig. 5. At the same time the beveled surface 14 on the front of the bar 12 will engage the side loop F and move it outwardly and away from the box until it assumes the position shown in Fig. 5.

When all of the loops on the box have been thus bent into the position shown in Fig. 5, the bar 12 is moved downwardly, as shown in Figs. 6 and 7. At the start of the downward movement of the bar 12 from the position shown in Fig. 5 it presses top loop E down against the front side of the box, as shown in Fig. 6, and bends the side loop F outwardly, as shown in Fig. 6. Continued movement downwardly of the bar 12 presses side loop F down against the side of the box, as shown in Fig. 7, thus completing the closing operation. This downward movement of the bar 12 tensions the top loop E around the top corner of the box.

Referring to Fig. 10, it will be noted that the back portion of the forward end of the bar 12 overlies the lid of the box and thus serves as a presser to force the lid into proper closing position. When such a construction is used the presser bar 10 may be dispensed with.

As best shown in Fig. 5, the closing bar 12 is carried by slider blocks 15, one at each side of the machine. The slider blocks 15 slide vertically in guideways 16 formed in the overhanging portion of the frames 3.

Slider blocks 15 and the closing bar 12 secured thereto are lowered for a closing operation and then raised by lever arms 17 each pivoted to a frame 3 at 18 and pivotally connected at one end to a slide block 15 by a stud bolt 19 which rides in a slot 20 formed in the frame 3.

As shown in Fig. 2, the other end of each lever arm 17 is pivotally connected to a link 21 which connects the lever arm 17 to an eccentric 22 keyed to a shaft 23 journaled in the side frames. The connection between link 21 and eccentric 22 is preferably screw-threaded to permit adjusting the lever of the closing bar 12 to accommodate different sized boxes.

Shaft 23 is driven through a clutch 24 by a gear 25 which meshes with a gear 26 keyed to a stud shaft 27 to which is also keyed a belt pulley 28. The clutch 24 is operated by a clutch control lever 29 through a clutch buffer 30.

It will be understood that an eccentric 22 is provided for each lever arm 17 to impart a horizontally level motion to closing bar 12.

The operation of the machine will be apparent from the foregoing detailed description. As the box is fed into the machine the presser bar 10 contacts the top or lid of the box, bearing down on the same and bringing the top or lid to closed position. During this feeding movement of the box into the machine the beveled surfaces 13 and 14 of the closing bar 12 engage each pair of loops E and F in the manner shown in Figs. 9 and 10 and bend them into the position shown in Fig. 5. When the box has been fed into the machine far enough to position each pair of loops E and F, as shown in Fig. 5, the movement of the box is arrested and the operator through clutch control lever 29 clutches shaft 23 to gear 25 for one cycle of operation. During this cycle of operation the eccentrics 22 operating through connecting links 21 and lever arms 17, lower and then raise the closing bar 12. As the closing bar 12 descends it bends top loop E downward to the position shown in Fig. 6 and then continued downward movement bends side loop F downward to the position shown in Fig. 7, thus firmly hooking side loop F through top loop E and completing the closing operation. The closing bar 12 then rises to the position shown in Fig. 5 and the closed box is moved out of the machine and another box moved into position for a closing operation.

Among other advantages the machine of this application reduces the time required for closing boxes and also effects an efficient and substantially uniform closure on each wire of the box. Heretofore each pair of loops was bent into hooking engagement separately and by a manual operation, the operator using for this purpose a hand tool, or in some instances, merely his fingers and a hammer. Such a manual closing operation was not only slow and laborious, but resulted in varying degrees of efficiency. The present machine overcomes the above-mentioned defects of the manual closing operation.

While a moving conveyor for the boxes to be operated upon is shown and described, it will be understood that a stationary support for the box may be substituted for the moving conveyor, on which stationary support the boxes may be placed by the operator and manually pushed into position to be operated upon by the machine.

It will also be understood that the invention is not to be limited to the specific embodiment shown herein for purposes of illustration, as features of the invention may be used to advantage in other forms.

It will also be understood that all of the inventive features of the machine need not be used conjointly as they may be embodied in various combinations as defined in the sub-joined claims.

I claim:

1. In a machine for closing looped ends of box binding wires, the combination of a conveyor for

the boxes to be closed, side and top guides for the boxes, and a reciprocating closing bar constructed and arranged to engage and position each pair of looped wire ends as the box is fed into the machine and then simultaneously to bend all of the pairs of looped ends into tensioned hooking engagement.

2. In a machine for closing looped ends of box binding wires, the combination of a conveyor for the boxes to be closed, side guides for the boxes, and a reciprocating closing bar constructed and arranged to engage and position each pair of looped wire ends as the box is fed into the machine and then simultaneously to bend all of the pairs of looped ends into tensioned hooking engagement.

3. In a machine for closing looped ends of box binding wires, the combination of a conveyor for the boxes to be closed, guides for the boxes, and a reciprocating closing bar constructed and arranged to engage and position each pair of looped wire ends as the box is fed into the machine and then simultaneously to bend all of the pairs of looped ends into tensioned hooking engagement.

4. In a machine for closing looped ends of box binding wires, the combination of a conveyor for the boxes to be closed, guides for the boxes, and a reciprocating closing bar constructed and arranged to engage and position each pair of looped wire ends as the box is fed into the machine and then simultaneously to bend all of the pairs of looped ends into hooking engagement.

5. In a machine for closing looped ends of box binding wires, the combination of a conveyor for the boxes to be closed, guides for the boxes, and a closing bar constructed and arranged to engage and position each pair of looped wire ends as the box is fed into the machine and then simultaneously to bend all of the pairs of looped ends into hooking engagement.

6. In a machine for closing looped ends of box binding wires, the combination of a support for the boxes to be closed, and a closing bar constructed, arranged and operating to engage and bend a plurality of pairs of looped ends into hooking engagement.

7. In a machine for closing looped ends of box binding wires, the combination of a support for the boxes to be closed, and a closing bar constructed, arranged and operating to engage and position each pair of looped wire ends as the box is fed into the machine and then to bend the looped ends into hooking engagement.

8. In a machine for closing looped ends of box binding wires, the combination of a support for the box, means to engage and bend the loops into hooking engagement, and means to cause relative movement between the box support and the engaging and bending means.

9. In a machine for closing looped ends of a box binding wire, the combination of box positioning means, means to bend the looped ends into hooking engagement, and means to cause relative movement between the positioning means and the bending means.

10. In a machine for closing looped ends of box binding wires, the combination of a conveyor for the boxes to be closed, guides for the boxes, and closing means constructed and arranged to engage and position each pair of looped wire ends as the box is fed into the machine and then simultaneously to bend all of the pairs of looped ends into hooking engagement.

11. In a machine for closing looped ends of a box binding wire, the combination of a conveyor for the box, guides for the box, and closing means constructed and arranged to engage and position a pair of looped wire ends and to bend the looped ends into hooking engagement.

12. In a machine for connecting a pair of flexible bights secured to adjacent box parts, the combination of means to position the box parts, and means constructed, arranged and operating to engage the bights and bend them into hooking engagement.

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