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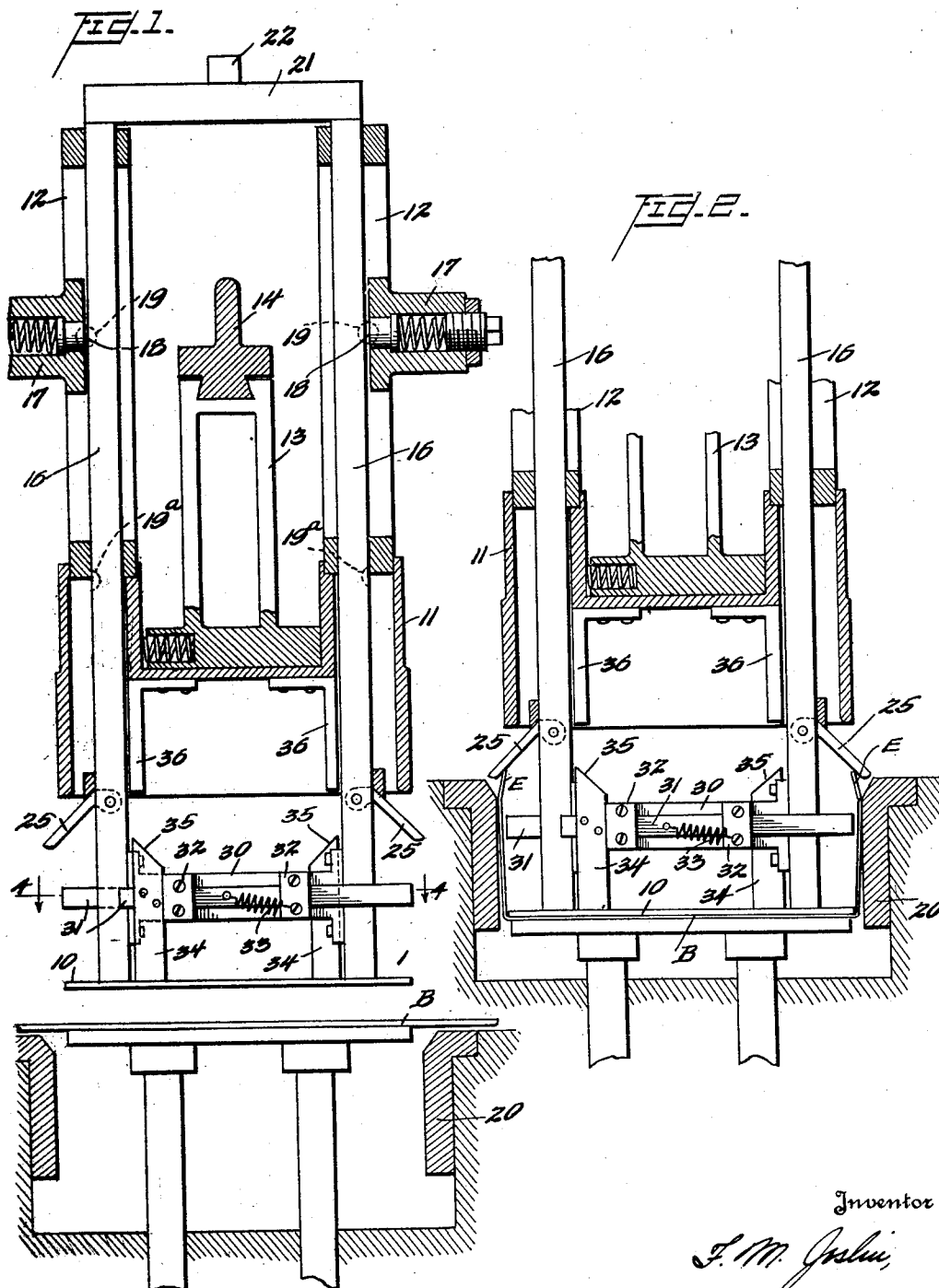
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1,835,401

PLUNGER FOR BOX MAKING MACHINES

Filed Feb. 14, 1930

2 Sheets-Sheet 1



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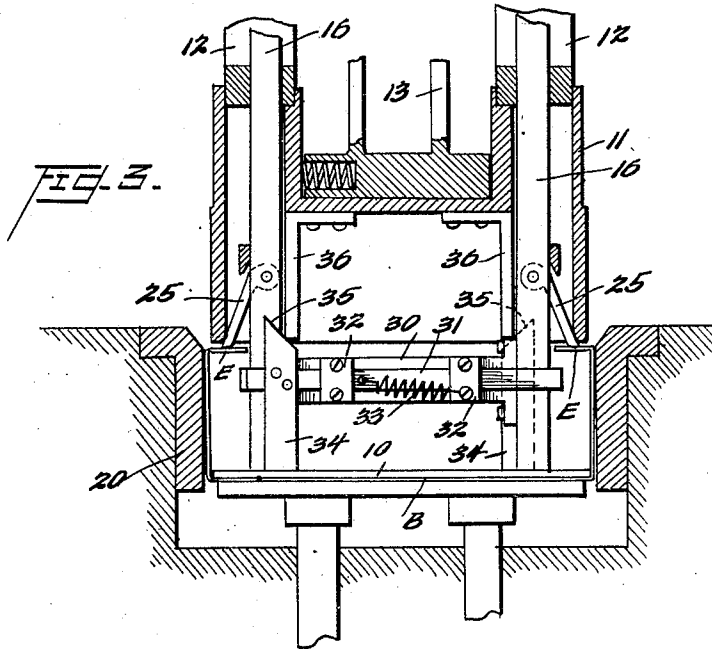
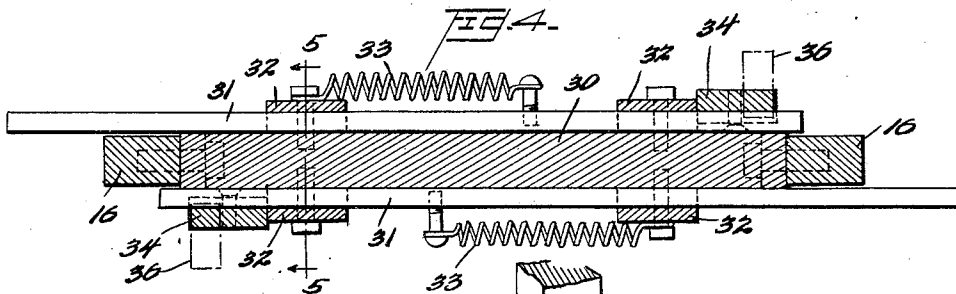
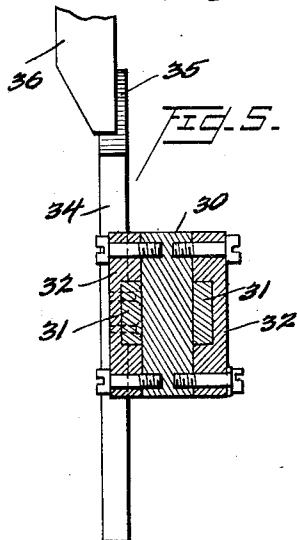
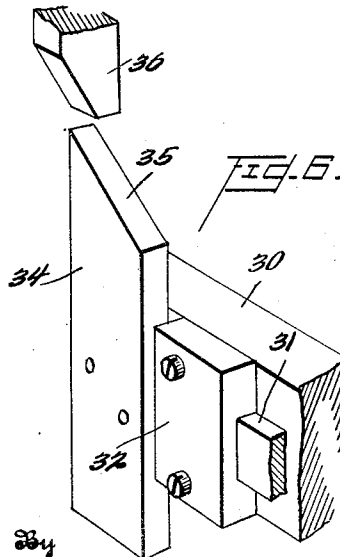
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PLUNGER FOR BOX MAKING MACHINES

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2 Sheets-Sheet 2



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UNITED STATES PATENT OFFICE

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PLUNGER FOR BOX-MAKING MACHINES

Application filed February 14, 1930. Serial No. 428,470.

This invention relates to box-making machines of the type shown in my prior Patent No. 1,356,771, October 20, 1920, and is directed particularly to certain detailed improvements over the machine of my copending application Serial No. 354,353, filed April 11, 1929.

In machines of this type, the plunger is made up of two relatively movable parts, one part having wings pivotally supported thereon and adapted to be swung so as to bend inwardly the edge portions on two opposite sides of a box, the wings being caused to operate by the relative movement between the two parts of the plunger. It has been found that in some cases, particularly with large or deep boxes, there is a tendency for the sides of the box to buckle or move inwardly as the wings bend the outer edge portions thereof inwardly,

It is therefore an object of this invention to provide in a box machine of this type means which will prevent this inward movement or buckling of the box while the edges thereof are being bent inwardly.

A further object of the invention is to provide means of that character which are yieldably held in position to support the sides of the box or prevent inward movement or buckling thereof and which are retracted or moved inwardly out of the way during the operation of the plunger.

A still further object is to provide means of this character in which members are slidably mounted on the lower portion of the plunger and spring pressed into position to support the sides of the box while the edges thereof are being bent and which are positively moved inwardly as the upper portion of the plunger descends into the die.

The invention in one specific form is illustrated in the accompanying drawings forming a part hereof and in which:

Figure 1 is a vertical sectional view of a plunger and die, the plunger having the invention applied thereto and certain parts in this figure being shown in vertical elevation;

Figure 2 is a partial sectional view similar to Fig. 1, the parts being shown in a different position and certain parts being omitted;

Figure 3 is a partial vertical sectional view showing the lower portions of the plunger and the cooperating die, the parts in this figure being shown in still a different position;

Figure 4 is a transverse sectional view on the line 4—4 of Fig. 1;

Figure 5 is a transverse sectional view on the line 5—5 of Fig. 4; and

Figure 6 is a perspective view of certain details of the device.

In the accompanying drawings the invention is shown as applied to a plunger identical with that described and claimed in my said copending application Serial No. 354,353; and detailed illustration and description of the plunger and the means for operating the same are thought unnecessary in this application. Briefly, the plunger comprises a bottom part 10 and a body part 11 which are movable relative to each other. The body part 11 includes upwardly projecting portions 12 and a central portion 13, which latter is connected by a dovetailed joint to a crosshead 14 which is vertically reciprocated by suitable mechanism as set forth in said prior application. The bottom part 10 of the plunger includes standards 16 which extend upwardly through the body part 11. The two parts 10 and 11 of the plunger are movable relative to each other. Latches are provided for yieldably locking the two parts of the plunger together in two different positions. These latches each comprise a casing 17 secured to the upper portion of the body part 11 and containing a spring pressed ball 18 adapted to engage upper and lower recesses 19, 19a in the standard 16.

As fully set forth in said prior application, with the two portions of the plunger locked together in the position shown in Figure 1, the crosshead is moved downwardly which causes the bottom part 10 of the plunger to enter the die 20 and fold the blank, indicated at B, into the position shown in Figure 2. Downward motion of the bottom part 10 is then stopped but the body part 11 continues to move downwardly into the die, this relative movement being permitted by yielding of the latch connection between the two parts of the

plunger. When the body part 11 reaches the lower limit of its movement, the two parts 10 and 11 of the die are again locked together so that as the crosshead 14 moves upwardly, both parts of the plunger are lifted from the die. As such upward movement takes place, a cross bar 21 on the part 10 of the plunger strikes a lever 22 which arrests further movement of the part 10 but the upward movement of part 11 continues until the parts are again in the position shown in Figure 1.

After the blank B is forced into the die and into the position shown in Figure 2, the edge portions E thereof on two opposite sides are bent inwardly. This is accomplished by means of the wings 25 which are pivotally supported on the standards of the bottom part 10 of the plunger and which are caused to swing inwardly as the body part 11 thereof descends, as illustrated in Figure 3.

As the edges E of the box are thus bent inwardly, there is a tendency to also bend inwardly or distort the sides of the box below said edges E and if the sides of the box are thus bent inwardly or buckled to any considerable extent, the descending body part 11 of the plunger will strike the same and instead of merely forcing the edges E downwardly to complete the inward folding thereof, the sides themselves will be crushed and broken and the box destroyed. This difficulty is obviated by means of the present improvement.

A cross bar 30 is rigidly secured between the standards 16 of the bottom part of the plunger above the lower end thereof. Slidably mounted on the bar 30 are two members 31 which are arranged to move in suitable guides 32 secured to the bar 30. Each of the members 31 has connected thereto one end of a spring 33, the other end of these springs being anchored to the cross bar 30 or to one of the guides 32 thereon. The springs 33 exert a constant pressure on the slidable members 31 and normally hold the same projected outwardly. The outer ends of the slidable bars 31 will thus be normally held close to the sides of the die or in position to support the sides of the box and prevent buckling or inward movement thereof as the upper edges are bent inwardly by the wings 25.

In order to permit full descent of the body part 11 of the plunger it is necessary that the bars 31 be retracted or drawn inwardly at the proper time. This is accomplished in the following manner. Each slidable bar 31 opposite its free end has rigidly secured thereto a plate 34, the upper ends of which are beveled or inclined, as shown particularly at 35, Figure 6. Secured to the body part 11 of the plunger are two downwardly extending bars 36 and the lower ends of these bars are so positioned that when the body part 11 of the plunger descends, the bars 36 will strike the inclined surfaces 35 on the plates 34 with the result that one of these

plates with its attached bar 31 will be moved in one direction and the other will be moved in the other direction. This movement of the bars 31 serves to retract the same or draw the free ends thereof inwardly so that they will be out of the path of movement of the body part 11 of the plunger as it moves into the die.

It will thus be seen that the members 31 act to support or prevent inward movement or distortion of the sides of the box while the wings 25 operate to bend the upper edges thereof inwardly. The term "support" is employed in the appended claims to define the functions of the bars 31. At the same time, when the body part 11 of the plunger moves downwardly into the die to complete the inward bending and folding of the edges E, the members 31 are retracted out of the way. When the plunger is again lifted from the die, and the parts assume the position shown in Figure 1, the members 31 are again projected outwardly by the springs 33 into position to act when the plunger again descends. The extent of the outward movement of the members 31 is limited by contact of each of the plates 34 with the adjacent guide 32. The bars do not move outwardly sufficiently to contact with the sides of the die or even with the folded sides of the box but when projected they lie sufficiently close to the sides of the box to perform the function above noted.

Modification of the details of the apparatus within the scope of the appended claims may be made without departing from the spirit of the invention.

Having thus described the invention, what is claimed as new and desired to be secured by Letters Patent is:

1. A machine for making boxes from blanks comprising, in combination, a die, a plunger for forcing a blank into the die to form the same into a box, said plunger comprising two parts movable relative to each other, means on one part of said plunger for bending inwardly the upper edges on opposite sides of a box while in the die, and means mounted on the other part of said plunger for supporting the sides of the box during said bending operation.

2. A machine for making boxes from blanks comprising, in combination, a die, a plunger for forcing a blank into the die to form a box, means on said plunger for bending inwardly the upper edge on one side of the box while in the die, a member mounted on said plunger and movable laterally thereof into position to support the sides of the box during said bending operation, and means for moving said member out of said position.

3. A machine for making boxes from blanks comprising, in combination, a die, a plunger for forcing blanks into the die to

form a box, means for bending inwardly the upper edges on opposite sides of the box while in the die, two members carried by said plunger and movable laterally thereof in opposite directions into position to support the sides of the box during said bending operation, and means for moving said members inwardly toward the plunger after said bending operation.

4. A machine for making boxes from blanks comprising, in combination, a die, a plunger for forcing a blank into the die to form a box, means for bending inwardly the upper edges on opposite sides of the box while in the die, two members carried by the plunger and movable laterally thereof in opposite directions into position to support the sides of the box during said bending operation, yieldable means for normally holding said members in said position and means for moving said members inwardly toward the plunger after said bending operation takes place.

5. A machine for making boxes from blanks comprising, in combination, a die, a plunger for forcing a blank into the die to form a box, pivoted wings carried by said plunger and arranged to bend inwardly the upper edges of a box while in the die, laterally movable members carried by said plunger below said wings, yieldable means for normally holding said members projected outwardly from said plunger to support the sides of the box during such bending operation, means for moving said wings about their pivoted supports and means for retracting said members after said bending operation.

6. A machine for making boxes from blanks comprising, in combination, a die, a plunger for forcing a blank into the die to form a box, means for bending inwardly a portion of the edge of the box while in the die, means carried by said plunger and movable laterally thereof for internally supporting the blank during such bending operation and means for retracting said supporting means after such bending operation.

7. A machine for making boxes from blanks comprising, in combination, a die, a plunger for forcing a blank into the die to form a box, said plunger including a bottom part and a body part, means for first moving the bottom part and then the body part of the plunger into the die, devices carried by said bottom part of the plunger for bending inwardly the upper edges on two opposite sides of the box after the bottom part of the plunger enters the die and while the box is in the die, movable members carried by said bottom part of the plunger for supporting the sides of the box during said bending operation, and means on the body part of the plunger for operating said bending devices and for retracting said members when the

body part of the plunger is moved toward the die.

8. A construction is specified in claim 7 in which yieldable means are provided for projecting said members into position to support the sides of the box during the bending operation.

9. A construction as specified in claim 7 in which said members are provided with inclined surfaces and in which said body part of the plunger is provided with projections adapted to contact with said inclined surfaces, to thereby retract said members.

10. A machine for making boxes from blanks comprising, in combination, a die, a plunger having a bottom part adapted to force a blank into the die to form a box, means for first moving said bottom part of the plunger into the die, bending devices pivotally supported on said bottom part of the die for bending inwardly the upper edges on opposite sides of the box while in the die, two members movably supported on said bottom part of the die, a spring for projecting each of said members outwardly into position to support the sides of the box during said bending operation, said plunger also having a body part movable into the die, and means carried by said body part for operating said bending devices and for retracting said members inwardly against the action of said springs.

11. A plunger adapted to cooperate with the die of a box-forming machine to form a box from a blank, said plunger comprising a bottom part and a body part movable relative to each other, said bottom part having devices thereon for bending inwardly the outer edges on two opposite sides of a box while the same is in the die and also having members movably mounted thereon for supporting the sides of the box during such bending operation, and means for operating said bending devices and retracting said members when said body part of the plunger is moved relative to the bottom part.

12. A plunger adapted to cooperate with the die of a box-forming machine to form a box from a blank, said plunger comprising a bottom part and a body part movable relative to each other, said bottom part having devices pivotally mounted thereon for bending inwardly the outer edges on two opposite sides of a box while the same is in the die and also having members movably mounted thereon for supporting the sides of the box during said bending operation, springs for normally holding said members projected outwardly from said bottom part of the plunger, and means for operating said bending devices and retracting said members when said body part of the plunger is moved relative to the bottom part.

13. A plunger for box-forming machines having devices pivotally mounted thereon for bending inwardly the edge portions on

two opposite sides of a box, and also having members movably mounted thereon for supporting the sides of the box during such bending operation, and means for yieldably holding said members in position to support the sides of a box.

14. A plunger for box-forming machines having devices pivotally mounted thereon for bending inwardly the edge portions on two opposite sides of a box and also having two members movably mounted thereon for supporting the sides of the box during such bending operation, said members being arranged below said bending devices and springs for normally holding said members in position to support the sides of a box.

15. A plunger for box-forming machines, said plunger comprising two parts movable relative to each other, means carried by one of said parts for folding inwardly the edge of a box blank and other means for supporting said blank during the folding operation and means carried by the other part for controlling the operation of said folding and supporting means.

16. A plunger for box-forming machines, said plunger comprising two parts movable toward and from each other, folding devices pivotally supported on one of said parts and supporting devices slidably mounted on said last named part and means carried by the other part for operating said folding devices and retracting said supporting devices when the two parts of the die move toward each other.

In testimony whereof I hereunto affix my signature.

FRANK M. JOSLIN.

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