

April 23, 1963

W. WALDBAUER ET AL

3,086,427

APPARATUS FOR PRODUCING FOLDED BOXES AND BOX COVERS

Filed July 5, 1962

3 Sheets-Sheet 1

Fig. 1

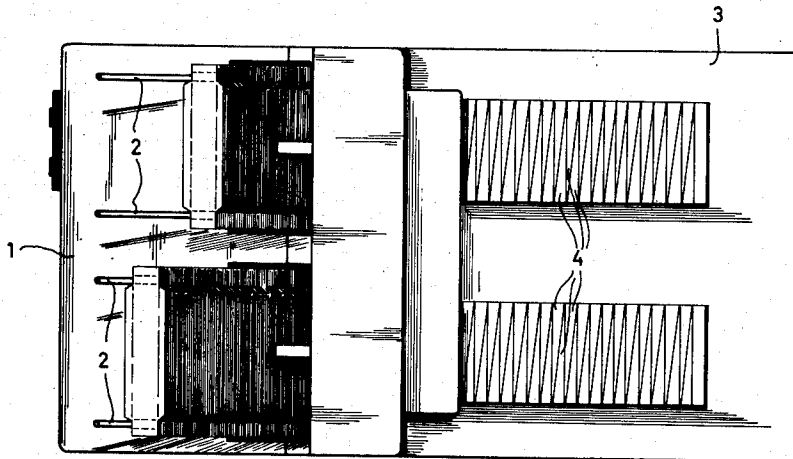
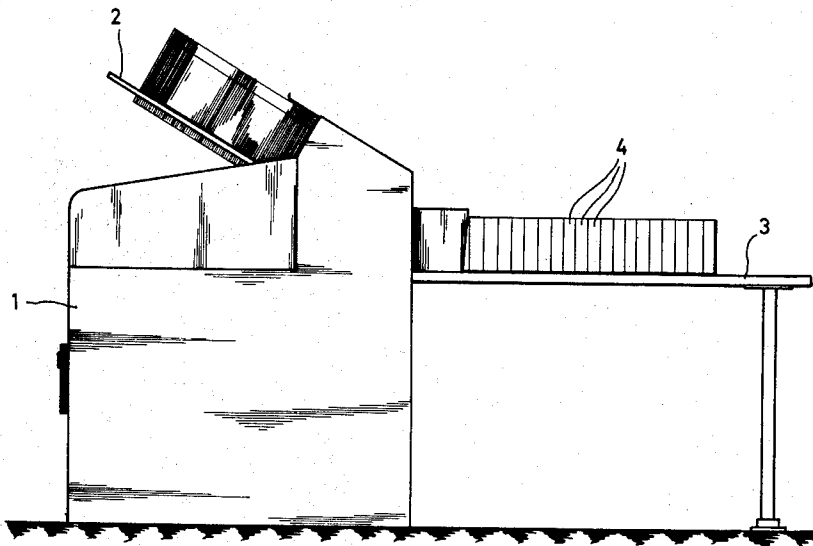


Fig. 2

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Fig. 3

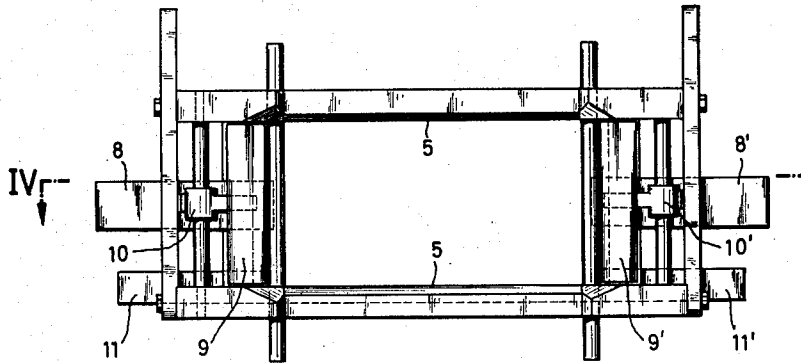


Fig. 4

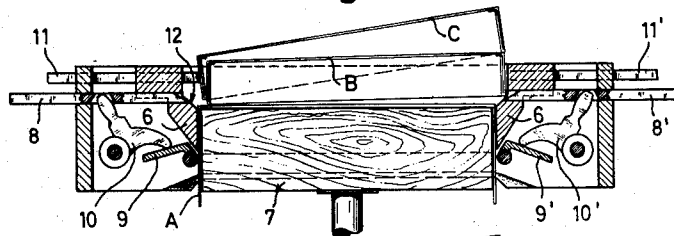


Fig. 5

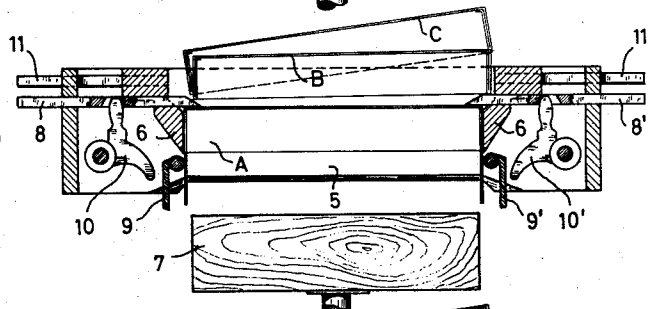
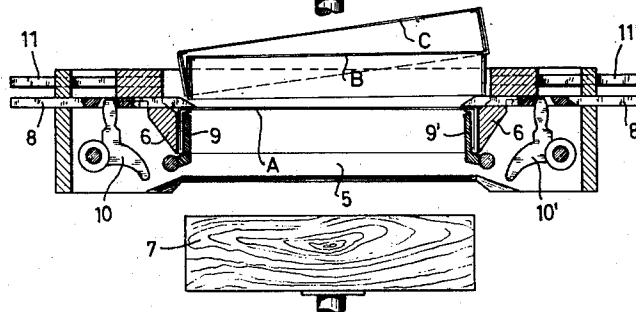


Fig. 6



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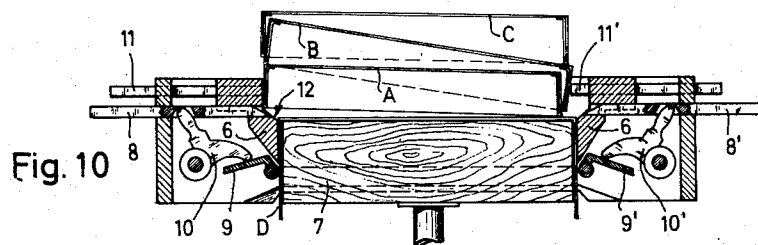
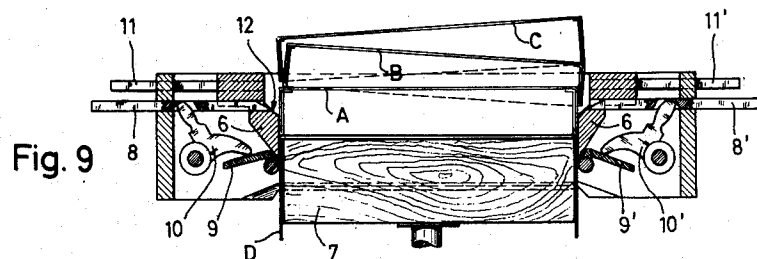
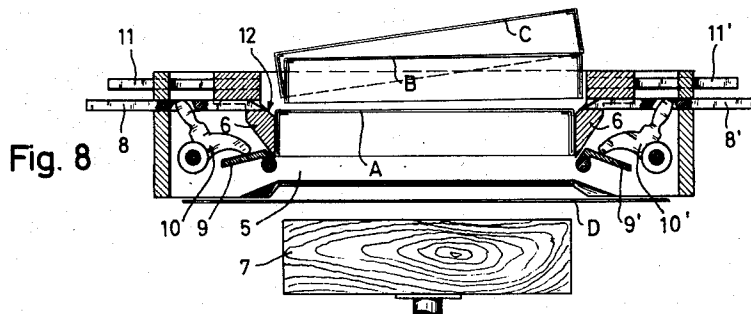
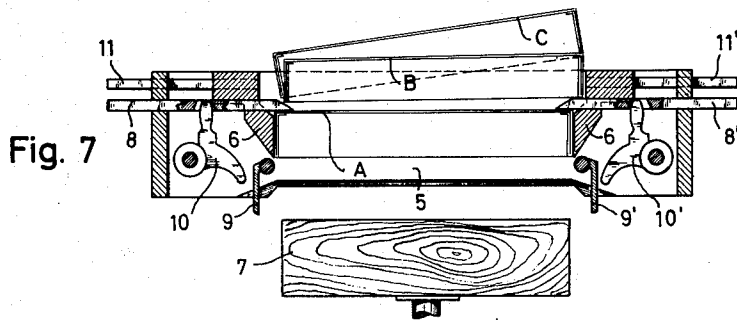
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APPARATUS FOR PRODUCING FOLDED BOXES AND BOX COVERS

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2 Claims. (Cl. 93—51)

The present invention relates to an apparatus for producing open folded boxes and/or box covers and for stacking them in a manner so as to nest in a zigzag formation in each other by means of a pair of slide members which are provided at the side of the folding box of the apparatus where the completed boxes or box covers are ejected and which alternately act upon one or the opposite side wall of the successive boxes or covers so as to shift them slightly toward the right or toward the left of each other.

Although in a prior apparatus of this kind, as disclosed in the U.S. Patent No. 1,538,851, the completed boxes are stacked in a similar manner as above described so as to nest in a zigzag formation in each other, this stacking has to be carried out in a vertical direction by means of a plunger upon which the individual finished boxes first have to be deposited in an accurate position and which at every stroke must lift the entire vertical stack of boxes before it can add the next box to the stack. While the plunger is being retracted to receive a new box, the stack of boxes must be held in an arrested position between guide rails by a special holding mechanism which must also permit the last-inserted box to be held at a prescribed level and then to be shifted toward the right or toward the left. Apart from the fact that such a holding mechanism is rather complicated and expensive, this entire apparatus can be used merely for stacking boxes which have previously been made in another machine and it is of such a design that without a special inventive effort it cannot be reconstructed so as to form a single unitary machine which is adapted to make as well as to stack the boxes in a continuous operation.

Although the U.S. Patent No. 2,132,859 discloses an apparatus for producing folded boxes or box covers which is provided with slide fingers serving as stop members for forming and supporting the bottom of a box while it is being made in the folding box, this apparatus is not adapted for also stacking the boxes or covers so as to rest in a zigzag formation in each other, but the completed boxes are individually ejected in the downward direction from the folding box and must thereafter be stacked in a separate operation. Apart from the fact that this box-making apparatus is very complicated and expensive, its method of operation is slow and it also requires an extra attendant merely for the purpose of collecting and stacking the completed boxes.

It is an object of the present invention to provide a very simple and unitary apparatus which overcomes the disadvantages of the above-mentioned apparatus and is adapted to fold the boxes or box covers and immediately thereafter to stack them so as to rest in a zigzag formation in each other. For attaining this object, the invention provides a box-making apparatus which comprises a folding box which is disposed in a substantially horizontal position, a plunger which is adapted to reciprocate in a substantially horizontal direction for inserting suitably precut blanks into the folding box for folding them therein to form the boxes or box covers and for also ejecting the completed boxes or covers from the folding box, a platform for receiving the completed boxes

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which is in alignment with and forms a continuation of the lower wall of the folding box, and a pair of slide members which may be inserted from two opposite sides into the folding box in a direction parallel to the plane of the receiving platform. The free ends of these slide members form fingers which when the plunger is moved to its forward end position within the folding box, serve as a support or stop for the bottom of the box which is being formed. The end surfaces of the inner box-forming walls of the folding box facing the stop fingers and also the end surfaces of these fingers facing each other are beveled so as to diverge in the direction in which the boxes are ejected and to form guide surfaces along which the free rear edges of the corresponding side walls of the completed boxes can slide. When the fingers are moved outwardly, their beveled edges are substantially in alignment with and form a continuation of the beveled edges of the folding box. A further feature of the invention consists in providing behind these stop and guide fingers, as seen in the direction in which the completed boxes are ejected, a further pair of slide members which are movable in the same direction as these fingers and are adapted to engage with one or the opposite side wall of the completed box which is being ejected and to shift the same alternately to the left or to the right so that the edges of the completed boxes slide alternately over the beveled guide surfaces toward one side or the other so that the ejected boxes will be nested in a zigzag formation in each other.

A further feature of the invention which also permits the apparatus to be of a very simple construction consists in designing it so that the two fingers are movable simultaneously in opposite directions when used as stops for the bottom of the box which is being formed in the folding box, while when they are used as guide members in operative association with the other slide members they are alternately moved.

The features and advantages of the present invention will become more clearly apparent from the following detailed description of a preferred embodiment thereof which is illustrated in the accompanying drawings, in which—

FIGURE 1 shows a general side view of the entire machine;

FIGURE 2 shows a plan view of the machine according to FIGURE 1;

FIGURE 3 shows a bottom view of the folding mechanism, as seen in the direction of operation of the plunger; while

FIGURES 4 to 10 are cross sections taken along line IV—IV of FIGURE 3 and illustrate different steps in the operation of the folding mechanism.

The housing 1 of the machine contains the driving and control means for operating the machine. Above this housing 1, two pairs of inclined rails 2 are provided on which the blanks slide into the folding mechanism. Behind the machine, as seen in the direction of operation, a platform 3 is provided along which the finished boxes 4 nesting in each other in a zigzag formation are moved. The walls of the folding box of the machine are formed by the members 5 and 6. The precut blanks A are pushed one at a time by the plunger 7 into the folding box 5, 6, while two slide fingers 8 and 8' serving as stop members are moved toward each other into the folding box from the two narrow sides thereof before the plunger 7 reaches the position in which its movement is reversed. By this inward movement of the fingers 8 and 8', the box B is moved from its inclined position, as illustrated in FIGURE 4, to which it has been moved by a further pair of slide members 11 and 11' which are located behind the fingers 8 and 8' and are movable in the same direction as the latter to a posi-

tion which is slightly more parallel to the front surface of the plunger, as illustrated in FIGURE 5.

After plunger 7 has then pressed the blank A against the fingers 8 and 8' and is thereafter withdrawn from the folding box 5, 6, as also shown in FIGURE 5, a pair of pivotable arms 9 and 9' fold the flaps of blank A which project over the wall portions of the latter toward the inside and press them against the inner sides of the wall portions, as shown in FIGURE 6.

Since the box is now completed, the folding arms 9 and 9' are pivoted out of the box, as shown in FIGURE 7, and then back to their original positions, whereby the control members 10 and 10' are likewise pivoted back so as to withdraw the fingers 8 and 8' from the inside of the folding box 5, 6 to the position as shown in FIGURE 8. In the meantime, a new blank D is slipped in front of the folding box so that at its next forward movement plunger 7 engages with and inserts this new blank D into the folding box, and this blank thereby pushes the box A out of the folding box and partly into the box B which causes the latter to turn to an inclined position opposite to its previous inclination, as indicated in full and dotted lines in FIGURE 9. The further movement of box A causes the inclination of box B to be increased with the result that the next box C is again moved to a position parallel to the opening of the folding box.

As the next step in the operation of the machine as illustrated in FIGURE 10, box A which lies in front of the folding box is pushed by the slide member 11' toward the left, whereby the free edge of the left side wall of box A slides along the inclined surface 12. This slide member 11' is exactly like the slide member 11 which, as shown in FIGURE 4, has previously pushed the box B toward the right.

Since the means for driving and controlling the operation of the members 7, 8, 9, 10, and 11 are conventional in the art and do not constitute a part of the invention, a special illustration thereof has been omitted.

Although our invention has been illustrated and described with reference to the preferred embodiment thereof, we wish to have it understood that it is in no way limited to the details of such embodiment, but is capable of numerous modifications within the scope of the appended claims.

Having thus fully disclosed our invention, what we claim is:

1. A unitary apparatus for producing folded box parts in the form of open boxes or box covers and for then stacking said box parts so as to nest in a zigzag formation in each other comprising a folding box, a plunger

adapted to reciprocate in a substantially horizontal direction into and out of said folding box for folding a precut blank into a box part and for then ejecting the latter from said folding box by means of the following completed box part, said folding box having a substantially horizontal lower wall, a platform substantially in alignment with and forming a continuation of said lower wall for receiving the ejected box parts from said folding box, a pair of slide members adjacent to the rear edges of two opposite side walls of said folding box defining the box-forming area thereof, said slide members being adapted to reciprocate transverse to the direction of movement of said plunger and over said rear edges of said opposite side walls toward and away from each other, the ends of said slide members facing each other having one side facing said box-forming area adapted to form stop members for supporting the bottom of the box part formed in said area, said rear edges and also the rear side of each of said slide member ends being beveled so as to diverge from each other in the direction toward said platform so that, when said slide members are retracted, the corresponding beveled surfaces of said slide members and said folding box are substantially in alignment with each other so as to form continuous guide surfaces along which the free edges of the respective side walls of the completed box parts can slide, and a second pair of slide members behind said first pair in the direction of ejection of said box parts from said folding box and movable in the same direction as said first pair, each of said slide members of said second pair being adapted to engage alternately with one of two opposite side walls of successively ejected box parts so as to shift one box part toward one side and the next box part to the opposite side, whereby each box part slides over the beveled guide surfaces at the side toward which it is shifted to a position at an inclined angle to and into the previously ejected box part.

2. An apparatus as defined in claim 1, in which said first slide members when serving as stop members for the formation of said box part in said folding box are movable simultaneously with each other, while when said first slide members are moved in operative association with said second slide members, they are alternately movable for shifting each successive box part to an inclined position relative to the previous box part.

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