Nov. 29, 1927. 1,651,200

H. J. GOSS

MACHINE FOR MAKING SET-UP BOXES

Filed June 10, 1926 2 Sheets-Sheet 1

Fig. 1

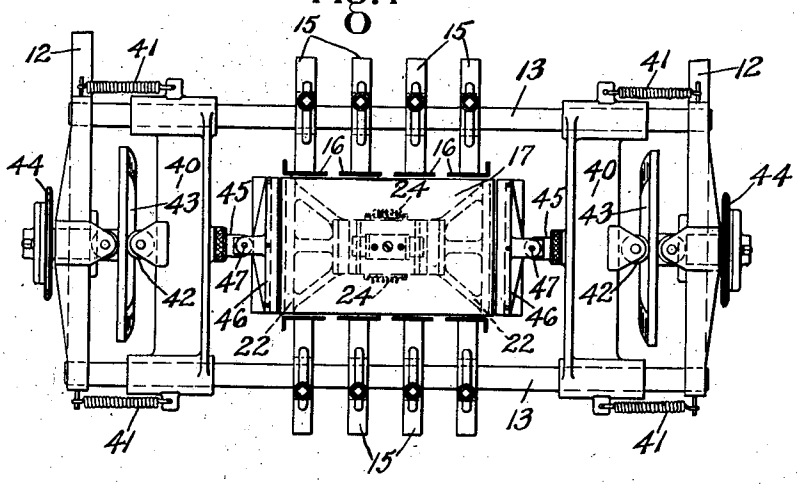


Fig. 2

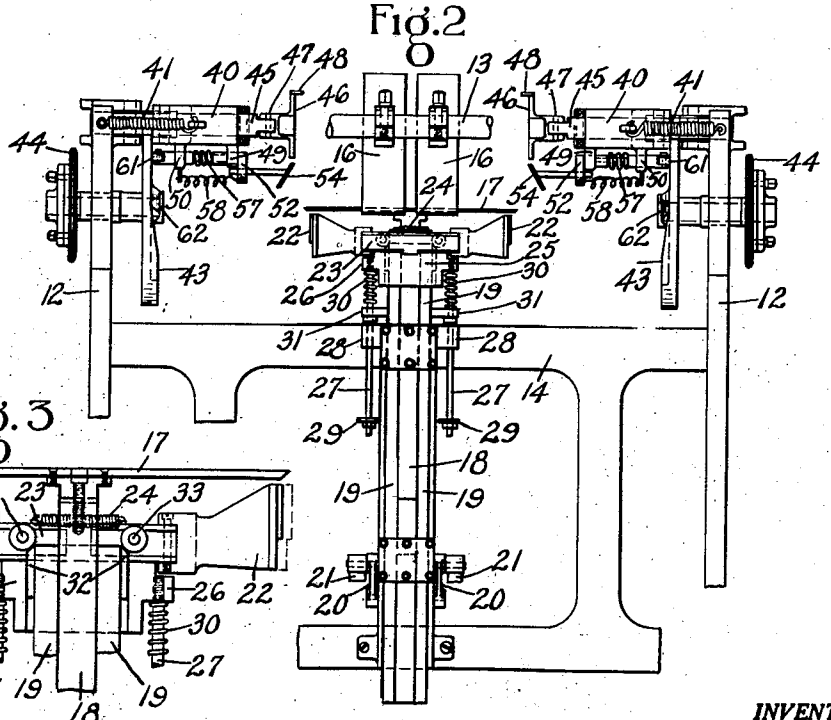


Fig. 3

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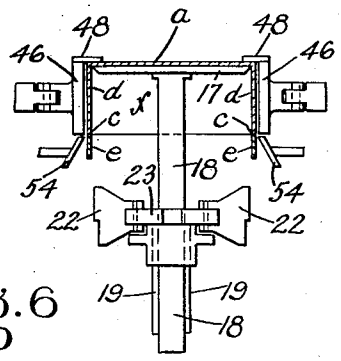


Fig. 6

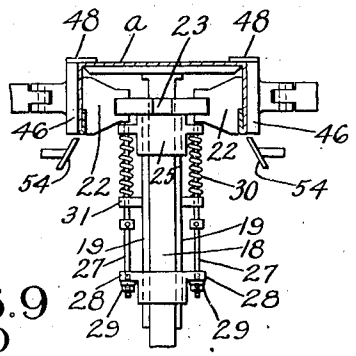


Fig. 9

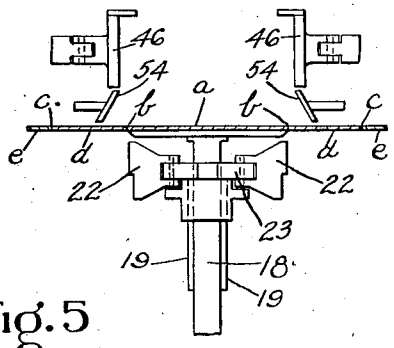


Fig. 5

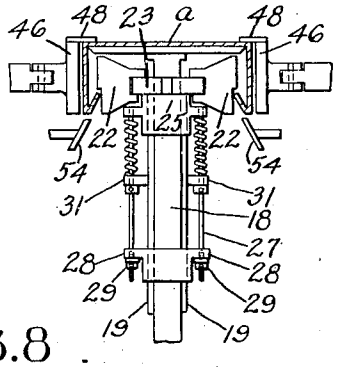


Fig. 8

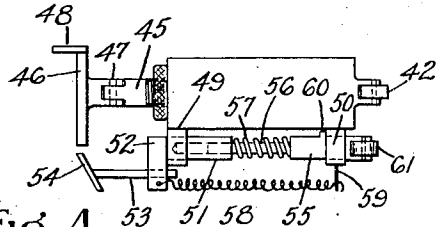


Fig. 4

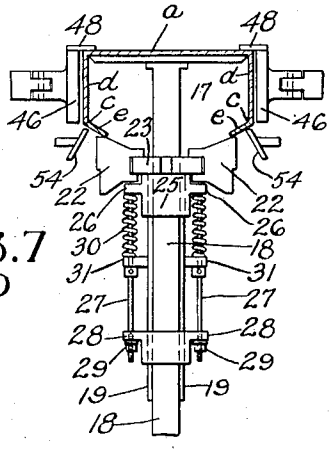


Fig. 7

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Patented Nov. 29, 1927. 1,651,200

UNITED STATES PATENT OFFICE.

HAROLD J. GOSS, OF NASHUA, NEW HAMPSHIRE, ASSIGNOR TO THE LAKE ERIE TRUST COMPANY, OF CLEVELAND, OHIO, A CORPORATION OF OHIO.

MACHINE FOR MAKING SET-UP BOXES.

Application filed June 10, 1926. Serial No. 114,890.

This invention relates to the manufacture of paper board boxes and has particular reference to machines for making rectangular boxes in set up form, ready to have goods placed therein. Boxes of this type are referred to as wall boxes for the reason that they present side portions which serve as walls to retain goods. Practically the same machine is employed to make the covers for such boxes. Therefore such terms as boxes or wall portions used herein are to be understood as sufficiently generic to include covers as well as the receptacle members of boxes.

Different types of machines for doing this class of work have been produced. One employs an internal form which expands when the pressure, which is required to complete the box member, is applied to the glue-carrying sections of said member, as illustrated in Letters Patent No. 1,513,236, dated October 28, 1924, and reissued October 27, 1915, No. 16,193. The other type of machine employs a practically solid or non-yielding internal form, with movable plates which are actuated to exert the final external pressure upon the overlapping glue-carrying sections of the box member on said solid form. The last mentioned type is illustrated in Letters Patent No. 1,563,184, issued November 24, 1925, which patent may be referred to if detailed information is required concerning the mechanism for actuating the operative or movable parts of the machine shown in the present accompanying drawings.

Each type of machine possesses its individual advantages, but also possesses certain disadvantages. The internal expanding form illustrated in the first-mentioned patent is more adaptable than a solid one for some forms or sizes of boxes, while the effect of the action of external pressure applied at the correct times as illustrated in the last-mentioned patent is more satisfactory, when other kinds of boxes are being made.

The object of the present invention is to provide an improved machine which is rapid and automatic in operation and which possesses the advantages of both types of machines above referred to, and eliminate the undesirabilities of both.

With said object in view, the invention consists in the construction and combination of parts substantially as hereinafter described and claimed.

Of the accompanying drawings:—

Figure 1 is a plan view of so much of the machine as includes my present improvements.

Figure 2 represents the same in elevation.

Figure 3 is a view similar to a portion of Figure 2, on a larger scale.

Figure 4 is a view similar to another portion of Figure 2, and also on a larger scale.

Figures 5 to 9 inclusive are somewhat diagrammatic views illustrating the successive positions of the box-carrying plate or plunger and the expansion form and cooperating pressure members during the making of a box.

Similar reference characters indicate similar parts in all of the views.

Referring first to Figures 1, 2 and 3, the frame of the machine includes side portions 12 connected by tie rods 13, and having a transverse portion 14. Adjustably mounted on the tie rods 13 are the base portions 15 of guiding wall plates 16.

Vertically movable from a lower position upward between the plates 16 is a horizontal plate 17 carried by a stem 18 which is mounted in ways carried by the frame, said stem being actuated by suitable timed operating mechanism such as a lever and cam as illustrated in the patent referred to.

Mounted to slide parallel with the stem 18, in ways supported by the frame, are two plunger stems 19 having link connections 20 (Fig. 2) with levers portions of which are illustrated at 21, the complete details of the levers and operating cams being illustrated in the patent referred to. The expanding internal form is carried by the vertically reciprocating stems 19. Said form comprises two pressers 22 which have a slight outward and inward movement, their inner portions being mounted in a block 23 and connected by springs 24 having a tendency to pull the pressers toward each other or, in other words, to contract the form in length.

Mounted on the stems 19 below the block 23 is a block 25 having ears 26 from which small rods 27 depend, passing through guide ears 28 of the frame (Fig. 2) and having stops 29 at their lower ends. Springs 30 coiled around the rods 27 are confined between the ears 26 and lugs 31 projecting from the stems 19.

Integral with or secured to the upper ends

of the stems 19 are wedges or cams 32 (Fig. 3) which coact with rolls 33 carried by the inner portions of the form members 22 to force said members apart, against the contractile force of the springs 24 during the operation of the machine as hereinafter described.

The mechanism for effecting the external pressure will now be described. Mounted to slide on the tie rods 13 are two carriages 40 (Figs. 1, 2 and 4), each normally held outward by springs 41 and having a roll 42 at its back, against which roll a disk having an elongated cam surface 43 operates, the shaft of the disk having a sprocket wheel 44 to be engaged by a chain that is driven to operate the cam disk at the proper times to effect inward movement of the carriage, the two carriages, of course, moving inward simultaneously.

The inner face of each carriage has a stud 45 to which a presser plate is connected, preferably by a vertical pivot 47 which will permit the plate to tilt sufficiently, laterally, to press uniformly on the end folds of a box brought between them by the expansible form 22—22 as hereinafter described.

Projecting inward from the top of each plate 46 is a ledge 48.

Extending below each carriage 40 (Figs. 2 and 4) are two lugs 49, 50. Mounted to slide in each lug 49 without rotation therein, is a slide 51 having a lug 52 in which is secured the shank 53 of an inclined member 54 hereinafter referred to as a tucker finger. A slide 55 is mounted in the other lug 50 and has a pin 56 extending into a socket in the slide 51, a spring 57 being coiled around said pin and confined between the end of the slide 51 and a shoulder of the slide 55. A tension spring 58, connected to the lug 52 and to a pin 59 projecting down from the fixed lug 50, tends to hold the parts in the position illustrated by Figure 4, with a stop portion 60 of the slide 55 against the lug 50. For a reason explained hereinafter the springs 57 have a greater expansive strength than the tension strength of the springs 58.

Each slide 55 is provided with a roll 61 which is acted upon by a short cam surface 62 of the same disk which has the longer cam surface 43.

The operation is as follows:—

By suitable mechanism which may be such as illustrated and described in the Patent 1,563,184 referred to, each blank to be converted to set up box form is delivered to proper position on the plunger plate 17 (Fig. 5). Each blank is cut and creased to present a middle or bottom section and side and end wall sections having corner flaps, some portions of which sections or flaps have glue applied thereto before arriving in position to be folded. This type of blank being well-known, and machines for folding such blanks being also well-known, it will be sufficient for an understanding of the present improvements to refer to the blanks as creased at *b* and *c* to define the middle section *a* and the end wall sections *d* having edge flaps *e* (Fig. 5). Of course there are also side wall sections and corner flaps, but to illustrate them in Figures 5 to 9 would tend to confusion with parts of the mechanism. Figure 6 however indicates one of the side wall sections *f*.

After the blank arrives on the plunger plate 17 (Fig. 5) the said plate rises to its extreme upper position (Fig. 6), effecting folding down of the wall sections, and the margins of the section *a* coming to a stop against the ledges 48 of the plates 46 which, at this time, are in their outer positions. The inclined faces of the members 54 aid in effecting the folding of the sections *d*.

The next step of the operation, while the form 22, 23, remains down, is to bend the flaps *e* inward on the crease lines *c*. This is effected by the inward movement of the two tucker fingers 54 which occurs just before the rising form members 22 engage the flaps *e*. The said fingers move in such plane that their upper edges engage the flaps *e* at a considerable distance from the crease lines *c* and bend them in (Fig. 7) without tending to bend the wall sections *d* into the path of the upwardly moving form members 22. Said members 22 are collapsed during their upward movement. The fingers 54 hold the flaps *e* so that they will be engaged by the upper edges of the said members 22 which then, rising, turn the flaps *e* well up inside (Fig. 8) and pass on up to position between the portions of the box that are close to the presser plates 46.

The overlapping (and glue-carrying) sections of the box or blank are now pressed together by the movement of the external plates 46 inward and the movement of the form members 22 outward (Fig. 9), said outward movement of the members 22 being effected by the action of the wedges or cams 32 (Fig. 3) against the rolls 33, and the action of the cams 43 (Fig. 1) against the rolls 42 of the presser carriages 40. The plates 46 press yieldingly against the box ends, due to the employment of springs not necessary to illustrate.

It will be undertood that the extent of the movements of the presser plates 46 need be but very little, since the expansible form does not spread until after it is raised, as indicated by comparing Figures 8 and 9. And the amount or degree of expansion of the form also is very slight (as indicated by the full and dotted lines at the right in Figure 3), thereby effecting a saving of considerable time in the operation as compared with the time required for the reciprocation

of either external or internal members when one or the other alone as in the two patents referred to, is depended upon to effect all of the pressure.

By comparing Figures 7 and 8 it will be seen that when the form rises, in its contracted condition, it engages the flaps *e* at such distance from the creases *c* as to effect a leverage thereon that turns said flaps up on said crease lines as pivots, permitting an easy action and avoiding any tendency to crush the wall members of the box. The form does not expand until it has entirely entered the box.

Among the advantages of the coacting expanding form and contractible or inwardly movable pressers, are the following:— When the form first engages a blank and moves up, its outer ends engage the blank some little distance inwardly from the creases *b*, thereby effecting a leverage or bending action on each crease *b* as a pivot, while a non-expansible form of the proper size would necessarily extend so close to the creases as to effect no leverage and sometimes resulting in a crushing of the box. The pressers 46, when they move in against the box which is firmly supported on the form after the latter has expanded effect a substantial pressure, and the entire operation of making the boxes is performed at greater speed than when an internal expansible form alone, or external pressers alone, serve to effect the final box-making pressures.

The reason for providing springs 57 (Fig. 4) of greater strength than the tension strength of the springs 58 as hereinbefore mentioned, is that no action of the springs 57 is required unless the tucking fingers 54 encounter some obstacle such as a jam of blanks in the machine. Normally the springs 57 are inactive. Each spring 57 is strong enough to cause the two slides 51, 55, to reciprocate as a unit under the action of the cam 62 and the coaction of the weaker return spring 58. But if anything obstructs the inward movement of a finger 54 when the cam 62 is acting on the roll 61 of the slide 55, then the spring 57 will collapse and avoid injury to the finger, although the slide 55 can be pushed entirely inward.

Having now described my invention, I claim:—

1. A box-making machine having an expansible form for the interior of a box-blank to be folded thereover, external pressers, said form being movable to and from position between the pressers, and means for actuating said pressers toward the form.

2. A box-making machine having an expansible form for the interior of a box-blank to be folded thereover, external pressers, said form being movable to and from position between the pressers, means for actuating said pressers toward the form, and tuckers in position to act on portions of the blank to turn them into the path of movement of the form.

3. A box-making machine having a vertically movable expansible form for the interior of a box-blank to be folded thereover, external pressers movable in a plane to cooperate with the expansible form when the latter is raised, and means for actuating said pressers toward the form.

4. A box-making machine having a vertically movable expansible form for the interior of a box-blank to be folded thereover, external pressers movable in a plane to cooperate with the expansible form when the latter is raised, means for actuating said pressers toward the form, and tuckers in position to act on portions of the blank to turn them into the path of movement of the form when the latter is raised.

5. A machine substantially as specified by claim 4, the tuckers having inclined lower faces.

6. A box-making machine comprising horizontally movable pressers and means for actuating them toward each other, a plunger plate vertically movable to carry a box-blank to partly folded condition between the pressers, and an expansible form and means to raise it between the pressers after the operation of the plunger plate.

7. A box-making machine comprising horizontally movable pressers and means for actuating them toward each other, a plunger plate vertically moved to carry a box-blank to partly folded condition between the pressers, an expansible form, means to raise said form between the pressers after the operation of the plunger plate, and means for turning edge portions of the blank inward after said plate rises, to bring said edge portions into the path of upward movement of the form.

8. A machine substantially as specified by claim 7, the edge turning means being mounted to yield if an obstruction is presented to the inward movement of said means.

9. A box-making machine having a vertically movable expansible form, a vertically movable plunger above said form, tuckers in position to act on portions of a blank elevated by the plunger, and movable pressers in position to act on portions of the completely folded blank.

In testimony whereof I have affixed my signature.

HAROLD J. GOSS.