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APPARATUS AND STRUCTURE FOR HANDLING COPY PAPER

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2 Sheets-Sheet 1

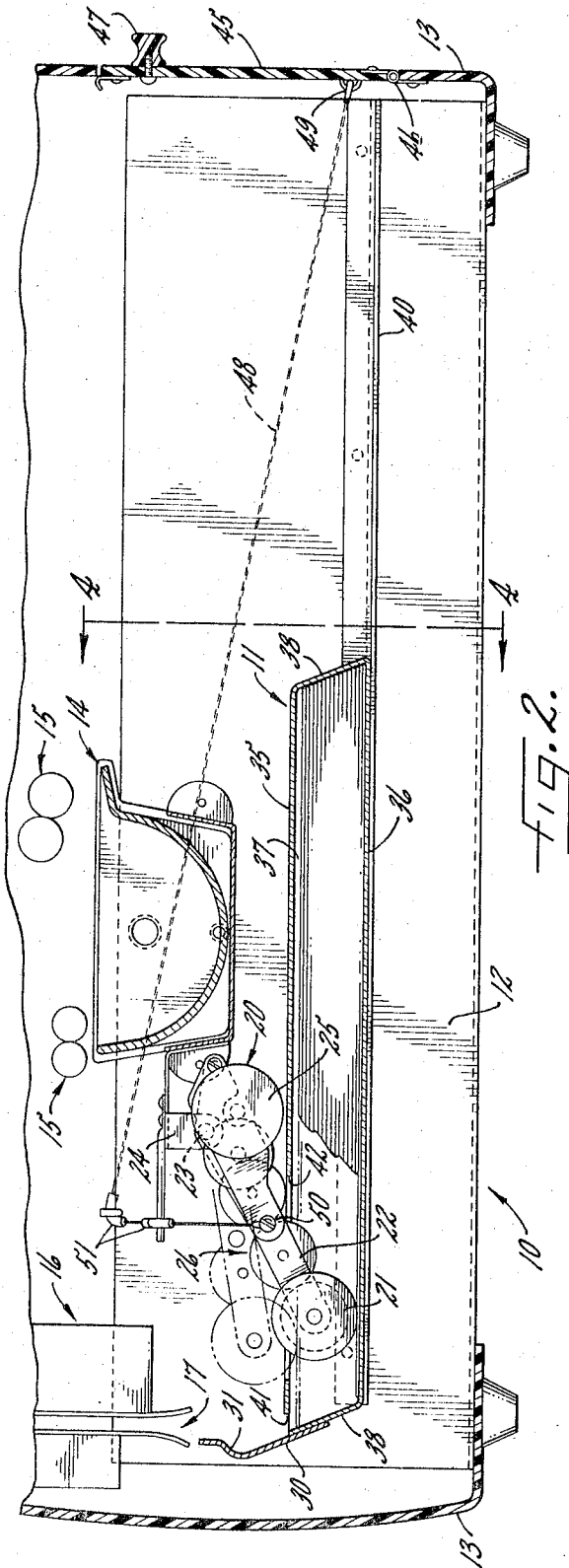


FIG. 2.

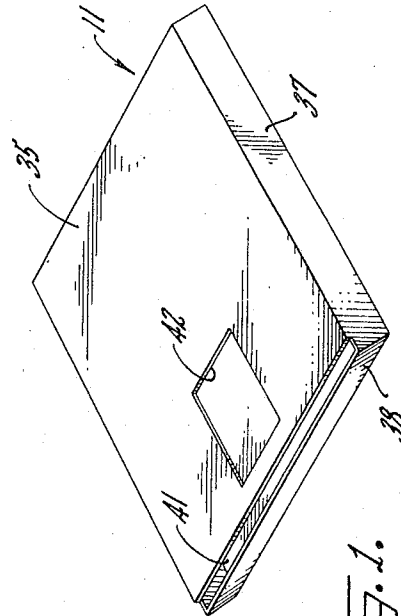


FIG. 1.

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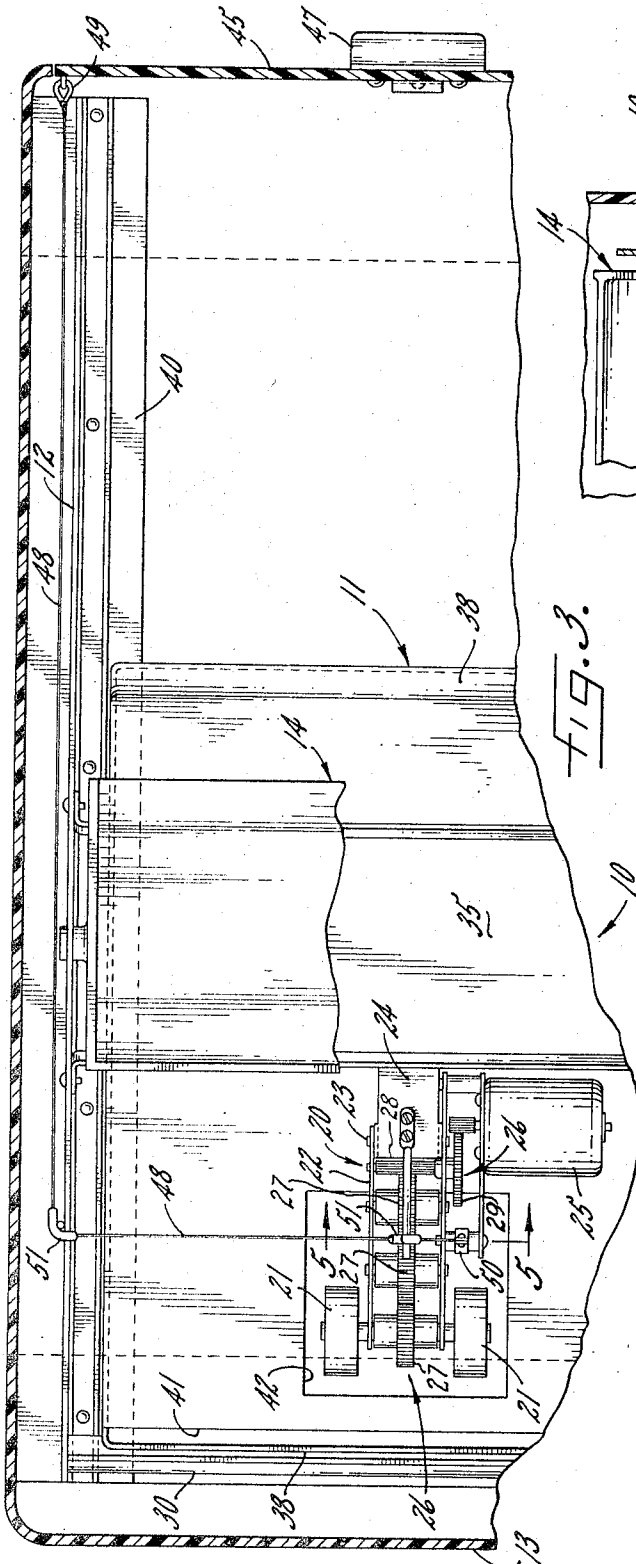
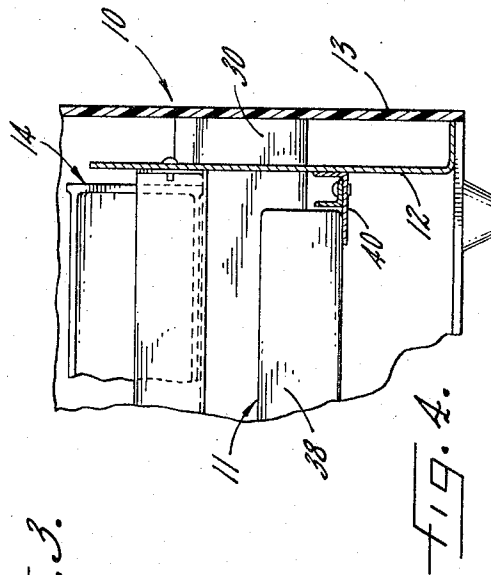
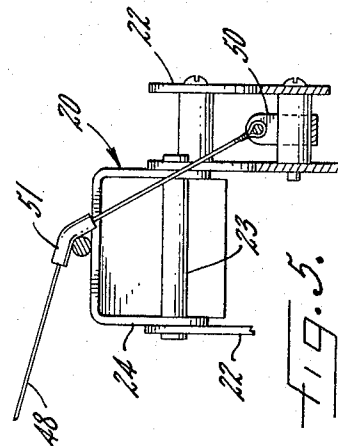
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APPARATUS AND STRUCTURE FOR HANDLING COPY PAPER

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4 Claims. (Cl. 221—41)

This invention relates generally to office copying machines and concerns, more particularly, apparatus and packaging structure for handling copy paper intended for use in such machines.

It is an object of the invention to provide a novel packaging structure for a supply of copy paper that protects the paper from dirt and exposure through shipping, storage and loading into a copy machine until the moment that each sheet is actually used to make a copy.

Another object is to provide a packaging structure of the above kind together with cooperating copy machine apparatus that permits easy loading of a copy machine with a supply of copy paper—the loading operation requiring a minimum amount of care and attention on the part of the operator. A collateral object is to provide structure and apparatus as characterized above that facilitates rapid, convenient changes in the copy paper being used by a copy machine as, for example, changing between letter and legal sized copy sheets.

A further object is to provide a packaging structure of the above character which assists in attaining reliable sheet feeding, one sheet at a time. More specifically, the packaging structure causes the act of packing to splay the stack of copy sheets being packed so that the sheets are riffled to promote proper separation.

Other objects and advantages of the invention will become apparent upon reading the following detailed description and upon reference to the drawings, in which:

FIGURE 1 is a perspective of a packaging structure embodying the present invention;

FIGURE 2 is a fragmentary section of a copy machine containing the packaging structure of FIG. 1 and constructed in accordance with the invention;

FIGURE 3 is a fragmentary horizontal section of the structure shown in FIG. 2;

FIGURE 4 is a fragmentary section taken approximately along the line 4—4 in FIG. 2; and

FIGURE 5 is a slightly enlarged fragmentary section taken approximately along the line 5—5 in FIG. 3.

While the invention will be described in connection with a preferred embodiment, it will be understood that we do not intend to limit the invention to that embodiment. On the contrary, we intend to cover all alternatives, modifications and equivalents as may be included within the spirit and scope of the invention as defined by the appended claims.

Turning now to the drawings, there is shown a portion of an office type copying machine 10 and a copy paper box structure 11 embodying the invention. The machine 10 is made up of a frame 12 enclosed by a housing 13 and supporting the operating subassemblies utilized for making copies. The latter are only fragmentarily shown and include a developer tray assembly 14, feed roller pairs

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15, and a precharge unit 16 that defines a copy paper throat 17 into which sheets of copy paper are passed at the start of the copy making operation.

Copy paper is fed into the throat 17 by a sheet feeding mechanism 20 which includes a pair of feeding rolls 21 journaled on a subframe 22 which is pivoted for vertical swinging movement on a shaft 23 mounted in a bracket 24. The bracket 24 is fixed relative to the frame 12. The rolls 21 are driven, clockwise as seen in FIG. 2, by an electric motor 25 secured to the subframe 22 and rotatably coupled to the rolls 21 by a gear train 26. In the illustrated machine, the gear train 26 includes three successively meshed gear wheels 27 extending from the rolls 21 to a pinion 28 which is secured to a wheel 29 meshing with the output pinion of the motor 25 (see FIG. 3). The weight on the subframe 22 is balanced so that the rolls 21 are gravity urged downwardly to frictionally engage the top surface of the uppermost copy sheet in an underlying stack of sheets. Energization of the motor 25 drives the rolls 21 and propels the topmost sheet to the left as seen in FIG. 2.

To insure single sheet feed into the throat 17, an inclined guide plate 30 is mounted in the frame 12 underlying the throat 17 and is formed with a deflecting portion 31. Sheets fed by the rolls 21 engage the plate 30, curve upwardly, and their leading edges abut and slide over the deflecting portion 31 into the throat 17. If two sheets tend to stick together, the abutment of the leading edge of the lower sheet against the portion 31 is usually sufficient to break the adherence between the sheets and the topmost sheet continues alone into the throat 17.

In accordance with the invention, the box 11 is shaped and formed to permit the entire box, containing a stack of copy paper, to be slid into cooperative relation with the guide plate 30 and the feeding mechanism 20 so that the copy paper is not removed from the box until single sheets are passed into the throat 17 for the copy making operation. To this end, the box 11 is formed with top and bottom panels 35 and 36 interconnected by a pair of side panels 37 and a pair of end panels 38. The top and bottom panels 35, 36 are approximately the size of the copy sheets contained in the box 11, being slightly larger as is customary when boxing paper. Within the machine 10, the box 11 rests on support members in the form of a pair of guide rails 40 fixed on the frame 12 and spaced apart the approximate width of the top and bottom panels of the box.

The side panels 37 of the box 11 are parallelogram shaped so that one end panel 38 lies flatly against the guide plate 30 when the box is slid fully to the left on the rails 40 into the paper supplying position, illustrated in FIGS. 2 and 3. The top panel 35 defines a slot 41 at one end between the acute angle corners of the side panels 37 by being relieved or spaced away from the end panel 38 and the top acute angle corners of the side panels 37, which places the slot 41 adjacent the guide plate 30 when the box 11 is in paper supplying position. The top panel 35 is also formed with a central opening 42 that is rectangular in the illustrated form and which underlies and permits entry of the feed rolls 21 with the box 11 in paper supplying position.

Thus, with the box slid along the rails 40 into paper supplying position with one end panel 38 abutting the

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guide plate 30, copy paper can be fed from within the box by the feed rolls 21 by the feed rolls dropping down into the opening 42. Energization of the motor 25 drives the rolls so as to propel the topmost sheet in the box to the left so that it slides up the end panel 38, through the slot 41 and over the guide plate 30 toward the paper receiving throat 17.

As a feature of the invention, the housing 13 of machine 10 is provided with a door 45 permitting the box 11 to be removed, reinserted or replaced within the machine, and the door is interconnected with the sheet feeding mechanism 20 so that opening the door lifts the rolls 21 clear of the box. In the illustrated construction, the door 45 is hinged at 46 along its bottom edge to the housing 13 and is provided with a fingertip gripping knob 47. The door 45 can be swung down and out with respect to the housing 13 so as to open up the ends of the rails 40 and thus permit the box 11 to be slid into or out of the machine 10.

A light cable 48 connects a point 49 on the door 45 that is spaced from the hinge line 46 with a point 50 on the feeding mechanism subframe 22 that is spaced from the hinge shaft 23. The cable is guided by suitable conduits 51 fixed relative to the frame 12 or, if desired, pulleys could be utilized for this purpose.

It will be apparent that lowering the door 45 to open up the rails 40 tensions the cable 48 so as to elevate the subframe 22. The parts are proportioned so that with the door 45 in fully opened position, the feeding mechanism subframe 22 is lifted slightly above the dashed line position shown in FIG. 2 so that the feed rolls 21 clear the top panel 35 of the box 11. In this way, the feeding mechanism 20 offers no restriction on removal or insertion of the box 11 into the machine 10.

Since the copy sheets are not removed from the box 11 until a single sheet is fed into the throat 17 for the copy making operation, it can be seen that the paper is protected from dirt and exposure throughout the operations of shipping, storage and loading into the copy machine. It is contemplated that the box 11 be formed with the usual sturdy cardboard construction normally associated with paper packaging. Further protection of the copy sheets within the box 11 is attainable by overwrapping the box 11 so as to close the slot 41 and the opening 22, or providing these openings in the box with easily removable closure members.

Those familiar with this art will quickly appreciate that the box 11 and the cooperating structure of the copy machine 10 permits easy loading of the machine with a supply of copy paper. A minimum amount of care and attention is required on the part of the operator since the loading operation consists of opening the door 45 and sliding the box 11 along the guide rails 40 until the box abuts the guide plate 30. When the door 45 closes, the feeding mechanism 20 drops into position and the machine is ready for operation. The usual need for careful attention to placement of a stack of copy sheets so as to avoid improper sheet feeding is obviated. Equally simple and straightforward is the act of removing a supply of copy sheets from the machine 10 when it is desired to substitute a different type of copy paper. The door 45 is opened and the box 11 pulled outwardly along the guide rails 40. A different box containing the desired type of copy paper can then be inserted into the machine. In this way, the machine can quickly be converted from making copies of one size or type to another.

As will also be understood by those skilled in the art, the shape of the box 11 inherently assists in attaining reliable sheet feeding since the parallelogram shaped side panels 37 of the box require that the stack of copy sheets placed within the box be splayed or riffled during the packaging operation. This is normally an operation required of the copy machine operator so as to minimize the possibility of two or more sheets being fed simultaneously into the copy paper throat. The shape of the box

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11 insures that the proper riffing or splaying has taken place and the result is more reliable single sheet feeding.

It has been found that the proper acute angle for the side panel 37 of the box 11 depends in part on the characteristics of the copy paper intended to be used by the copy machine 10. The acute angles of the parallelogram side panels 37 could range to 30° to 70° depending on the copy paper thickness, stiffness and coating characteristics.

We claim as our invention:

1. Apparatus for handling copy paper sheets comprising, in combination, a frame, a paper guide plate mounted in said frame at an angle from the vertical, box support members in said frame extending toward said guide plate and forming an obtuse angle therewith, a box with top and bottom panels interconnected by a pair of side panels and a pair of end panels positioned with said bottom panel on said support members, said side panels being parallelogram shaped so that one of said end panels lies flatly against said guide plate, said top panel having a central opening, said top panel and said one end panel defining a slot at one end adjacent said guide plate, and a sheet feeding member mounted on said frame for vertical movement through said central opening so as to engage and drive sheets in said box through said slot and over said guide plate.

2. Apparatus for handling copy paper sheets comprising, in combination, a frame, a paper guide plate mounted in said frame at an angle from the vertical, box support members in said frame extending toward said guide plate and forming an obtuse angle therewith, a box with top and bottom panels interconnected by a pair of side panels and a pair of end panels positioned with said bottom panel on said support members, said side panels being parallelogram shaped so that one of said end panels lies flatly against said guide plate, said top panel having a central opening, said top panel and said one end panel defining a slot at one end adjacent said guide plate, a sheet feeding member mounted on said frame for vertical movement through said central opening so as to engage and drive sheets in said box through said slot and over said guide plate, a housing mounted on said frame, a door in said housing permitting said box to be slid from the apparatus when the door is opened, and means interconnecting said door and said sheet feeding member so that opening said door raises said member clear of said box.

3. Apparatus for handling copy paper sheets comprising, in combination, a frame, a paper guide plate mounted in said frame, a box support member in said frame extending toward said guide plate, a box with top and bottom panels interconnected by a pair of side panels and a pair of end panels positioned with said bottom panel on said support member, said side panels being shaped so that one of said end panels lies flatly against said guide plate, said top panel having a central opening, said top panel and said one end panel defining a slot at one end adjacent said guide plate, and a sheet feeding member mounted on said frame for vertical movement through said central opening so as to engage and drive sheets in said box through said slot and over said guide plate.

4. Apparatus for handling copy paper sheets comprising, in combination, a frame, a paper guide plate mounted in said frame, box support members in said frame extending toward said guide plate, a box with top and bottom panels interconnected by a pair of side panels and a pair of end panels positioned with said bottom panel on said support members, said side panels being shaped so that one of said end panels lies flatly against said guide plate, said top panel having a central opening, said top panel and said one end panel defining a slot at one end adjacent said guide plate, a sheet feeding member mounted on said frame for vertical movement through said central opening so as to engage and drive sheets in said box through said slot and over said guide plate, a housing mounted on said frame, a door in said housing permitting said box to be slid from the apparatus when the door is opened,

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and means interconnecting said door and said sheet feeding member so that opening said door raises said member clear of said box.

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