Feb. 22, 1966 C. L. RAUTBORD ET AL 3,236,168

COMBINED SHIPPING CONTAINER, TRAY AND PAPER GUIDE FOR PHOTOCOPY MACHINE OR THE LIKE

Filed May 22, 1963 2 Sheets-Sheet 1

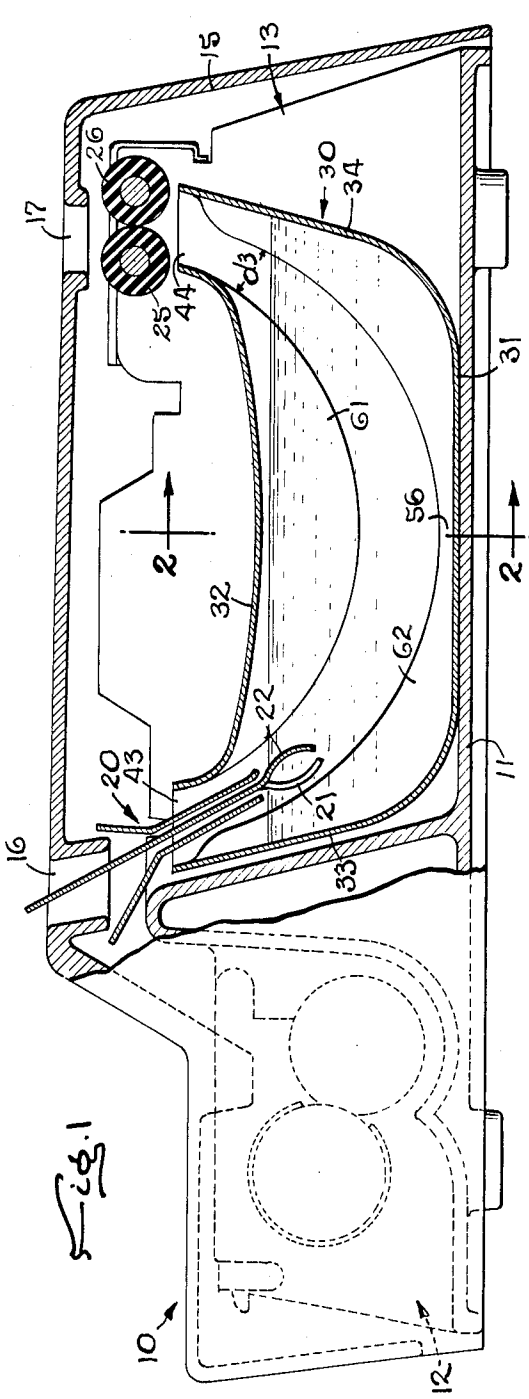


Fig. 1

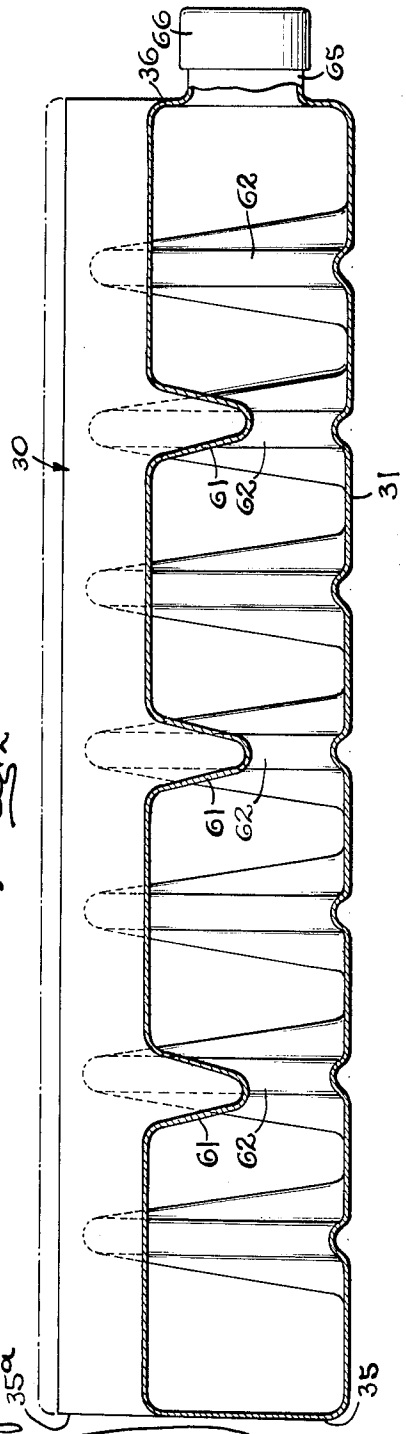


Fig. 2

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Fig. 3

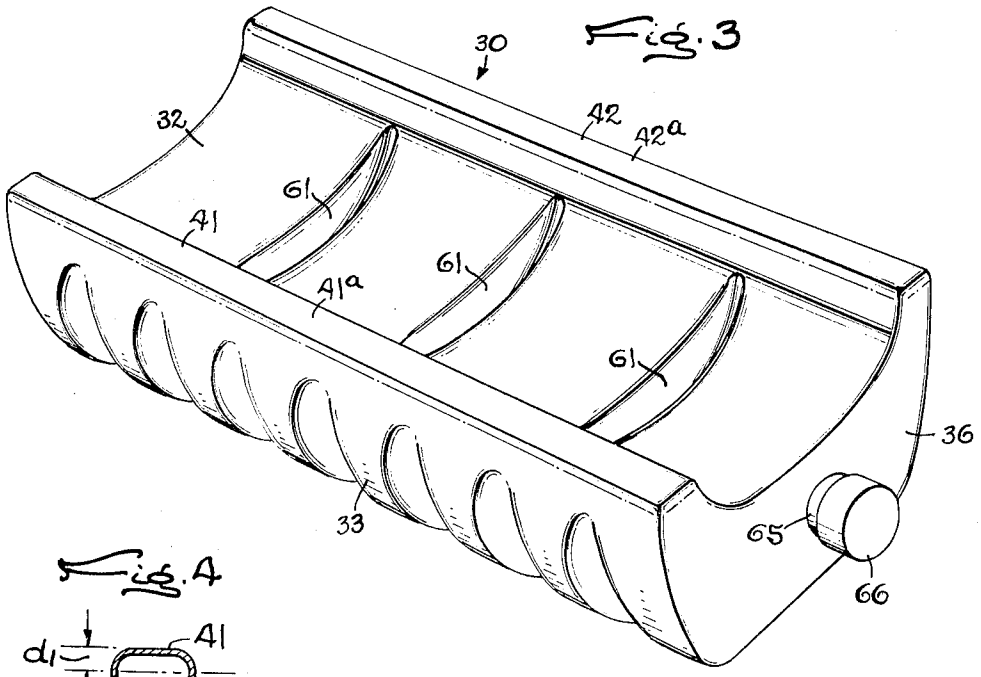


Fig. 4

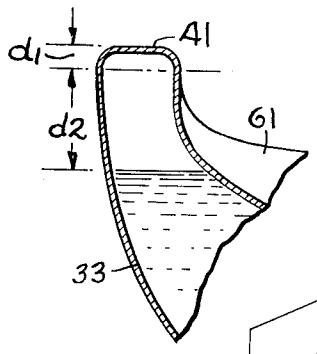
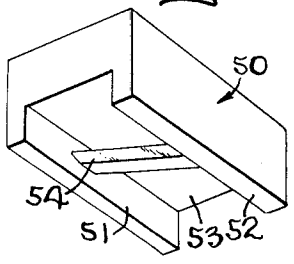


Fig. 5



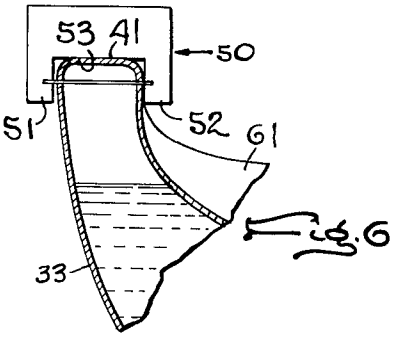
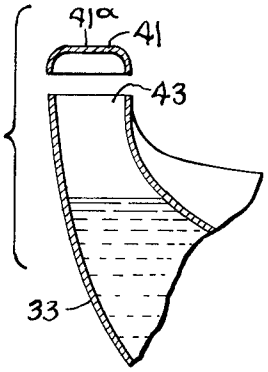


Fig. 6

Fig. 7



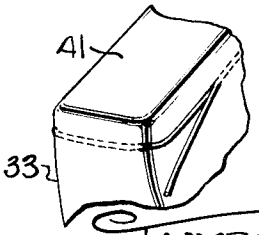


Fig. 8

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3,236,168

COMBINED SHIPPING CONTAINER, TRAY AND PAPER GUIDE FOR PHOTOCOPY MACHINE OR THE LIKE

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7 Claims. (Cl. 95—89)

The present invention relates to photocopy machines and more particularly to a novel shipping container and tray construction.

A reason which is believed to account for the failure of so-called "liquid" photocopy machines to maintain their original popularity is the reluctance of the office personnel to take care of the periodic replenishment and cleaning of the developer tray. This normally requires partial disassembly of the machine to free the tray, following which the spent liquid is discarded and the tray itself disassembled and flushed to remove any collected deposit at the bottom of the tray. The tray must be reassembled and measured amounts of liquid concentrate and water added before reinstallation, being careful throughout to avoid spillage on clothing, carpeting or desk top. Where a machine is in constant use, this procedure may have to be repeated as often as once a day or at least once every few days. The chore tends to be put off which degrades the quality of the copy and results in wastage of the photocopy paper.

Accordingly, it is an object of the invention to provide a novel container for the processing fluid which minimizes the maintenance required in a liquid-type photocopy machine. More specifically, it is an object of the invention to provide a novel container for the processing of liquid which serves as both a shipping container and disposable tray fitted directly into the photocopy machine and which thus avoids necessity for any pouring of liquids or water from one vessel to another and with no necessity for flushing or cleaning out the deposits which collect at the bottom of the tray. In a more specific aspect of the invention, it is an object to provide a combined shipping container and tray which includes a provision for guiding the photocopy sheets through the tray along a predetermined path from an inlet slot to an outlet slot.

It is another object of the present invention to provide a combined shipping container and tray for processing liquid in which the container is securely sealed against leakage during shipment but which may be easily and quickly opened at the time of use to expose the sheet entry and exit slots and which, moreover, insures that such slots are at the proper level and position so as to insure a proper fit in the machine, and efficient cooperation with the sheet driving rollers or the like.

It is, moreover, an object of the present invention to provide a combined shipping container and tray which may be economically blow-molded of polyethylene plastic or the like at a cost which only slightly exceeds that of a conventional polyethylene bottle of the same fluid capacity.

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

FIGURE 1 is an elevation of a photocopy machine broken away to show the improved container and tray in transverse section.

FIG. 2 is a longitudinal section taken through the container and tray and looking along the line 2—2 in FIG. 1.

FIG. 3 is a perspective showing a container in the condition in which it is shipped and prior to opening it for use.

FIG. 4 is a fragmentary elevation showing one side of the container and the level of the liquid therein.

FIG. 5 shows a cutting tool used in practicing the invention.

FIGS. 6 and 7 are similar to FIG. 4 but showing the container during and following the cutting operation.

FIG. 8 is a fragmentary view of an alternate scheme for opening the inlet and outlet slots.

While the invention has been disclosed in connection with a preferred embodiment, it will be understood that the invention is not limited thereto but includes the various modifications and alternative constructions included within the spirit and scope of the appended claims.

Turning now to the drawings, FIG. 1 shows a popular type of photocopy machine in which the present invention may be utilized. For the details of the machine, cross reference is made to copending Eisner et al. application, Ser. 77,084, filed December 20, 1960, now Patent No. 3,148,611. It will suffice to say that the machine, indicated at **10**, has a frame **11** mounting an exposing mechanism **12** along the front edge of the machine and a developing compartment **13** along the rear edge, the mechanism and compartment being enclosed by a cover **15** molded of suitable plastic having a transversely extending sheet entryway **16** and sheet outlet **17**. Positioned within the inlet **16** is a sheet separator **20** including rows of sheet separator fingers **21**, **22** insuring that two sheets, namely a transfer sheet and copy sheet, when fed in face to face, will be separated adequately to insure entry of developing fluid between them. Arranged adjacent the exit **17** are resilient expeller rolls **25**, **26** which are power rotated for expelling the sheets and which are pressure loaded so as to force the sheets into all-over contact while wringing out any excess developing fluid.

In accordance with the present invention, a container is provided for the processing fluid which is of elongated, trough-like construction normally sealed for shipment but having ridges extending along the outer edges thereof which are severed to define upwardly facing inlet and outlet slots and with the internal surface of the container being formed to provide upper and lower sets of spaced internal ribs defining an arcuate passageway for the sheets which smoothly interconnects the two slots. Thus, as shown in the first three figures of the drawings, we provide a liquid container **30** having a base wall **31**, a top wall **32**, side walls **33**, **34** and end walls **35**, **36** which have been separately identified for purposes of later discussion but which are all formed integrally by blow-molding or the like. Preferably, the top wall **32** is recessed, or trough-like so that it defines, along the lateral edges of the container, and in conjunction with the side walls, a pair of upraised ridges **41**, **42** which preferably lie in a common plane and which may be readily severed, by a cutting tool or the like, to form an inlet slot **43** and an exit slot **44**.

In accordance with one of the aspects of the invention, the ridges **41**, **42** are preferably formed to provide convenient guide or reference surfaces **41***a*, **42***a* for a cutting tool, being flat in the present instance. Thus, as shown in FIG. 5, a cutting tool or rider **50** is provided of inverted channel-shape having sides **51**, **52**, and a riding surface **53**. Bridging the sides **51**, **52** and spaced downwardly a predetermined distance from the surface **53** is a cutting blade **54** which is preferably mounted at an angle to provide a progressive shearing action. It will be apparent, then, that when preparing the container for use, the cutting tool **50** is simply seated at one end of one of each of the ridges and swept to the opposite end in a continuous motion. The removed cap portions of the ridges are, of course, discarded.

When the container is originally charged with liquid at the factory, the container is not completely filled but filled only to a level which will establish an optimum clearance distance at the inlet and outlet slots. Thus, with the knife spaced downwardly a distance d_1 from the reference surface as shown in FIG. 6, a clearance distance d_2 is established which is sufficiently great as to minimize possibility of spillage when the container is installed in the machine. Moreover, no reliance need be placed upon the user to pour in just the right amount of liquid or to mix liquids to secure proper concentration.

In accordance with one of the aspects of the invention, upper and lower sets of arcuately shaped reinforcing ribs are provided within the container to define a sheet passageway of substantially constant dimension which extends along an arcuate path adjacent the base wall of the container smoothly joining the inlet and outlet slots. Preferably such ribs are produced as an integral part of the container by molding in portions which are smoothly reentrant. Thus, in the present instance, the top wall **32** of the container is reentrantly formed with transverse ribs **61** of convex profile while the base and side walls are formed with reentrant cooperating ribs **62** having a concave profile and which together define a radial clearance space d_3. Such space is preferably somewhat less than the width of the inlet and outlet slots.

While the container may be made of relatively thin flexible plastic, and while the walls of the container are fairly extensive, nevertheless the container is self-supporting, strong and rigid. Taking the top surface **32** by way of example, a total of three ribs may be formed therein at equally spaced intervals; as a result of this and the trough contour, there is no "sagging" when the container is being used as a tray, nor any possibility of bulging when the container stands vertically during shipment. Similarly, the ribs **62** formed in the bottom and side walls serve not only to rigidify these walls but to strongly brace them with respect to one another so that the structure is much stronger than the total weight of plastic might indicate. The ribs **62** preferably "clear" the bottom of the container by a small amount **56** to provide space for the collection of any sediment or deposit and to insure that the sheets are maintained in upraised position in the clear liquid. The rigidity provided by the ribs is particularly important after the tops of the ridges have been removed since the top wall **32** is thereafter only attached at its ends.

For purposes of filling and shipment, a filling neck **65**, preferably threaded, is integrally molded in the end **36** of the container while the end **35** is made flat in order to permit the container to be stood on end. In this connection, it may be noted that the surfaces **35***a* at the ends of each of the ridges **41, 42** provide substantial "outboard" support so that the container is free from any tendency to tip in either direction when vertical. After filling to the desired level, the container may be permanently sealed by any desired means, as by a screw cap **66**.

While the invention has been discussed in connection with the use of a specially constructed knife **50** for removing the tops of the ridges, thereby to form the inlet and outlet slots, it will be understood that the invention is not limited to the use of a knife for this purpose and any means utilized in the art relating to plastic containers may be used to cut through or strip away the unwanted ridges. For example, as shown in FIG. 8, a suitable wire or tear strip may be molded in place for manual tearing away just prior to use. As a practical matter, however, it is found that the disclosed knife is quick and positive and insures complete severing. The particular stripping means will depend to some extent upon the type of plastic used. It is preferred to use low density polyethylene since this has the proper combination of resiliency combined with firmness and ease of cutting by a sharp blade.

While the features and advantages of the container will be apparent from the above discussion, a typical use cycle is as follows. A series of containers standing vertically, and with caps removed, may be fed through a filling machine in exactly the same manner as conventional containers of cylindrical shape. Filling to the proper level is accomplished automatically, caps are applied, and the containers are stacked in cartons for shipment. Simple, unreinforced and unlined cartons may be employed for this purpose. At point of use, the housing is lifted from the machine and the old container or tray, and its spent fluid, is simply discarded without necessity for flushing or cleaning. The new container is placed on its base as shown in the drawings and the knife is applied with a single sweeping motion along each of the ridges **41, 42** thereby converting the device from a shipping container to a tray having inlet and outlet slots. The tray, which is adequately rigid even in the opened state because of the trough shape and re-entrant ribbing, is lowered into position, following which the housing is replaced and the machine is instantly ready for use. It is not necessary at any point for the operator to come in contact with, or handle, the processing liquid. Moreover, since only the tops of the ridges are removed and since an adequate clearance space is provided above this level, there is no danger of splashing or spillage. In the event the operator should inadvertently tip the open tray endwise, the integral ribs act as effective baffles to prevent sloshing of the liquid from end to end. Thus, for the first time, liquid replenishing in photocopy machine may be accomplished without necessity for transferring liquid to or from liquid containers. This tends to insure that the machine will be replenished promptly when required and insures use of fresh fluid at just the proper concentration to obtain optimum results. It will be apparent, in view of the above, that if desired, the combined container and tray could be charged with concentrate to reduce shipping expense and with instructions to the operator to add water up to a prescribed "fill" line while maintaining all of the other features and advantages of the device.

While the term "of substantially constant dimension" has been used in the claims which follow in reference to the copy sheet passage, it will be understood that the degree of constancy is such as will assume smooth guidance to the outlet slot.

We claim as our invention:

1. A combined shipping container, processing tray and paper guide for a photocopy machine or the like which comprises a hollow liquid container of elongated, trough-like construction having a base ball, a top wall, side walls and end walls, said top wall being centrally recessed to define, at the junctions with the side walls, upraised ridges running the length of the container and capable of being severed from the container along a generally horizontal plane to define upwardly facing inlet and outlet slots, the walls of said container being formed with integral re-entrant portions providing upper and lower sets of longitudinally spaced internal ribs defining an arcuate paper passage which extends adjacent the base wall of the container and which is of substantially constant dimension along its length free of obstruction smoothly interconnecting the inlet slot and the outlet slot.

2. A combined shipping container, processing tray, and paper guide for a photocopy machine or the like which comprises a hollow liquid container of elongated trough-like construction having a base wall, a top wall, side walls and end walls, said container defining longitudinally extending slots at the junctions between the top wall and the side walls together with removable cover means integral with the container for maintaining the same sealed during shipment, the walls of said container providing upper and lower sets of longitudinally spaced internal ribs defining an arcuate paper passage which extends adjacent the base wall of the container and which is of substantially constant dimension along its length free of obstruction smoothly interconnecting the inlet slot and the outlet slot.

3. A combined shipping container, processing tray, and paper guide for a photocopy machine or the like which comprises a hollow liquid container of elongated trough-like construction having a base wall, a top wall, side walls and end walls, said container defining longitudinally extending slots at the junctions between the top wall and the side walls together with removable cover means integral with the container for maintaining the same sealed during shipment, the walls of said container being formed with integral re-entrant portions providing upper and lower sets of longitudinally spaced internal ribs defining an arcuate paper passage which extends adjacent the base wall of the container and which is of substantially constant dimension along its length free of obstruction smoothly interconnecting the inlet slot and the outlet slot.

4. A combined shipping container, processing tray, and paper guide for a photocopy machine or the like which comprises a hollow liquid container of elongated, trough-like construction having a base wall, a top wall, side walls and end walls, said top wall being centrally recessed to define, at the junctions with the side walls, upraised ridges running the length of the container and capable of being severed from the container to define upwardly facing inlet and outlet slots, the walls of the container providing upper and lower sets of longitudinally spaced internal ribs defining an arcuate paper passage which extends adjacent the base wall container and which is of substantially constant dimension along its length free of obstruction and smoothly interconnecting the inlet slot and outlet slot, the top longitudinal surfaces of said ridges being smoothly continuous to define a reference plane for a knife employed in the severing thereof from the body of the container.

5. In a combined shipping container, a processing tray, and paper guide for a photocopy machine or the like which comprises a hollow container of elongated, trough-like construction having a base wall, top wall, side walls and end walls, said top walls being centrally recessed to define at the junction with the side walls upraised ridges running the length of the container, means for horizontally severing said ridges to provide inlet and outlet slots at a level which is downwardly spaced from the tops of the ridges but which is above the top wall of the container, said container being filled with processing liquid to a level which is below the severing level to permit severing while minimizing one possibility of spillage of liquid, said container having upper and lower sets of longitudinally spaced internal ribs defining an arcuate paper passage smoothly interconnecting the inlet slot and the outlet slot for guidance of paper through the container.

6. A combined shipping container, processing tray, and paper guide for a photocopy machine or the like which comprises a hollow liquid container of elongated trough-like construction having a base wall, a top wall, side walls and end walls, said top wall being centrally recessed to define, at the junction with the side walls, upraised ridges running the length of the container, severing means including a rider having a groove conforming to the ridges to define a ridge-engaging surface together with a knife spaced downwardly from said surface so that when the rider is slid along said ridges the top portions of said ridges are cut off along a severing plane to open inlet and outlet slots, the interior of said container being formed to provide upper and lower sets of longitudinally spaced internal ribs defining an arcuate paper passage which extends from the inlet slot to the outlet slot and adjacent the base wall of the container for guiding paper fed into said inlet slot.

7. A combined shipping container, processing tray, and paper guide for a photocopy machine or the like which comprises a hollow liquid container of elongated construction having a base wall, a top wall, side walls, and first and second end walls, said top wall being trough-like and centrally recessed to define, at the junctions with the side walls, upraised ridges running the length of the container and capable of being severed from the container along a horizontal plane to define upwardly facing inlet and outlet slots, the interior of the container having upper and lower sets of longitudinally spaced internal ribs defining an arcuate paper passage of substantially constant cross section extending smoothly between the inlet and outlet slots and adjacent the base wall of the container, said first end wall having a filler opening with means for normally closing the same, and said second end wall being flat to enable said container to be stood on end during filling and shipment.

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