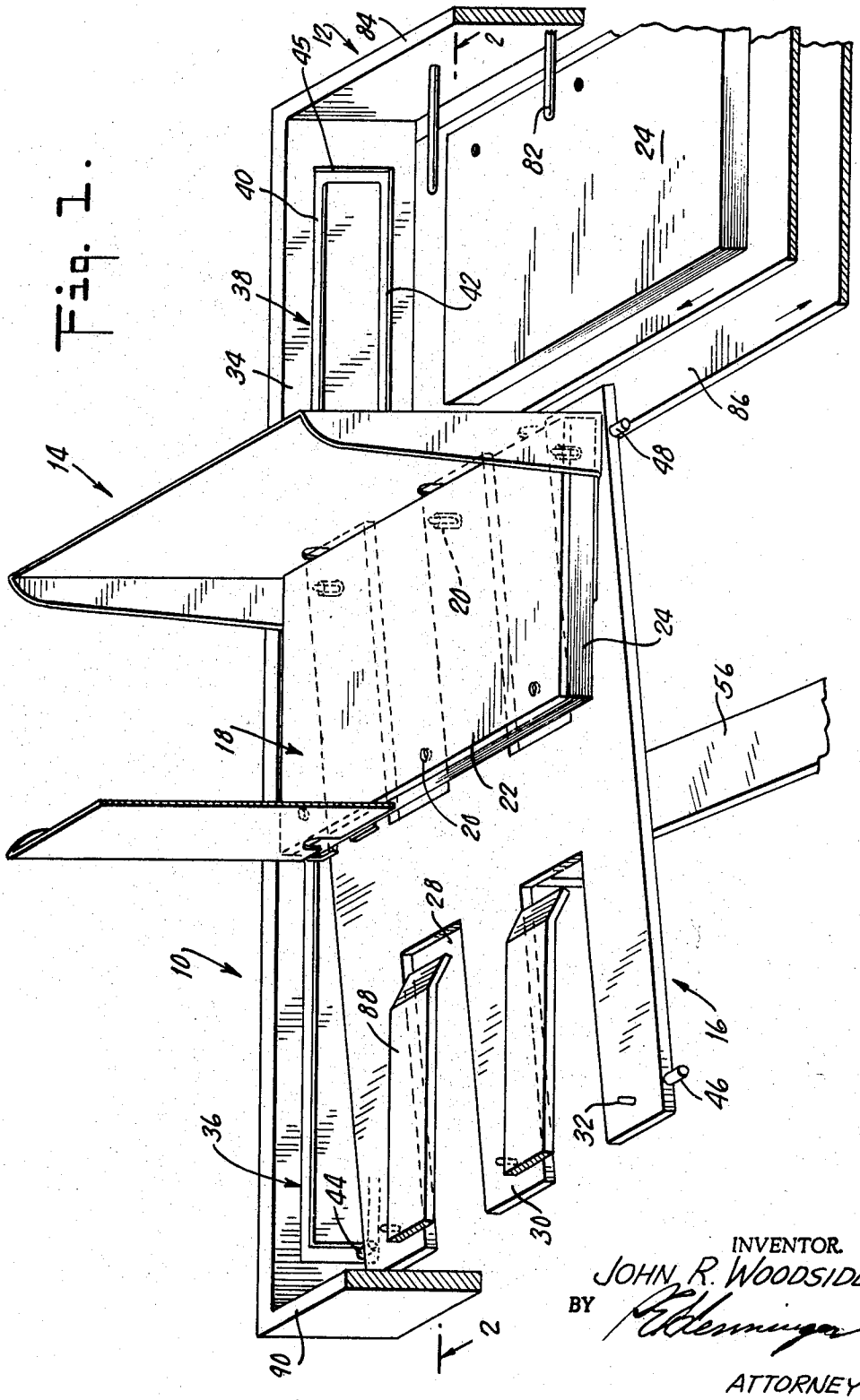
Dec. 30, 1969 J. R. WOODSIDE 3,486,639

SHEET DISPENSING APPARATUS

Filed Dec. 29, 1967 2 Sheets-Sheet 1

Fig. 1.



INVENTOR.
JOHN R. WOODSIDE
BY
ATTORNEY

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SHEET DISPENSING APPARATUS

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Fig. 2.

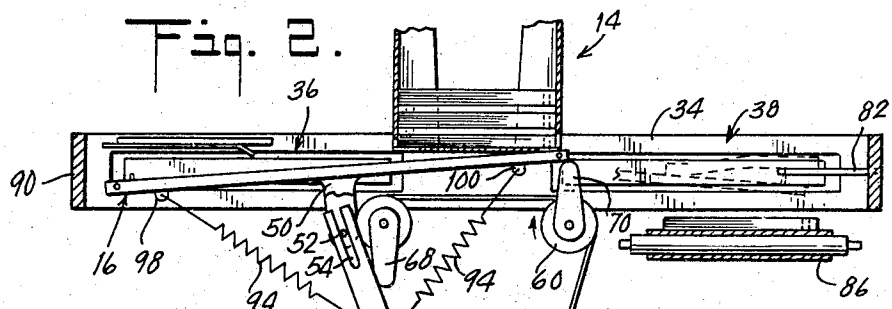


Fig. 3.

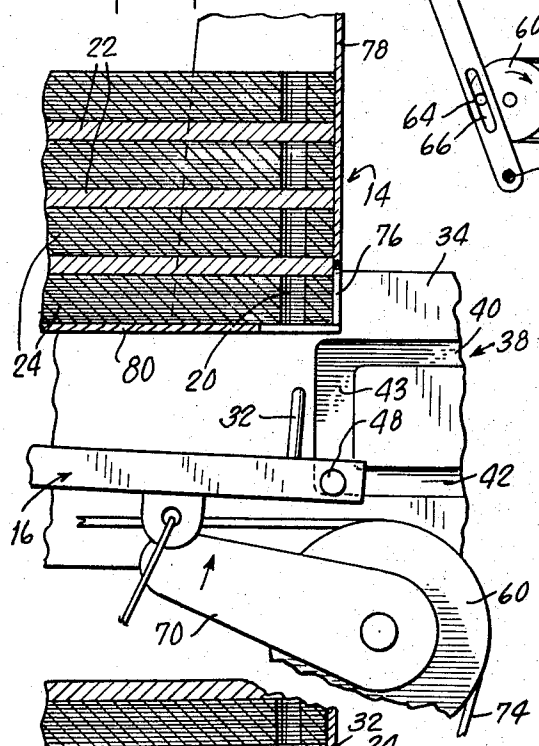
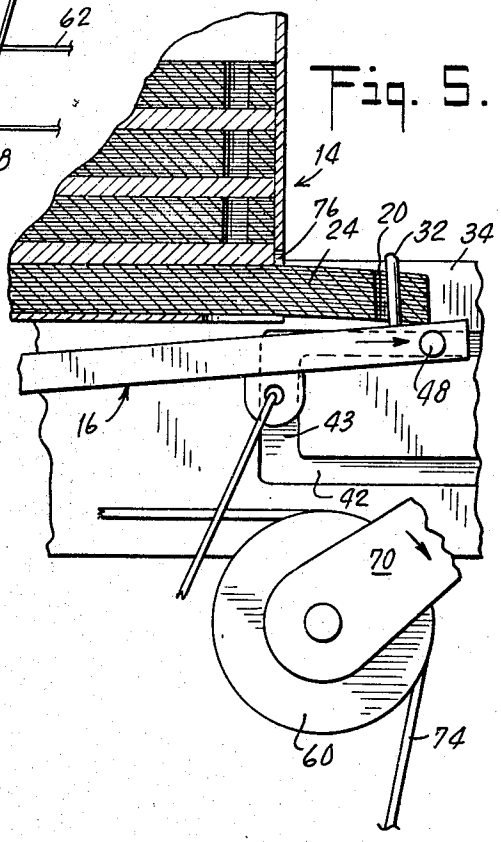


Fig. 5.



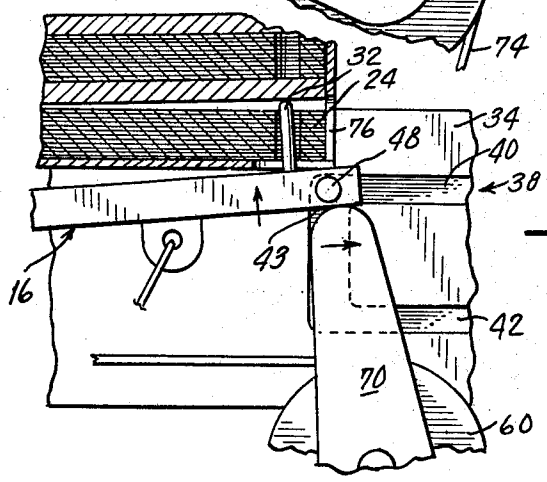


Fig. 4.

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3,486,639

SHEET DISPENSING APPARATUS

John R. Woodside, Orient Point, N.Y., assignor to Pageprint Systems, Inc., New York, N.Y., a corporation of New York

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Int. Cl. B65h 3/22
U.S. Cl. 214—8.5 9 Claims

ABSTRACT OF THE DISCLOSURE

A sheet dispenser having a hopper for holding a stack of sheets of the same size in which alternate sheets have apertures only along opposite edges is associated with a sheet transport cradle mounted for horizontal reciprocation and vertical oscillation in respect to the hopper. Sheet aperture pins are spaced along opposite ends of the cradle for engaging the respective sheet apertures. The cradle is reciprocated to alternately align the pins at the ends of the cradle with the apertures along the respective edges of the sheets in the hopper. When the pins are alternately so aligned, elevating cams raise the end of the cradle to engage the pins with the sheet apertures so that upon further reciprocation of the cradle, a sheet, or set of sheets, will be withdrawn from the hopper.

The invention can be more fully understood by reference to the following detailed description when read in light of the drawings. In the drawings, like reference numerals indicate like parts, and:

FIG. 1 is a fragmentary perspective view of the sheet dispenser;

FIG. 2 is a view on line 2—2 of FIG. 1, parts being shown in cross section and others in full lines;

FIG. 3 is a fragmentary view at one edge of a sheet hopper showing the position of sheet transport elements at an initial stage of a sheet dispensing operation;

FIG. 4 is a view similar to that of FIG. 3, showing, however, an advanced stage of the operation; and

FIG. 5 is a view similar to that of FIG. 3, showing the stage of the sheet dispensing operation as a stack of sheets are being withdrawn from the hopper.

The sheet dispenser **10** consists of a framework or table **12** with which is associated a sheet hopper **14** and in which is mounted a transport cradle **16** which is adapted to reciprocate in a horizontal plane and oscillate in a vertical plane within the table **12** and in relation to the fixed hopper **14**.

It is contemplated that the hopper **14** will receive a stack of sheets **18** which are coextensive in size and in which alternate sheets have apertures **20** only along opposite marginal edges thereof.

The invention is usefully employed wherein alternate sheets **22** of the stack **18** have a sufficient thickness to be engaged at its marginal apertures by sheet engaging means. One useful application of the invention has been to dispense sets **24** of printed sheets which have a plurality of equally spaced apertures **20** along one marginal edge thereof, e.g. along the right marginal edge as viewed in FIG. 1. When so employed, the alternate sheets **22** will have a substantial thickness such as provided by cardboard, and these sheets will have their apertures **20** equally spaced along the opposite edge thereof, e.g. along the left marginal edge as viewed in FIG. 1.

The foregoing arrangement of sheets or sets of sheets in the hopper **14** adapts alternate sheets for transport in opposite directions by the transport cradle **16**. The transport cradle **16** is a platform-like structure which is mounted for operation under and in conjunction with the hopper **14** which is fixed to the sheet dispenser **10**. Opposite ends

of the transport cradle have a plurality of spaced slots **28** extending through the edge thereof thus constituting the opposite ends of the cradle a rake-like structure **30**. Each finger of the rake-like structure carries sheet aperture engaging means which in the specific case illustrated in the drawing comprise upstanding sheet engaging pins **32**. These pins are so located at the opposite ends of the transport cradle as to be in registration respectively with the marginal sheet apertures **20** when the cradle is reciprocated to a position in which the sheet aperture engaging pins are under the sheet apertures, as shown in FIG. 3. If now the cradle is vertically oscillated to engage the pins with the respective sheet apertures, as suggested in FIG. 4 of the drawings, the pins will engage in the sheet apertures so that upon reciprocation of the cradle a sheet or stack of sheets will be removed from the hopper, as shown in FIG. 5 of the drawings.

A guide groove configuration is provided for each end of the cradle, each comprising a rectangular guideway which will permit the transport cradle to reciprocate as a whole to oscillate at each extremity of the cradle stroke. Specifically, by reference to FIG. 1, one of these guideways **36** accommodates the laterally extending guide pin **44** at the left of the cradle and the other guideway **38** accommodates a pin like the pin **48** at the right end of the cradle. Corresponding guideways are formed in the longitudinal dispenser frame at the opposite side of the device.

The specific nature of the guideways can be seen by reference to FIGS. 1 and 3, wherein the guideway **38** has an upper horizontal guide groove **40** and a parallel lower horizontal guide groove **42**. The opposite extremities of these horizontal guide grooves are connected by vertical end grooves **43** and **54** (FIG. 3).

The mechanism for controlling the transport cradle **16** is best shown in FIG. 2 of the drawings, wherein it is seen that a bracket **50** extends downwardly from the lower face of the cradle. This bracket provides a pin **52** which is engaged in a slot **54** in the upper end of an oscillating arm **56**. The oscillating arm **56** is adapted to rock on a pivot shaft **58** at its lower end.

In order to oscillate the arm **56**, there is provided a drive pulley **60** which may be driven in any suitable way as by a drive belt **62**. Eccentrically mounted on the drive pulley is an eccentric pin **64** engaged in a slot **66** formed in the oscillating arm **56**. It can be seen, therefore, that as the oscillating arm **56** is rocked to and fro on its pivot **58**, its engagement with the pin **52** will cause the transport cradle **16** to reciprocate horizontally in respect to the hopper **14** in a path determined by the upper and lower grooves of the guideways.

When the transport cradle has been reciprocated to an extreme position in which the pins at one end thereof are in alignment with the sheet apertures along one marginal edge of the sheets (FIG. 3), it becomes necessary to elevate that end of the cradle to engage the pins thereon with the sheet apertures. For this purpose, a pair of oppositely rotating cradle lifting cams **68** and **70** have been provided.

Assuming that the transport cradle **16** is in its extreme position toward the left, as shown in FIGS. 1 and 2, the guide pins **48** at that end of the cradle will be at the bottom of the vertical end groove **43** (FIG. 3), while those at the opposite end of the cradle will be aligned with the upper horizontal guide groove of the guideway **36** such that the sheet engaging pins **32** are in alignment with the sheet apertures **20**, assuming the position shown in FIG. 3. As the cradle lifting cam **70** is now rotated, e.g. in clockwise direction by any suitable means, such as a drive belt **72** engaged with the drive pulley **60** and a cam drive pulley **74**, the cam **70** will engage the bottom face of the transport cradle and lift the right end of the cradle

upwardly so that the sheet engaging pins **32** will engage the sheet apertures **20** in the first set of sheets **24**.

As the transport cradle is now reciprocated to the right by the oscillating arm **56** with the laterally extending guide pins **48** in the upper guide groove **40** of the guide groove system and the guide pins **44** and **46** at the opposite end of the cradle in the lower guide groove of the guideway **36**, the set of sheets **24** will be withdrawn from the hopper through a slot **76** therein formed between the lower edge of the hopper wing **78** and its bottom **80**. This is the position of the mechanism and the lower stack of sheets shown in FIG. 5.

When the stack of sheets **24** is carried to the extreme right by the transport cradle, the cradle will again be permitted to oscillate by the vertical end grooves of the guideways, such that the edge of a set of sheets will be engaged by a plurality of sheet stripping pins **82** (FIG. 1 and FIG. 2) extending inwardly from the end wall **84** of the dispenser frame. As the end of the transport cradle recedes, the sheet stripping pins **82** will hold the set of sheets sufficiently long to permit complete disengagement of the sheet engaging pins from the sheet apertures, so that as the transport cradle is retracted toward the left, the sheets **24** may drop to a conveyor **86**, or some other suitable collecting surface or mechanism.

As the set of sheets are carried to the right, the sheet engaging pins at the opposite end of the transport cradle are brought into alignment with the apertures **20** of the alternate set of sheets or separators. The aperture engaging motion of the transport cradle is repeated and the alternate sheet set or separator is withdrawn from the hopper in the opposite direction where they may be stripped from the cradle and deposited onto a receiving surface, such as the conveyor **86**, if desired, or on some alternate structure, such as separator trays **88** (FIG. 1). The separator trays **88**, like the sheet stripping pins **82**, may extend inwardly from the end wall **90** of the dispenser frame, and these trays, like the sheet stripping pins **82**, are located to register with the transport cradle slots **28**, permitting full freedom of movement of the transport cradle as it is oscillated at the extremes of its travel.

A pair of bias springs **92** and **94** (FIG. 2) are connected to a stud **96** extending from a face of the oscillating arm **56**. The bias spring **92** has its other end attached to a bracket **98** near one end of the transport cradle while the bias spring **94** has its opposite end attached to a bracket **100** near the opposite end of the cradle. These springs are under tension and tend to bias the respective ends of the cradle downwardly. This insures that the cradle will oscillate when its laterally extending guide pins are in the respective vertical end grooves of their guideways.

It can be seen from the foregoing that the invention provides a sheet dispenser having a hopper for holding a stack of sheets in which alternate sheets have apertures spaced along opposite marginal edges thereof in combination therewith a sheet transport cradle mounted for horizontal reciprocation and vertical oscillation in respect to the hopper for removing alternate sheets or set of sheets from the hopper. The sheet aperture engaging pins at opposite ends of the cradle permit engagement of marginal apertures in the sheets within the hopper such that as the cradle is reciprocated to alternately align the pins at opposite ends of the cradle with sheet apertures along the opposite edges of sheets in the hopper, the cradle oscillating cams insure positive engagement between the sheet engaging pins and the sheet apertures such that the cradle will deliver alternate sheets or sets of sheets in opposite directions as it is reciprocated.

While the fundamentally novel features of the invention have been illustrated and described in connection with a specific embodiment of the invention, it is believed that this embodiment will enable others skilled in the art to apply the principles of the invention in forms departing from the exemplary embodiment herein.

What I claim is:

1. A sheet dispenser comprising a hopper for holding a stack of sheets of coextensive size in which alternate sheets have apertures only along opposite marginal edges thereof, a sheet transport cradle mounted for horizontal reciprocation and vertical oscillation in respect to said hopper, sheet aperture engaging means at opposite ends of said cradle for engaging marginal apertures in sheets within said hopper, means for reciprocating said cradle to alternately align said sheet aperture engaging means at one end of said cradle with sheet apertures along one edge of sheets in said hopper and thereafter said sheet engaging means at the other end of said cradle with sheet apertures along the other edge of sheets in said hopper, means elevating said sheet engaging means into engagement with sheet apertures when reciprocated into alignment therewith, and means for releasing an engaged sheet from said sheet aperture engaging means when carried away from said hopper during reciprocation of said cradle.

2. The mechanism of claim **1**, in which said sheet transport cradle is guided in its movement by laterally extending guide pins at each end thereof operating in guide slots.

3. The mechanism of claim **1**, in which said sheet aperture engaging means at opposite ends of said cradle comprises a plurality of spaced upstanding pins.

4. The mechanism of claim **1**, in which said means for elevating said sheet engaging means comprises cam mechanism adapted to engage the underface of said transport cradle.

5. The mechanism of claim **1**, in which said means for elevating said sheet engaging means comprises a pair of cam devices adapted to alternately engage the underface of said transport cradle at opposite ends thereof.

6. The mechanism of claim **1**, in which said means for releasing an engaged sheet comprises a plurality of spaced sheet stripping pins underlying said transport cradle at its limit of outward movement in a first direction.

7. The mechanism of claim **6**, in which said transport cradle is slotted to permit the same to move below said pins as the same is oscillated.

8. The mechanism of claim **1**, in which said means for releasing an engaged sheet comprises a plurality of spaced sheet supporting trays underlying said transport cradle at its limit of outward reciprocation in a second direction.

9. The mechanism of claim **1**, in which said transport cradle is driven in its guided movement by a pivoted oscillating arm.

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GERALD M. FORLENZA, Primary Examiner

G. F. ABRAHAM, Assistant Examiner

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198—223; 221—213, 252