March 24, 1964 L. D. SACRE 3,126,122

PAPER DISPENSER FOR USE WITH PHOTOCOPY MACHINE OR THE LIKE

Filed July 10, 1961 2 Sheets-Sheet 1

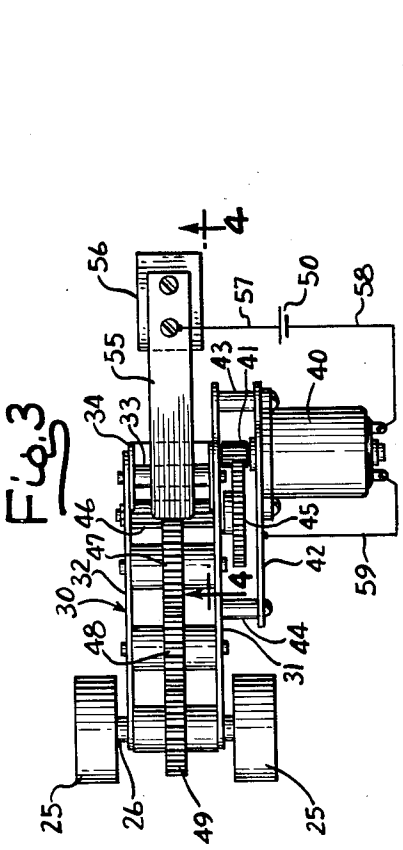


Fig. 3

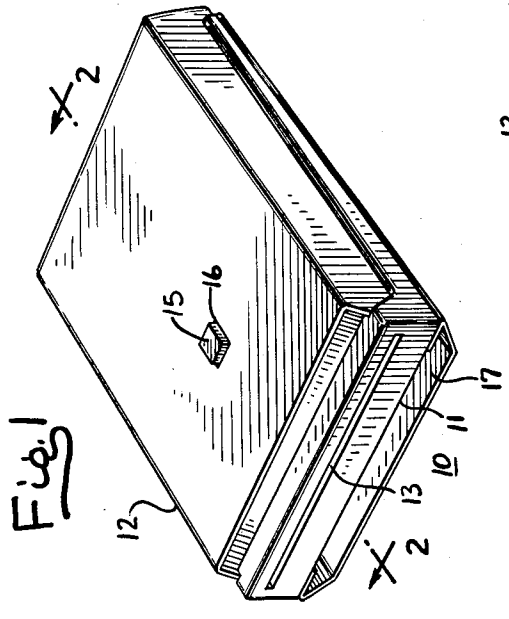


Fig. 1

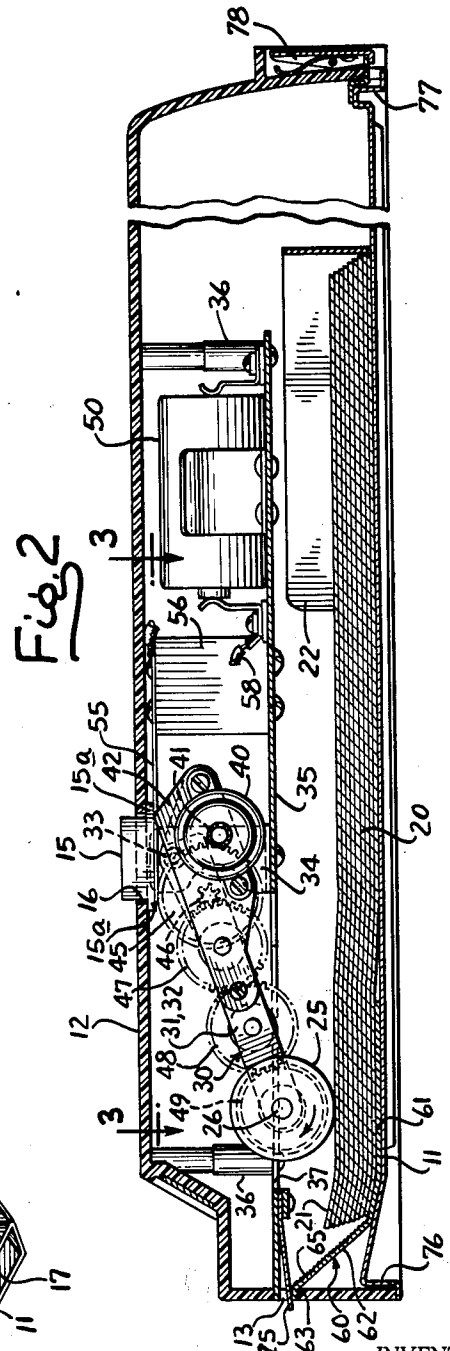


Fig. 2

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Fig. 6a

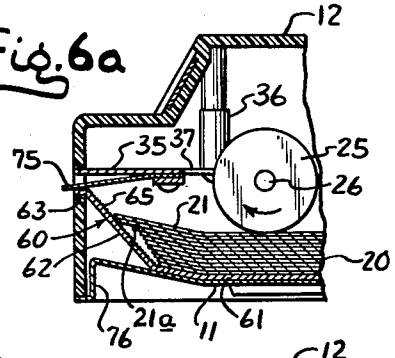


Fig. 6b

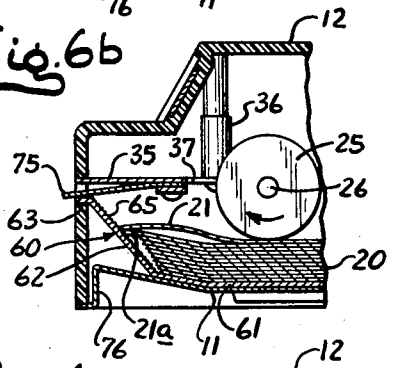


Fig. 6c

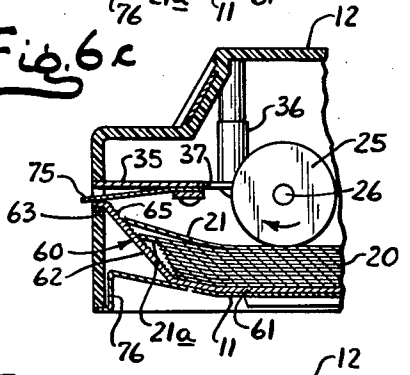


Fig. 6d

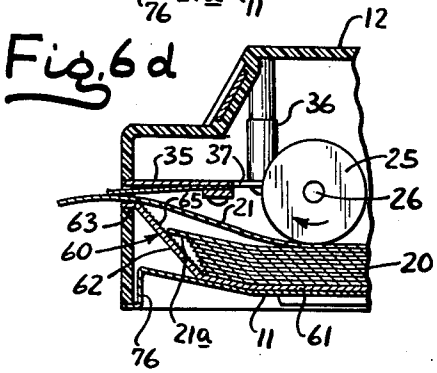


Fig. 4

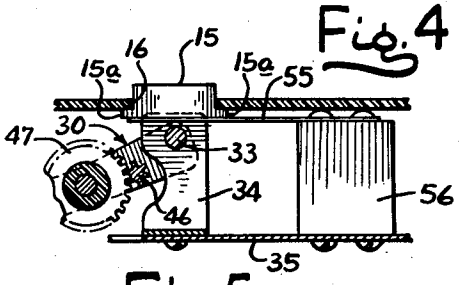


Fig. 5

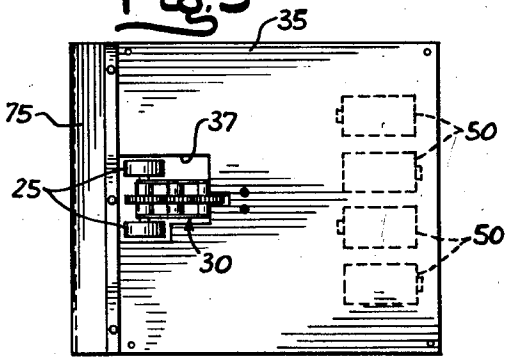


Fig. 7

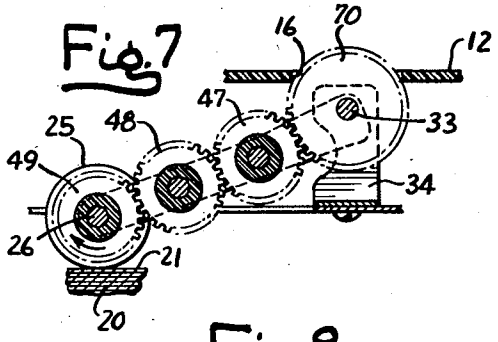
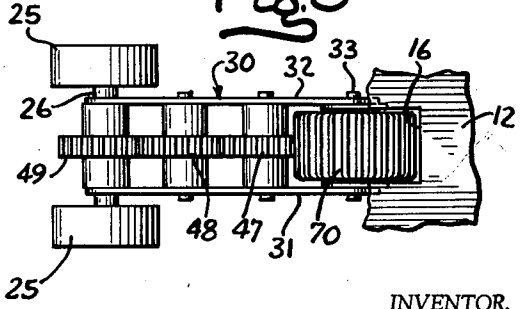


Fig. 8



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3,126,122

PAPER DISPENSER FOR USE WITH PHOTOCOPY MACHINE OR THE LIKE

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Filed July 10, 1961, Ser. No. 122,829
6 Claims. (Cl. 221—41)

The present invention relates to paper dispensers and more particularly to a device for storing light sensitive paper and for dispensing it sheet by sheet.

It is an object of the invention to provide a dispenser which is capable of feeding sheets from a light-tight enclosure, one by one, at the touch of a button. It is another object to provide a dispenser which has a novel electric driving arrangement but which is nevertheless light and portable with no line cord to plug in and no necessity for using the dispenser near a wall outlet.

It is another object of the invention to provide a dispenser for feeding sheets of coated paper from a mill-cut stack and which insures that only the top sheet of the stack will be fed, thereby preventing the wastage of paper and inconvenience of feeding two or more sheets at a time. In this connection it is an object to provide a device which is positive and reliable in operation but which is nevertheless simple, avoiding the relatively complex feeding devices which have been used in the past to avoid "double document" condition.

It is a further object of the present invention to provide a feeding mechanism for operation by flashlight batteries or the like which is highly efficient in operation, having minimum battery drain, so that thousands of sheets may be discharged before replacement of the batteries becomes necessary. It is one of the features of the present device that the electrical feeding mechanism is required to move the top sheet through a displacement of only an inch or so, i.e., until the front edge can be grasped by the fingers of the operator, so that only a short pulse of energy is required from the battery at each actuation.

It is another object of the device to provide a paper dispenser which is easy to load, notwithstanding the automatic electrical discharge feature, with the paper driving mechanism being recessed and largely hidden in the cover of the device and brought automatically into engagement with the top sheet when the cover is replaced following replenishment of the paper. Consequently the dispenser may be reloaded by office help who are untrained and unfamiliar with the construction and operation of the dispenser.

It is still another object of the present invention to provide an electric pushbutton operated paper dispenser which may be converted from electrical to manual operation simply by removing the motor and pushbutton and by substituting, in the same mechanism, a fingertip operated gear which projects through the button opening in the cover of the device. Thus it is an object to provide a novel paper dispenser having an electric-manual option and in which the housing and driving arrangement are completely interchangeable, making for a high degree of economy of manufacture.

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

FIGURE 1 is a perspective at reduced scale showing the external appearance of the paper dispenser constructed in accordance with the present invention;

FIG. 2 is a vertical section taken through the machine along the line 2—2 in FIG. 1;

FIG. 3 is a top view of the electrical driving mechanism looking along the line 3—3 in FIG. 2;

FIG. 4 is a fragmentary section taken along the line 4—4 in FIG. 3;

FIG. 5 is a view at reduced scale showing the underside of the dispenser cover;

FIGS. 6*a*, 6*b*, 6*c* and 6*d* are fragmentary stop motion views showing the manner in which the device strips off the upper sheet of the stack;

FIG. 7 is a fragmentary side view showing the manual version of the present device; and

FIG. 8 is a top view, shown fragmentarily of the device disclosed in FIG. 7.

While the invention has been described in connection with certain preferred embodiments, it will be understood that the invention is not necessarily limited thereto but it is intended to cover the various alternative and equivalent constructions included within the spirit and scope of the appended claims.

Turning now to the drawings, there is shown in FIG. 1 a paper dispenser **10** having a light-tight housing made up of a base **11** and cover **12**. At the front of the cover is an ejection slot **13**. Conveniently available in the top surface of the cover is an ejection control **15** fitted into an opening **16**. The device is so arranged that operation of the control **15** causes the discharge of a single sheet of paper from the ejection slot. The device is particularly adapted for storing the negative paper used in the transfer diffusion photocopy process which must be kept in substantial darkness until time of use. In practice, a tray **17** may be secured to the underside of the base **11** to hold the positive paper which is used in the same process.

Referring next to FIG. 2 which shows a cross section of the machine and to FIG. 3 which is a top view of the ejecting mechanism, a stack of sheets **20** having a top sheet **21** rests upon the base **11** being held in the position shown by paper guides **22** which are adjustably secured to the base and the adjustment of which depends upon the size of the sheets. Resting upon the top sheet **21** is an ejection roller **25** which is preferably formed of gum rubber or other resilient material. In the present instance the ejection roller **25** is formed in two sections which are secured to the opposite ends of a shaft **26**. For the purpose of mounting the roller **25** for vertical movement and with the roller biased against the top sheet, a roller arm **30** is provided which consists of two parallel arm members **31, 32** spaced from one another and which are pivoted at the upper end on a transverse pivot **33**. The arm is of such length that it normally occupies a downwardly angled position. To support the pivot a bracket **34** is used which is preferably mounted upon a platform **35** nested within the upper portion of the cover on posts **36**. A clearance opening **37** is formed in the platform through which the ejection roller and the lower portion of the arm **30** may project.

For the purpose of driving the ejection roller **25**, an electric motor is mounted upon the arm **30** for bodily movement therewith and coupled to the roller through a step-down driving connection. In the present instance the motor, indicated at **40** and having a driving pinion **41**, is secured to an outboard bracket **42** which is secured to the arm **31** on posts **43, 44**. To provide speed stepdown the pinion **41** meshes with a gear **45** having an integral pinion **46**. For transferring the rotative power from the pinion **46** to the roller **25**, a series of nylon gears **47, 48, 49** are used mounted between the arm members **31, 32**, the gear **49** being pinned or otherwise secured to the shaft **26** which mounts the roller. In order to control the pressure of the rubber roller **25** upon the sheet **21** so that it is limited to an ounce or so, the motor **40** is preferably mounted adjacent the horizontal pivot axis **33** so that it provides a limited counterbalancing effect.

In order to power the motor **40**, which is preferably of

the "midget" D.-C. type having a permanent magnet field, a battery **50** is used which may consist of a series of flashlight batteries suitably secured to the platform **35** and with conventional means for making electrical connection from cell to cell.

In carrying out the present invention and for a purpose which will become more significant as the discussion proceeds, the control member opening **16**, in the top of the housing, is preferably centered over the arm pivot shaft **33**. The controller is, as shown in the preferred embodiments of FIGS. 1–4, in the form of a pushbutton **15** which substantially fills the opening **16** and which has a lip **15***a* to limit the outward movement. For the purpose of biasing the pushbutton **15** outwardly and for providing electrical contact, a leaf spring **55** is used, overlying the shaft **33** and mounted cantilever fashion to an insulating block **56**. To complete the electrical circuit, the leaf spring **55** is connected by a lead **57** to one side of the battery. The other side of the battery is connected to one of the motor leads **58**, the remaining motor lead **59** being grounded to the arm. Thus pressing upon the pushbutton **15** brings the tip of the leaf spring **55** into contact with the shaft **33** completing the motor circuit and causing the motor to rotate. This drives the gear train **47–49**, rotating the roller **25** at a peripheral speed which may be on the order of several inches per second and with rotation taking place in the direction of the arrow shown in FIG. 2 to cause movement of the top sheet toward the ejection slot **13**.

In accordance with one of the important features of the present invention a separator ramp is provided adjacent the front edge of the stack **20** and having a roughened surface consisting of closely spaced horizontal striations for the purpose of engaging the leading edges of the sheets and for holding back all of the sheets except the topmost one which is positively expelled under the action of the roller **25**. Referring particularly to FIG. 2, in the present instance the separator ramp is formed of a plate of metal **60** bent into a dogleg cross section having a base portion **61** which is secured to the base **11** and an upwardly inclined ramp portion **62** which terminates in a lip **63** at the lower edge of the ejection slot. The horizontal striations, indicated at **65**, may be formed in a number of different ways without departing from the present invention. I prefer to form the striations by slowly and with appreciable pressure drawing a piece of garnet paper horizontally across the surface, the paper being 120 grit or coarser.

It is found that with a proper choice of ramp angle it is possible to vary the depth and spacing of the striations while still producing a reliable inhibiting effect. In the case of coated photocopy paper an angle between 50 and 60° with respect to the horizontal is preferred. In practice and for use with a particular gauge of paper, the angle may be increased in increments starting with a shallow angle and until reliable blocking is achieved. I have observed that the top sheet **21**, being positively driven by the rubber roller **25**, readily overcomes the friction at the ramp whereas the sheets immediately adjacent the top sheet, not being positively driven, are positively held back. The operation of the striated ramp is set forth in stop motion views FIGS. 6*a*–6*d*. In FIG. 6*a* it will be noted that the topmost sheet indicate at **21** is moved endwise with at least the second sheet in the stack indicated at **21***a*, clinging to it. This tends to happen since the stack is mill cut which causes the fibers at the edges of the sheets to be compressed together and to some extent interlocked. However, upon continued rotation of the roller **25**, the topmost sheet continues to be driven forwardly, buckling slightly as indicated in FIG. 6*b*. The adjacent sheet **21***a*, however, tends to remain stationary with its front edge blocked against movement. Copy paper intended for photocopy work is coated and hence sufficiently stiff so that there is no tendency for the second sheet **21***a* to buckle with the first. The buckling constitutes an unstable condition so that, as the sheet **21** is driven still further, the front edge tends to snap clear and to occupy the position shown in FIG. 6*c*. Since the leading edge of the sheet now bears a shallow angle with respect to the striated surface **65**, the sheet is progressively and rapidly advanced until the leading edge emerges through the ejection slot as shown in FIG. 6*d*. This entire ejecting procedure takes approximately a second so it is clear that the pushbutton **15** need only be momentarily touched in order to advance the leading edge of the sheet out into a position where it may be grasped with the fingers. The operator then release the button and takes hold of the sheet drawing it out the remaining distance. Since the arm which supports the roller **25** is supported rearwardly of the roller, and since the roller **25** exerts relatively light pressure, there is very little drag upon the sheet even though the roller **25** remains stationary. As soon as the sheet **21** is withdrawn, the next sheet **21***a* becomes the top sheet so that it is directly acted upon by the ejection roller and discharged in the same way.

It is one of the features of the present construction that the ejection mechanism may be converted from motor driving to manual driving simply by removing the pushbutton switch and by mounting a fingertip-operated gear on the horizontal shaft **33** so that it projects upwardly through the opening **16** formed in the top surface of the cover **12**. To understand this simple substitution reference is made to FIGS. 7 and 8. In these figures it will be noted that the motor **40**, its outboard bracket **42** and its gear **45** are simply omitted, which frees the gear **47** in the gear train. The fingertip gear, indicated at **70**, and which is formed of plastic or the like, occupies substantially all of the width between the parallel upstanding members which form the supporting bracket **34**. In operation (see FIG. 7) a slight wiping movement of the fingertip is sufficient to rotate the roller **25** to eject the leading edge of the sheet, with the remaining sheets being held back just as in the case of the motor driven version. Since the majority of the ejecting mechanism, the platform and the housing all remain unchanged, both the electrically operated and manually operated versions may be produced in the same assembly line with a high degree of economy. Since some users prefer electrical pushbutton operation while others prefer fingertip operation, individual preferences can be met in the device to provide a wide market among users of photocopy machines.

It has been assumed in the above discussion that the device is intended for holding light sensitive paper, for example, the negative paper in the transfer diffusion process. To insure light tightness, the opening **16** at the top surface of the cover is dimensioned so that it snugly contains either the pushbutton **15** or the fingertip gear **70**. If desired a piece of black felt having an opening which is just slightly smaller than the opening **16** may be cemented in register with the opening on the underside of the cover. Any light which might happen to get by the light seal at this point is effectively stopped by the platform **35** which is preferably painted black and which tends to shield the paper. Light is prevented from getting into the ejection slot **13** by using a closure vane **75** which is formed of a thin strip of resilient material riveted or otherwise secured to the platform **35** and with its outer lip biased downwardly into engagement with the lip **63** formed on the ramp member **60**. Preferably the closure vane **75** overlaps the lip slightly as shown. Consequently the dispenser may not only be employed for photocopy paper, which is relatively insensitive, but it may, if desired, be used with the more sensitive projection paper employed in a photographic laboratory. Or, if desired, the dispenser may be used for non-photosensitive sheets wherever it is desired to feed sheets from a stack one by one.

It is one of the features of the present construction that the dispenser may be easily reloaded when it becomes necessary by even the most inexperienced office person-

nel. At the front edge of the device the lip **63** on the ramp **62** preferably is registered with and extends through the ejection slot **13**. The degree of extension is, however, limited by forming a boss **76** integrally on the base **11** for engaging the front skirt portion of the enclosure. At the rear edge a similar boss **77** registers with the skirt of the cover and the cover is secured to the base by means of a spring clip **78**. Consequently, to take off the cover, the spring clip **78** is pressed whereupon the cover **12** is rocked upwardly so that the lip **63** is disengaged from the slot **13** enabling the cover to be drawn forwardly and completely removed. A fresh stack of sheets is substituted and the procedure is reversed, the lip **63** being inserted into the slot **13** and the cover being rocked downwardly until the catch **78** snaps in place. During the loading of the machine there is no need for the operator to be concerned with the ejection mechanism since this remains within the underside of the cover and with contact being reestablished with the sheets automatically when the cover is snapped into place.

While the device has all of the modern pushbutton benefits of electrically driven operation, it will be apparent that this has been brought about without necessity for a line cord and without requiring that the device be positioned near a wall outlet. Thus the device is light and easily portable, filling every conceivable requirement for a single sheet feeding device.

While the ejecting roller has been described as made of rubber, it will be apparent that other friction-type materials may be used and hence the term "rubber" is intended in a generic sense.

I claim as my invention:

1. In a paper dispenser for use with a photocopy machine or the like, the combination comprising a light-tight housing having a base and a cover with a discharge slot along the front edge thereof, means in said base for supporting a stack of sheets, a vertically swingable arm fixedly mounted in said cover for swinging about a stationary transverse pivot axis and having a rubber roller at the end remote from said pivot axis for engaging the stack of sheets, driving means mounted for rotation about the stationary transverse pivot axis together with a drive connection on the arm for connecting the drive means to the roller so that the roller is driven independently of the angular position of the arm, and means for inhibiting the forward movement of the sheets, the pivot axis being substantially offset from the center of gravity of the arm so that the arm is gravity biased downwardly for engagement of said roller with the topmost one of the sheets for driving the same through said discharge slot when the driving means is actuated, said driving means being mounted on said arm adjacent said axis for providing a limited counterbalancing effect.

2. In a paper dispenser for use with a photocopy machine or the like, the combination comprising a light-tight housing having a base and a cover with a discharge slot along the front edge thereof, means in said base for supporting a stack of sheets, a platform recessed in said cover, a vertically swingable arm fixedly mounted on said platform for pivoting about a stationary transverse pivot axis and having a rubber roller at the end remote from said pivot axis for engaging the stack of sheets, driving means mounted for rotation about the stationary transverse pivot axis together with a drive connection on the arm for connecting the drive means to the roller so that the roller is driven independently of the angular position of the arm, the platform being relieved to permit passage of the roller and arm, the pivot axis of said arm being offset from the center gravity of the arm so that the latter is gravity biased downwardly with the rubber roller free to move into contact with the topmost one of the sheets for driving the same through said discharge slot when the driving means is actuated, said driving means being mounted on said arm adjacent said axis for providing a limited counterbalancing effect.

3. In a dispensing machine or the like, the combination comprising a light-tight housing including a base and a cover and having a discharge slot at the front edge thereof, means for supporting a stack of sheets in said base adjacent said discharge slot, means for guiding the sheets from the stack to the slot, ejecting means including an arm having a stationary horizontal pivoted connection in said cover and having a rubber roller at its free end for engaging the topmost one of the sheets, said pivoted connection being offset from the center of gravity of the arm so that the roller is gravity biased into contact with the topmost of the sheets, a driving motor bodily mounted on said arm adjacent said pivoted connection and having a driving connection with the rubber roller, said motor being positioned relative to said pivoted connection so as to provide a limited counterbalancing effect, a battery mounted in the cover, and a pushbutton switch accessible at the top of the cover for energizing the motor by the battery for ejection of a sheet through said slot when the switch is momentarily operated.

4. In a dispensing machine or the like, the combination comprising a light-tight housing including a base and a cover and having a discharge slot at the front edge thereof, means for supporting a stack of sheets in said base adjacent said discharge slot, means for guiding the sheets from the stack to the slot, ejecting means including an arm having a stationary horizontal pivoted connection in said cover and having a rubber roller at its free end so that when the cover is installed on the base the roller engages the topmost one of the sheets, said pivoted connection being offset from the center of gravity of the arm so that the roller is gravity biased into contact with the topmost one of the sheets, a driving motor bodily mounted on said arm adjacent said pivoted connection and having a driving connection to the rubber roller, said motor being positioned relative to said pivoted connection so as to provide a limited counterbalancing effect, a source of voltage, and a switch accessible at the top of the cover for energizing the motor from said source for ejection of a sheet through said slot when the switch is momentarily operated.

5. In a paper dispenser for use with a photocopy machine or the like, the combination comprising a light-tight housing having a base and a cover with a discharge slot, means for supporting a stack of sheets, a vertically swingable arm in said cover having a pivot pin located immediately adjacent the top surface of the cover and fixedly secured thereto, a rubber roller rotationally mounted at the lower end of said arm for engaging the topmost sheet, motor driving means on said arm including a gear train coupled to said rubber roller, said pivot pin being offset from the center of gravity of the arm so that that roller is gravity biased into contact with the topmost one of the sheets, said motor driving means being positioned on said arm relative to said pin so as to provide a limited counterbalancing effect, a source of voltage, and a pushbutton centered above said pivot pin and projecting through an opening in the top surface of said cover for connecting the motor to the voltage source for driving of the topmost sheet through said discharge slot.

6. In a paper dispenser for use with a photocopy machine or the like, the combination comprising a light-tight housing having a base and a cover with a discharge slot, means for supporting a stack of sheets, a vertically swingable arm in said cover having a pivot pin located immediately adjacent the top surface of the cover and fixedly secured thereto, a rubber roller rotationally mounted at the lower end of said arm for engaging the topmost sheet, motor driving means on said arm including a gear train coupled to said rubber roller, said pivot pin being offset from the center of gravity of the arm so that the roller is gravity biased into contact with the topmost one of the sheets, and motor driving means being positioned on said arm relative to said pin so as to provide

a limited counterbalancing effect, a source of voltage, and a pushbutton centered above said pivot pin and projecting through an opening in the top surface of said cover for connecting the motor to the voltage source for driving of the topmost sheet through said discharge slot, the size of the opening in the cover being such as to accommodate projection of a gear on said pivot pin when manual operation is desired.

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