United States Patent

[11] 3,599,682

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[21] Appl. No. **756,607**
[22] Filed **Aug. 30, 1968**
[45] Patented **Aug. 17, 1971**
[73] Assignee **Eastman Kodak Company**
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[54] **LOADING MECHANISM**
4 Claims, 15 Drawing Figs.

[52] **U.S. Cl.** **141/106,** 141/284, 222/81
[51] **Int. Cl.** **B65b 1/04,** B65b 3/04
[50] **Field of Search** ..... 141/330, 106, 364, 284; 222/80—90

[56] **References Cited**

UNITED STATES PATENTS

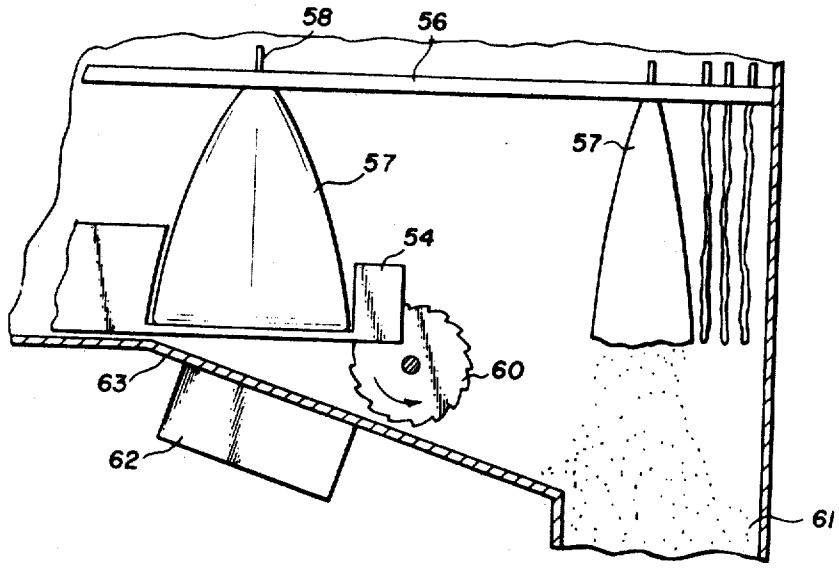
3,171,449	3/1965	Ellms et al.	141/364 X

FOREIGN PATENTS

6,402,165	9/1964	Netherlands	222/81

Primary Examiner—Houston S. Bell, Jr.
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ABSTRACT: A bag nest for use in an electrographic machine receives a bag, carrying toner. While vertical movement of the bag is restricted, it is ruptured by a saw or knives, thereby emptying the toner into a dispensing mechanism below the bag. The bag is removed from the nest so that another bag may be inserted. In preferred embodiments, toner reluctant to leave the bag is dislodged as the bag is dragged over a rigid edge of the nest while being removed for disposal. Mechanisms, such as barbed spears, rails and jaw gripping devices are disclosed for performing at least part of the holding and/or bag disposing functions.



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SHEET 1 OF 4

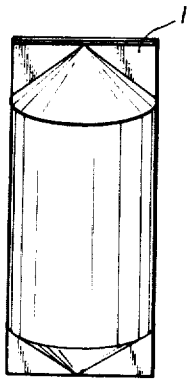
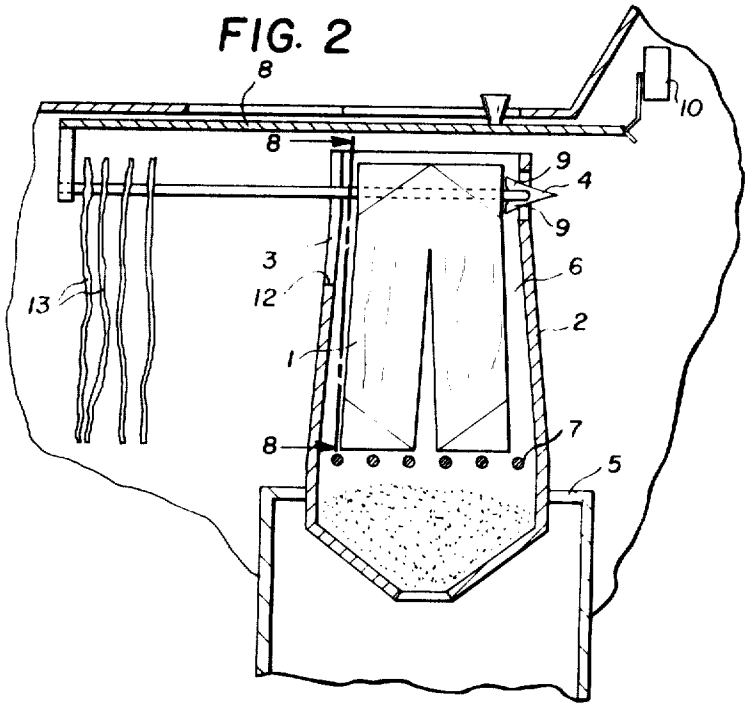


FIG. 1

FIG. 2



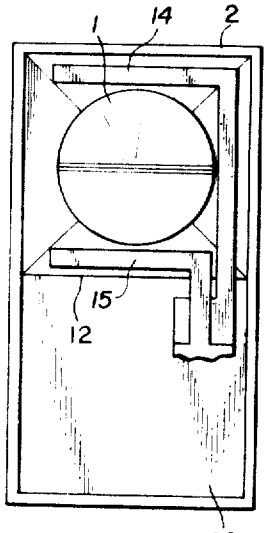


FIG. 3

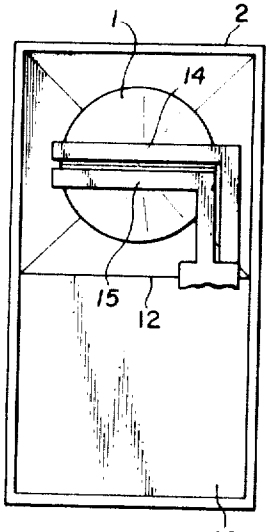


FIG. 4

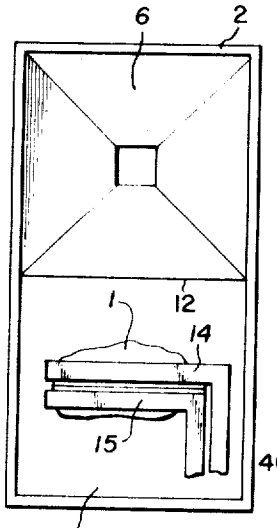


FIG. 5

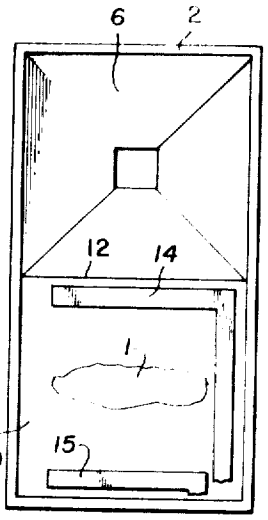


FIG. 6

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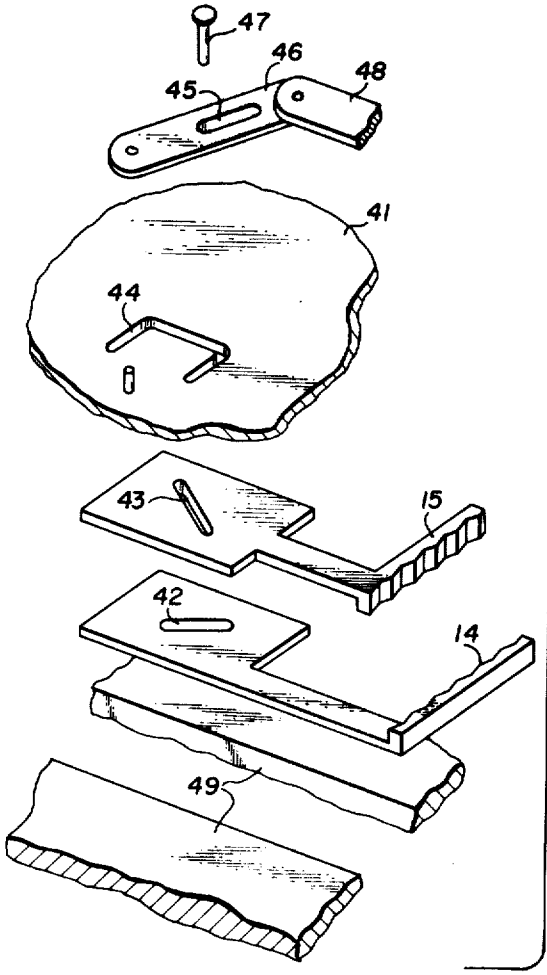


FIG. 7

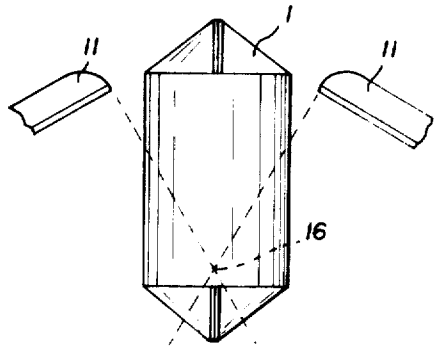


FIG. 8

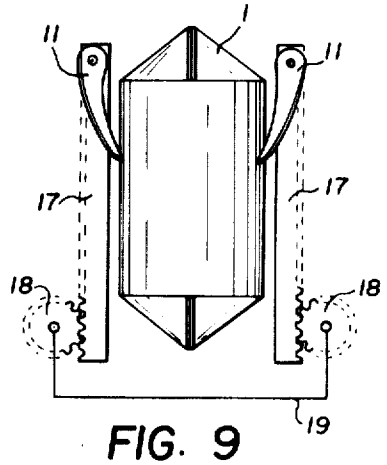


FIG. 9

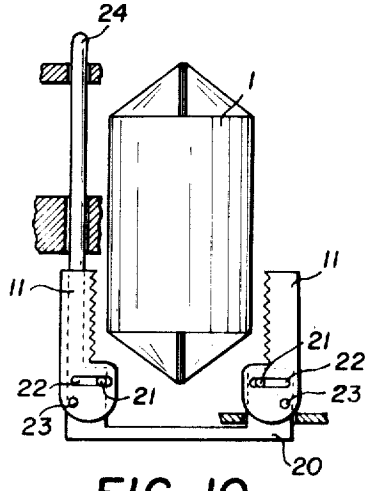


FIG. 10

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FIG. 11

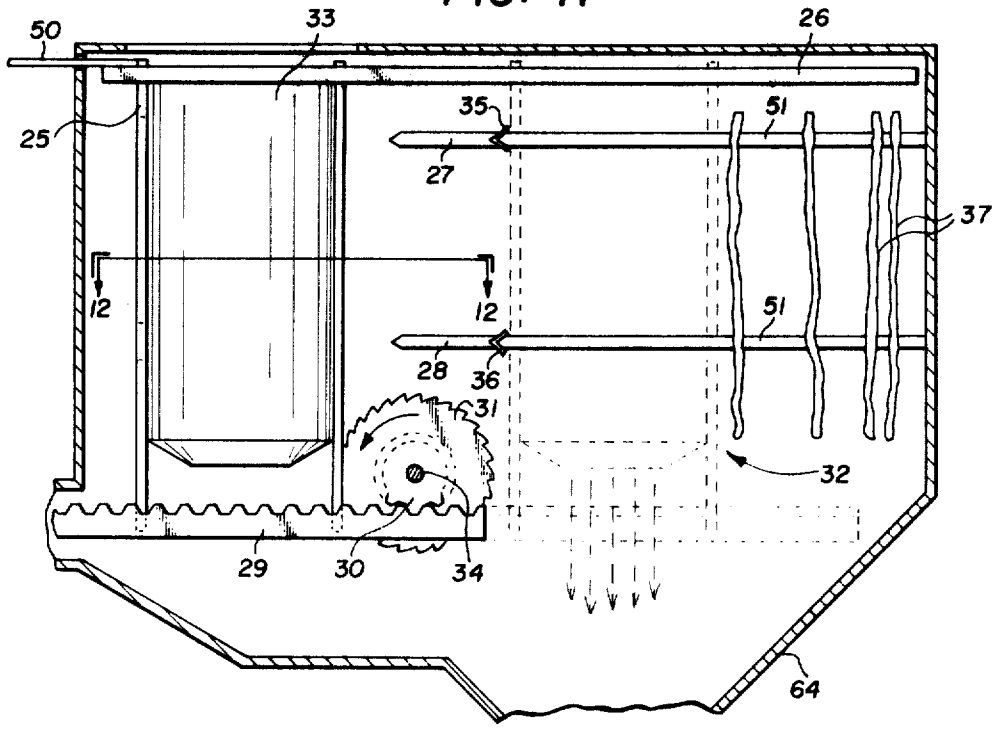
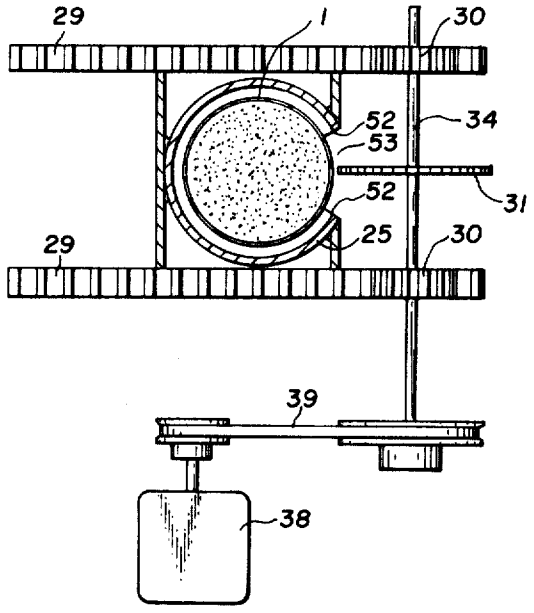


FIG. 12



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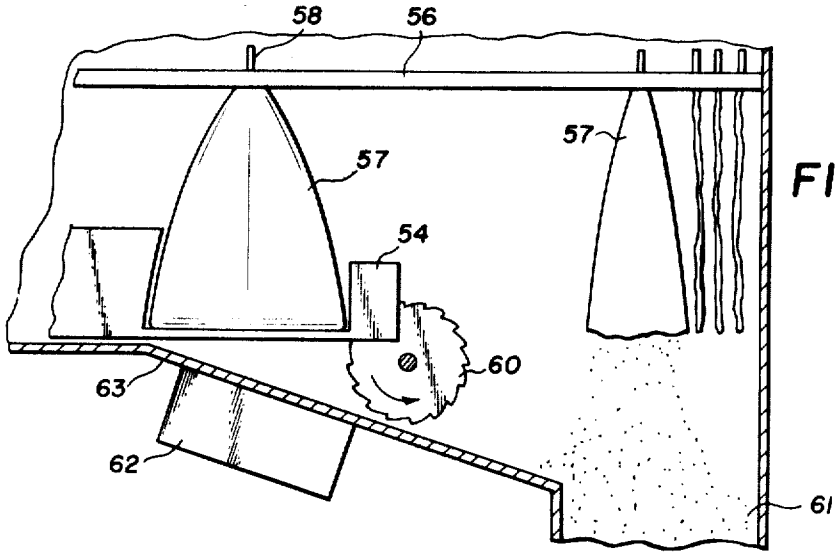


FIG. 13

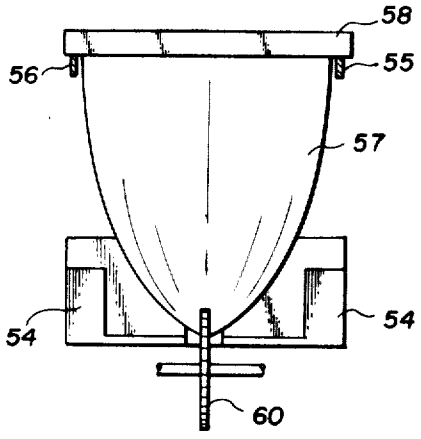


FIG. 14

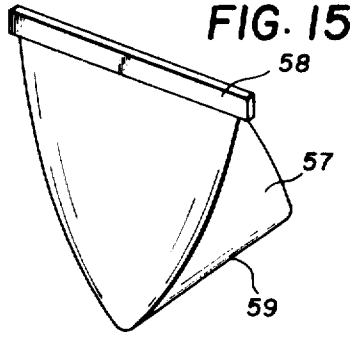


FIG. 15

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LOADING MECHANISM

CROSS-REFERENCES TO RELATED APPLICATIONS

Reference is made to commonly assigned cofiled U.S. Pat. application Ser. No. 756,517, entitled "Loading Mechanism Improvement" and U.S. Pat. application Ser. No. 756,608, entitled "Package" both filed in the name of D. J. Albert

BACKGROUND OF THE INVENTION

This invention relates to particulate material handling mechanisms, for example, to mechanisms usable in loading dry toner into an electrographic apparatus.

In electrographic apparatus using dry toner powder, such toner must be replaced periodically. Common commercial toners present considerable difficulty to handling both because they blacken everything they touch and because they are extremely difficult to thoroughly empty from any container.

Disposable toner containers presently in use generally are opened by an operator and emptied into a dispensing mechanism in an electrographic apparatus. Complete emptying of toner from such containers into a dispenser by hand without excessive blackening of person and clothing is a delicate operation in which failure is common.

Toner containers have been designed which are adapted to be inserted into a machine where they function as a dispensing container. Insertion of such prior container-dispensers has commonly involved operator handling of the container in the actual dispensing area with the attendant blackening of his person and clothing. Because of the dispensing function for such containers, they have been complex in design and expensive to manufacture.

Other toner containers have been designed which, when inserted into a machine, are opened by the machine and emptied of toner into a separate dispensing mechanism. These have an advantage over prior toner containers of reducing the risk to the operator of blackening of his person and clothing on insert. However, such prior containers have generally been of complex design involving complicated couplings with the machine itself and including mechanisms for assuring thorough emptying of the container. Because of such complexities, the container is commonly removed for reuse when empty, with a risk at that point of blackening the operator's person or clothing.

SUMMARY OF THE INVENTION

It is an object of this invention to provide a toner loading mechanism which will receive toner packaged in a container of simple and inexpensive construction and empty it into a toner dispenser with a minimum risk of blackening the person and clothing of the operator.

This and other objects are accomplished by a toner loading mechanism adapted to receive a rupturable bag of toner. The bag is held by a suitable means, for example, a pair of jaws, rails or a spear, each of which is designed to cooperate with the upper portion of the bag and restrain the bag from moving downward. The lower portion of the bag is ruptured by suitable means, for example, a pair of knives or a saw blade, emptying the bag into a toner receiving means positioned below the bag.

In preferred embodiments of this invention, the means for preventing downward movement of the bag, for example, the spear or the jaws, is used to remove the bag from the receiving mechanism so that the receiving mechanism can receive another bag without manual handling of the old bag. Thorough emptying of the bag is enhanced by dragging it over a rigid edge in the removing process, thereby dislodging toner that sticks to the bag.

A remarkable thing about this mechanism is that it gives thorough emptying of a toner container with a minimum risk to the operator of blackening his person or clothing while at the same time operating with a toner container of extremely simple and inexpensive construction.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. 1 is a perspective view illustrating a package or bag of toner usable in the invention.

FIG. 2 is a fragmentary side view illustrating a toner loading mechanism constructed according to the invention with portions eliminated for clarity of illustration.

FIGS. 3, 4, 5 and 6 are plan views of an alternative bag holding device having jaws usable in the mechanism shown in FIG. 2; FIG. 3 illustrating the position of the mechanism immediately after insert of a bag; FIG. 4 when the bag is ready for rupture; FIG. 5 when the bag has been removed for disposal and FIG. 6 during the actual disposal of the bag.

FIG. 7 is an exploded view of the bag holding device of FIGS. 3 to 6 illustrating a mechanism for cycling its operation.

FIG. 8 is a section taken along line 8–8 of FIG. 2 showing the path of movement of knives in rupturing the bag shown in FIG. 1.

FIGS. 9 and 10 are schematic drawings showing alternate arrangements for knives usable in the mechanism shown in FIG. 2.

FIG. 11 is a longitudinal section showing an alternative embodiment of the invention.

FIG. 12 is a horizontal section, taken along line 12–12 of FIG. 11.

FIG. 13 is a horizontal section of another embodiment of the invention.

FIG. 14 is a front elevation of a portion of the mechanism shown in FIG. 13.

FIG. 15 is a perspective view of a bag adapted to be used in the mechanism shown in FIGS. 13 and 14.

DESCRIPTION OF THE PREFERRED EMBODIMENT

Referring to FIG. 1, dry toner powder usable in an electrographic machine is packaged in a sealed bag 1 which can be constructed of a flexible, rupturable material, for example, polyethylene.

Referring to FIG. 2, a cavity 6 is formed by a bag nest 2, which nest includes a bottom 7 which is capable of supporting a full bag of toner but is pervious to toner.

The bag 1 is placed in the cavity 6 and a lid 8 is closed, by sliding it from left to right as viewed in FIG. 2, to prevent escape of toner. As the lid 8 is closed, a spear 4 coupled to the lid 8 and having barbs 9 enters the nest through an opening 3 and pierces the bag to hold it and restrain it from downward movement. As the lid 8 becomes completely closed, it actuates a switch 10 which in turn actuates knives 11, preferred embodiments of which are shown in FIGS. 8, 9 and 10 discussed more fully below. The knives rupture the bag 1 emptying it of toner which toner falls through pervious bottom 7 into a toner receiving means, for example, a toner dispenser 5, from which toner is metered, by means not shown into an electrographic developing apparatus, also not shown.

When a new bag is to be inserted, the lid 8 is opened. Because spear 4 is coupled to lid 8, the old bag 1 is pulled through the opening 3 in the bag nest 2. As the bag 1 goes through the opening 3, it is dragged across a rigid edge 12 which dislodges toner in the bag 1. As the cycle is repeated for more bags, used bags 13 remain on the spear 4 where they can eventually be disposed of by a serviceman.

FIGS. 3 through 7 illustrate an alternative mechanism for holding the bags and preventing downward movement thereof in the bag nest 2. In FIG. 3, jaws 14 and 15 are shown ready to grip the top of bag 1 after it has been inserted in nest 2. In FIG. 4, the bag is gripped by the jaws for rupturing and emptying. In FIG. 5, the bag 1 has been dragged over edge 12 by the jaws 14 and 15 where it is dropped into a receptacle 40, as shown in FIG. 6. The receptacle 40 can have a disposable lining for receiving a number of bags which lining can be removed by a serviceman.

Actuation of jaws 14 and 15 can be accomplished by a number of well-known mechanisms. For example, as shown in FIG. 7, a single cam control slot 44 in a part 41 of the housing can effectively program the whole series of movements. Jaws 14 and 15 are restricted to single direction horizontal movement by guide means 49, while a pin 47 is moved in the control slot 44 by a drive slot 45 in a drive lever 46 connected through a connecting lever 48 to a source of reciprocal motion. While pin 47 moves in a portion of slot 44 parallel to guide means 49, jaws 14 and 15 stay closed and move from a position over a nest 2 to a position over receptacle 40. When pin 47 moves in either of two transversely oriented portions of control slot 44, it acts on slots 42 and 43 in jaws 14 and 15 to open and close the jaws. Lever 48 can be operated by hand through a suitable connection outside the machine in response to a visual determination from inspecting copies that more toner is needed. Alternatively, it can operate in response to a signal for more toner from a sensing device, not shown, responsive to low toner in the dispenser 5 which sensing device actuates lever 48, to move the bag 1 to the dispose position, open the jaws, close the jaws, return them to the nest position and open the jaws for receipt of a new bag. After insertion of the new bag, the jaws are closed and remain so until the next low toner signal.

FIG. 8 shows schematically one type of movement for knives 11 in which they crisscross a point 16, thereby forming a single rupture of the type shown in FIG. 2 of bag 1. FIG. 9 shows a knife actuating mechanism in which knives 11 are moved by racks 17 driven by pinions 18 which are coupled together by a suitable drive mechanism shown schematically by line 19.

FIG. 10 shows another knife actuating mechanism in which knives 11 are moved by a yoke 20 through pins 21 in slots 22 to pivot around pins 23 secured to a housing, not shown. One end 24 of yoke 20 can be used to actuate the knives by closing of a lid, not shown.

Another preferred embodiment of the invention is shown in FIGS. 11 and 12 in which a nest 25 for receiving a toner bag 1 is mounted on guide rails 26 for movement. Racks 29 driven by pinions 30 which in turn are driven by a shaft 34 move the nest 25 toward an emptying position 32 over a toner receiving means 64 from an original receiving position 33. Movement of nest 25 also moves a cover 50 across receiving position 33. In the course of this movement, the bag 1 engages a saw 31 also driven by shaft 34. Engagement is also made with spears 27 and 28 having barbs 35 and 36, respectively, which perform a function similar to that performed by spear 4 in the embodiment shown in FIG. 2. The bag is ruptured by saw 31 and toner is emptied into the toner receiving means 64 while in the emptying position 32. The rack 29 returns the nest to its original position, but the now empty bag is restrained from return movement with the nest by barbs 35 and 36 and drags over rigid edges 52 on an opening 53 in nest 25 dislodging reluctant toner. When a new bag of toner is moved through the same cycle, the old bag will be compressed, along with bags 37 from previous cycles, on portions 51 of the spears 27 and 28 designed for that function. Shaft 34 is driven by an endless belt 39 which in turn is driven by a reversible drive motor 38.

An improved embodiment of the invention is shown in FIGS. 13, 14 and 15, the advantages of which are more fully described in cofiled applications Ser. Nos. 756,517 and 756,608, in the name of D. J. Albert entitled "Loading Mechanism Improvement" and "Package," respectively. A nest 54 is positioned below a pair of parallel rails 55 and 56. The rails are positioned to receive a toner container 57 shaped as shown in FIG. 15 in which the container is substantially triangular in shape in both front and side views having elongated opposite ends. One end has a rigid member 58 secured to it with the other end 59 running in a direction transverse to the one end. The rigid member 58 can be made of cardboard and is constructed to overlap the edges of the bag itself so that the overlap portions can rest on the rails 55 and 56 supporting the bag in the nest 54. Placement of the rigid member 58 on the rails 55 and 56 positions the rest of the toner container 57 so that the base 59 runs substantially in a direction parallel to the rails. The bag nest 54 is adapted to be moved as in the embodiment shown in FIGS. 11 and 12 into engagement with a saw 60 which gradually severs the bag as it moves relatively along the length of the bags 59. This type of engagement gives a gentle, clean opening of the bag with a minimum number of small pieces of the container torn away from the bag and, hence, dispensed with the toner. Best results are obtained with a saw having dull, nontearing teeth which tend to stretch the plastic, thinning it locally and eventually severing it rather than tearing small pieces away. As in the embodiment shown in FIGS. 11 and 12, the bag nest is moved over a toner receiving means 61 and the bags are stacked in a used condition at the end of the rails. Because some toner escapes as the saw begins opening the bag, a vibrator 62 can be positioned on an inclined portion of the housing underneath the saw to encourage travel to the reservoir 61 of any toner so escaping.

The invention has been described in detail with particular reference to preferred embodiments thereof, but it will be understood that variations and modifications can be effected within the spirit and scope of the invention as described hereinabove and as defined in the appended claims.

I claim:

1. In electrographic apparatus of the type having a toner reservoir, a mechanism for loading toner carried in rupturable containers into said toner reservoir, said mechanism comprising:

means for receiving such a toner container at a location spaced from said toner reservoir and for supporting a received container for movement along a path at least a portion of which is over said toner reservoir,

means located along said path for rupturing a received container during movement along said path,

means for moving a received container along said path into engagement with said rupturing means and over said toner reservoir to empty said toner into said reservoir; and

means located proximate said reservoir for receiving

2. In electrographic apparatus having a toner reservoir, a mechanism for loading toner into said reservoir from rupturable toner containers, said mechanism comprising:

a. means in said apparatus for receiving such containers at a first location spaced from said reservoir and for supporting received containers for movement into a position over said reservoir;

b. means in said apparatus for moving a received container from said first location to said position over said reservoir;

c. means in said apparatus for rupturing a received container in a manner such that the toner therein is discharged by gravity into said reservoir; and

d. means located in said apparatus for restraining a container moved to said position over said reservoir from movement toward said first location and for storing in said apparatus a plurality of such emptied containers.

3. The invention defined in claim 2 wherein said means for rupturing a received container includes a rotatable saw blade located in said apparatus at a position for intersecting such container during movement from said first location to said position over said reservoir and means for rotating said saw blade during movement of such container.

4. The invention defined in claim 2 wherein said means for restraining movement of a container includes means mounted in said apparatus for puncturing such a container during movement of such container to said position over said reservoir.

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(5/69)

UNITED STATES PATENT OFFICE
CERTIFICATE OF CORRECTION

Patent No. 3,599,682 Dated March 27, 1972

Inventor(s) Conrad Altmann

It is certified that error appears in the above-identified patent and that said Letters Patent are hereby corrected as shown below:

In column 4, line 28, cancel beginning with "1. In electrographic apparatus" to and including "means located proximate said reservoir for receiving" in column 4, line 42 and insert the following claim:

1. In electrographic apparatus of the type having a toner reservoir, a mechanism for loading toner carried in rupturable containers into said toner reservoir, said mechanism comprising:

means for receiving such a toner container at a location spaced from said toner reservoir and for supporting a received container for movement along a path at least a portion of which is over said toner reservoir,

means located along said path for rupturing a received container during movement along said path,

means for moving a received container along said path into engagement with said rupturing means and over said toner reservoir to empty said toner into said reservoir; and

means located proximate said reservoir for receiving and storing in said apparatus a plurality of such emptied containers.

Signed and sealed this 11th day of July 1972.

(SEAL)
Attest:

EDWARD M. FLETCHER, JR.
Attesting Officer

ROBERT GOTTSCHALK
Commissioner of Patents