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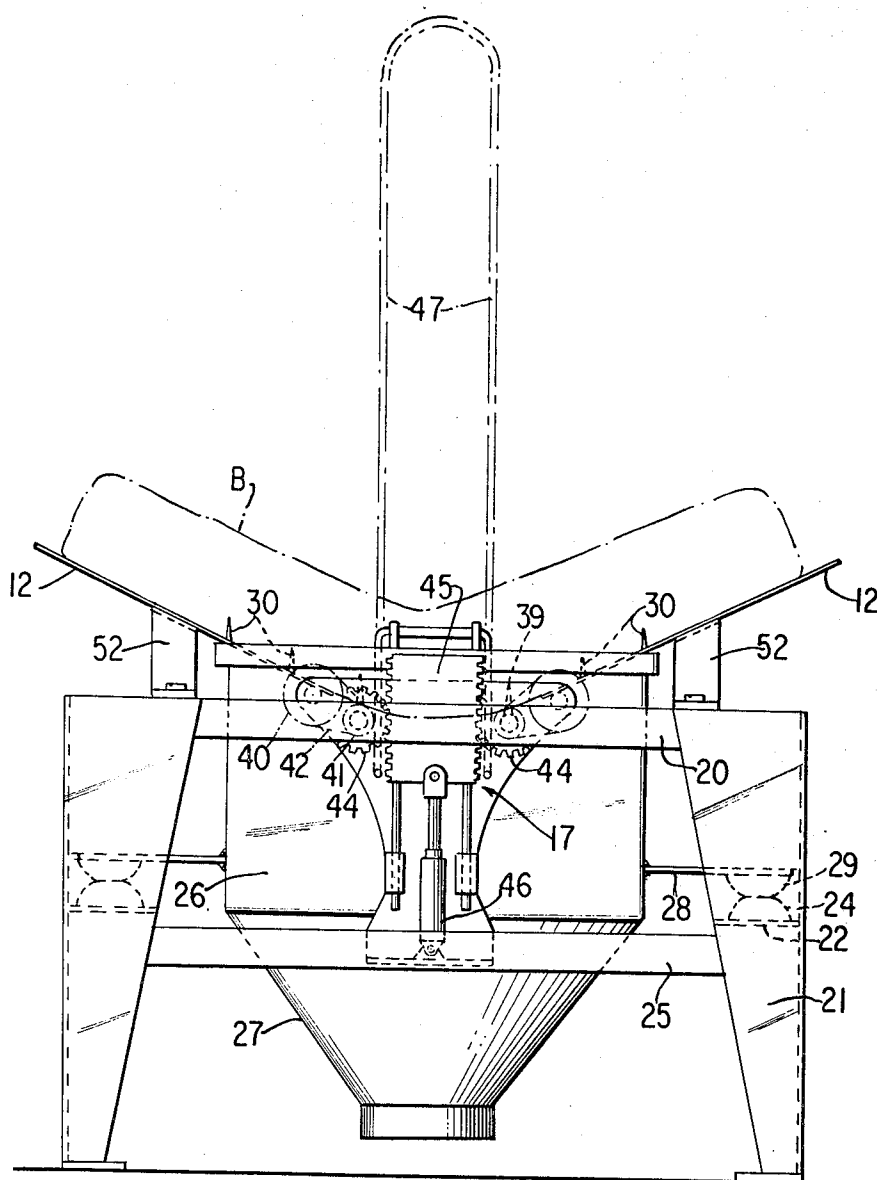
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BAG OPENING AND EMPTYING MACHINE

Filed Feb. 7, 1968

3 Sheets-Sheet 2

FIG. 2



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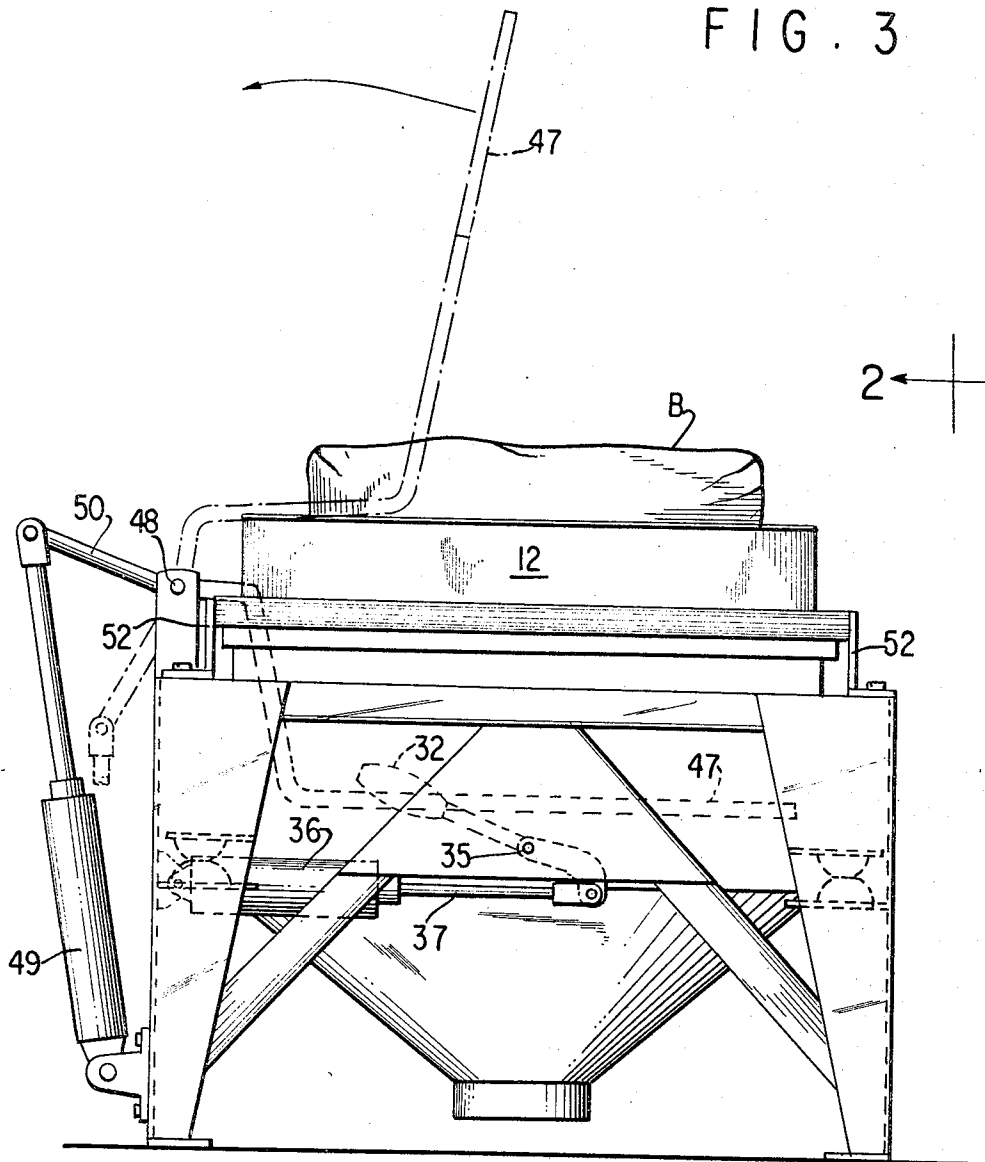
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FIG. 3



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BAG OPENING AND EMPTYING MACHINE

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6 Claims

ABSTRACT OF THE DISCLOSURE

A machine for slitting and emptying a bag containing free flowing particles of material which machine includes plates for supporting the bag and retaining the same thereon, mechanism for pulling the bag apart at the slit to provide an enlarged opening, and mechanism for moving the plates to fold the bag whereby removal of the material from the bag is expedited.

BACKGROUND OF THE INVENTION

Field of the invention

The present invention relates to material handling apparatus, and more particularly to a machine for opening bags or sacks and emptying the contents thereof into another receptacle, which machine is an improvement over the machine disclosed in U.S. patent application, Ser. No. 673,762, filed Oct. 9, 1967.

Summary of the invention

Accordingly, an object of the present invention is to provide such a machine which assures rapid and complete emptying of the bag.

Another object is to provide such a machine wherein fouling of the bag with bag supporting means is prevented.

A further object is to provide such a machine which is simple and economical in construction and reliable in operation.

Other and further objects of the invention will be obvious upon an understanding of the illustrative embodiment about to be described, or will be indicated in the appended claims, and various advantages not referred to herein will occur to one skilled in the art upon employment of the invention in practice.

In accordance with the present invention, the foregoing objects are generally accomplished by providing a bag opening machine which comprises a pair of spaced apart bag engaging and supporting members, knife means operable between the members for slitting the underside, and mechanism for raising the bag supporting members to thereby fold the bag and expedite the emptying of the bag. Preferably, the machine includes means for engaging and pulling the bag apart at the slit to provide an enlarged opening which enables material to be discharged from the bag more rapidly.

Brief description of the drawings

FIG. 1 is a plan view of a bag opening machine in accordance with the present invention.

FIG. 2 is an end view of the machine illustrating the position of the bag supporting members when the bag is placed thereon.

FIG. 3 is a side view of the machine as shown in FIG. 2.

FIG. 4 is an end view similar to FIG. 2, partly in section, illustrating the bag supporting member in raised position to expedite emptying of the bag and the means for enlarging the bag opening in operated position.

Description of the preferred embodiment

Referring now to the drawings in detail, a bag opening machine and emptying machine is shown which generally

comprises a frame 10, a basket or hopper 11 supported on the frame, a pair of spaced apart members 12 on the hopper for supporting a bag 13 filled with free flowing material above the hopper, knife mechanism 14 operable between the members 12 for slitting the underside of the bag crosswise, means 15 for engaging and pulling the bag apart at the slit to enlarge the bag opening, means 16 for raising the bag supporting members 12, mechanism 17 for operating the means 15 and 16, mechanism (not shown) for vibrating the hopper and the bag to induce the flow of material from the bag, and mechanism 18 for ejecting the emptied bag.

The frame 10 comprises an upper rectangular frame member 20, an upright leg 21 at each corner of the frame member, a horizontal shelf 22 on each leg beneath the frame member, a hemispherical yieldable member 24 on each shelf, and horizontal members 25 for bracing the legs.

The hopper 11 comprises an upper tubular section 26, a lower conical section 27, horizontal extensions 28 on the upper hopper section, and hemispherical yieldable members 29 on the underside of the extensions seated on the yieldable members 24 to resiliently support the hopper on the frame whereby vibration of the hopper is facilitated.

The bag supporting members 12 are a pair of plates having a plurality of spikes 30 thereon for gripping the bag 13. The lower ends of the plate members 12 are secured to spaced apart parallel shafts 31 which have their ends journaled for rotation on the wall of the upper hopper section 26 so that the plates can be raised and lowered in an arcuate path in the manner described hereinafter.

The knife mechanism 14 includes a knife 32 on a holder 34 which is mounted at one end for rotation with a shaft 35, an air operated motor 36, and linkage 37 for effecting oscillation of the shaft 35 so that the knife is swung through an arc and slits the underside of the bag at S.

The means 15 for pulling the bag apart at its slit include a pair of spaced apart parallel horizontal rods 38 within the space between the shafts 31 with each rod adjacent a shaft and having their ends journaled for rotation on the wall of the upper hopper section 26, and spikes 39 on the rods 38 for piercing and engaging the bag adjacent both sides of the slits so that the bag can be pulled apart in the manner described hereinafter.

The plate member moving means 16 include a sprocket 40 on the shafts 31, a sprocket 41 on the rods 38 and a chain 42 connecting each set of sprockets 40-41.

The mechanism 17 for operating the means 15 and 16 includes a pinion gear 44 on the rods 38, a gear rack 45 engaging the gears 44, and an air motor 46 for reciprocating the gear rack to effect rotation of the shafts 31 and the rods 38 in clockwise and counter-clockwise directions.

The ejecting mechanism 18 includes an elongate member 47 disposed crosswise beneath the bag at its slit, a shaft 48 journaled for rotation on the frame and having the member 47 mounted thereon near one end thereof, a reciprocating air operated motor 49 mounted on the frame 10, and linkage 50 connecting the motor 49 and the mounted end of the member 47. Preferably, the member 47 has two parallel spaced apart sections 51 between which the knife 32 passes.

In operation with the plate members 12 in their lower position (FIG. 2) and resting on rails 52, the vibrating mechanism (not shown) is started, a bag B is dropped on the plate members 12 and is penetrated by the spikes 30 and 39, the knife mechanism 14 is operated to crosswise slit the underside of the bag, the spikes 39 are rotated 180° from an upright position to a depending position (FIG. 4) and pull apart the bag at the slits to form a

wide opening in the bag, and simultaneously the plate members are swung to an almost upright position.

The material in the bag is rapidly discharged through the opening at its underside into the hopper 11. When the bag has been emptied, the plate member spikes 30 and the spikes 39 are returned to an upright position to enable the bag to be lifted therefrom without fouling the spikes, and the ejector mechanism 18 is operated to raise the elongate member 47 to an upright (indicated in broken lines) to throw the empty bag to the side of the machine. The ejector member 47 is then returned to its initial position so that the machine is ready for the reception of the next bag to be emptied.

The spikes 30 and 39 serve to hold the bag against movement while the bag is being slit. The spikes 39 also peel back the bag portions bordering the slit. The spikes 30 also hold the bag to prevent the collapse thereof while being emptied. The plate members 12 upon converging as being raised fold the bag transversely with respect to its longitudinal axis and serve to squeeze the material out of the bag. These features together with vibration assure complete emptying of the bag in less than ten seconds.

It will be understood that the operation of the various mechanisms is controlled by timing and programming means, for example, such as disclosed in the aforementioned patent application.

Summation

From the foregoing description, it will be seen that the present invention provides an improved bag slitting and emptying machine which is simple, practical and economical in construction and is rapid and reliable in operation.

I claim:

1. A bag opening machine of the class described comprising a pair of spaced apart bag engaging and supporting members, knife means operable between said members for slitting the underside of the bag, mechanism for raising the bag supporting members to thereby fold the bag and expedite the emptying of the bag a pair of rotatable rods adjacent the slit having spikes thereon for engaging and pulling the bag apart at the slit to provide an enlarged opening which enables material to be discharged from the bag more rapidly, and means operable by said mechanism for effecting rotation of said rods.

2. A machine according to claim 1, wherein said bag

supporting members are plates having bag gripping spikes thereon which plates are pivotally mounted at their inner ends and said mechanism swings said plates from an almost horizontal position to an almost vertical position and vice versa.

3. A bag opening machine of the class described comprising a pair of spaced apart bag supporting members, constructed and arranged to lay a largest side of a bag thereon, pivotably mounted knife means between said members operable for slitting the underside of the bag crosswise, means for engaging and pulling the bag apart at the slit to provide an enlarged opening which enables material to be discharged from the bag more rapidly, and mechanism for operating said last mentioned means.

4. A machine according to claim 3, wherein said last mentioned means include spikes mounted on rotatable rods, and said mechanism effects rotation of said rods.

5. A bag opening machine of the class described comprising a pair of spaced apart rotatable shafts, bag supporting plates each having its inner end secured to one of said shafts and having bag gripping means thereon, a rotatable rod inwardly adjacent each of said shafts having bag engaging spikes thereon, knife means operable between said rods for slitting the underside of the bag, and mechanism for rotating said shafts to swing said plates from an almost horizontal position to an almost vertical position and vice versa so that the bag is raised and for rotating said rods to swing said spikes from an upwardly extending position to a downwardly extending position and vice versa so that the bag is pulled apart at the slit to provide an enlarged opening whereby rapid and complete discharge of the material in the bag is assured.

6. A machine according to claim 5, wherein said mechanism includes a pinion gear and a sprocket on each rod, a gear rack for effecting rotation of said gears, a sprocket on each shaft, and a chain operatively connecting each set of rod and shaft sprockets.

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