

Feb. 6, 1951

M. J. HARRINGTON ET AL

2,540,615

APPARATUS FOR OPENING AND FILLING BAGS

Filed Sept. 10, 1946

3 Sheets-Sheet 1

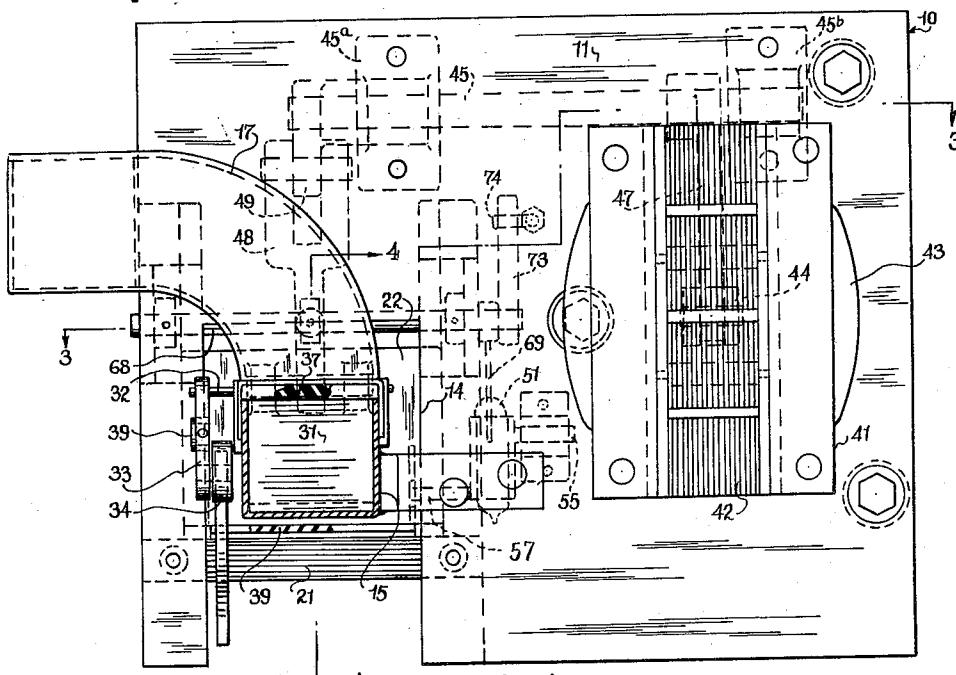


Fig. 1

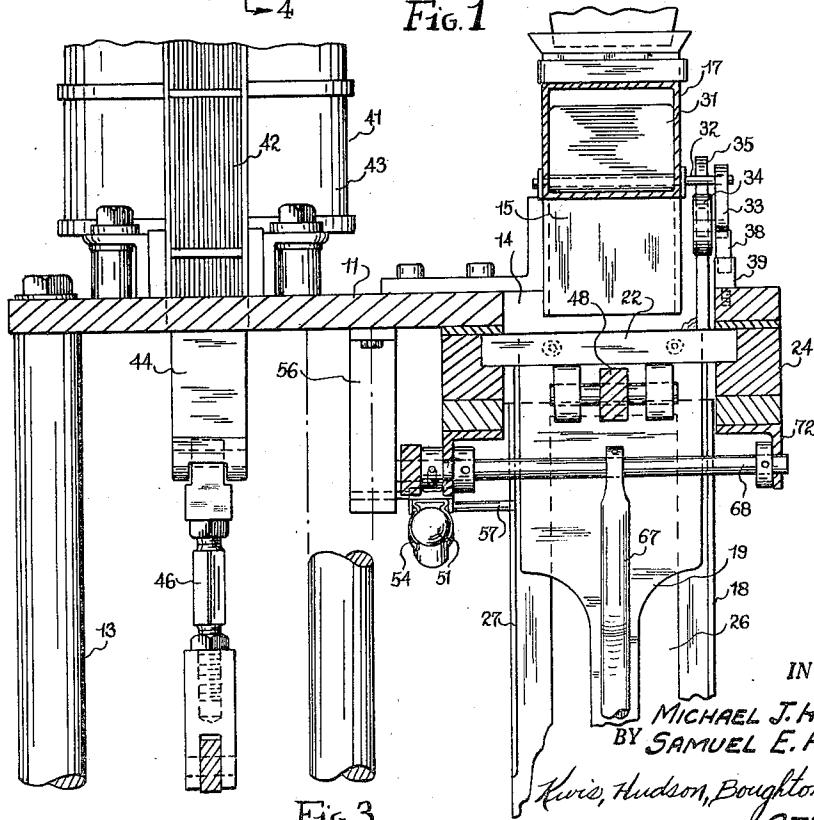


Fig. 3

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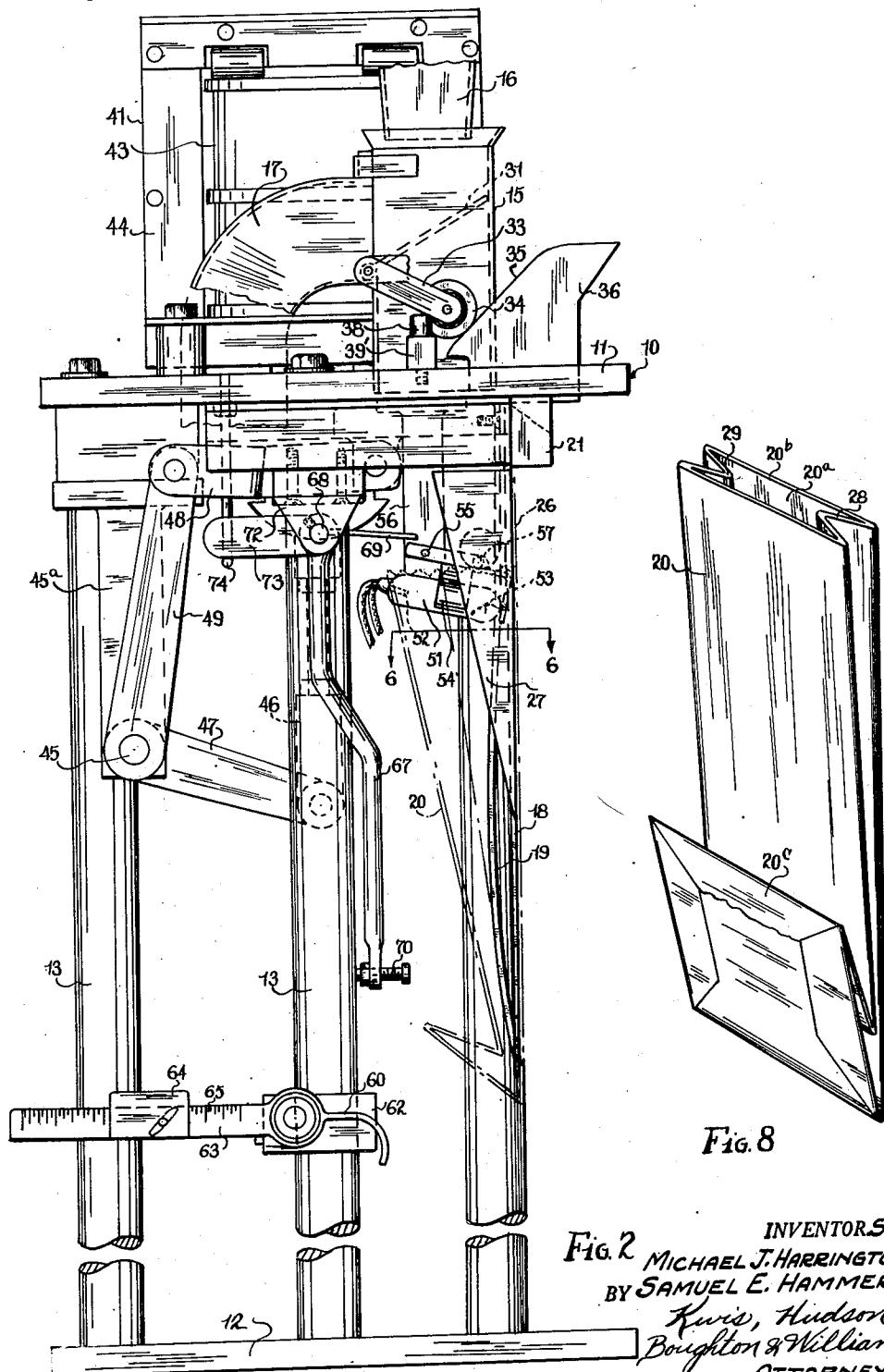
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3 Sheets-Sheet 2



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APPARATUS FOR OPENING AND FILLING BAGS

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3 Sheets-Sheet 3

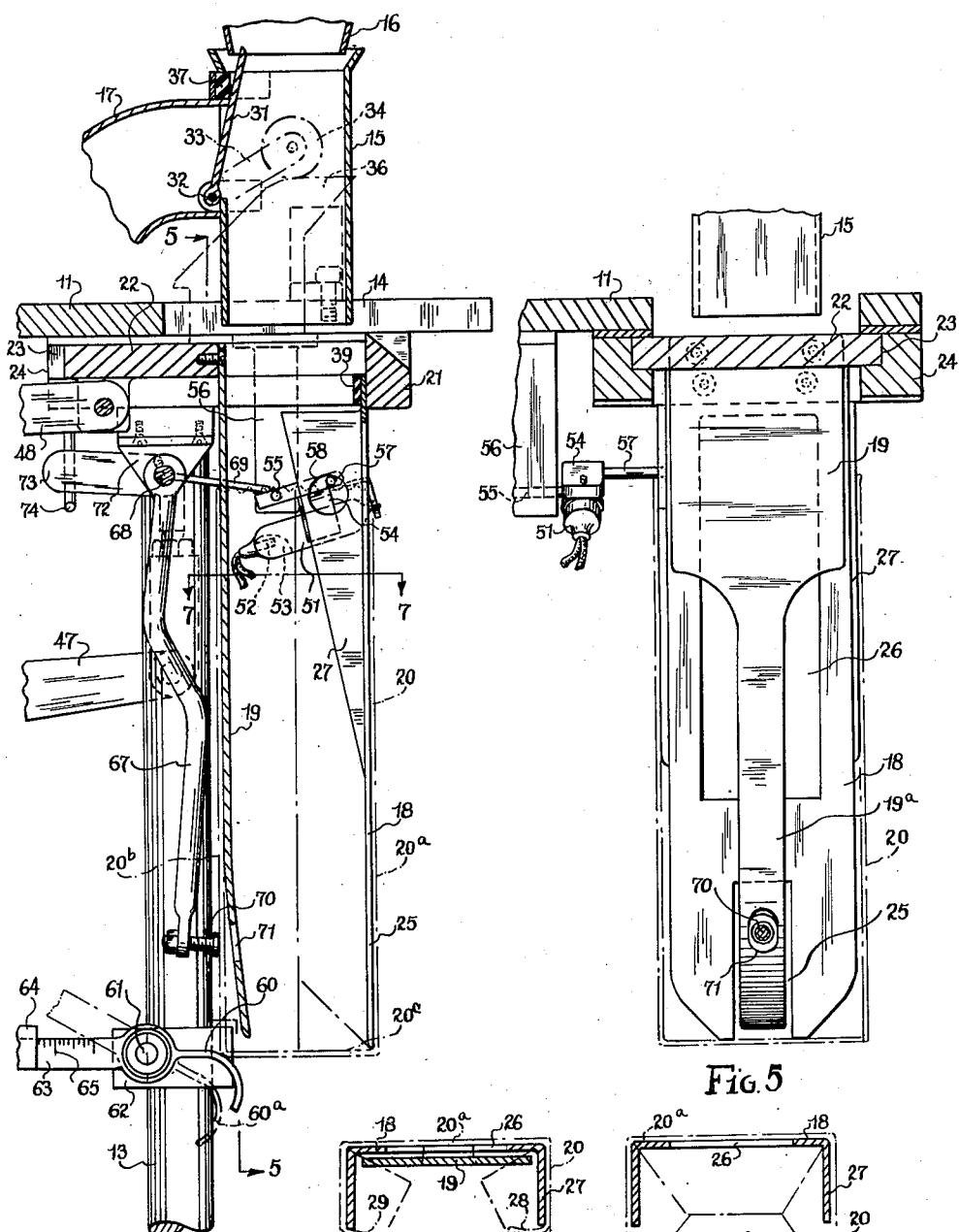


Fig. 4

Fig. 6

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Patented Feb. 6, 1951

2,540,615

UNITED STATES PATENT OFFICE

2,540,615

APPARATUS FOR OPENING AND FILLING BAGS

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Application September 10, 1946, Serial No. 695,946

17 Claims. (Cl. 226—59)

1

This invention relates to bag opening and filling apparatus by which container bags can be opened and filled with bulk material in a rapid and reliable manner and, more particularly, to apparatus of this kind which is an improvement over that disclosed in our earlier application Serial No. 490,418, filed June 11, 1943, now Patent No. 2,409,626 granted October 22, 1946.

In said earlier application there is disclosed a bag opening and filling apparatus having a pair of substantially coextending members on which a collapsed bag can be manually slipped by endwise telescoping movement and which members are then spread apart by the operation of an electric power device for distending the walls of the bag to a fully opened condition so as to receive the charge of bulk material. In the apparatus of said earlier application it is necessary for the operator to maintain a hold on the bag during the filling operation so as to prevent the bag from dropping off the bag-distending members and this prevents the operator from reaching for or picking up the next bag to be opened and filled until the bag in process of being filled has been removed from the machine. The apparatus of said earlier application also includes a switch which controls the electric power device and is located to be engaged and actuated by the upper end of the bag.

As one of its objects the present invention aims to provide improved bag opening and filling apparatus of a type similar to that of said earlier application but in which the above mentioned disadvantage is overcome in that it is not necessary for the operator to hold the bag on the distending members. In the improved machine the placing of the bag on the distending members actuates a switch which initiates the operation of the machine and results in the entire cycle being followed through, including the discharge of the filled bag, without need for the operator to retain a hold on the bag after the switch has been actuated. This will enable the operator to reach for and pick up a second bag immediately after the switch has been actuated by the first bag and thus the operator can be ready to apply the second bag to the machine just as soon as the first bag has been filled and discharged.

Another object of this invention is to provide an improved bag opening and filling apparatus of this kind in which means is employed for retaining the bag in place in its open condition during the filling operation and which will cause the discharge of the filled bag automatically.

Still another object of the invention is to provide improved apparatus of the character mentioned in which the means for retaining the bag in place during the filling operation includes a bag rest which is movable so as to permit the filled bag to drop off the bag-distending members.

2

A further object is to provide improved apparatus of the kind referred to, which embodies a valve for controlling the flow of bulk material into the bag and wherein the valve is actuated concurrently with the actuation of the bag-distending means.

This invention also aims to provide an improved apparatus of the character mentioned in which the switch controlling the electric power device is of the tiltable type and is disposed so as to be tilted when engaged by the bag to be opened and wherein holding means retains the switch in its tilted position for maintaining the power device energized as long as the bag remains in the filling position.

Yet another object of this invention is to provide improved bag opening and filling apparatus in which the armature of the electric power device serves as a counterbalance for the bag distending and valve actuating means and causes the movable members to be returned to their initial or starting position at the end of the cycle of operation.

The invention can be further briefly summarized as consisting in certain novel combinations and arrangements of parts hereinafter described and particularly set out in the appended claims.

In the accompanying sheets of drawings

Fig. 1 is a plan view of a bag opening and filling apparatus embodying this invention,

Fig. 2 is a side elevation thereof,

Fig. 3 is a partial vertical sectional view taken on line 3—3 of Fig. 1,

Fig. 4 is another partial vertical sectional view taken on line 4—4 of Fig. 1 and showing the relative positions of the parts when the bag is in a fully opened condition,

Fig. 5 is a partial vertical sectional view taken on line 5—5 of Fig. 4,

Fig. 6 is a partial transverse sectional view taken through the distending members before the bag has been fully opened, as indicated by line 6—6 of Fig. 2,

Fig. 7 is a similar sectional view taken through the distending members when the bag has been fully opened, the view being taken on line 7—7 of Fig. 4 and

Fig. 8 is a perspective view showing a container bag of a kind adapted to be opened and filled by the apparatus of Figs. 1—7, inclusive.

The improved bag opening and filling apparatus 10 is provided with a frame which includes a transverse top or table 11, a base 12, and spaced columns 13 by which the table 11 is connected with the base. The table 11 has an opening 14 extending therethrough and through which the bulk material to be bagged or packaged is discharged in a downward direction by the chute 15. The material to be packaged, such as coffee

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mitted by a valve 31 located in the chute 15. The valve 31 is mounted on a transverse pivot 32 and in its closed position extends across the passage of the chute in an inclined relation as shown in Fig. 2. A valve actuating arm 33 is connected with the pivot 32 and carries a roller 34 which cooperates with the actuating face 35 of a cam 36. The cam 36 is mounted on the slide 11 so that when the slide is actuated to shift the member 19 away from the stationary member 18 to distend the bag 20 to its fully opened condition, the cam face 35 will act on the roller 34 to lift the arm 33 and swing the valve 31 upwardly to its open position as shown in Fig. 4. When the valve is in its open position the predetermined charge of material is permitted to flow freely through the chute 15 and into the bag 20. Any material which is delivered into the chute by the spout 16 while the valve 31 is in its closed position is deflected by the latter into a by-pass chute 17.

To obtain a quiet operation of the valve 31 during the opening thereof, a resilient bumper strip 37 can be located in the main chute 15 at a suitable point to be engaged by the valve as the latter swings to its open position. A similar bumper element 38 is provided on the head of a screw 39 which is mounted on the head of a point to be engaged by the arm 33 when the latter moves in a downward direction to cause closing of the valve 31. Another such bumper and silencing element 39 can be mounted on the stationary member 18 at a point to be engaged by the member 19 when the latter is returned to its initial position. The bumper elements 37, 38 and 39 can be made of any suitable resilient material such as sponge rubber.

The slide 22 can be actuated by any appropriate power device such as the electromagnet or solenoid 41 shown in this instance. The magnet 41 includes a suitable laminated frame 42 mounted on the table 11 and carrying an energizing coil 43. The magnet also includes a movable armature or plunger 44 which extends through a suitable opening in the table. The lower end of the armature 44 is connected with a countershaft 45 by means of the pivoted link 46 and a lever 47 fixed on the countershaft. The slide 22 is actuated by the rocking movement of the countershaft imparted thereto by the armature 44 of the electromagnet and for this purpose the slide is connected with the countershaft by means of the pivoted link 46 and a lever 49 which is also fixed on the countershaft. The countershaft can be supported by suitable brackets 45a and 45b depending from the table 11.

The coil 43 of the electromagnet 42 is provided with a suitable energizing circuit which is controlled by an electric switch 51. This switch is of the tiltable type and is located adjacent the stationary member 18 of the bag opening device so that the switch can be actuated by the upper end of the bag when the latter is moved onto the bag opening members 18 and 18 as mentioned above. The switch 51 can be of any suitable construction which will enable it to be shifted or tilted by the bag for the purpose indicated. In this instance the switch 51 is of the type comprising a glass or insulating casing into which a pair of fixed switch contacts 52 extend in spaced relation and in which a body 53 of conducting material, such as mercury, is shiftable in response to tilting of the casing for causing opening or closing the electric circuit at the point of the contacts 52.

The switch 51 is carried by a bracket 54 which is pivoted at 55 on an arm 56 depending from the table 11. A switch-actuating finger 57 is connected with the bracket 54 and extends into the path of movement of the upper end of the bag so as to be engaged thereby to cause tilting or rocking of the switch from the open position shown in Fig. 2 to the closed position shown in Fig. 4. The actuating finger 57 is preferably of a length to extend into an opening 58 provided in one of the wings 27 of the stationary member 18 so that the upper end of the bag cannot be moved past the switch without causing the desired tilting thereof. The tilting of the switch to its closed position shown in Fig. 4 causes the electromagnet 41 to be energized which immediately causes an upward power stroke of the armature 44 thereby actuating the slide 22 and the valve 31 to the positions shown in Fig. 4. The energization of the electromagnet in response to the tilting of the switch 51 thus causes a substantially instantaneous distending of the bag to its open position shown in Fig. 4 and a concurrent opening of the valve 31 to permit the flow of the predetermined volume of bulk material into the bag 20.

In the arrangement above described for the electromagnet 41 it will be noted that the armature 44 is disposed in a substantially vertical position and that this enables this member to serve as a counterweight for the slide 22. The armature 44 is constructed so as to have a weight or mass sufficient to cause a return movement of the slide and bag-distending member 19 as soon as the electromagnet has been deenergized. When the filled bag is discharged from the bag-distending members 18 and 19 in the manner to be presently explained, the switch 54 is free to tilt back to its initial or open position shown in Fig. 2 thereby causing deenergization of the circuit of the electromagnet.

An important feature of the present invention is the provision of a bag supporting means by which the bag 20 will be retained on the bag-distending members 18 and 19 during the filling operation so as to permit the operator to let go of this bag and reach for and pick up the next bag to be filled. This is a very important characteristic of the improved apparatus 10 because it enables the operator to pick up the next bag and obtain the grip thereon which is needed to draw the open end of such next bag upwardly in telescoping relation onto the bag-distending members 18 and 19. By being able to pick up the next bag while the present bag is being filled greatly speeds up the operation of bag opening and filling apparatus of this type.

The bag supporting means provided for the accomplishment of this important function includes a bag rest 60 mounted on a horizontal pivot 61 which is carried by a bracket 62. The bracket 62 is mounted on one of the posts 13 at a suitable elevation so as to locate the rest 60 in laterally spaced relation to the lower end of the stationary member 18. The rest 60 is disposed so that when the bag 20 is distended to its fully opened condition shown in Fig. 4 the side wall 20b will be moved by the member 19 to a position in which a portion of the bottom 20c will engage and overlap the rest. During the filling operation the bottom 20c is supported on the rest 60 and the bag is thereby maintained on the bag-distending members 18 and 19. When the previously measured charge of bulk material has been fed into the bag the weight of the bag and contents will then be such as to cause downward

swinging of the rest 60 on the pivot 61; that is, be tripped so as to release the bag and permit the same to drop off the bag-distending members 18 and 19. To facilitate this downward movement of the bag past the rest 60 and the subsequent return of the rest to its operative position, the outer end of the rest is preferably constructed as a downwardly curving convex arm or plate 60a as shown in Fig. 4.

The bag rest 60 is connected with an arm or lever 63 on which a counterweight 64 is adjustably mounted. The counterweight 64 can be shifted to a desired position on the arm 63 such that the weight of the bag and contents will cause the desired downward swinging of the rest 60 as explained above and will cause the return of the rest to its initial full line position shown in Fig. 2. The arm 64 may, if desired, be provided with graduations 65 to facilitate the proper setting of the counterweight 64 thereon for the particular weight of material being charged into the individual bags. The bracket 62 is vertically adjustable on the post 13 so that the position of the rest 60 can be varied to suit the length of the bags being opened by the distending members 18 and 19.

In the operation of the apparatus above described it is desirable that the bag 20 be held in its fully opened condition by the member 19 during the entire filling operation and this is accomplished by maintaining the electromagnet 41 energized during the filling operation. For this purpose a holding means or interlock is provided for maintaining the switch 51 in the tilted position of Fig. 4 which corresponds with the energized condition of the electromagnet. This holding means comprises a depending arm or lever 67 carried by a rock-shaft 68 and a finger 69 projecting from the rock-shaft and engageable with the bracket 54 of the switch 51. The lower end of the arm 67 carries a pin or screw 70 which is disposed opposite an opening 71 of the member 19. When the bag 20 is on the bag-distending members 18 and 19 the wall 20b thereof covers the opening 71 and prevents the screw 70 from entering the same. This enables the arm 67 to hold the shaft 68 in a rocked position in which the finger 69 engages the bracket 54 and holds the same in the depressed or tilted position shown in Fig. 4.

The rock-shaft 68 is suitably supported as by being mounted in a pair of brackets 72 depending from the underside of the table and mounted on the guide members 24. The arm 67 is preferably counterbalanced by a weighted lever 73 projecting from the shaft 68 and which is engageable with a rest 74 for holding the arm in the initial position shown in Fig. 2 in which the screw 70 thereof is ready to be engaged by the wall 20b of the bag 20 when the distending member 19 is shifted by a working stroke of the slide 22. When the filled bag drops off the distending members 18 and 19 as explained above, the screw 70 is released and enters the opening 71 and the corresponding rocking movement imparted to the shaft 68 lifts the holding finger 69 and permits the electric switch 51 to tilt back to its open position shown in Fig. 2 for deenergizing the electromagnet 41. When the operator applies the next bag to the members 18 and 19 the switch 51 will again be actuated and the entire cycle will be automatically followed through from that point until the bag has been filled and drops off of the distending members 18 and 19 by the above-described tilting of the

bag or that the distension on a previously discharged member

From the accompanying drawings an improved bag opening device will be readily understood. It has been provided for the bag opening apparatus to be readily opened and heretofore it has been understood that it is necessary to use a bag opening device which is capable of opening the bag after the bag has been filled with bulk material. The bag opening device is initiated by the operator while the bag is being opened.

In the drawing an improved bag opening device is shown which is capable of opening the bag after the bag has been filled with bulk material. The bag opening device is initiated by the operator while the bag is being opened.

Although the improved bag opening device is described herein as being applicable to the opening of bags, it is understood that the improved bag opening device is applicable to the opening of any bag which is filled with bulk material.

Having described the improved bag opening device, we claim:

1. In a bag opening apparatus, a delivery chute for bulk material, a bag opening device having a pair of depending members adapted to extend into a bag to be opened and being movable away from the bag to an open condition beneath said chute, a power device for causing the movement of said members, a switch being connected to the power device so as to be engaged by the bag to be opened.

2. In a bag opening apparatus, a delivery chute for bulk material, a bag opening device having a pair of depending members adapted to extend into a bag to be opened and being movable away from the bag to an open condition beneath said chute, a power device for causing the movement of said members, a switch being connected to the power device so as to be engaged by the bag to be opened.

one member, a circuit for causing energization of said power device, and a switch controlling said circuit, said switch being of the self-contained tiltable type and being located adjacent said members so as to be engaged and tilted by the upper end of said bag during said relative telescopic movement.

3. In bag opening and filling apparatus, a delivery chute for bulk material, a bag opening device operable to spread apart the walls of a bag and to maintain the bag in an open condition beneath said chute, and a supporting means for supporting said bag while the latter is in said open condition and being filled with said material, said supporting means including an arm forming a bag rest adapted to be engaged by a portion of the bottom of the bag and which arm is curved downwardly and pivoted for downward swinging to permit the filled bag to move downwardly and disengage itself from said opening device.

4. In a bag opening and filling apparatus, a delivery chute for bulk material, a bag opening device having a pair of depending members adapted to extend into a bag to be opened and being capable of relative separating movement for spreading apart the walls of the bag and for maintaining the bag in an open condition beneath said chute, and a supporting means for supporting said bag while the latter is in said open condition and receiving a predetermined charge of said material, said supporting means comprising a downwardly curved arm pivoted for downward swinging movement by the bag upon the latter receiving said predetermined charge therein so as to permit the charged bag to drop off of said depending members of the bag opening device.

5. In bag opening and filling apparatus, a delivery chute for bulk material, a bag opening device having a pair of depending members adapted to extend into a bag telescopically applied thereto, one of said members being stationary and adapted to hold one side wall of the bag substantially stationary, and a bag rest spaced from said stationary member and including a downwardly curved arm extending toward said stationary member and pivoted for swinging in a direction downwardly and away from said stationary member, the other member of said pair being movable away from the stationary member for distending the other side wall of the bag to an open condition beneath said chute in which a portion of the bottom of the bag overlaps said curved arm of the bag rest, said bag rest acting to retain the bag on said members during the filling operation and being movable by the action of the bag on said curved arm to permit the bag to drop off said members when the bag has been filled.

6. In bag opening and filling apparatus, a delivery chute for bulk material, a bag opening device having a pair of depending members adapted to extend into a bag telescopically applied thereto, one of said members being stationary and adapted to hold one side wall of the bag substantially stationary, and a bag rest spaced from said stationary member, the other member of said pair being movable away from the stationary member for distending the other side wall of the bag to an open condition beneath said chute in which a portion of the bottom of the bag overlaps the bag rest, said bag rest comprising a pair of connected arms one of which is a downwardly curved arm adapted to be engaged by the bag and

to retain the bag on said members during the filling operation, said rest being pivoted for downward swinging movement of said curved arm to permit the filled bag to drop off said members, and a counterbalance on the other of said arms for preventing such downward swinging of the curved arm until the bag has been filled, said counterbalance being movable along said other arm for adjusting said rest to be responsive to different bag loads.

7. In bag opening and filling apparatus, a frame, a delivery chute for bulk material mounted in fixed relation on said frame, a pair of substantially coextending members depending from said frame and adapted to extend into a bag when the latter is telescopically applied thereto, one of said members being fixed on said frame and adapted to hold one side wall of the bag substantially stationary, a bag rest spaced from said fixed member, means mounting the other member of said pair on said frame so as to be movable away from the fixed member for distending the other side wall of the bag to an open condition beneath said chute in which the bottom of the bag overlaps the bag rest, a valve comprising a member separate from said chute and movable relative thereto to open and closed positions for controlling the flow of said bulk material through said chute, and means for concurrently opening said valve and imparting the distending movement to said other member, said bag rest comprising a downwardly curved arm acting to retain the bag on said members during the filling operation and being movable downwardly and laterally to permit the bag to drop off said members when the bag has been filled.

8. In bag opening and filling apparatus, a frame, a delivery chute for bulk material, a pair of substantially coextending members depending from said frame and adapted to extend into a bag when the latter is telescopically applied thereto, one of said members being fixed on said frame and adapted to hold one side wall of the bag substantially stationary, a slide movable on said frame, the other member of said pair being connected with said slide for movement away from the fixed member for distending the other side wall of the bag to an open condition beneath said chute, a valve movable to open and closed positions for controlling the flow of said bulk material through said chute, cam means connected with said slide and adapted to actuate said valve concurrently with the movement of said other member, and an electric power device operably connected with said slide.

9. In bag opening and filling apparatus, a frame, a delivery chute for bulk material, a pair of substantially coextending members depending from said frame and adapted to extend into a bag when the latter is telescopically applied thereto, one of said members being fixed on said frame and adapted to hold one side wall of the bag substantially stationary, a slide movable on said frame, the other member of said pair being connected with said slide for movement away from the fixed member for distending the other side wall of the bag to an open condition beneath said chute, a magnet on said frame and having a core, and an armature connected with the slide and responsive to energization of the magnet for causing a working stroke of said slide, said armature being disposed for movement relative to said core in a substantially vertical direction and having a mass sufficient to counterbalance said slide and cause a return stroke thereof.

10. In bag opening and filling apparatus, a frame, a delivery chute for bulk material, a pair of substantially coextending members depending from said frame and adapted to extend into a bag when the latter is telescopically applied thereto, one of said members being fixed on said frame and adapted to hold one side wall of the bag substantially stationary, a slide movable on said frame, the other member of said pair being connected with said slide for movement away from the fixed member for distending the other side wall of the bag to an open condition beneath said chute, a valve movable to open and closed positions for controlling the flow of said bulk material through said chute, cam means connected with said slide and adapted to actuate said valve concurrently with the movement of said other member, a magnet on said frame, and an armature connected with the slide and responsive to energization of the magnet for causing a working stroke of said slide, said armature having a mass sufficient to counterbalance said slide and cause a return stroke thereof.

11. In bag opening and filling apparatus, a frame, a delivery chute for bulk material, a pair of substantially coextending members depending from said frame and adapted to extend into a bag when the latter is telescopically applied thereto, one of said members being fixed on said frame and adapted to hold one side wall of the bag substantially stationary, a slide movable on said frame, the other member of said pair being connected with said slide for movement away from the fixed member for distending the other side wall of the bag to an open condition beneath said chute, a valve movable to open and closed positions for controlling the flow of said bulk material through said chute, cam means connected with said slide and adapted to actuate said valve concurrently with the movement of said other member, and electric power device operably connected with said slide, a circuit for causing energization of said power device, and a switch controlling said circuit, said switch being of the tiltable type and being located adjacent said fixed member so as to be engaged and tilted to circuit-closing position by the upper end of said bag.

12. In bag opening and filling apparatus, a frame, a delivery chute for bulk material, a pair of substantially coextending members depending from said frame and adapted to extend into a bag when the latter is telescopically applied thereto, one of said members being fixed on said frame and adapted to hold one side wall of the bag substantially stationary, a slide movable on said frame, the other member of said pair being connected with said slide for movement away from the fixed member for distending the other side wall of the bag to an open condition beneath said chute, a valve movable to open and closed positions for controlling the flow of said bulk material through said chute, cam means connected with said slide and adapted to actuate said valve concurrently with the movement of said other member, an electric power device operably connected with said slide, a circuit for causing energization of said power device, a switch controlling said circuit, said switch being of the tiltable type and being located adjacent said fixed member so as to be engaged and tilted to circuit-closing position by the upper end of said bag, and holding means adapted to retain said switch in its circuit-closing position while the bag is on said members.

apparatus, a material, a pair members depending extend into a 5 telescopically applied fixed on said side wall of the bag rest spaced movable on said pair being 10 telescopically applied thereto, one of said members being fixed on said frame and adapted to extend into a bag when the latter is telescopically applied thereto, one of said members being 15 fixed on said frame and adapted to hold one side wall of the bag substantially stationary, a slide mounted on said frame for movement in opposite directions, the other member of said pair being connected with said slide for movement away from the fixed member for distending the other side wall of the bag to an open condition beneath said chute during movement of the slide in one direction, a valve movable to open and closed positions for controlling the flow of said bulk material through said chute, a power device operable to cause actuation of said slide, and means providing an operating connection

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between said valve and slide for causing opening of said valve in response to movement of said slide in said one direction and closing of said valve in response to movement of said slide in the opposite direction.

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17. In bag opening and filling apparatus, a frame, a delivery chute for bulk material mounted in fixed relation on said frame, a pair of substantially coextending members depending from said frame and adapted to extend into a bag when the latter is telescopically applied thereto, one of said members being fixed on said frame and adapted to hold one side wall of the bag substantially stationary, a slide mounted on said frame for movement in opposite directions, 35 the other member of said pair being connected with said slide for movement away from the fixed member for distending the other side wall of the bag to an open condition beneath said chute during movement of the slide in one direction, a valve comprising a valve member separate from said chute and movable relative thereto to open and closed positions for controlling the flow of said bulk material through said chute, a power device operable to cause actuation of said slide, and means providing an operating connection

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between said valve member and slide for causing opening of said valve member in response to movement of said slide in said one direction and closing of said valve member in response to movement of said slide in the opposite direction.

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