Nov. 10, 1964 T. E. PIAZZE 3,156,273

APPARATUS FOR AND METHOD OF OPENING AND FILLING BAGS

Filed Dec. 3, 1959 3 Sheets-Sheet 1

Fig. 1

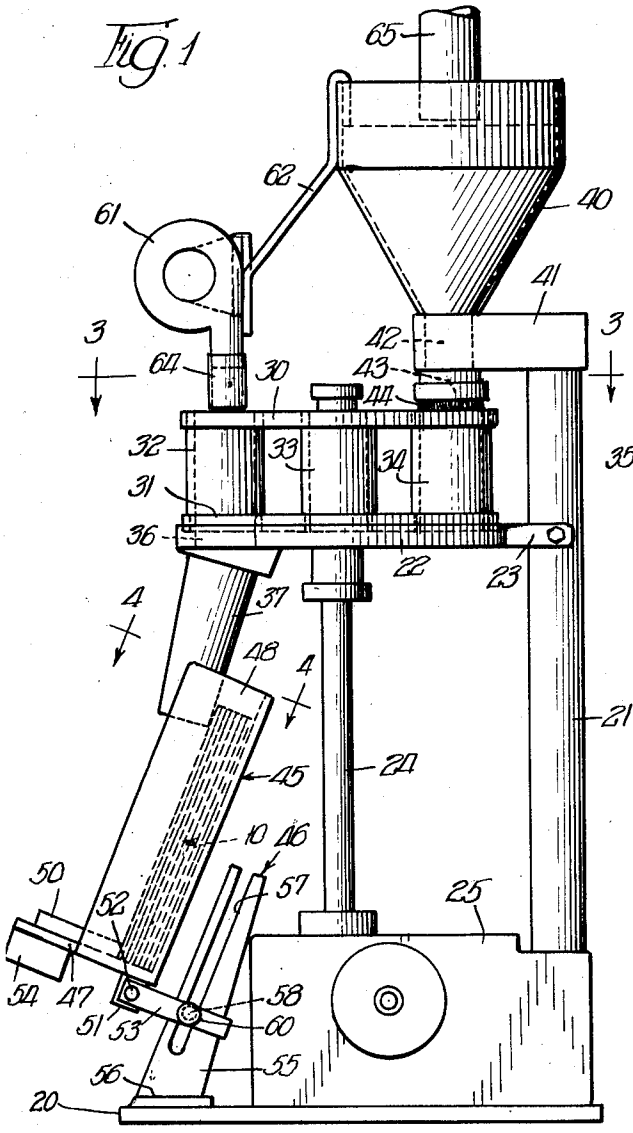
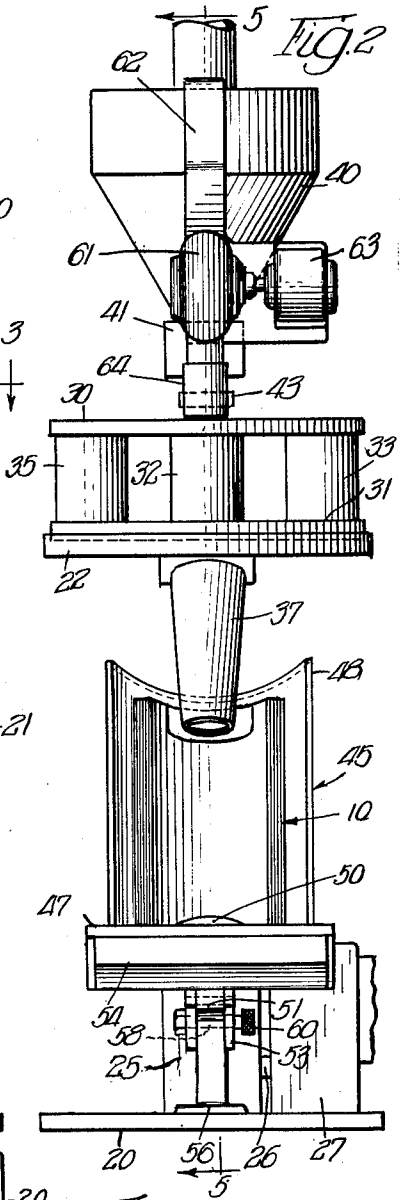


Fig. 2



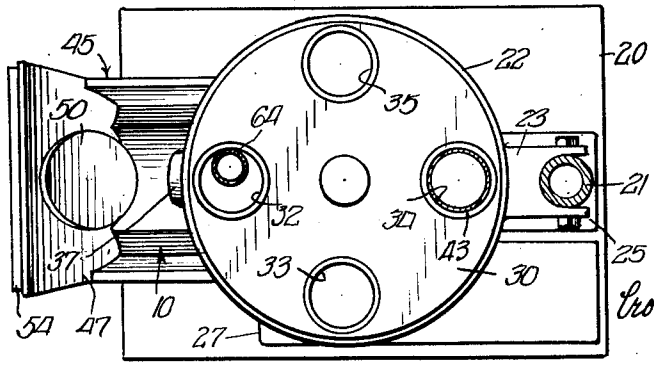


Fig. 3.

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Filed Dec. 3, 1959 3 Sheets-Sheet 2

Fig. 5.

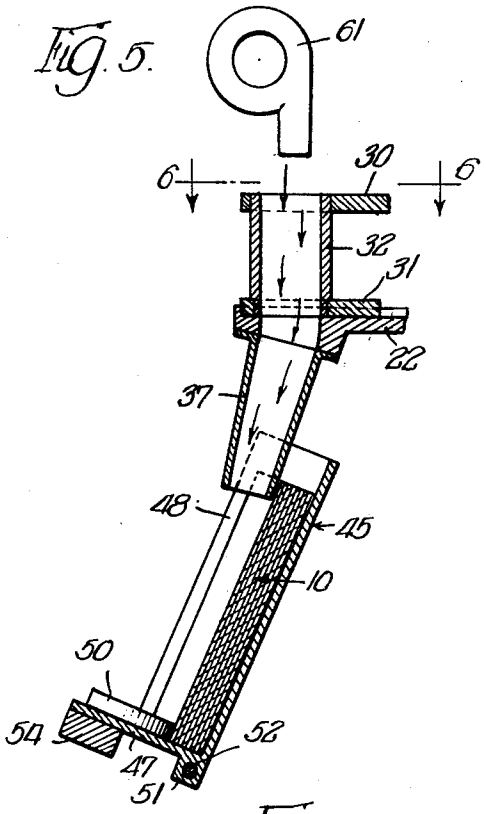


Fig. 7

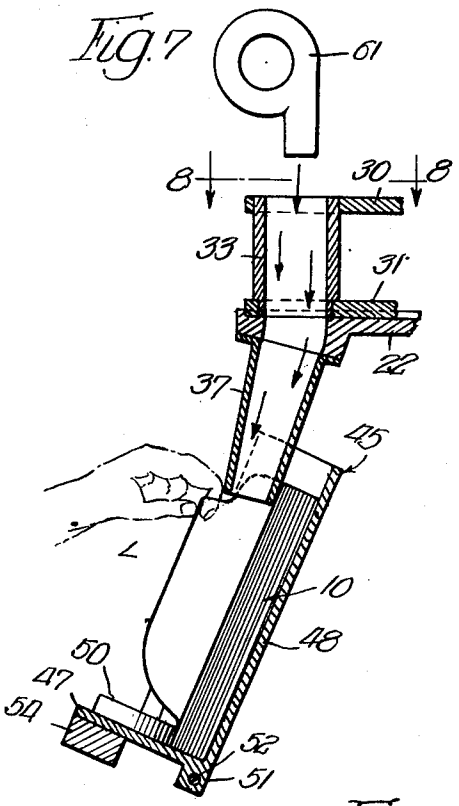


Fig. 6

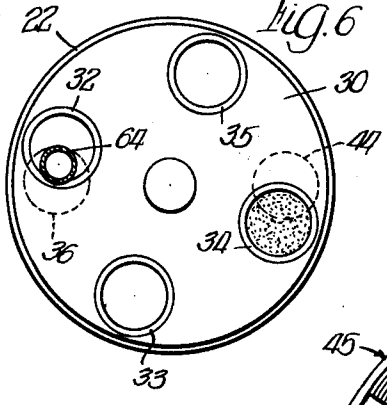


Fig. 4

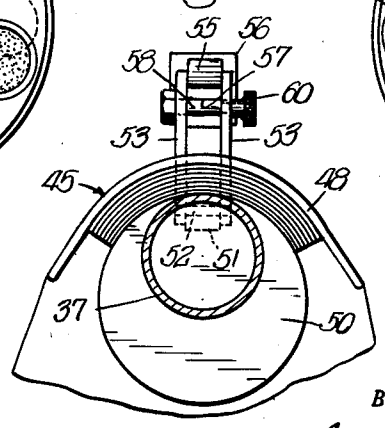
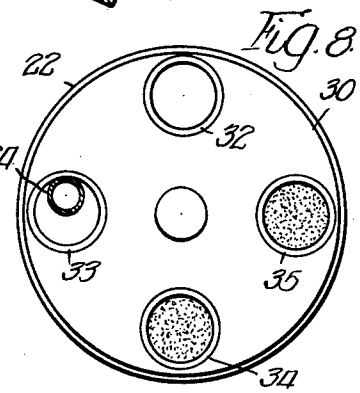


Fig. 8.



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APPARATUS FOR AND METHOD OF OPENING AND FILLING BAGS

Filed Dec. 3, 1959 3 Sheets-Sheet 3

Fig. 9

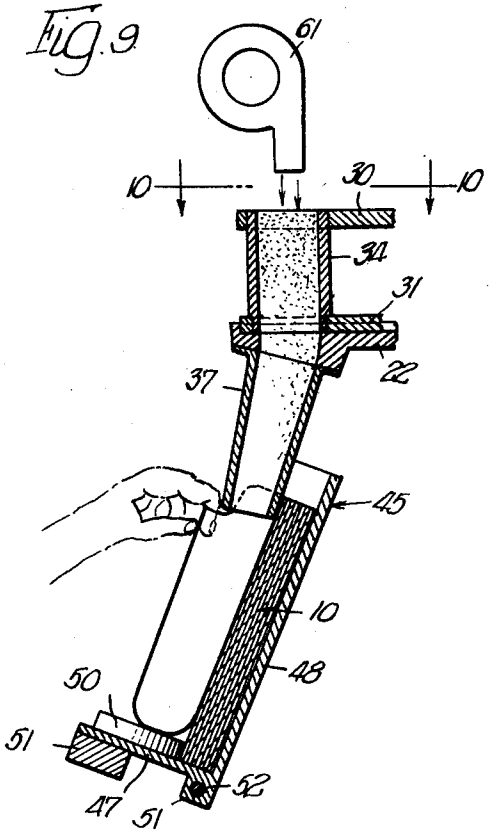


Fig. 11

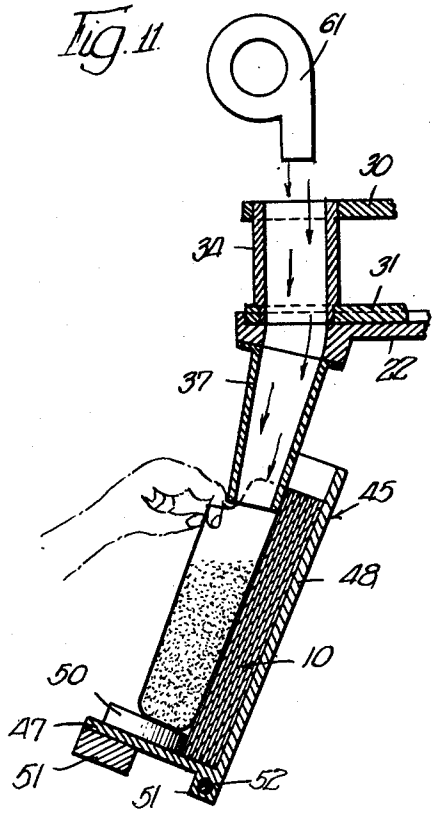


Fig. 10

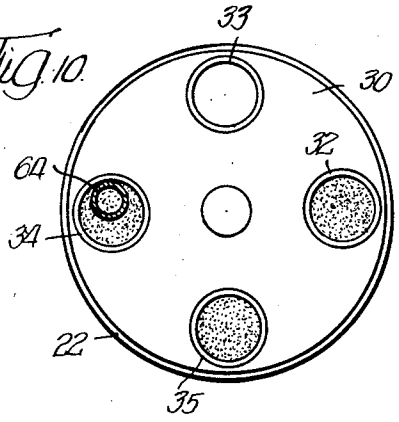
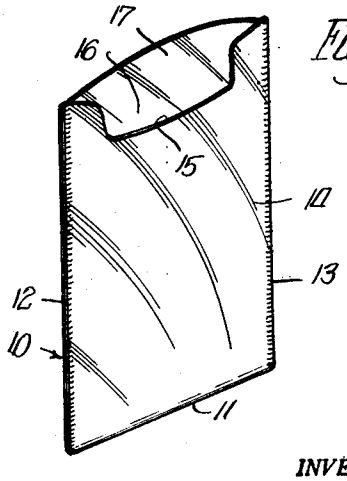


Fig. 12



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APPARATUS FOR AND METHOD OF OPENING AND FILLING BAGS

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8 Claims. (Cl. 141—317)

This invention relates to packaging and is more particularly concerned with improvements in a method and apparatus for opening and filling bags which are formed of relatively flexible materials such as plastic films.

Many products are now packaged in bags which are formed of plastic films such as cellophane, Pliofilm, polyethylene, Saran, vinyl and the like, of such thin gauge that they are difficult to handle. Also, these materials are characterized by a tendency for the surfaces to adhere when placed in contact so that when the bags are supplied in quantities in flattened or collapsed condition, considerable difficulty is experienced in opening up the mouths of the bags to receive the merchandise to be packaged therein, particularly, when the bags are opened by hand operations. These difficulties have tended to discourage the use of the thin film bags. Various efforts have been made to devise satisfactory methods and apparatus for opening and filling this type bag but none have been particularly successful. It is a general object, therefore, of the present invention to provide an improved method and apparatus for use in the opening and filling of bags which are formed of light gauge, plastic film material.

It is a more specific object of the invention to provide a method and apparatus for use in the opening and filling of flattened bags of relatively thin, plastic film material wherein provision is made for supporting a stack of the flattened bags in upright position beneath the filling spout of a standard volumetric filler so that the mouth of the endmost bag in the stack may be opened beneath the spout by manually grasping and pulling on the front wall while the back wall is held against the spout, and wherein provision is made for supporting each successive bag while it is in opened position at the front of the stack until the product is discharged through the spout after which the filled bag is removed, leaving the next bag in the stack exposed for the opening of the mouth, with the opening and filling operations being adapted to be repeated at regular intervals so as to provide a semi-automatic operation.

It is a further object of the invention to provide an apparatus for use with a volumetric bag filler which comprises a pivotally mounted member for supporting a stack of flattened bags in upright position beneath the discharge spout of the filler with the foremost bag in the stack having the top margin of its back wall gripped between the back wall of the spout and the supporting member and having its front wall free of the spout so that it may be grasped by the fingers and pulled forward to open the mouth of the bag beneath the discharge end of the spout.

It is another object of the invention to provide an apparatus for opening and filling bags of flexible film materials which comprises a volumetric bag filler and a bag magazine pivotally mounted beneath the discharge spout in which a stack of bags may be supported in upright position with the endmost bag in the stack having a lip forming top marginal portion of its back wall held between the discharge spout and an upright back wall portion of the magazine and with the front wall of the bag free of engagement with the discharge spout and

accessible for grasping with the fingers to open the bag mouth so as to receive the product discharged through the spout and a device mounted above the filler in position to direct a stream of air through the discharge spout and into the open mouth of the bag whereby to initially expand the body of the bag and to facilitate the movement of the product through the spout and into the bag.

It is still another object of the invention to provide apparatus for use in opening and filling bags which are formed of relatively thin plastic films so that they are difficult to open and support in open position for filling wherein the apparatus comprises a product measuring device in which a series of vertically disposed, open ended measuring cups are rotatably mounted between an overhead supply hopper and a bottom supporting plate having a discharge opening with a filling spout depending therefrom, a magazine pivotally mounted in vertically adjustable relation on a support bracket beneath the filling spout for supporting in upright relation thereon a stack of bags in flattened condition and with lip forming portions of the back wall thereof disposed between the filling spout and an upwardly projecting portion of the magazine so that the front wall of the end bag in the stack may be grasped and pulled forward to open the mouth of the bag beneath the bottom end of the filling spout for receiving the product from a measuring cup which is rotated into discharge position over the discharge opening in the supporting plate and a fan located above the measuring cups and having a discharge funnel aligned in the vertical direction with the discharge opening in the supporting plate so as to assist in discharging the product from a measuring cup positioned at the discharge opening and for thereafter expanding the body of the next bag in the stack when its mouth is opened beneath the filling spout.

These and other objects and advantages of the invention will be apparent from a consideration of the method and apparatus which is illustrated in the accompanying drawings wherein:

FIGURE 1 is a side elevation of an apparatus having embodied therein the principal features of the invention;

FIGURE 2 is a front elevation of the apparatus;

FIGURE 3 is a cross section taken on the line 3—3 of FIGURE 1;

FIGURE 4 is a cross section taken on the line 4—4 of FIGURE 1, to an enlarged scale;

FIGURE 5 is a fragmentary vertical cross section taken on the line 5—5 of FIGURE 2;

FIGURE 6 is a fragmentary cross section taken on the line 6—6 of FIGURE 5;

FIGURE 7 is a fragmentary cross section similar to FIGURE 5, illustrating the bag opening and expanding stage,

FIGURE 8 is a fragmentary cross section taken on the line 8—8 of FIGURE 7;

FIGURE 9 is a fragmentary section similar to FIGURE 5, illustrating the beginning of the bag filling stage;

FIGURE 10 is a fragmentary cross section taken on the line 10—10 of FIGURE 9;

FIGURE 11 is a fragmentary section similar to FIGURE 5 illustrating the end of the bag filling stage; and

FIGURE 12 is a perspective view of a bag which is adapted to be filled with the apparatus.

Referring first to FIGURE 12, there is illustrated a bag **10** which is formed of a relatively thin, flexible plastic film material, for example, Pliofilm or polyethylene, and which is adapted to be opened and filled in accordance with the method of the invention and with the use of the apparatus illustrated in FIGURES 1 to 4 of the drawings. The bag **10** may be initially formed in flattened condition by several methods, one of which comprises folding a rectangular sheet of the film material upon itself about

a bottom forming fold line 11 and heat sealing the side edges as indicated at 12 and 13. A top marginal portion of the one wall 14, which may be designated the front wall of the bag thus formed, is cut away at 15, so that the corresponding marginal portion of the back wall 16 provides a lip forming portion 17 normally provided to facilitate opening the bag mouth by grasping the end portions of the two walls and pulling them apart.

The apparatus is illustrated in FIGURES 1 to 4 in combination with a volumetric bag filler which is of known or standard construction and only so much of the filler mechanism as is necessary for an understanding of the operation of the apparatus will be illustrated and described in detail. The filler is of a type designed for use in filling bags which are opened by hand and positioned with the open mouth beneath a filling spout depending from the charge measuring mechanism. The filler is adapted to handle a variety of materials or products, usually in the granular state.

The bag filler comprises a base 20 having an upright supporting post 21 at the rear of the base. A horizontally disposed circular plate support 22 is secured to the upright post 21 by bracket 23 in vertically spaced relation above the base 20. A vertically disposed drive shaft 24 is journaled in the support plate 22 with its lower end rotatably supported in a gear box 25 mounted on the base 20. The shaft 24 is connected at its lower end, by a drive, indicated at 26, to a combination motor and gear reduction unit 27, the latter having a suitable gear arrangement (not shown) for imparting intermittent rotative motion to the verical drive shaft 24. The vertical drive shaft 24 carries on its upper end a charge measuring and delivering device which consists of the vertically spaced top and bottom plates 30 and 31 and four cup members or measuring cylinders 32, 33, 34 and 35 which extend vertically between the plates 30 and 31 and are of identical size and construction. The cup members 32, 33, 34 and 35 are open at both ends and these members are set between the top and bottom plates 30 and 31 so that openings provided in the plates are aligned with the open ends of the respective cup members. The cup members are arranged in equally spaced relation about a circle having its center coincident with the center of rotation of the shaft 24. The bottom plate 31 rotates in engagement with the top surface of the support plate 22 which has a discharge opening 36 at the front side of the apparatus opposite the support post 21, which discharge opening 36 is located so that each of the cups 32, 33, 34 and 35 may be moved by rotation of the shaft 24 to position the bottom open end thereof over the discharge opening 36 so as to permit discharge of a measured quantity of the product through the opening 36. A bag filling spout 37 is attached to the support plate 22 beneath the discharge opening 36 in depending relation to the support plate 22 and inclined toward the front of the apparatus. The spout 37 has a funnel-like shape with the lower discharge end or mouth 38 somewhat smaller than the upper end which receives the product discharged from the measuring cup.

A supply hopper 40 is supported on the upper end of the post 21 by means of a horizontally disposed bracket 41 and has a funnel-like bottom portion 42 with a bottom discharge opening 43 which is located to align with the openings in the tops of the cups 32, 33, 34 and 35 as they are moved successively into a product receiving position beneath the hopper. The hopper 40 is designed to receive a supply of the product to be packaged which is of such a nature that it will readily flow by gravity from the hopper into the charge measuring cups when the latter are aligned with the hopper discharge opening 43. A suitable sealing device 44 is provided on the funnel-like end 42 of the hopper 40 which engages with the top surface of the top plate 30 and prevents overflow of the product as it is delivered through the discharge opening 43 to the cup. The sealing device 44 also wipes across the open top of the cup when the latter is moved from beneath the hopper discharge opening 43 by rotation of the shaft 24 and levels off the top of the product delivered to the cup so that each successive cup is filled with the same measured quantity of the product.

A support is provided for a stack of the bags 10 below the filling spout 37 which comprises a bag magazine 45 and a mounting bracket 46 on which the magazine 45 is pivotally mounted. The bag magazine comprises a plate 47 forming a bottom platform or base member and an upright back member 48, the latter being in the form of a rectangular plate bent to provide a semicircular cross section and providing an upright cradle-like rest or support against which a stack of the bags 10 is adapted to be positioned with the bags disposed in upright relation and having their bottom edges resting on the base or platform member 47 so that the lip portions 17 at the mouths of the bags are disposed between the back portion of the filling spout 37 and the top portion of the upright cradle member 48. The bags 10 are urged against the member 48 so that the stack is bowed to conform to the surface of the member 48 by a disc-like block or plate member 50 which rests on the top surface of the platform 47 where it is free to slide by gravity against the bottom of the stack due to the tilted position of the magazine. A mounting ear 51 extends downwardly beneath the back edge of the bottom or platform member 47 of the magazine 45 and has a pivotal connection at 52 with the forward end of a forked bracket member 53. The platform member 47 is provided at its forward edge with a weight 54 which urges the magazine 45 in a counterclockwise direction about the pivot 52. The bracket member 53 is adjustable on the upright supporting post member 55 of the support bracket 46. The post member 55 extends in upwardly and rearwardly slanted relation from a base member 56 which is secured relative to the base 20 of the filler. The post member has a vertically extending slot 57 which accommodates a clamping pin 58 extending between the legs of the forked end of the bracket member 53, the clamping pin or bolt 58 is provided with a clamping nut 60 so that the bracket 53 may be clamped in any desired position of vertical adjustment on the post 55. The vertical adjustment of the magazine 45 will, of course, depend upon the size of the bags 10. The back wall 48 of the magazine 45 has a height sufficient to engage with the back of the filling spout 37 when the magazine 45 is tilted forwardly at any vertically adjusted position so as to form with the spout 37 a clamp for the lip portions of the bags in the stack.

A fan or blower 61 is supported by means of a bracket 62 on the hopper 40 above the top plate 30 of the charge measuring and delivering mechanism. The fan 61 is driven by a continuously operating motor 63 and has an air discharge tube or conduit 64 which is disposed vertically above the discharge opening 36 so that when a measuring cup is moved to the discharge position a stream of air from the fan tube 64 will be delivered into the open top of the cup. When the cup is empty the air will pass through the cup and the filling spout 37 and into the top of a bag 10 which has been pulled open beneath the spout 37, the air serving to open up the body of the bag. When the cup is filled with a product for discharge through the spout 37 the air will assist in clearing the cup and the spout 37 of the product as it is discharged into a bag which has been opened beneath the spout 37. The discharge tube 64 is of smaller cross section than the cups and is arranged eccentric to the discharge opening 36 as shown in FIGURE 3 so that its full force is not applied to the top of the cup until it is aligned with the discharge opening 36.

The method of opening and filling the bags 10 with the apparatus described will be best understood by reference to FIGURES 3 to 12 of the drawings. A supply or stack of the bags 10 is placed in the magazine 45 and a supply of the product to be packaged is fed into the hop-

per 40 through the supply pipe 65. Operation of the filler is begun and the blower 61 is started so as to deliver air through an empty charge measuring cup 32 which, as shown in FIGURES 5 and 6, is initially positioned at the discharge opening 36 and at the start of the operation begins to advance to the next position. During the time the cup 32 is halted at the discharge station the oppositely disposed cup 34 is being filled through the filling spout 42 from the hopper 40. The air from the fan 61 passes through the empty cup 32 and the spout 37 in front of the foremost bag 10 in the stack until the filler operates to advance the cup 32 cutting off the flow of air through the spout 37. The operator grasps the top margin of the front wall 14 of the foremost bag 10 as shown in FIGURE 7 and exerts a forward pull. The lip 17 of the bag back wall 16 is retained in position between the magazine back wall member 48 and the spout 37 so that the mouth of the bag is opened beneath the mouth of the spout 37 to receive the air which flows through the cup 33, as the latter is halted at the discharge station, FIGURES 7 and 8, and into the bag, opening up or expanding the body thereof which is held against the stack at the bottom by the block 50. The filler mechanism then rotates to bring the next cup 34 which is filled with the product into discharge position at the opening 36 and the product in the cup 34 flows through the spout 37 and into the opened up bag 10. As the bag 10 is filled with the product the operator lifts it sufficiently to pull the bottom edge free of the block 50, the latter serving as a height compensator for the bag since the bag is reduced in height as it fills at the bottom so that the bag mouth is held close to the mouth of the spout 37 for receiving the final portions of the product. The air pressure from the fan 61 is on the top of the charge, and as shown in FIGURE 11, helps to clear the cup and the filling spout of the product as the product flows through the spout 37 and into the bag. It also helps to settle the product in the bag. When the bag is filled (FIGURE 11), it is, of course, removed from the apparatus, leaving the next bag in the stack accessible for immediate opening while the cup which has just been emptied remains at the discharge station, allowing the air to flow into the bag, the mouth of which is opened by the operator before the filler mechanism starts on the next quarter turn. The cycle of operations is repeated for opening and filling a bag on each quarter turn of the charge measuring mechanism once the apparatus is started. The charge measuring cups are rotated intermittently in timed relation and the manual opening and handling of the bags is performed by the operator in synchronism with the operations of the filler, the bag opening operations requiring the use of only one hand by the operator. As the thickness of the stack of bags is reduced by the removal of the bags, the height compensator block 50 slides toward the rear of the magazine 45 and maintains the stack in proper position with the top lip portions of the bags in the stack being clamped between the spout 37 and the back wall 48 of the magazine by the forward pivoting of the magazine on its support under the influence of the weight 54.

The method and apparatus disclosed are applicable to the opening and filling of bags formed of various relatively flimsy or flexible materials and of the several types which are adapted to be collapsed into flattened condition when empty including flat bottom and infolded side wall constructions. The materials or products which may be packaged are, of course, numerous, being generally in a granular form which is not subject to excessive scattering when moved into the path of the air from the fan 61. The velocity of the air may, of course, be varied with different materials.

While particular materials are specific details of construction have been referred to in describing the form of the apparatus illustrated, it will be understood that other materials and different details of construction may be resorted to within the spirit of the invention.

I claim:

1. In an apparatus for delivering a measured charge of material into an opened bag which apparatus is characterized by a vertically disposed open ended charge holding cup member and a supporting member having a discharge opening over which the cup member is movable to align the bottom open end with the discharge opening so that the material will pass through the opening, and a filling spout at said opening which extends beneath said cup supporting member, a support for a stack of bags of relatively thin, flexible material which are in flattened condition and arranged in upright relation beneath said filling spout, said bag support comprising a platform member and an upright back member extending at the rear side of the platform member, said back member being curved about its vertical axis to form a cradle for the stack of bags which are positioned with their bottom ends in engagement with the platform member and with lip forming portions extending above the bottom edge of the filling spout so that the lip portions of the bags in the stack are disposed between the back portion of the lower margin of the filling spout and the cradle, means on the platform for releasably holding the bottom edges of the bags in the stack against the bottom of the cradle so that the bags are bowed about a vertical axis, and means for pivotally mounting said bag support so as to swing the same to releasably clamp the stack of bags between the said back member and the filling spout and permitting the front wall of the endmost bag to be grasped by the fingers and moved forward while the back wall of the bag remains clamped between the filling spout and said back member so as to open up the mouth of the bag beneath the filling spout.

2. In an apparatus for use in opening and filling bags which are formed of relatively thin film material so that they are difficult to open and support in open position for filling, which apparatus comprises a product measuring device having a series of spaced, vertically disposed open ended measuring cups rotatably mounted beneath an overhead product supplying hopper, a bottom supporting plate having a cup discharge opening in the path of said cups, and a filling spout depending from said discharge opening, a bag magazine beneath said filling spout for supporting in upright position a stack of bags and having an upwardly projecting portion against which the stack rests, said upwardly projecting magazine portion extending above the bottom end of said filling spout, said magazine being constructed so that when a stack of bags is positioned therein the upper end portions thereof will be disposed between the filling spout and said upwardly projecting magazine portion, a bracket member having a pivotal connection with the bottom of said bag magazine, an upright post and an adjustable connection between said post and said bracket member so as to permit vertical adjustment of said magazine and said pivotal connection being located so that said magazine will swing by gravity to engage the upper end portions of said bags between the filling spout and said upwardly projecting magazine portion.

3. In an apparatus for opening and filling bags which are formed of relatively thin film material so that they are difficult to open and support in open position for filling, which apparatus comprises a product measuring device having a discharge opening and a filling spout depending from said discharge opening, a bag magazine for supporting in upright position a stack of bags and having a generally upright portion against which the back end of the stack rests, said upright magazine portion extending above the lowermost edge of said filling spout, said magazine having a bottom on which the bottom end of the stack of bags rests with the upper end portions of the bags disposed between the filling spout and said upright magazine portion, a bracket member, a pivotal connection between said bracket member and said bag magazine which is located so that said magazine will pivot by gravity to hold

the top edge of the back wall of the endmost bag in the front of the stack against the filling spout and enable the front wall of the bag to be pulled across the mouth of the filling spout thereby to open the bag for receiving a product.

4. Apparatus as recited in claim 3 and a supplemental bag supporting member positioned in movable relation on the bottom edge of the stack of bags to releasably hold the same against said magazine upright portion.

5. Apparatus as recited in claim 3 and said magazine being so constructed and connected to said bracket member that the bottom of the magazine is normally inclined downwardly in the direction of the stack of bags, and a block member slidably positioned on said magazine bottom and urged by gravity into engagement with the lower end of the endmost bag in the stack.

6 In an apparatus for use in opening and filling bags which are formed of relatively thin film material so that they are difficult to open and support in open position for filling, said apparatus comprising a product measuring device having a discharge opening and a filling spout depending in a generally vertical direction from said discharge opening, a bag magazine for supporting in upright position a stack of bags, said magazine having an upwardly projecting portion against which the stack rests and which projects above the bottom end of said filling spout, said magazine having a base on which the stack of bags is positioned with the upper end portions of the bags disposed between the filling spout and said upwardly projecting magazine portion, an upright post forming a support for said magazine, a bracket mounted on said post for vertical sliding movement, said magazine having a pivotal connection with said bracket so as to swing said upwardly projecting magazine portion toward the filling spout for clamping the bags therebetween, and said upwardly projecting magazine portion having a horizontal cross section which causes the bags in the stack to bow about their vertical axis when held against the said upwardly projecting magazine portion.

7. Apparatus for use in filling bags which are formed of flexible sheet materials and which have a portion of one wall extending beyond the opposite wall at the mouth thereof when the bags are in flattened condition, said apparatus comprising a filling spout, means to support said spout in generally vertical position, a magazine beneath the spout for receiving thereon a stack of the bags in empty flattened condition and in upright position so that the extending portion of the one wall of the bag on the open face of the stack engages the lower edge of the spout while the opposite wall of the bag is accessible for opening the mouth of the bag beneath the spout,

means for pivotally supporting the magazine, and means for biasing the magazine so as to urge the top of the stack of bags toward the pouring spout.

8. In an apparatus for delivering measured charges of material into opened bags which apparatus is characterized by an open ended charge holding cup member, a supporting member having a discharge opening over which the cup member is movable to align the bottom end with the opening for passage of the material through the opening, and a filling spout depending from said supporting member at said opening, a support for a stack of bags of relatively thin, flexible material which bags are flattened and arranged in upright position beneath said filling spout, said bag support comprising a pair of angularly related members forming a cradle for the stack of bags, one of said cradle forming members being disposed in upright position, the stack of bags being disposed on said cradle in an upright position and having lip forming portions extending above the bottom edge of the filling spout and between the filling spout and said one upright cradle forming member, means for releasably holding the bottom edges of the bags in the stack against said upright cradle forming member, and means for mounting said bag support on a pivot which is located so that said upright cradle forming member is swung by gravity toward the filling spout and the lip portions of the bags in the stack are releasably held between the filling spout and said upright cradle forming member with the front wall of the endmost bag free to be grasped by the fingers and moved forward while the back wall of the bag remains clamped between the filling spout and said upright cradle forming member so as to open up the mouth of the bag beneath the filling spout.

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