June 30, 1964 J. F. GERBE 3,138,907

BAG OPENING AND FILLING MACHINE

Filed Oct. 19, 1961 3 Sheets-Sheet 1

FIG. 1

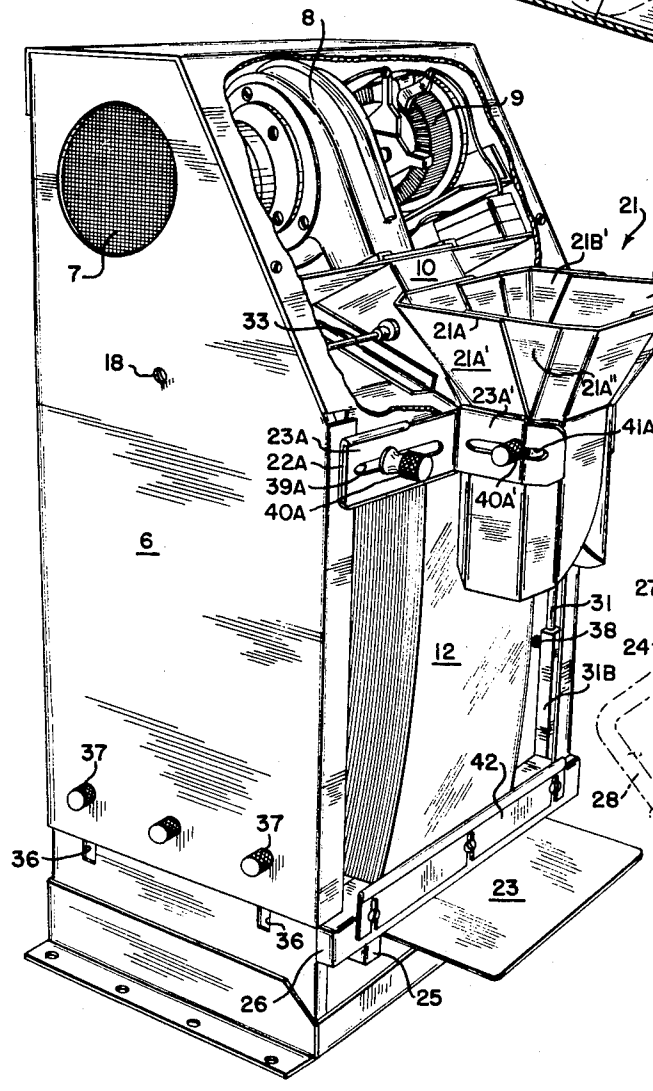

FIG. 5

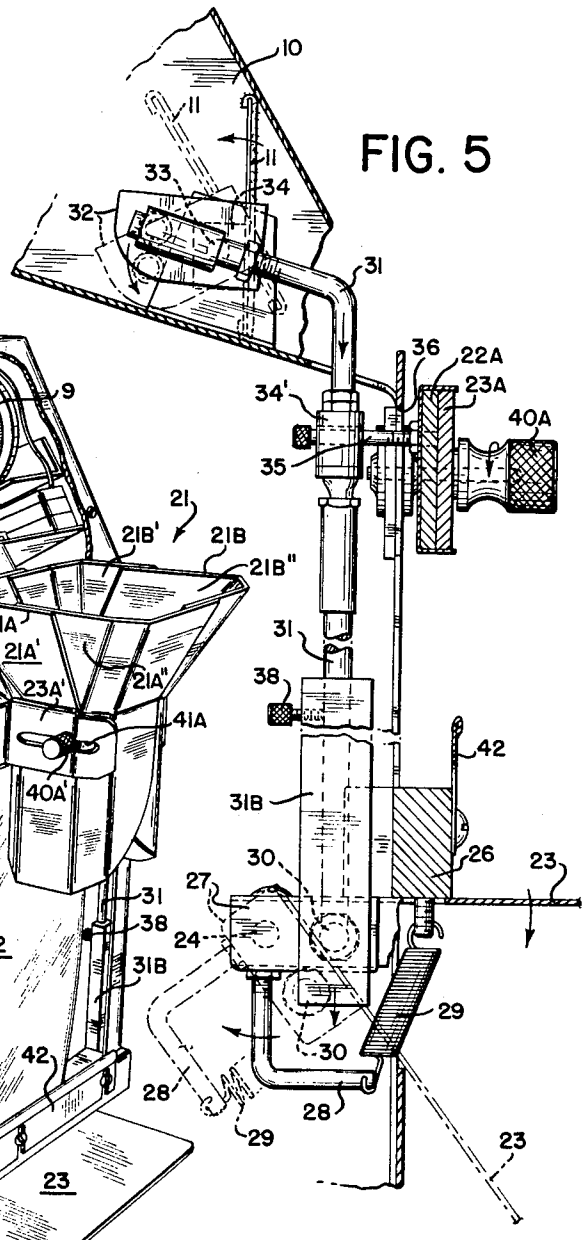

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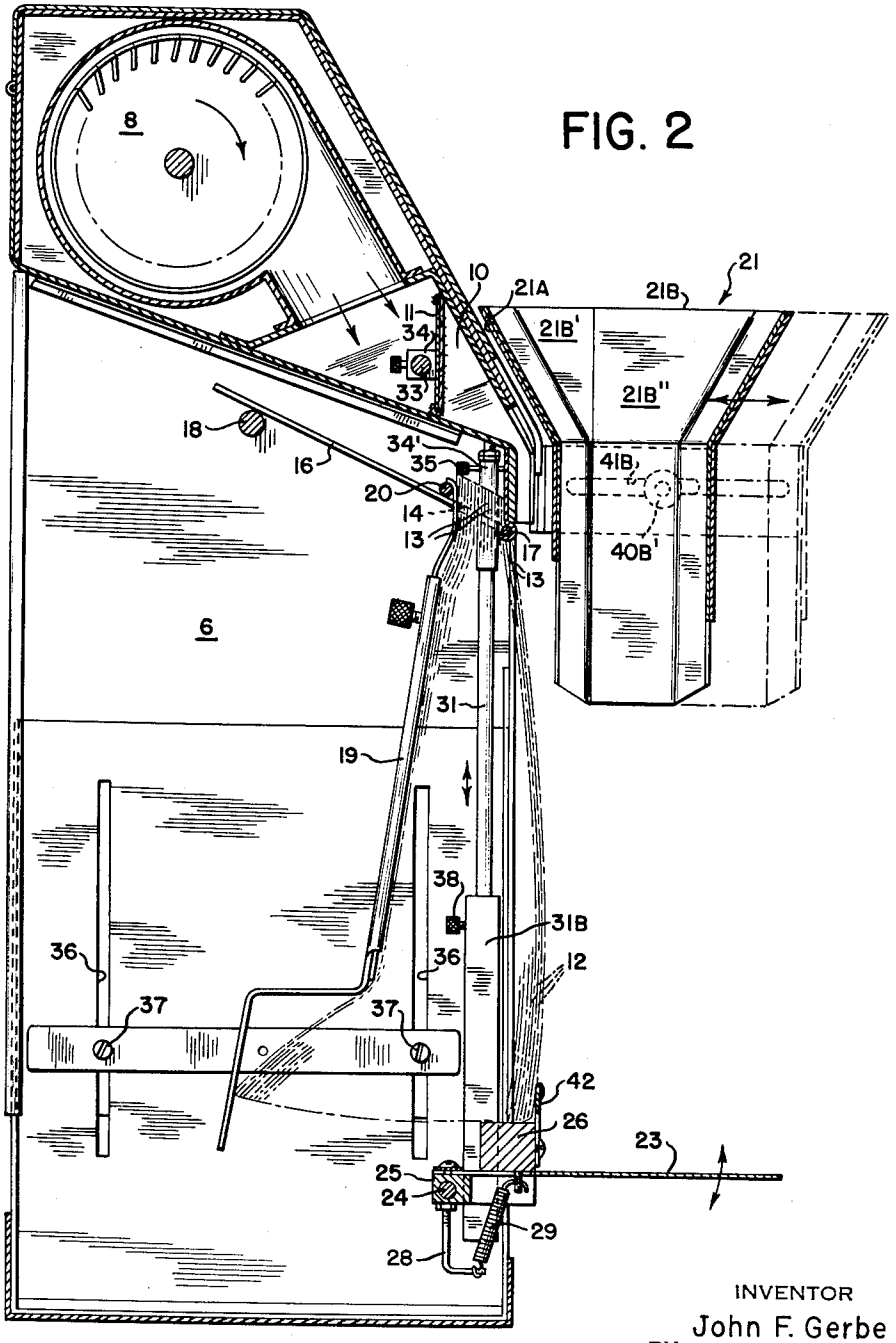
FIG. 2



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BAG OPENING AND FILLING MACHINE

Filed Oct. 19, 1961 3 Sheets-Sheet 3

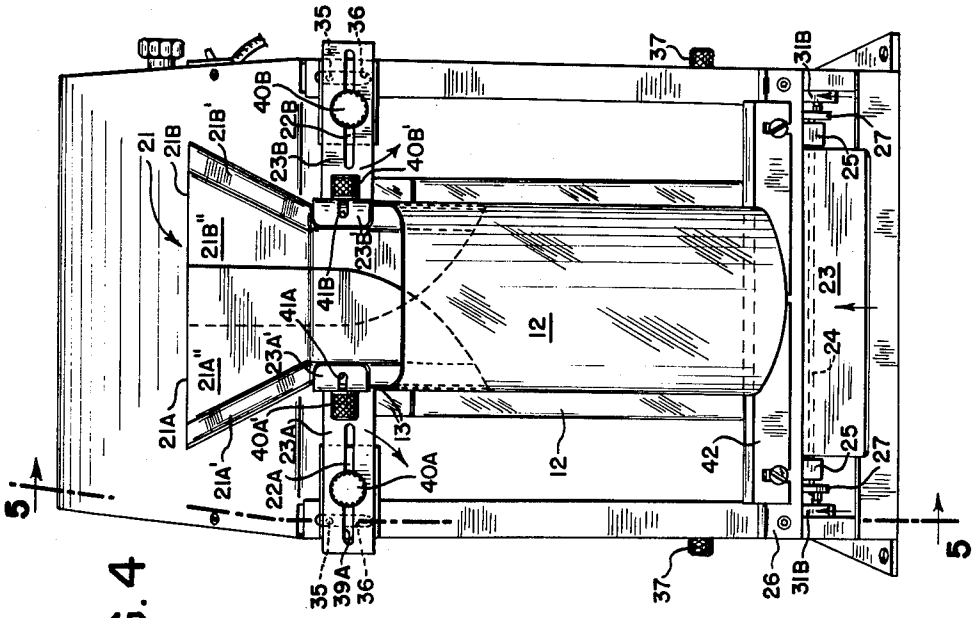

FIG. 4

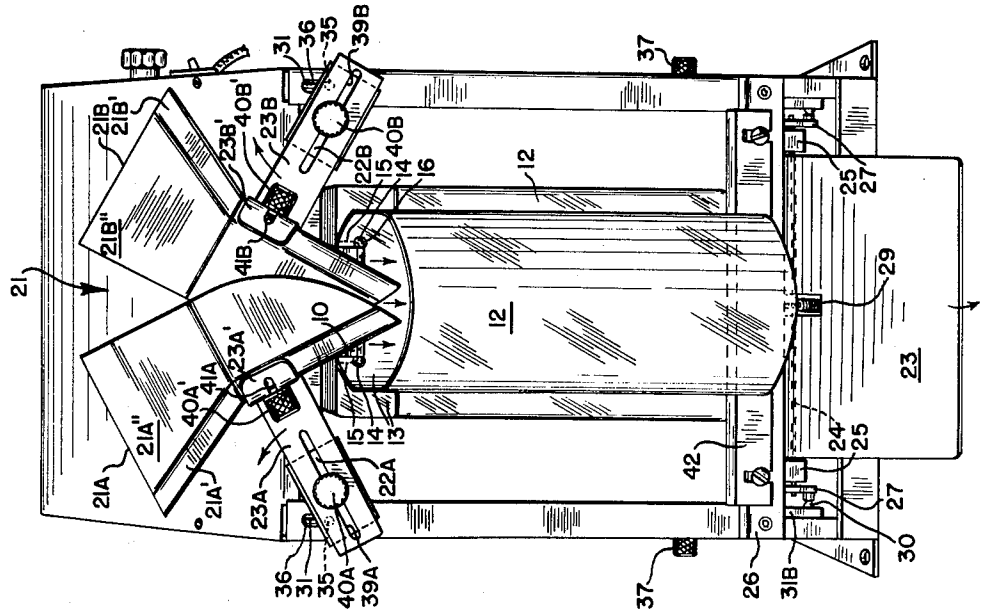

FIG. 3

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United States Patent Office 3,138,907 Patented June 30, 1964

3,138,907

BAG OPENING AND FILLING MACHINE

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Filed Oct. 19, 1961, Ser. No. 146,267
6 Claims. (Cl. 53—385)

This invention relates to packaging machines, and more particularly, to a package machine for filling pliable containers such as bags and the like.

In bag filling devices of the prior art, it has been a common expedient to open the bag by means of a blast of air. It is clearly apparent, however, that the bags will not remain in their distended or opened condition unless either the air supply is continued or some mechanical device is used to hold the bag open. The continued blast of air into a bag during the filling operation is particularly disadvantageous when the bag is being filled with light material because the blast of air rebounding from the interior of the bag tends to carry the filling material out of the bag and into the ambient atmosphere. Mechanical devices proposed for eliminating this problem have been characterized generally by such small discharge openings positioned within the interior of the opened bag that the filling operation is impeded.

I have now devised a bag opening and filling machine which is free from the objections of the prior art devices in that a mechanical loading element engages an opened bag and holds it in a completely distended position so that the discharge opening in the loading element has the same cross-sectional area as that of the opened bag. The machine of the present invention comprises a bag supporting rack, a plurality of stacked flat-folded open-top bags each supported by a flap extending upwardly above its open top and frangibly engaging the supporting rack. An air supply duct is positioned so as to direct a flow of air downwardly against the open top of the foremost bag of the stack thereof, and advantageously a butterfly valve is movably mounted within this air supply duct. A rectangular guide funnel is positioned above and in front of the open top of the foremost bag of the stack thereof, the funnel being composed of two complementary halves joined together along two opposite telescoping sides thereof with a rocker arm supporting each of the two halves of the funnel to permit this telescoping motion. In one of the extreme positions of the two halves of the funnel in the course of this telescoping motion, the halves form a complete funnel and in the other extreme position they form a bag guide in which the lower end of the funnel is contracted and the upper end of the funnel is expanded. A trip lever is provided which has two operative positions and which is connected to the funnel and to the butterfly valve so as to move the two halves of the funnel to the bag-guide form and to open the valve when the trip lever is in one position and so as simultaneously to close the butterfly valve and to move the two halves of the funnel to the complete funnel form with the lower end of the funnel engaging and supporting the air-opened top portion of the bag when the trip lever is in another position.

These and other novel features of the bag opening and filling machine of my invention will be more readily understood from the following description taken in conjunction with the drawings in which:

FIG. 1 is a perspective view, partially broken away, of the complete machine;

FIG. 2 is a vertical side cross-section taken through the center of the machine shown in FIG. 1;

FIG. 3 is a perspective front view of the machine showing the two halves of the funnel in their bag guide position;

FIG. 4 is a perspective front view of the machine showing the funnel in its complete funnel form; and

FIG. 5 is a vertical side cross-section taken along the line 5—5 in FIG. 4.

As shown in FIG. 1, an upper portion of the side wall 6 of the machine is provided with an air inlet 7 through which air is drawn by a motor driven fan 8 whose speed is controlled by rheostat 9. The air from the fan is discharged through an air duct 10 provided internally with a butterfly valve 11 as shown in FIG. 2.

The discharge end of the air duct directs the air downwardly against the upper front portion of the foremost bag 12 of a stack thereof. The bags are advantageously formed of plastic material and have an open top with an upper flap 13 extending upwardly beyond the open top of the bag. Each of the bag flaps is provided with a pair of openings 14 which are advantageously connected to the uppermost edge of the flap by a tearing or breaking line 15. The bags are supported in stacked position by a bail 16 or other supporting rack having a U-shaped configuration. The closed end of the U-shaped bail 16 is supported on a hook 17 and the opposite end of the arms of the bail are supported higher on a transverse bar or rod 18. A pendulum-like weight 19 is hung from a supporting rod 20 near the top of the stack of the bags and is free to hang downwardly against the rearwardmost bag so as to urge the entire stack forward, that is, to the right in FIG. 2.

Above the open top of the bags and in front thereof is mounted a rectangular guide funnel 21. The guide funnel is composed of two complementary halves 21A and 21B, each half being substantially U-shaped in cross-section with the arms of each section overlapping or telescoping about the arms of the other section. The upper portion of each funnel half section flares outwardly in all directions and the lower portion of each section is shaped to form a discharge spout through which material may be discharged without impediment when the two halves are positioned in the completed-funnel form. The two halves of the funnel are mounted on separate rocker arms 22A and 22B so that when the rocker arms are rotated to an upper position the two halves of the funnel are moved into a bag-guide form characterized by expansion of the upper end of the funnel and contraction of its lower end. In the other lower position of the rocker arms 22A and 22B, the two halves of the funnel are brought into the completed funnel form shown in FIG. 4. As can be clearly seen in FIG. 3 wherein the funnel sections are in the bag-guide form, the lowermost end of the funnel is adapted to enter the opened top of a bag which is temporarily held open by a blast of air from the fan 8. It will be also seen in FIG. 4 that the movement of the two funnel halves to the form of a completed funnel causes the lower end of the funnel to enter into the opened top of the bag and to engage its inner surface so as to support the bag in the fully opened condition.

Movement of the complementary halves of the funnel 21 as well as control of the supply of bag-opening air is effected by movement of a bag support plate 23. This plate is positioned directly below and in front of the bottom of the stack of bags and is mounted on a shaft 24. The ends of the shaft 24 extend through a pair of bearing blocks 25 secured to the front frame 26 of the machine. The ends of the shaft 24 project through the innermost portion of a pair of lower rocker plates 27. Each lower rocker plate is further provided with a downwardly and forwardly depending arm 28 to the end of which there is secured a spring 29. The action of the spring, one end of which is connected to the front frame 26 of the machine, is to hold the lower rocker plate 27 in its horizontal position with the bag supporting plate 23 similarly maintained

in a horizontal position directly in line vertically with the discharge end of the funnel **21**.

The forward portion of each lower rocker plate **27** is connected by means of a journal **30** to the lower end of an actuating arm **31** which rises vertically within the front corner of the machine. The upper end of the actuating shaft **31** extends rearwardly and is journalled to the innermost end of the upper rocker plate **32**. The upper rocker plate is secured to a supporting shaft **33** which extends through and is mounted in the air supply duct **10**. Within the duct **10** the shaft is engaged by a boss **34** on which the buterfly valve **11** is mounted.

It will be seen, accordingly, that tripping movement of the bag supporting plate **23** to the dotted position shown in FIG. 5 causes the lower rocker plate **27** to rotate to its dotted position and to pull downwardly on the actuating shaft **31**. This movement of the shaft **31** causes the upper rocker plate **32** to move downwardly in the direction of the arrow in FIG. 5 and thus rotate the butterfly valve **11** from the valve-closed position to the valve-opened position (shown in dotted lines in FIG. 5). It will also be observed that the overall motion of the actuating shaft **31** is to move rearwardly as it moves downwardly. Accordingly, in order to impart the up and down motion of the actuating arm **31** to the funnel support rocker arms **22A** and **22B**, a boss **34'** is mounted on the actuating shaft and is provided with an opening through which a rocker arm pin **35** freely projects. The forwardly projecting portion of the pin **35** projects through a vertical slot **36** in the front of the machine and engages an outboard portion of each rocker arm **22A** and **22B**. Thus, as the rocker pin **35** is moved downwardly by the movement of the actuating arm **31**, it causes the rocker arms **22A** and **22B** to rotate in the direction of the arrows in FIG. 3 and thus move the complementary funnel halves **21A** and **21B** to the bag-guide position shown in FIG. 3. The rearward extension of the rocker pin **35** through the actuating arm boss **34'** maintains engagement of the pin with the arm in spite of the rearward movement of the arm during its downward travel.

In operation of the bag opening and filling machine of the invention, the bag support plate **23** is pressed downwardly to its dotted position shown in FIG. 5. This opens the butterfly valve **11** and permits air to pass through the duct and downwardly against the top of the front bag in the stack thereof hanging in the front portion of the machine. This blast of air causes the front bag to billow open as shown in FIG. 3 and causes the bottom of the bag to escape from its stop plate **42**. Inasmuch as the complementary funnel halves **21A** and **21B** are simultaneously raised to the bag-guide position, the lower ends of the two funnel halves are raised above the top of the bag and are in a contracted position. When pressure on the bag support plate **23** is released, this support plate moves to its horizontal position, the actuating arm is simultaneously raised and the butterfly valve **11** is moved to the valve-closed position. As this happens, the lower extremities of the funnel halves **21A** and **21B** move downwardly into the still distended bag and engage the inner surface of the upper portion of the bag by the time that the butterfly valve **11** reaches its valve-closed position. The weight of the funnel halves **21A** and **21B**, the action of the spring **29** and the pressure of the blast of air against the butterfly valve **11** as it approaches its valve-closed position cause the lower portion of the funnel halves to engage and support the opened bag by the time the air supply to the bag is shut off by the butterfly valve.

I have found that the generally rectangular cross-sectional shape of the funnel **21** is conductive to free flow of the material charged to the bag without being blocked by the charged material. This result is not obtained with a funnel having a circular cross-sectional shape. However, non-rectangular cross-sectional shapes are useful for other materials which do not present a flow problem.

The bag filling and opening machine of my invention is provided with means for adjusting its size to varying sizes of bags to be filled. Thus, the side walls of the machine are provided with telescoping portions interconnected by means of slots **36** and clamping nuts **37**. The actuating arm **31** is also provided with a telescoping lower portion **31B** which is also provided with a locking screw **38**. By control of these two telescoping and locking devices the entire upper body portion of the machine may be raised or lowered to accommodate bags of different heights. It will also be seen that the funnel-supporting rocker arms **23A** and **23B** are provided with slots **39A** and **39B** as well as locking nuts **40A** and **40B** so that the arms may be moved toward one another or away from one another in order to change the width of the funnel in a direction crosswise of the front of the machine. In addition, each of the complementary halves of the funnel **21** is divided into two complementary quarters **21A'**, **21A''**, **21B'** and **21B''**. The two pairs of complementary quarters constitute the complementary halves of the funnel. Thus, the complementary quarter **21A'** is secured to an outward projection **23A'** on the inboard end of the funnel rocker arm **23A**, and an adjustable bolt **40A'** is secured to the complementary funnel quarter **21A''** and extends through a slot **41A** in the arm **23A'** so that the complementary quarter **21A''** can be moved inwardly and outwardly with respect to the complementary quarter **21A'** so as to decrease or increase the width of the funnel in a direction perpendicular to the front of the machine. The complementary funnel half **21B** is similarly provided with these adjusting devices. This compound adjustment of the four quarters of the funnel **21** makes it possible to adjust the funnel size to any size bags.

The adjustment of the funnel to the appropriate bag size is so made that the discharge end of these funnel components in the bag-filling position firmly support the opened bag. However, this contact does not prevent the bag from being withdrawn from the discharge end of the funnel after the bag is filled, this withdrawal being made either by hand or by the weight of the bag or by some other independent bag handling device which is conventional in this art. It will be seen, however, that the downward movement of the filled bag, regardless of how it is moved, causes the filled bag to depress the bag support plate **23** and thus repeat the bag opening and filling operation.

The bag opening and filling machine of my invention is applicable for work with any conventional material-supplying device. This feature, together with its complete adaptability to a variety of bag sizes and shapes, contributes to the outstanding utility of the machine. It will also be understood that although the machine is described and claimed herein as being in an upright position so that the bags hang downwardly from their support rack, the machine can equally well be operated in a horizontal position with only such modifications as is required to support the bags in their horizontal position and to feed them upwardly into bag-opening position.

I claim:

1. A bag opening and filling machine for opening and filling open top bags each having a flap extending upwardly above its open top, such machine comprising a bag supporting rack for a supply of such bags constructed and arranged to frangibly engage the upwardly extending flaps of the respective bags, an air supply duct positioned so as to direct a flow of air downwardly against the open top of the foremost bag of the stack thereof, a valve mounted within the air supply duct, a rectangular guide funnel positioned above and in front of the open top of the foremost bag of the stack thereof, said funnel being composed of two complementary halves jointed together along two opposite telescoping sides thereof, a rocket arm supporting each of the two halves of the funnel for telescoping motion from a complete funnel form to a bag-

guide form in which the lower end of the funnel is contracted and the upper end of the funnel is expanded, and a trip lever having two operation positions and connected to the funnel and valve so as simultaneously to move the two halves of the funnel to the bag-guide form and to open the valve when the trip lever is in one operative position and so as simultaneously to close the valve and to move the two halves of the funnel to the complete form with the lower end of the funnel engaging and supporting the air-opened top portion of the bag when the trip lever is in the other operative position.

2. A bag opening and filling machine for opening and filling open top bags each having a flap extending upwardly above its open top, such machine comprising a bag supporting rack for a supply of such bags constructed and arranged to frangibly engage the upwardly extending flaps of the respective bags, an air supply duct positioned so as to direct a flow of air downwardly against the open top of the foremost bag of the stack thereof, a butterfly valve moveably mounted within the air supply duct, a rectangular guide funnel positioned above and in front of the open top of the foremost bag of the stack thereof, said funnel being composed of two complementary halves joined together along two opposite telescoping sides thereof, a rocker arm supporting each of the two halves of the funnel for telescoping motion from a complete funnel form to a bag-guide form in which the lower end of the funnel is contracted and the upper end of the funnel is expanded, and a trip lever having two operative positions and connected to the funnel and butterfly valve so as simultaneously to move the two halves of the funnel to the bag-guide form and to open the valve when the trip lever is in one operative position and so as simultaneously to close the butterfly valve and to move the two halves of the funnel to the complete-funnel form with the lower end of the funnel engaging and supporting the air-opened top portion of the bag when the trip lever is in the other operative position.

3. A bag opening and filling machine for opening and filling open top bags each having a flap extending upwardly above its open top, such machine comprising a bag supporting rack for a supply of such bags constructed and arranged to frangibly engage the upwardly extending flaps of the respective bags, an air supply duct positioned so as to direct a flow of air downwardly against the open top of the foremost bag of the stack thereof, a valve mounted within the air supply duct, a rectangular guide funnel positioned above and in front of the open top of the foremost bag of the stack thereof, said funnel being composed of two complementary halves joined together along two opposite telescoping sides thereof, a rocker arm supporting each of the two halves of the funnel for telescoping motion from a complete funnel form to a bag-guide form in which the lower end of the funnel is contracted and the upper end of the funnel is expanded, a trip lever having two operative positions, and an actuator arm interconnecting the trip lever, the funnel-supporting rocker arms and the valve so as simultaneously to move the two halves of the funnel to the bag-guide form and to open the valve when the trip lever is in one operation position and so as simultaneously to close the valve and to move the two halves of the funnel to the complete funnel form with the lower end of the funnel engaging and supporting the air-opened top portions of the bag when the trip lever is in the other operative position.

4. A bag opening and filling machine for opening and filling open top bags each having a flap extending upwardly above its open top, such machine comprising a bag supporting rack for a supply of such bags constructed and arranged to frangibly engage the upwardly extending flaps of the respective bags, an air supply duct positioned so as to direct a flow of air downwardly against the open top of the foremost bag of the stack thereof, a valve mounted within the air supply duct, rectangular guide funnel positioned above and in front of the open top of the foremost bag of the stack thereof, said funnel being composed of two complementary halves joined together along two opposite telescoping sides thereof, a rocker arm supporting each of the two halves of the funnel for telescoping motion from a complete funnel form to a bag-guide form in which the lower end of the funnel is contracted and the upper end of the funnel is expanded, and a trip lever disposed directly below the foremost bag in its air-opened positioned and having two operative positons, the trip lever being connected to the funnel and valve so as simultaneously to move the two halves of the funnel to the bag-guide form and to open the valve when the trip lever is in one positon and so as simultaneously to close the valve and to move the two halves of the funnel to the complete funnel form with the lower end of the funnel engaging and supporting the air-opened top portion of the bag when the trip lever is in the other operative position, the trip lever being normally held in the second-mentioned operative position and being tripped to the first-mentioned position by downward movement of the bag out of engagement with the lower end of the funnel.

5. A bag opening and filling machine for opening and filling open top bags each having a flap extending upwardly above its open top, such machine comprising a bag supporting rack for a supply of such bags constructed and arranged to frangibly engage the upwardly extending flaps of the respective bags, an air supply duct positioned so as to direct a flow of air downwardly against the open top of the foremost bag of the stack thereof, a valve mounted within the air supply duct, a rectangular guide funnel positioned above and in front of the open top of the foremost bag of the stack thereof, said funnel being composed of two complementary halves joined together along two opposite telescoping sides thereof, each funnel half being composed of two complementary quarter portions adjustably joined together along two overlapping sides thereof, a rocker arm supporting each of the two halves of the funnel for telescoping motion from a complete funnel form to a bag-guide form in which the lower end of the funnel is contracted and the upper end of the funnel is expanded, and a trip lever having two operative positions and connected to the funnel and valve so as simultaneously to move the two halves of the funnel to the bag-guide form and to open the valve when the trip lever is in one position and so as simultaneously to close the valve and to move the two halves of the funnel to the complete funnel form with the lower end of the funnel engaging and supporting the air-opened top portion of the bag when the trip lever is in the other operative position.

6. A bag opening and filling machine for opening and filling open top bags each having a flap extending upwardly above its open top, such machine comprising a bag supporting rack for a supply of such bags constructed and arranged to frangibly engage the upwardly extending flaps of the respective bags, an air supply duct positioned so as to direct a flow of air downwardly against the open top of the foremost bag of the stack thereof and thus open the bag, a butterfly valve movably mounted within the air supply duct, a rectangular guide funnel positioned above and in front of the open top of the foremost bag of the stack thereof, said funnel being composed of two complementary halves joined together along two opposite telescoping sides thereof, each funnel half being composed of two complementary quarter portions adjustably joined together along two overlapping sides thereof, a rocker arm supporting each of the two halves of the funnel for telescoping motion from a complete funnel form to a bag-guide form in which the lower end of the funnel is contracted and the upper end of the funnel is expanded, a trip lever disposed directly below the foremost bag in its air-opened position and having two operative positions, an actuator arm interconnecting the trip lever, the funnel-supporting rocker arms and butterfly valve so as simultaneously to move the two halves of the funnel to the bag-guide form and to open the valve when

the trip lever is in one operative position and so as simultaneously to close the butterfly valve and to move the two halves of the funnel to the complete funnel form with the lower end of the funnel engaging and supporting the air-opened top portion of the bag when the trip lever is in the other operative position, the trip lever being normally held in the second-mentioned operative position and being tripped to the first-mentioned operative position by downward movement of the bag out of engagement with the lower end of the funnel.

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UNITED STATES PATENT OFFICE

CERTIFICATE OF CORRECTION

Patent No. 3,138,907 June 30, 1964

John F. Gerbe

It is hereby certified that error appears in the above numbered patent requiring correction and that the said Letters Patent should read as corrected below.

Column 4, line 72, for "jointed" read -- joined --; line 73, for "rocket" read -- rocker --; column 5, lines 3 and 60, for "operation", each occurrence, read -- operative --; line 8, before "form" insert -- funnel --; same column 5, line 64, for "portions" read -- portion --.

Signed and sealed this 10th day of November 1964.

(SEAL)
Attest:

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Attesting Officer

EDWARD J. BRENNER
Commissioner of Patents