Aug. 26, 1952 H. A. ROHDIN 2,608,335

APPARATUS FOR VACUUM FILLING CONTAINERS

Filed March 4, 1948 7 Sheets-Sheet 1

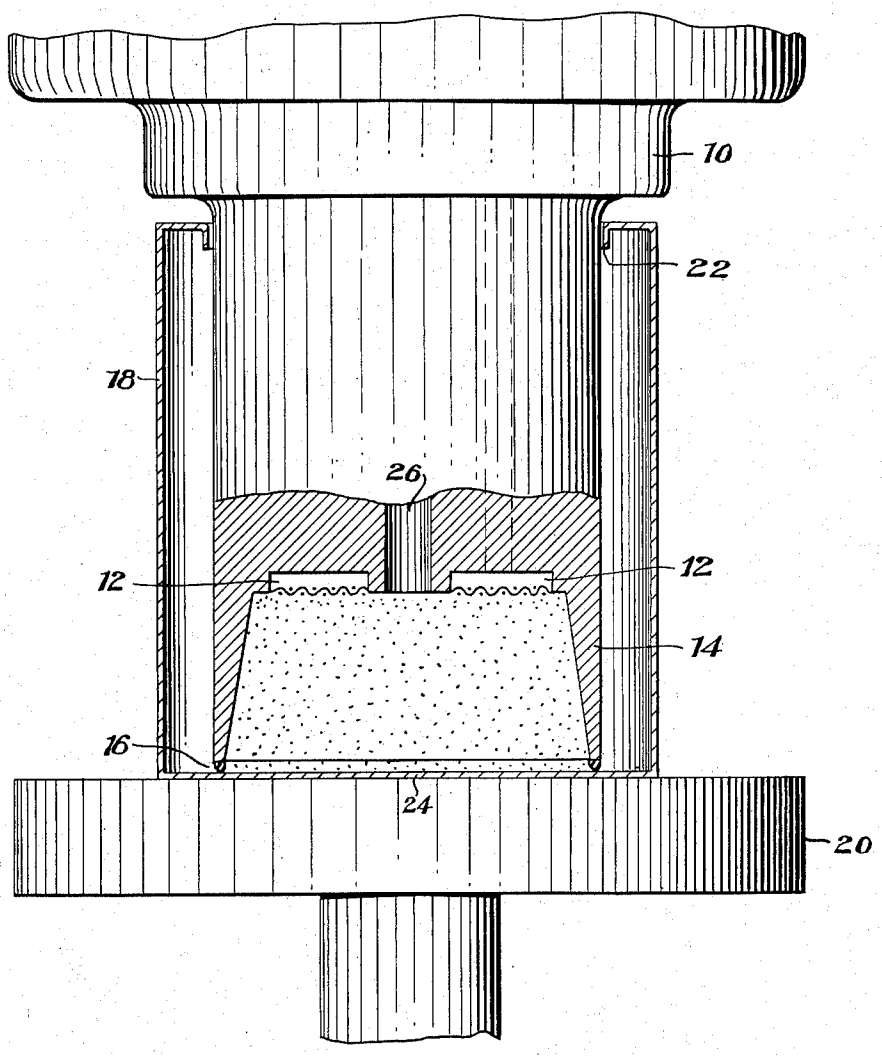


Fig. 1

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By Ross C. Hussey

Aug. 26, 1952 H. A. ROHDIN 2,608,335

APPARATUS FOR VACUUM FILLING CONTAINERS

Filed March 4, 1948 7 Sheets-Sheet 2

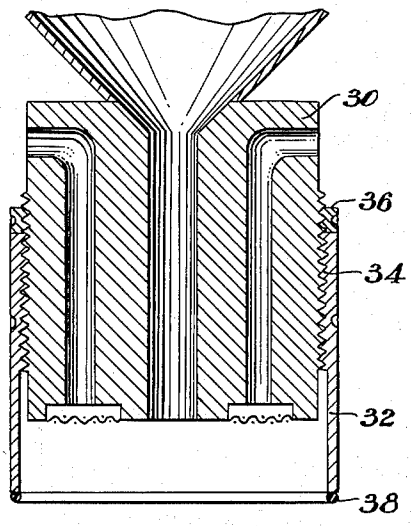


Fig. 2

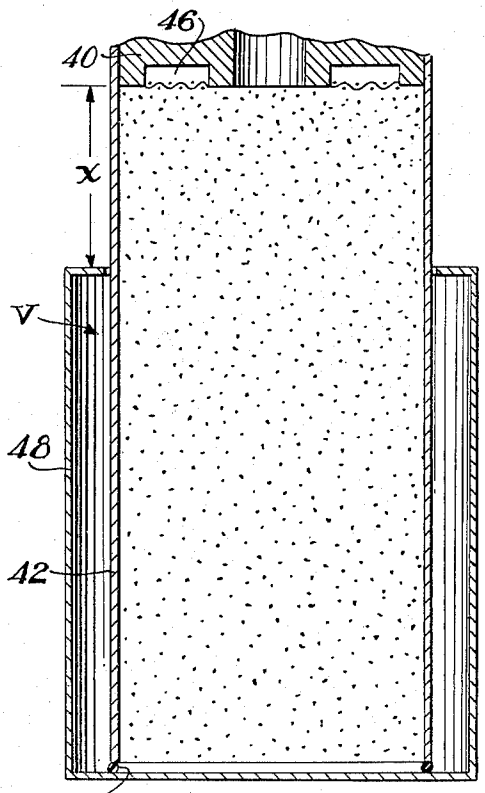


Fig. 3

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By Ross Oberrey

Aug. 26, 1952 H. A. ROHDIN 2,608,335

APPARATUS FOR VACUUM FILLING CONTAINERS

Filed March 4, 1948 7 Sheets-Sheet 3

Fig. 5

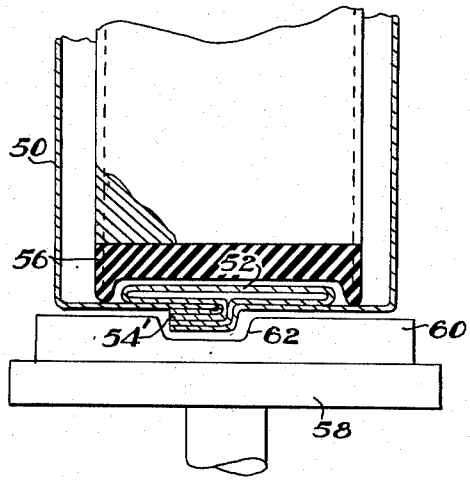


Fig. 4

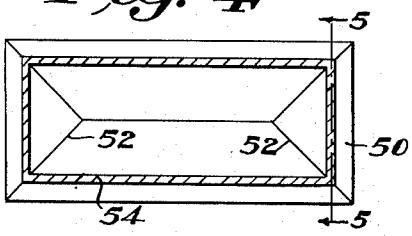
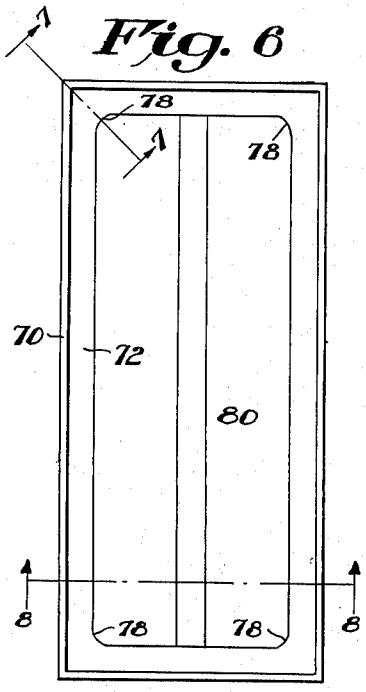


Fig. 6



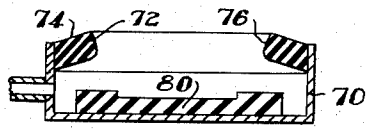


Fig. 8

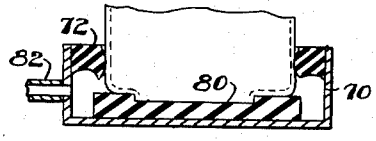


Fig. 9

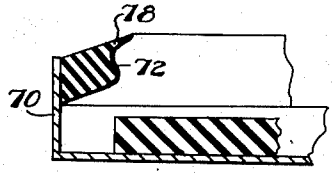


Fig. 7

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Aug. 26, 1952 H. A. ROHDIN 2,608,335

APPARATUS FOR VACUUM FILLING CONTAINERS

Filed March 4, 1948 7 Sheets-Sheet 4

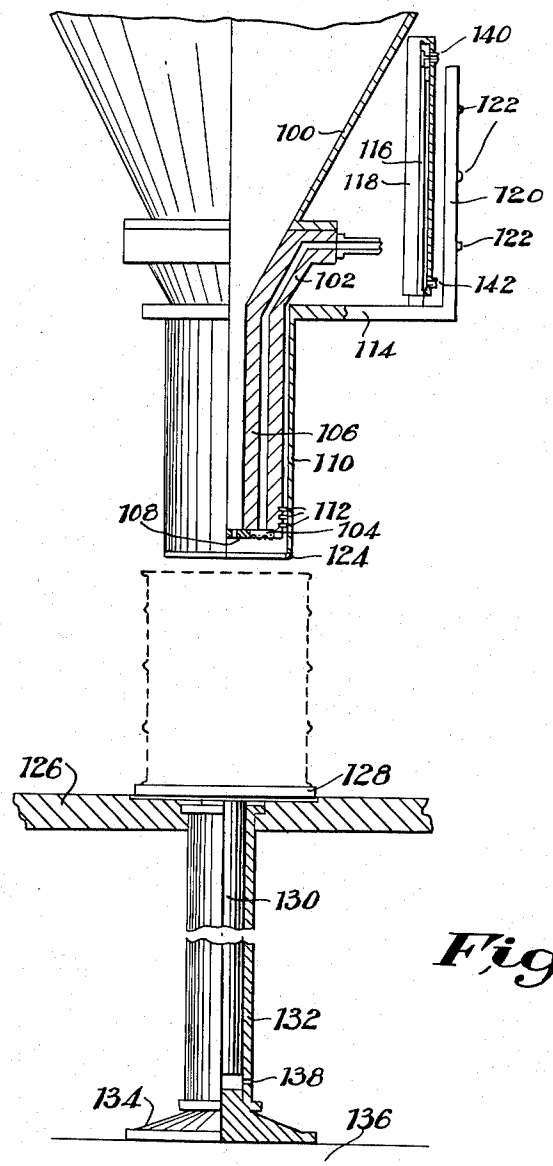


Fig 10

Howard A. Rohdin,
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By Ross Alburger

APPARATUS FOR VACUUM FILLING CONTAINERS

Filed March 4, 1948 7 Sheets-Sheet 5

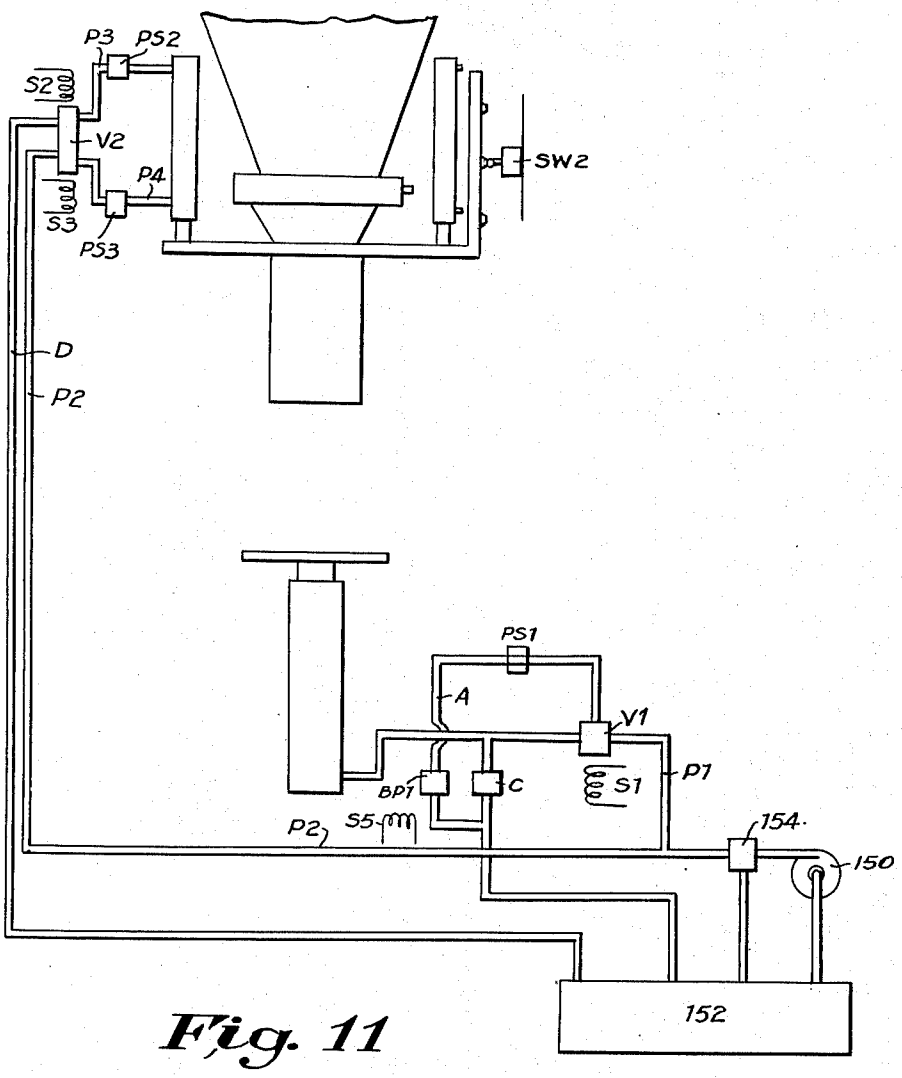


Fig. 11

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By Ross Attorney

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APPARATUS FOR VACUUM FILLING CONTAINERS

Filed March 4, 1948 7 Sheets-Sheet 6

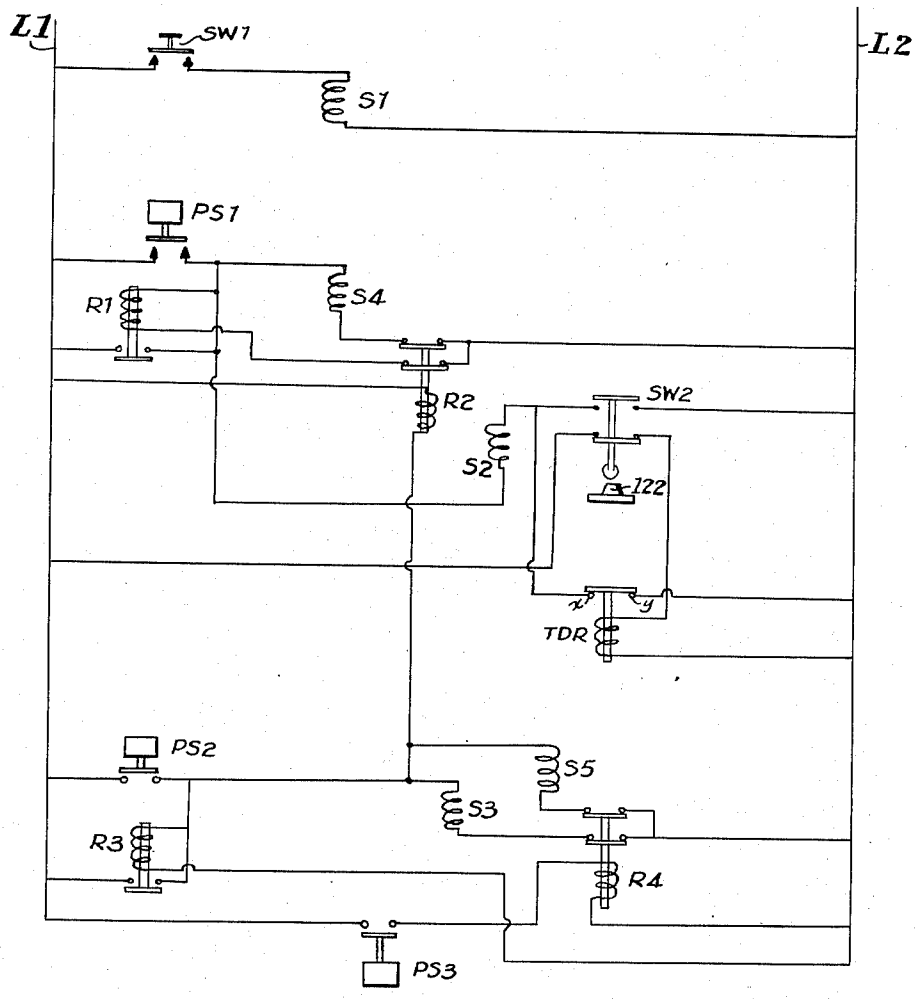


Fig. 12

Howard A. Rohdin,
Inventor

By Ross Aburray

Aug. 26, 1952 H. A. ROHDIN 2,608,335

APPARATUS FOR VACUUM FILLING CONTAINERS

Filed March 4, 1948 7 Sheets-Sheet 7

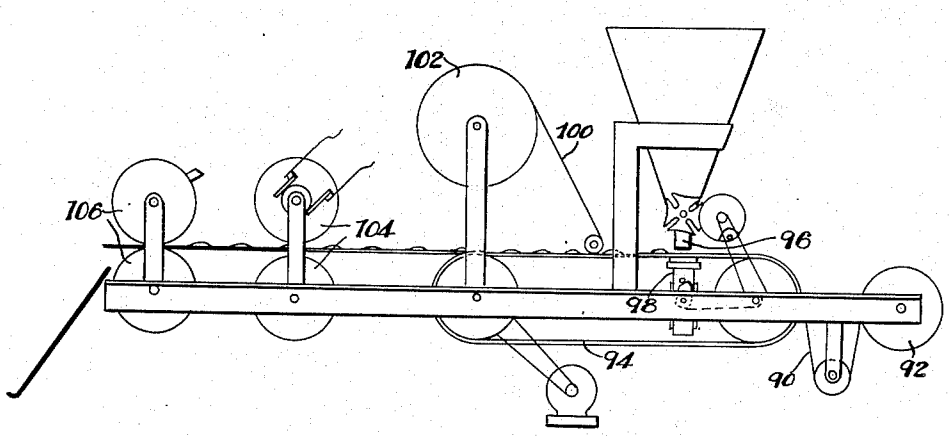


Fig. 13

Howard A. Rohdin,
Inventor

By Ross Attorney

Patented Aug. 26, 1952

2,608,335

UNITED STATES PATENT OFFICE

2,608,335

APPARATUS FOR VACUUM FILLING CONTAINERS

Howard A. Rohdin, Glen Ridge, N. J.

Application March 4, 1948, Serial No. 12,957

22 Claims. (Cl. 226—116)

1

It is an object of this invention to provide a vacuum filling head capable of delivering substantially identical quantities of material to consecutive containers regardless of variations in the internal volume in such containers.

It is a further object of this invention to provide a vacuum filling head as aforesaid capable of delivering relatively small exact quantities of material into the bottom of relatively large containers.

It is a further object of this invention to provide a vacuum filling head as aforesaid capable of adjustment to vary the quantity of material delivered.

It is a further object of this invention to provide a vacuum filling head as aforesaid which will operate on porous containers without the necessity of applying vacuum to the exterior of such containers.

It is a further object of this invention to provide an automatic vacuum filling machine which will fill, accurately and swiftly, the largest containers.

It is a further object of this invention to provide a machine which will deposite small, accurate, compact charges of powder onto a web.

The above and other objects will be made clear from the following detailed description taken in connection with the annexed drawings in which:

Fig. 1 is a view partly in cross-section of one form of the improved filling head;

Fig. 2 is a view similar to Fig. 1 illustrating a filling head adjustable for various quantities of material;

Fig. 3 is another form of filling head designed to assure complete filling of a container, the cross-section of which does not conform to the cross-section of the spout;

Fig. 4 illustrates the engagement of the improved filling head with the bottom of an expanded gusseted bag;

Fig. 5 is a section on the line 5—5 of Fig. 4;

Fig. 6 is a plan view of a special form of base member to be used on porous paper bags;

Fig. 7 is a section on the line 7—7 of Fig. 6;

Fig. 8 is a section on the line 8—8 of Fig. 6;

Fig. 9 is a view similar to Fig. 8 showing a bag and filling spout engaged with the base member;

Fig. 10 is an elevation view, partly in section showing a special form of this invention for filling large receptacles;

Fig. 11 is a diagram of the hydraulic circuits for operating the machine illustrated in Fig. 10;

Fig. 12 is a diagram of the electrical circuits for actuating the hydraulic circuits shown in Fig. 10; and

Fig. 13 shows a special application of this invention to a container forming machine.

Patents 2,170,469 and 2,360,198 both to Clarence F. Carter illustrate the general types of vacuum filling machines to which the present invention is adapted and reliance is had on the disclosure of these patents for all auxiliary mechanism.

2

There are many pulverulent materials which can be packaged satisfactorily only by resort to vacuum filling. The basic vacuum filling process, however, as used on pulverulent material has been subject to certain rather severe limitations. In the first place, it is very difficult to pre-determine the quantity of material and in most cases the filling process is terminated by the container becoming full. This means that the actual quantity delivered is dependent on the absolute internal volume of the container and this is subject to considerable variation between containers. In the second place, unless the container is inherently rigid and impervious, it has been necessary to create a vacuum not only inside the container but outside the container in order to avoid distortion of the container walls. This is cumbersome at best and in the case of cartons, the flaps of which must be disposed of to clear the mouth, the problem of sealing and evacuating the exterior of the package is very troublesome. A third defect in the prior art has been the inability to dispose an accurately measured and located quantity of material in a container, the ultimate volume of which is considerably greater than the charge of the material. This problem occurs typically in the formulation of bronze or aluminum paints when it is desired to place a relatively small charge of bronze or aluminum powder in the bottom of a can which thereafter is to be filled with a liquid vehicle.

The present invention meets all phases of the problems above discussed as illustrated and described in detail hereinafter. The invention is susceptible of many physical embodiments. Nevertheless, and regardless of the physical embodiments, the inventive concept retains its identity

Referring now to Fig. 1, there is shown a vacuum filling head 10 having screened vacuum openings 12 and a depending skirt 14 below the level of the vacuum openings. The skirt 14 has, around its lower periphery, a gasket 16 formed of rubber or similar material. A container 18 is placed on an elevator platform 20 which raises the container 18 so that its mouth 22 is penetrated by the head 10. The gasket 16 of the skirt 14 is pressed against the bottom 24 of the container 18 and makes a vacuum tight seal. The vacuum head is then placed in operation and a charge of material is delivered through a duct 26 to the space bounded by the skirt 14. This form of the device is particularly useful where a relatively small charge of powdered material is to be delivered to the bottom of a relatively large can or jar.

Fig. 2 illustrates a head 30 similar to the head 10 shown in Fig. 1. This head has a skirt 32 which is threaded to the head 30 at 34. A lock ring 36 is also threaded to the head 30. The skirt 32 has, at its lower extremity, a gasket 38 of rubber or similar material. This head operates in precisely the manner of the head 10 of Fig. 1 but due to the threaded engagement between the skirt 32 and the head 10, it is capable

of rather wide adjustment in the quantity of material to be delivered.

It frequently happens that a can or jar to be filled has a mouth considerably smaller than its cross-section. Then again, the mouth may be cylindrical and the container body rectangular. In any such case any spout which can enter the container mouth obviously, in the extent of its insertion into the can or jar, cannot provide sufficient volume to fill the entire can. This problem is met by the form illustrated in Fig. 3 which shows a head 40 having a skirt 42 which has the usual gasket 44. The vacuum opening 46 of the head 40 however, is located a distance X above the mouth of the container 48 when the bottom of the container is engaged by the gasket. The volume of material represented by the dimension X is sufficient to fill the surplus volume V of the container.

When the container to be filled is rigid such as a can or jar, the bottom of the container will usually be smooth and symmetrical so that the vacuum spout with its resilient free end 44 will make a good seal against the bottom. In such case resiliency of the can or jar supporting plunger serves merely to accommodate any inequalities between consecutive containers and to permit the bottom of the container to be normal to the periphery of the spout.

In the case of the cartons, there will usually be relatively short flaps coming in from the side walls and lying against a single flap flowed in from either the front or rear wall. Accordingly, the bottom of the carton will have two distinct ledges marking the ends of the side wall flaps, each ledge having a depth equal to the thickness of the board of which the carton is made. Obviously in such a situation, the rim 44 of the spout must be soft enough to conform to these ledges and thereby to form an effective seal around the entire periphery of the spout.

In the case of bags, the mathematics of the bag construction necessitates variations of from one to five plies in the thickness of the bag bottom. This is true even of a single ply bag. When the number of plies is increased, the problem is accentuated in direct proportion. In filling bags, therefore, the spout rim must be exceptionally soft and the surface of the bag supporting plunger should be equally soft and, where multiple bags are concerned, it may be necessary to contour the rim of the spout and the surface of the supporting plunger to conform to variations in thickness encountered so as not to rely entirely on deformation of the resilient material to provide an effective seal.

Figs. 4 and 5 show how the above problem is met in the case of a sewed gusseted bag which is probably the most extreme situation which will be encountered. For simplicity the bag is illustrated as having only two plies. In practice, however, such bags have from four to six plies. Fig. 4 shows a bag 50 in the bottom of which are the usual triangular folds 52. Typical dimensions of such a bag are 18'' across the face and 4'' across the gussets. In any such case, the spout or head instead of being cylindrical will be made rectangular so as approximately to conform to the cross-section of the bag and the shaded area 54 indicates where the gasket will engage the bag bottom. Fig. 5 shows the bag in cross-section where the effect of the triangular area 52 and the fin like closure 54' will be appreciated. Inasmuch as, in gaskets formed in rubber or like material, the pressure is a fairly

direct function of deformation and since equality of pressure throughout the gasket is desired, the gasket 56 is contoured so as to bring about substantially equal deformation and, therefore, substantially equal pressure throughout the periphery of the spout. In this case also the elevator 58 has a rubber bearing pad 60 which is contoured as at 62 to accommodate the bag 50.

So long as the spout is of relatively small cross-section and particularly so long as the cross-section is substantially cylindrical, not much account need be taken of the external forces incident to the evacuation of the interior of the spout. When, however, the spout is of large size and substantially rectangular in cross-section as it would be for the larger shipping sacks, external forces constitute a distinct problem. A typical shipping sack expanded will measure 4'' on one side, and 18'' on the other, and, particularly adjacent to the mouth of the spout, the forces incident to evacuation will tend to bow the spout walls inwardly. This is objectionable, not merely from the standpoint of possible collapse of the spouts, but particularly in rendering variable the volume of the spout. The problem may be met without unduly increasing the thickness of the metal in the spout by the use of either or both of two expedients. First, the long dimension of the spout may be slightly bowed outwardly. The amount of bow being calculated so that the flexure of the spout wall under external force will make the spout substantially rectangular and of the desired volume. The other expedient is to provide ribs or corrugations running across the spout wall in the direction transverse of the spout. Such ribs or corrugations, without increasing the thickness of metal, will add enormously to the resistance of the spout wall to flexure.

When the nature of the material to be filled is such that under the vacuum packaging it tends to take, it may be well to give the interior of the spout or skirt a slight taper from the gasket to the vacuum ducts in order to facilitate withdrawal of the cake from the spout.

Figs. 6 through 9 illustrate an expedient which is useful in filling large bags formed of relatively porous paper and having a large number of plies. In this case the container supporting member is in the form of a box 70 having a relatively wide gasket 72 around its entire periphery. The internal dimensions of the gasket are slightly smaller than the external dimensions of the skirt or spout of the filling member. The upper surface 74 of the gasket 72 slopes upwardly and its inner surface 76 slopes downwardly. The sloping inner surface 76 defines a funnel shaped entrance to receive the spout. At the corners the gasket is slightly extended laterally to form fins 78. A resilient bottom support 80 is placed in the box 70 and its upper surface is relieved as discussed in connection with Fig. 5.

When a spout covered by an expanded bag is inserted into the box the gasket 72 is deformed as shown in Fig. 9 and forms a tight seal of considerable area around the extremity of the spout. The box 70 is then evacuated through a duct 82 simultaneously with the action of the vacuum head. There is thus no pressure differential acting to draw air through the material of the bag. It will also be noted that the contour of the gasket 72, particularly the face 74 is such that evacuation of the box acts to tighten the gasket 72 in its grip on the spout.

Figs. 10, 11, and 12 together illustrate an au-

tomatic machine which is particularly adapted to the filling of very large containers where, with conventional equipment, it would be most difficult to assure that the entire mass is packed with uniform density and without empty space at the bottom of the container.

The apparatus comprises the usual hopper 100 connected with a vacuum filling head 102 having the usual screened openings 104. The head 102, however, is elongated as at 106 to provide a cylindrical portion having a length greater than the depth of the container to be filled. The central channel of the head has at its lower end the usual perforated plate 108.

A sleeve 110 surrounds the elongated portion of the head. Piston rings 112 set into the head 102 form a tight seal between the sleeve and the head. At its upper end the sleeve 110 has a laterally projecting flange to which are connected the pistons 116 of a plurality of hydraulic cylinders 118. These cylinders are equally spaced around the flange 114 and are supported on the main frame of the machine (not illustrated). At any convenient point on the flange 114 is mounted a rod 120 having a length equal to the height of the sleeve 110. A T-slot or other suitable means extends the length of the rod 120 to provide a means for securing, wherever desired, a series of cams 122. These cams are beveled on their lower sides, flat on top and square on their upper sides. Their purpose will appear herebelow.

The lower edge of the sleeve 110 projects slightly below the end of the head 102 and terminates in the usual rubber gasket 124.

Directly below the sleeve 110, at the floor line 126 and spaced from the extermity of the sleeve by slightly more than the height of the container to be filled is a platform 128 supported by a piston 130 in a cylinder 132. The cylinder has a base 134 which rests on a foundation 136.

Disregarding, for the moment, all control features, the basic operation of the parts just described is as follows:

A barrel or drum is placed on the platform 128 which is raised toward the sleeve 110 by oil entering the cylinder 132 through a duct 138 and acting upon the piston 130. The sleeve 110 enters the mouth of the container until the gasket 124 firmly engages the container bottom. The rise in pressure incident to engagement of the container and the sleeve automatically shuts off the supply of oil to the cylinder 132.

This same pressure rise simultaneously starts the vacuum process in the head 102 and also causes oil under pressure to be supplied to the upper sides of pistons 116 through ducts 140. This feeds the sleeve downwardly along the head 102 and carries the container, the platform 128 and the piston 130 with it. This is permitted by the fact that while the supply of oil to duct 138 is cut off, there is a relief valve in the line which permits oil to leave the cylinder 132 under a predetermined pressure.

The effect of the foregoing is to make a piston of the head 102 and a cylinder of the sleeve 110 with the bottom of the container acting as the head of the cylinder. The advance of sleeve 110 therefore itself creates a vacuum and draws material through the plate 108. The vacuum system works throughout the descent of the sleeve but is effective chiefly to remove air which enters the sleeve with the pulverulent material.

The cams 122 function as follows:

The descent of the sleeve 110 is quite rapid, and it is desirable to have the sleeve pause one or more times during its descent to give the vacuum system a chance to catch up on air removal. This is done by the cams operating a control switch which interrupts the supply of oil to the ducts 140. Flow is restablished by means which will be described later.

When the platform reaches the end of its stroke, there is an immediate rise in pressure in the ducts 140 and this is used to open these ducts to drainage and to supply oil to ducts 142 of the cylinders 118. This oil acts on the undersides of the pistons 116 and the result is to lift the sleeve 110. Since the same pressure rise which reverses the pistons 116 shuts off the vacuum system of the head 102 with the system open to the atmosphere, the filled material remains in the container.

The operation and control of the above described actions will be understood from Figs 11 and 12. A pump 150 draws oil from a reservoir 152 and delivers it, through a relief valve 154 to branching lines P1 and P2. The line P1 feeds the duct 138 through a balanced one-way valve V1 which is opened by a solenoid S1. The valve V1 may be closed by a pilot piston supplied by a line A which also contains a pressure switch PS1.

The cycle is started by momentarily closing the starting stitch SW1 which energizes the solenoid S1 and opens the valve V1 which supplies oil to the duct 138 and starts to raise the platform 128.

When the container on the platform 128 engages the sleeve 110, there is a sharp rise in pressure in the line A which acts on the pilot side of the valve V1 and closes the valve which will remain closed until solenoid S1 is again energized. This pressure rise also closes the pressure switch PS1 (see Fig. 12) and this energizes solenoids S2 and S4.

The line P2 from the pump 150 goes to a spring centered, closed center, solenoid operated four way valve V2. The solenoids controlling this valve are designated S2 and S3. When solenoid S2 is energized, and so long as it remains energized the valve V2 connects the line P2 to the ducts 140 of cylinders 118 through a line P3 containing a pressure switch PS2. In short, while the switch S2 is energized, oil is delivered to the ducts 140 and the sleeve 110 is forced downwardly against the resistance of a relief valve C running from the line P1 to the reservoir 152 as shown in Fig. 11. Since the relief valve C will open only under a predetermined pressure, the descent of the sleeve 110 is resisted at all points and times by a pressure sufficient to maintain a vacuum tight seal between the gasket 124 on the sleeve 110 and the bottom of the container on the platform 128.

It is to be noted that when the pressure switch PS1 is closed to energize the solenoids S2 and S4, these two solenoids are locked into energized condition by a relay R1 as shown in Fig. 12.

As the rod 120 descends with the flange 114 of the sleeve 110, the first of the cams 122 closes a two-pole switch SW2 (see Fig. 11). As set, movement of the switch SW2 breaks the circuit of solenoid S2 and simultaneously closes a circuit through a time delay relay TDR. It will be remembered that the top surface of the cam 122 is flat, hence its opening of the circuit of solenoid S2 persists. While the solenoid S2 is deenergized, the valve V2, being spring centered and closed center, returns to neutral and downward movement of the sleeve 110 ceases. The circuit of solenoid S4, however, remains closed

by the relay R1, without regard to the vagaries of pressure in the hydraulic line A of Fig. 11. As a result the vacuum system of the head 102 continues to operate.

After a predetermined interval the time delay relay TDR, having been energized as aforesaid by the cam 122, closes a set of contacts *x*—*y* (Fig. 12) which again complete the circuit of solenoid S2 to energize the same. This moves the sleeve 110 downwardly again, with the flat surface of the cam 122 holding the relay TDR energized and the contacts *x*—*y* closed until the follower of SW2 rides off the flat surface of the cam 122 to close the circuit of the switch SW2 and simultaneously to open the circuit of the time delay relay TDR. The sleeve 110, accordingly, continues to move downwardly until another cam 122 is encountered by the follower of the switch SW2. Obviously the number and spacing of the cams 122 is purely empirical, and adjustment of the relay TDR may be set to accommodate as few or as many cycles of the vacuum apparatus of the head 102 as may be desired.

Regardless of the number of cams 122, the sleeve 110 ultimately must force the platform 128 to the limit of downward movement. When this limit is reached there occurs a sharp rise in the pressure in line P3 feeding the ducts 140 of the cylinders 118. This pressure rise closes a pressure switch PS2 in the line P3 (Fig. 11) and the closure of this switch PS2 energizes a relay R2 (Fig. 12) which breaks the circuit of the solenoid S4 and also the circuit of its locking relay R1. Breaking of the latter circuit also deenergizes the solenoid S2. Breaking the circuit of the solenoid S2 permits the valve V2 to return to spring centered position and cuts the supply of pressure to the line P3 and the ducts 140 of the cylinders 118, and, therefore, halts the downward movement of the sleeve 110. At the same time, closure of the pressure switch PS2 energizes a solenoid S3 which shifts the valve V2 from center or neutral position to connect the line P2 to the line P4 and thus to supply oil to the opposite sides of the pistons 116 through ducts 142. This, of course, raises the sleeve 110. It will be noted that closing of the pressure switch PS2 also energizes a solenoid S5 and a a relay R3. The latter merely locks the circuits of solenoids S3 and S5 in closed condition regardless of subsequent opening of the switch PS2.

The effect of solenoid S3 has already been described. The solenoid S5 opens a by-pass valve BP1 (Fig. 11) which assures that there can be no residual pressure in the system of cylinder 132 sufficient to close the switch PS1. Premature operation of solenoids S2 and S4 is thereby positively prevented.

When the sleeve 110 reaches its upper limit of movement, there is an abrupt pressure rise in the line P4 feeding the ducts 142. This pressure rise closes a pressure switch PS3 in the line P4. The closing of pressure switch PS3 (Fig. 12) energizes a relay R4 which breaks the circuit of the solenoid S3 to deenergize the same. This releases the valve V2 which, being spring centered, at once assumes its neutral position closing the oil line P2. The relay R4 also breaks the circuit of the solenoid S5 which reconditions the system of the cylinder 132 for the beginning of another cycle when SW1 is again pressed.

All valves of the type of V2 drain to some extent and this drainage increases with use and age. Accordingly, high pressure cannot be maintained more than a very short time in either of lines P3 or P4 when the valve V2 is centered. This is why relay R3 is used to lock closed the circuit initially established by switch PS2, and it is equally the reason for omitting such a locking feature in the circuit of switch PS3.

In Patent 2,170,469 to Carter there is provided a single predetermined cycle of operation of the vacuum head in which each side of the head receives first vacuum, then air at atmospheric pressure, then vacuum and finally air at atmospheric pressure. In the operation of the parts just described, more than a single cycle obviously is needed. The precise number of cycles, however, is largely immaterial and the only real essential is that the head be disconnected from the source of vacuum and open to atmospheric pressure when the sleeve 110 rises. Accordingly the present invention contemplates having the cam shaft of the valve system disclosed in the patent driven by a constantly running motor through the interposition of a clutch of the one revolution type with its interrupter lug under the control of the solenoid S4. That is, when the solenoid S4 is energized, the interrupter lug is withdrawn from the path of the clutch lug and the motor then drives the cam shaft. When the solenoid is deenergized the clutch is disengaged and the cam shaft stops. This makes it possible, through entirely conventional means, to assure that the cam shaft will stop with the source of vacuum shut off and with the atmospheric pressure connection open to the head 102.

When the spout or sleeve conforms closely to the mouth of an impervious container and its inserted volume approximates the internal volume of the container, rapid insertion of the spout will displace air at a high rate. In such case it may be well to provide flutes on the outside of the spout to form channels assuring egress of air as the spout is inserted.

In Fig. 13 is shown an adaptation of the head illustrated in Fig. 1 to a machine of the general type illustrated in my co-pending application Ser. No. 740,193, filed April 8, 1947. Here a web 90 of packaging material is drawn from a roll 92 onto a belt 94 where it advances beneath a spout 96 of the type shown in Fig. 1. The belt and the web advance intermittently. As the belt and web pause, an elevator 98 below the belt 94 raises the belt and web and presses the web firmly against the gasketed rim of the spout, while a cam shaft, not shown, actuates the vacuum system. The result is to deliver an accurate charge of material upon the web 90. When the material is of the sort which compresses or compacts, the charge is in the form of a firm disc.

The vacuum is released as the elevator drops and the belt and web resume their advance. A second web 100 is drawn from a supply roll 102 and is superimposed on the web 90 and the charges of material deposited by the head or spout 96. The superimposed webs then pass beyond the belt 94 through a pair of heat sealing rolls 104 and then to cutting rolls 106 which sever individual packages from the web, each package containing a single charge of material. The compactness with which the spout delivers a charge is highly advantageous in a machine of this class, since it prevents the charge of material from getting into the area of the intended heat seal.

While certain specific embodiments of this invention have been herein disclosed, it is not intended to limit the invention to the precise details here shown but only as set forth in the

subjoined claims which are to be broadly construed.

I claim:

1. In a machine of the class described, an elongated spout having a length greater than the depth of the container to be filled, means at one end of said spout for evacuating said spout, means for delivering pulverulent material to said end of said spout in response to such evacuation and means for forming a vacuum tight seal between the other end of said spout and the interior of the bottom of a container.

2. A machine according to claim 1 in which the internal volume of the spout is equal to the volume of material intended to be placed in said container.

3. A machine according to claim 2 having means for adjusting the internal volume of said spout.

4. In a machine of the class described; an elongated spout having a length greater than the depth of the container to be filled and having at one end a connection for evacuating the spout and a supply duct for delivering pulverulent material in to the spout responsive to evacuation thereof; said spout having at its opposite end a flexible, airtight gasket around its periphery; and means for pressing said gasket into sealing contact with the bottom of a container into which said spout enters.

5. A machine according to claim 4 in which the internal volume of said spout is equal to the volume of material intended to be placed in said container.

6. A machine according to claim 5 having means for adjusting the internal volume of said spout.

7. A machine according to claim 4 in which the spout gasket is contoured to conform to the container bottom.

8. A machine according to claim 5 in which the spout gasket is contoured to conform to the container bottom.

9. A machine according to claim 6 in which the spout gasket is contoured to conform to the container bottom.

10. In a machine of the class described, an elongated spout having a length greater than the depth of the container to be filled and having at one end a connection for evacuating the spout and a supply duct for delivering pulverulent material into the spout responsive to evacuation thereof; said spout having at its opposite end a flexible, airtight gasket around its periphery; a container support located below the gasketed end of the spout; and means to cause the spout and support to approach each other to press the spout gasket into sealing contact with the bottom of a container on said support.

11. A machine according to claim 10 in which the container contacting surface of the support is contoured to conform to the contours of the container bottom.

12. A machine according to claim 11 in which the container supporting surface is formed of resilient material.

13. A machine according to claim 10 in which the spout gasket is contoured to conform to the container bottom.

14. A machine according to claim 11 in which the spout gasket is contoured to conform to the container bottom.

15. A machine according to claim 12 in which the spout gasket is contoured to conform to the container bottom.

16. In a machine of the class described, an elongated spout adapted to enter a container, means at one end of said spout for evacuating said spout, means for delivering pulverulent material to said end of said spout in response to said evacuation; a chamber receiving the opposite end of said spout with a container thereon; means pressing said container between the periphery of said spout and that of said chamber to form a seal; and means for evacuating said chamber.

17. Apparatus for depositing a compact charge of pulverulent material upon a web of packaging material comprising a spout having an open end, said end being gasketed; means at the other end of said spout for evacuating the spout; other means at said end for supplying pulverulent material to said spout in response to said evacuation, and means for pressing a web of packaging material into sealed engagement with the gasketed end of said spout.

18. A vacuum filling machine comprising: a cylindrical head having a duct, extending throughout its length, to supply pulverulent material, and having screened vacuum openings at its lower end adjacent the mouth of said duct; a sleeve surrounding said head and slidable thereon, said sleeve having its free end surrounded by a resilient gasket; a container supporting platform below said sleeve and aligned therewith; means for bringing said platform with a container thereon, and said sleeve toward each other to press the gasketed end of the sleeve against the bottom of the container on the platform; means operable thereafter to move the sleeve, the container and the platform along said head and away from the mouth of said duct; means for maintaining pressure between said sleeve and the container bottom during the joint movement of said sleeve and platform, and means for thereafter withdrawing said sleeve from said container bottom.

19. A machine according to claim 18 including means whereby the operation of the means for moving jointly the sleeve and platform along the head is initiated by the attainment of a predetermined pressure between the sleeve and the container bottom.

20. A machine according to claim 18 including means for interrupting the movement of the sleeve and platform along the head a predetermined number of times and for predetermined periods.

21. A machine according to claim 18 in which the means for bringing the sleeve and platform together and the means for moving the sleeve and platform along the head are both hydraulically operated.

22. A machine according to claim 19 in which the means for bringing the sleeve and platform together and the means for moving the sleeve and platform along the head are both hydraulically operated.

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REFERENCES CITED

The following references are of record in the file of this patent:

UNITED STATES PATENTS

Number	Name	Date
1,879,794	Cundall	Sept. 27, 1932