March 9, 1954 C. W. VOGT 2,671,587

BAG FILLING MACHINE

Filed July 30, 1948 8 Sheets-Sheet 1

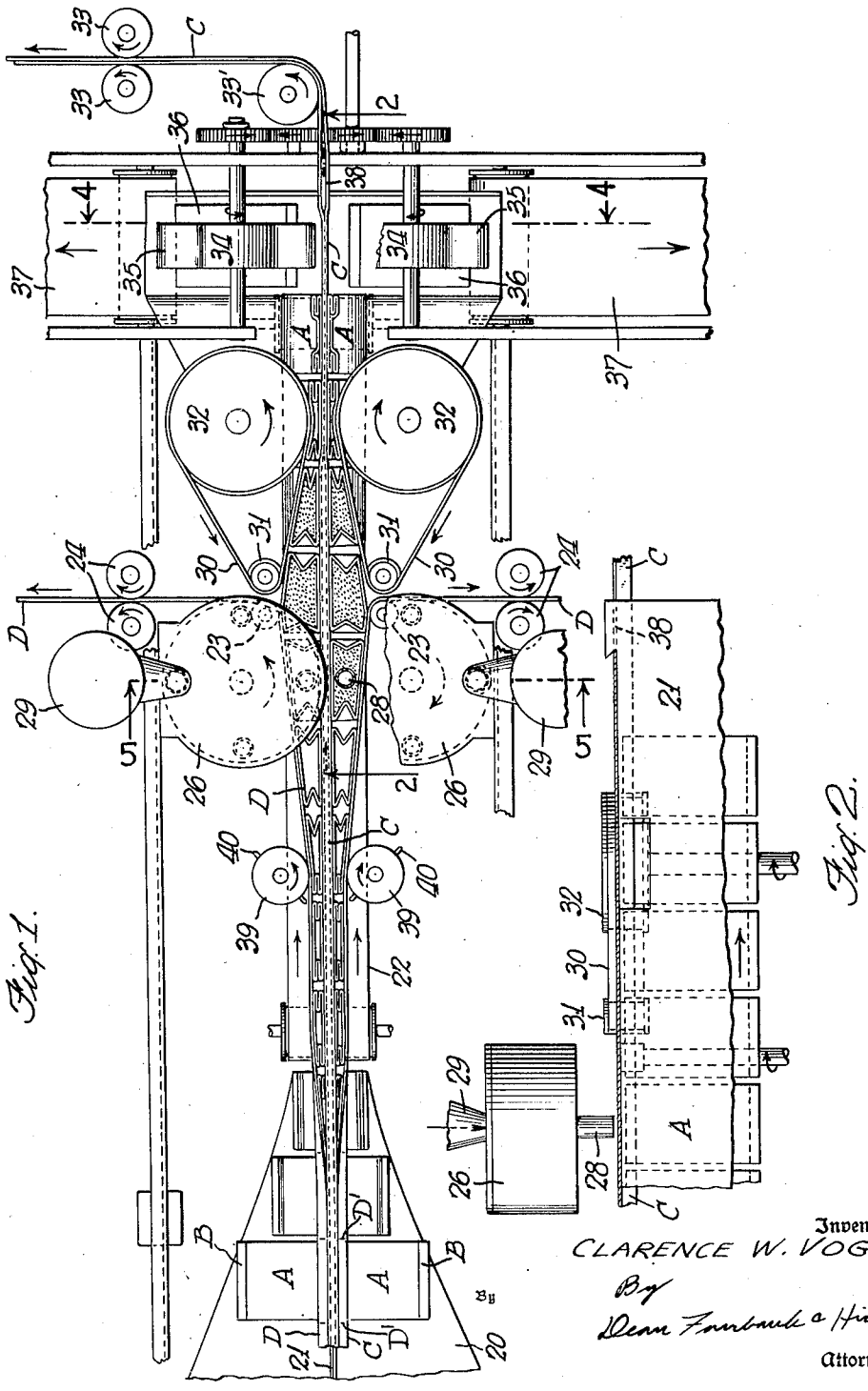


Fig. 1.

Fig. 2.

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BAG FILLING MACHINE

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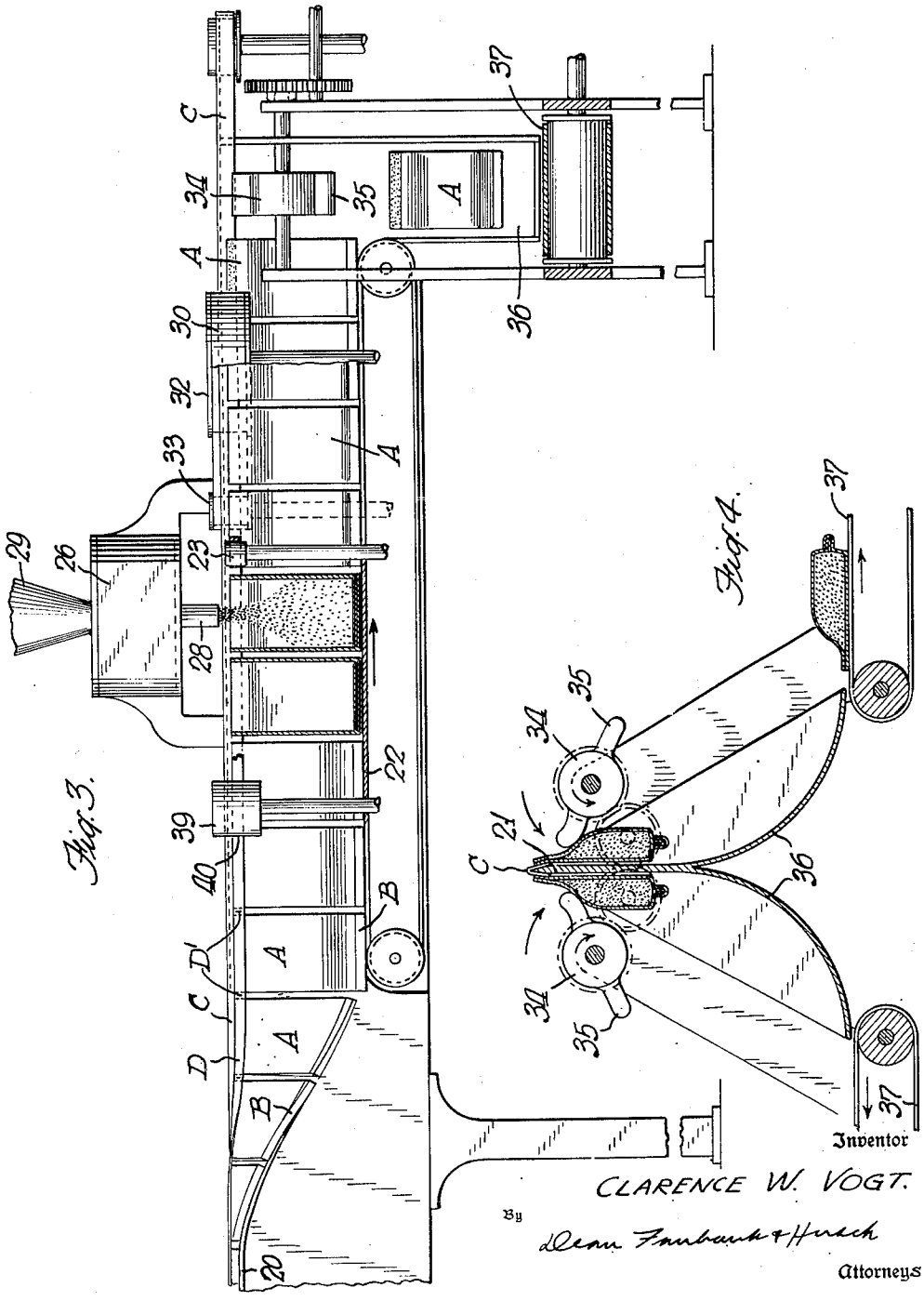


Fig. 3.

Fig. 4.

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BAG FILLING MACHINE

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Fig. 5.

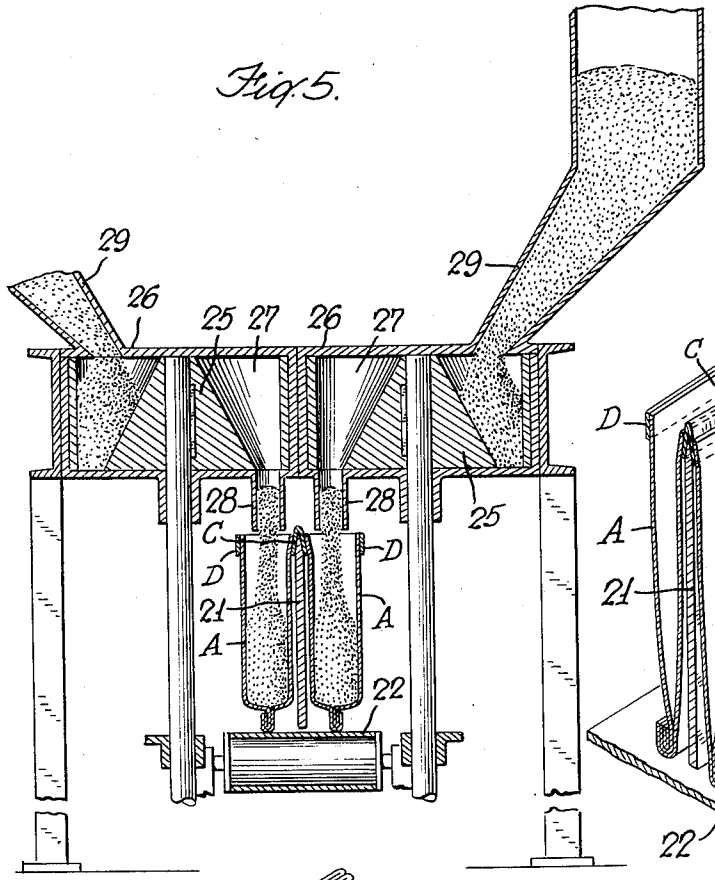


Fig. 6.

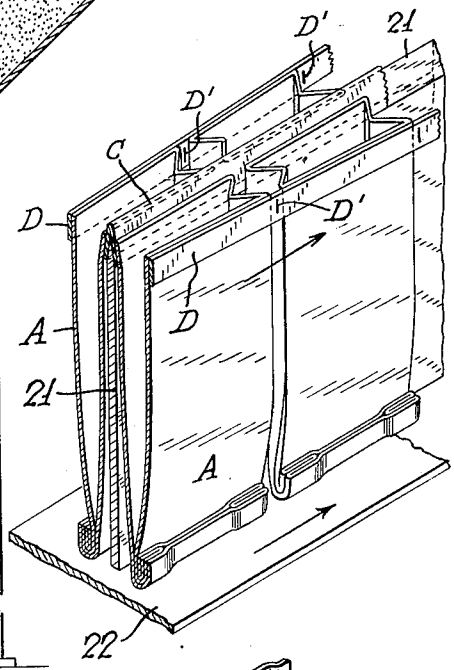
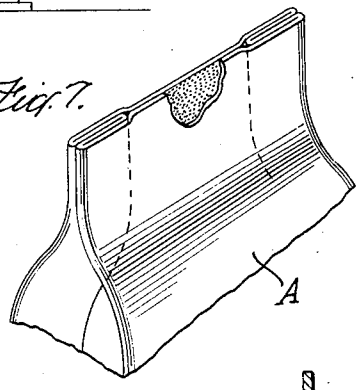


Fig. 7.



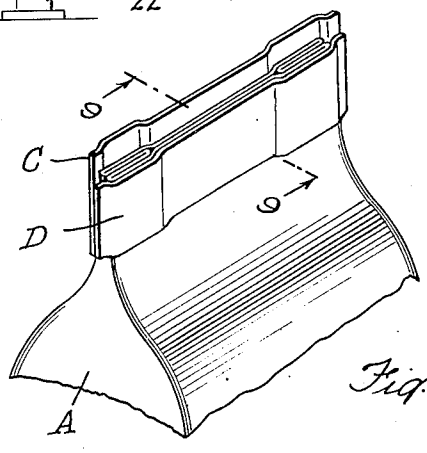


Fig. 8.

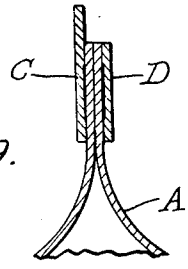


Fig. 9.

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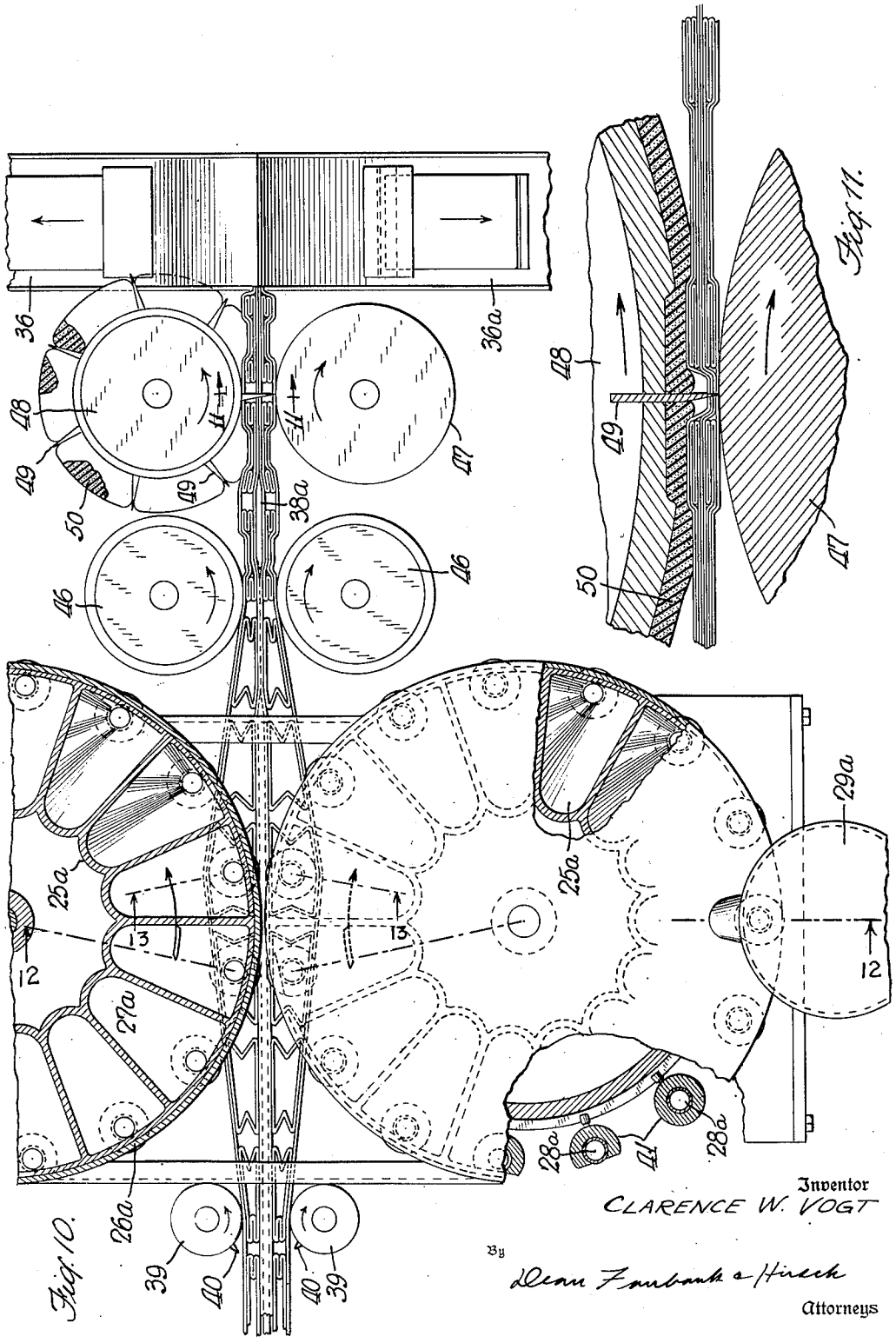
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BAG FILLING MACHINE

Filed July 30, 1948 8 Sheets-Sheet 4



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BAG FILLING MACHINE

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Fig. 12.

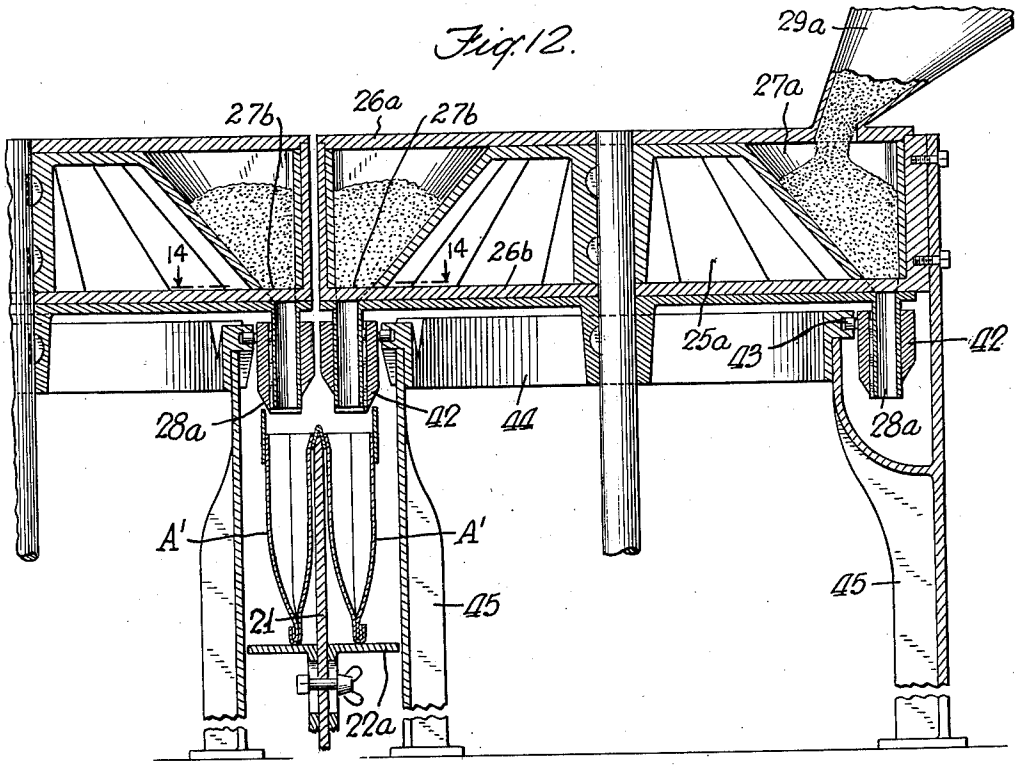
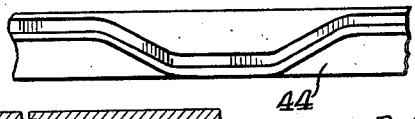


Fig. 14a



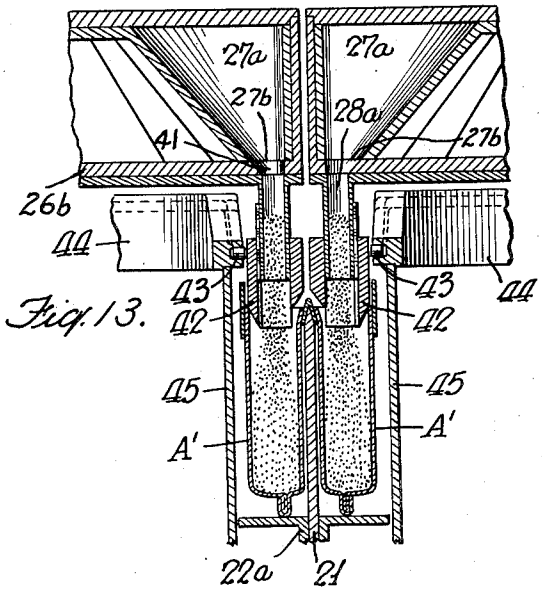


Fig. 13.

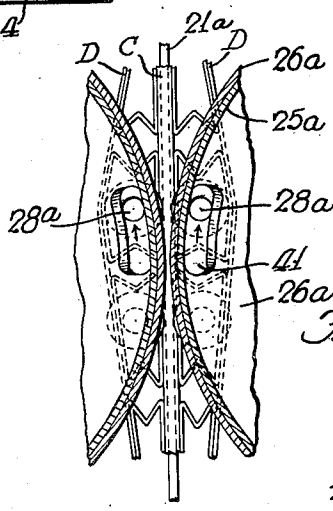


Fig. 14.

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BAG FILLING MACHINE

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Fig. 15.

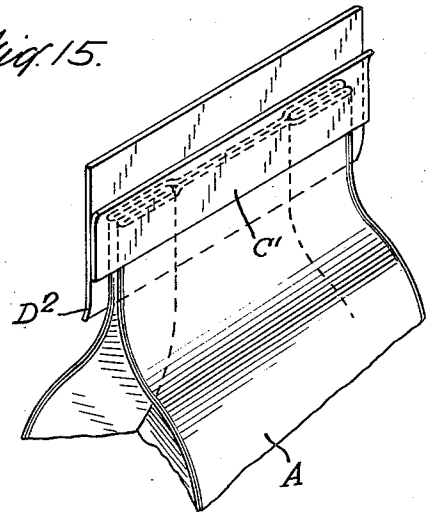
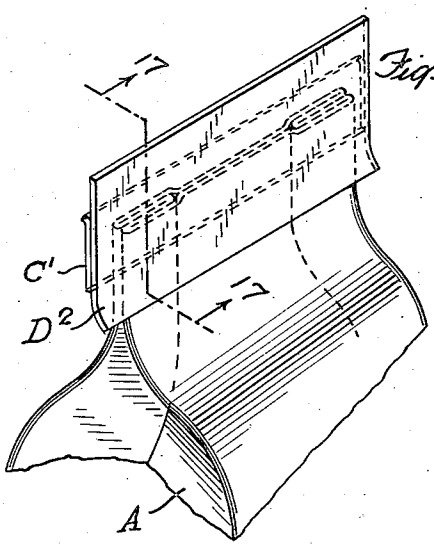


Fig. 16.



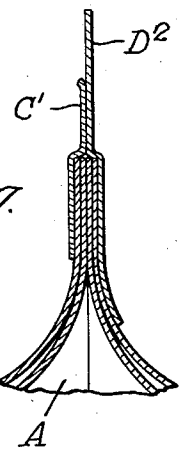


Fig. 17.



Fig. 19.

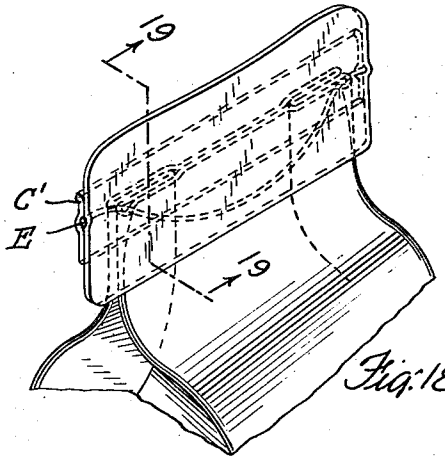


Fig. 18.

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BAG FILLING MACHINE

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Fig. 20.

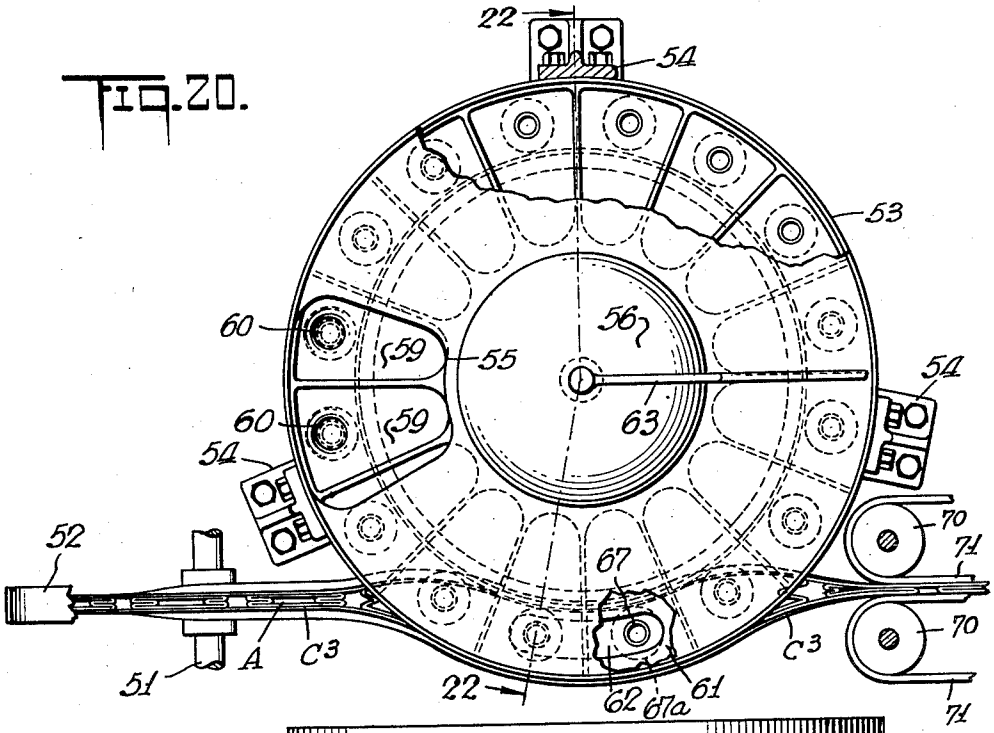
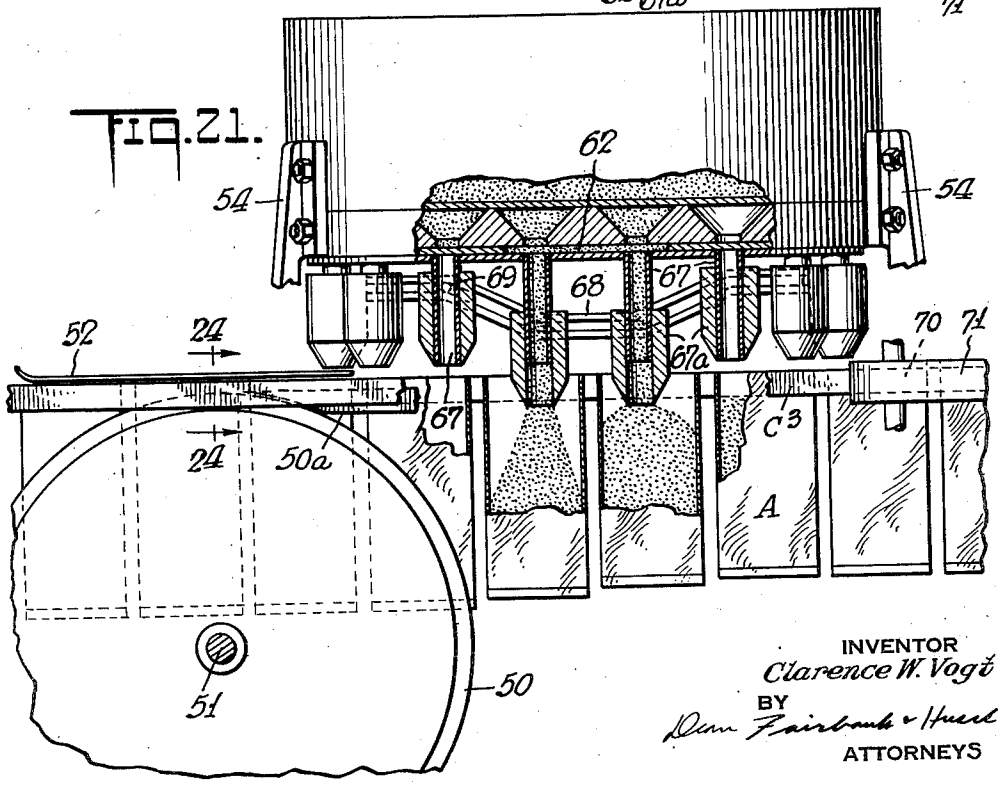


Fig. 21.



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BAG FILLING MACHINE

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FIG. 22.

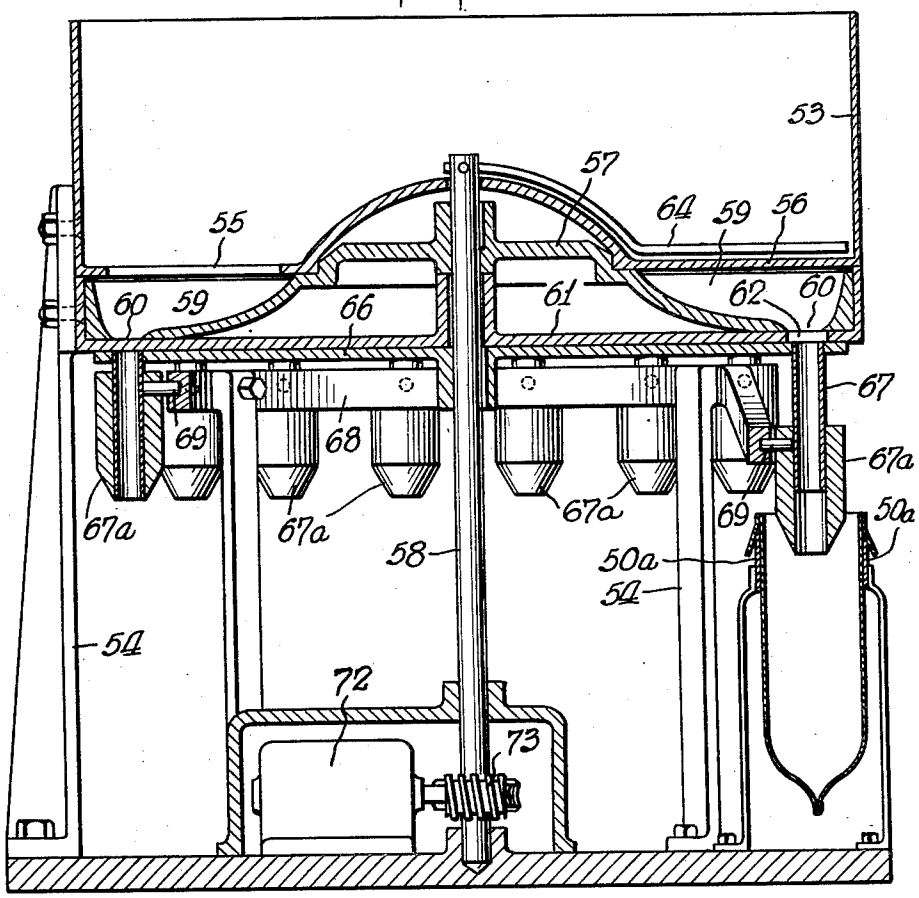


FIG. 23.

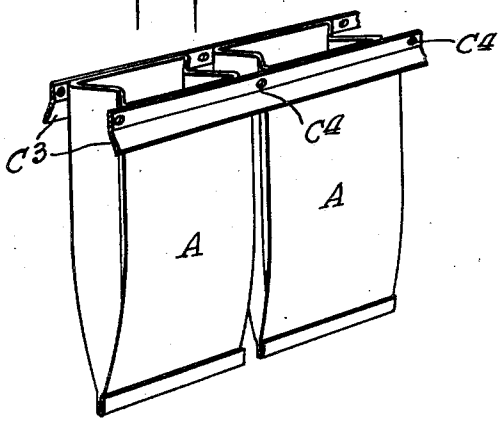
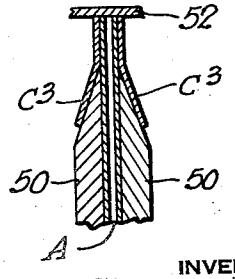


FIG. 24.



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Patented Mar. 9, 1954 2,671,587

UNITED STATES PATENT OFFICE

2,671,587

BAG FILLING MACHINE

Clarence W. Vogt, Norwalk, Conn.

Application July 30, 1948, Serial No. 41,497

17 Claims. (Cl. 226—51)

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This invention relates to apparatus for filling and closing bags, and involves a new type of machine which is particularly adapted for filling and closing bags which are connected together as a chain of bags or bag pairs. One form of such chain of bag pairs is disclosed in my copending application Serial No. 30,647, filed June 2, 1948, now Patent No. 2,628,013, and various other forms are shown and claimed in my copending application Serial No. 38,477, filed July 13, 1948, now Patent No. 2,647,680.

The present invention provides means whereby bags connected in such chains may be continuously fed through the machine, opened, filled, closed, sealed, and freed from each other, or if desired, divided into groups or short chains of filled bags, for shipment, storage and sale.

The invention relates more particularly to the filling, closing and sealing of bags which are connected in series by one or more strips, and the invention provides means whereby one or more of such connecting strips are utilized for supporting and/or advancing the bags to and from filling and sealing stations.

The invention resides not only in the general assembly of parts, but also in the details of construction and operation of different sections or units which act in succession on the bags as they advance.

In the accompanying drawings:

Fig. 1 is a top plan view of one form of apparatus embodying my invention.

Fig. 2 is a vertical longitudinal section on the line 2—2 of Fig. 1.

Fig. 3 is a side elevation of the machine shown in Fig. 1, certain parts being broken away.

Fig. 4 is a transverse section on the line 4—4 of Fig. 1.

Fig. 5 is a transverse section on the line 5—5 of Fig. 1.

Fig 6 is a perspective view of a portion of the chains of bags on the bag supports of the machine, and before filling.

Fig. 7 is a perspective view of the upper end of a closed and sealed bag as discharged from the apparatus shown in Figs. 1 to 6.

Fig. 8 is a similar view of a bag as discharged from the apparatus shown in Figs. 10 to 14.

Fig. 9 is a section on the line 9—9 of Fig. 8.

Fig. 10 is a top plan view similar to a portion of Fig. 1, but showing an alternative construction.

Fig. 11 is a section similar to a portion of Fig. 10, but on a larger scale.

Fig. 12 is a section on the line 12—12 of Fig. 10.

Fig. 13 is a section on the line 13—13 of Fig. 10.

Fig. 14 is a transverse section on the line 14—14 of Fig. 12.

Fig. 14a is a face view of a portion of the cam for raising and lowering the lower ends of the nozzles.

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Figs. 15 and 16 show a pair of filled and sealed bags after separation from each other.

Fig. 17 is a section on the line 17—17 of Fig. 16.

Fig. 18 is a perspective view similar to Fig. 16, but showing a rip-cord incorporated in the bag at the time of closing and sealing.

Fig. 19 is a section on the line 19—19 of Fig. 18.

Fig. 20 is a top plan view of an apparatus for filling a chain of bags comprising a single row.

Fig. 21 is a side elevation, partly in section, of the apparatus shown in Fig. 20.

Fig. 22 is a section on the line 22—22 of Fig. 19.

Fig. 23 is a perspective view of a chain of bags which may be filled by the apparatus shown in Figs. 20 to 22, and

Fig. 24 is a section on the line 24—24 of Fig. 21.

Although various details of a machine embodying my invention will vary in accordance with the particular type of bag chains which are to be filled and sealed, I have illustrated embodiments of my invention which are adapted for use with bag chain constructions in which a bag-connecting strip or tape is folded along a line lengthwise thereof to inverted V form, and I utilize this strip to support the bags substantially upright and on opposite sides of a horizontal member positioned in the groove or channel of the strip as the strip moves endwise to bring the bags into registry with bag filling and closing units.

I have illustrated bag chains in which the body portions of the bags A have opposed inverted pleats, and the bottoms of the bags are closed by folding over the lower end portion B. The side panels of a pair of bags at their upper open ends are adhesively secured to a side portion of a strip C. In one form shown there are two rows of bags A secured to opposite edge portions of a strip C to form bag pairs, and the opposite or outer side panels of the bags are connected together by narrow strips D by means of adhesive of a character which permits said strips to be pulled off as hereinafter described. In another form there is a single row of the bags A secured between a pair of the supporting strips C.

The apparatus illustrated in Figs. 1 to 6 inclusive is for use with the first mentioned form of bag chain. The chain of bags with the two bags of each pair extending out horizontally in opposite directions may be supported on a table 20, which at one end presents surfaces which incline downwardly in opposite directions from a center line, and at progressively steeper angles toward the delivery end of the table. Along the center line of the table is a vertically disposed plate 21 which engages the under surface of the center strip C of the bag chain, so that as the chain of bags is pulled toward the right from the table 20 the outer ends of the bags of each suc-

cessive pair of bags progressively move down the inclined surface of the table until when they reach the end of the table the two bags of each successive pair reach vertical positions, and the bags are supported solely by the engagement of the mid-portion of the strip C with the upper edge of the vertical plate 21. Thus the plate constitutes an elongated support or track for the bags, and along which they slide. If desired, the lower ends of the bags, particularly after they have been filled, may rest on and be additionally or wholly supported by a conveyor belt 22. The progressive advancement of the bags to and through the machine is effected primarily by pulling on the strips or tape C, or on the tapes D, or both.

As the pairs of bags advance along the supporting plate 21 they are progressively opened, then filled, and then closed. To effect the opening of the bags the two strips D pass around rollers 23 which are spaced away from and on opposite sides of the supporting plate 21, and to the extent required to open the bags. These rollers are heated, so that the heat softens the adhesive on the tapes or strips. Thus the tapes D may be pulled laterally and free from the bars by any suitable means, as for instance, pairs of pull rolls 24, and this pulling of the tapes or strips in opposite directions opens up the bag mouths. The distance to which they are opened is controlled by the spacing of the two rollers 23. The tapes D are pulled free from the bags as the bags pass said rollers, but the bags remain connected together by the supporting strip C.

Various other means may be employed for opening up the bags. If the bag walls be very thin and of thermoplastic material such as polyethylene or polyvinylidene chloride, or of heat sealing cellophane, the full opening may be facilitated by air blasts from a pair of nozzles.

After the bags have thus been opened they are filled with measured quantities of the desired material to be packaged. In the particular mechanism illustrated in Fig. 5 there is employed a pair of rotatable measuring members 25 mounted in separate chambers in casings 26, and each having a plurality of measuring pockets 27. On the bottom of the casings 26 are a pair of nozzles 28 terminating almost flush with the path of movement of the upper ends of the bags. The pockets may be filled in any suitable manner, as for instance by hoppers or supply chambers 29 mounted on the top walls of the casing 26. As the measuring members 25 rotate, the pockets come in succession into registry with the hoppers and become filled, and after further rotation through 180° they register with the nozzles 28, and the contents of the pockets are discharged into the bags which are directly therebelow.

It will of course be understood that the measuring pockets 27 are moved in timed relationship to the bag advancing means, so that there will be a pair of bags directly beneath the pair of nozzles each time the measuring pockets come into registry with said nozzles. Obviously, there may be only a single measuring member with two concentric rows of pockets for registry with the two nozzles.

After the bags have been filled during their progressive advancement, the upper end portions of the bags come between belts 30 traveling around pulleys 31 and 32. The belts in passing from the pulleys 31 to the pulleys 32 converge and press against the outer side walls of the bags at their upper ends and progressively close the bags, so that as the bags pass between the pulleys 32 the walls of the bags at their mouths are tightly pressed together. The pulleys or rollers 32 are preferably heated, so that the bags are not only closed, but are tightly sealed if the bag walls be of thermoplastic material, as is preferably the case.

The advancement of the bags after the strips D have been removed is effected by pull rolls 33 acting on the center strip C to carry the closed bags beyond the pulleys or rollers 32. The heating of the bag walls at the time of closing and sealing also acts to soften the adhesive connecting the bags to the center strip C, but not sufficiently to insure the bags dropping off by their own weight.

At a short distance beyond the pulleys 32 there may be provided some form of pusher means which applies downward pressure on the bags, and thus frees them from the center strip C. In the form illustrated, the pushers are rotors 34 on opposite sides of the strip C, and having arms 35 so positioned that as the rotors 34 rotate, the arms will engage the upper portions of the bags as shown in Fig. 4, and press them downwardly. The bags are free to drop as soon as released from the strip C, and may slide down chutes 36 onto conveyor belts 37.

The plate 21 along which the strip C slides terminates shortly beyond the pushers which separate the bags from the strip, and adjacent to the end of the supporting plate there may be provided an upwardly extending knife 38 which slits the strip C in two along the fold line. The rollers 33 may pull the strip C around a roller 33' and laterally. There may be a pair of the rollers 33', and they may pull the strip C, in which case the rollers 33 may be omitted. Any other suitable means may be provided for pulling this strip.

It is important that the bag filling unit operate in proper timed relationship to the bag movement, and that filling begin when the bags are in proper position. In order to insure this, any suitable means may be provided, as for instance a pair of rollers 39 engaging the outer sides of the bags on their way to the filler, and having pins 40 entering between the bags of one pair and those of the next, or entering properly spaced perforations or slits D' in the strips D, and between successive bags. Thus, with the bags fed in proper timed relationship to the rollers 39 so that the pins 40 enter between successive bags, and with the rollers 39 properly geared to all of the rest of the mechanism, the various operations on the bag will take place as the bags reach the successive stations. The filled, closed, and sealed bag after being freed from the strips C and D will appear as shown in Fig. 7.

To simplify the illustration I have not shown all of the moving parts of the apparatus connected up to a single source of power, with gearing or other power transmitting elements so proportioned and designed as to insure the proper timed relationship of the different operating parts. Such interconnecting means may be provided by anyone skilled in the art.

It will be understood that the parts 24 and 33 and other parts which contact sticky adhesive on the bag parts may be sheathed with teflon or coated with a silicone, or otherwise treated to prevent adhesion of the strips or other bag parts thereto.

In the embodiment of the invention above de-

scribed, the strips D and C are separated from the bags A as the latter advance along their path of movement to leave the bag as shown in Fig. 7. This is not essential, so far as my broad invention is concerned, as at least one of the strips may be left in place on the bags after filling and sealing, and the strip or strips may be cut between successive bags into sections, so that the sections of at least one of the strips remain on the filled and sealed bags. Such strips may have printing thereon, in a repetitive pattern, indicating the contents of the bag and other desired information. Thus the sections of the strip serve as labels on the bags.

In Figs. 10 to 14 inclusive I have shown a machine which, although it differs in detail from that above described, operates in substantially the same manner, except as to the removal of the strips. In this form the measuring members 25a are rotatable in casings 26a, and have measuring pockets 27a having outlets 27b for delivering material to nozzles 28a, and which pockets may be filled from a hopper 29a mounted on the casing. The casing 26a is formed with a bottom plate 26b upon which the measuring members are supported.

In order to extend the time during which the material is delivered through the nozzles, the bottom plates 26b have arcuate slots 41 formed therein along which the nozzles 28a move, as shown in Fig. 14. To insure the delivery of the material down into the pockets, the nozzles may be extensible, and means provided for intermittently moving a section of each nozzle down into the bag. As shown, each nozzle 28a has a sleeve 42 thereon, and the sleeve at one side has a pin 43 extending into a groove in the periphery of a stationary annular band 44. This band may be supported on the frame part 45 of the machine, and the groove along almost its entire length is in a single horizontal plane, so that the sleeves or nozzle extensions will remain in their raised position. For a short distance along the length of the groove and over the path of movement of the bags, the groove makes a sharp dip, as shown in Fig. 14a. This dip is of such width that as the advancing side of the bag passes beneath the nozzle, the sleeve or extension 42 moves down into the bag, as shown in Fig. 13. Before the bag has passed the nozzle, the nozzle is moved back up to its upper position. These extensions preferably have their outer surfaces tapered so as to guide them into the bags and hold the bags open during the filling. In starting the operation the ends of a pair of bags may be pulled open by hand as the bags approach the nozzles. As the bags fill, their outer walls move outwardly, and the outer connecting strips will thus be spread apart thereby to open up the next pair before they reach the nozzle.

After the bags have moved past the nozzles, the upper ends of the bags, still attached to the side strips and the center strip, pass between a pair of pressing and heating rollers 46 which close the mouths of the bags and hermetically seal them as well as sealing the tapes C', D^2 together. Directly beyond the bag closing rollers 46 the supporting rail or plate 21a is provided with an upstanding knife 38a, which slits the center and inverted V-shaped strip lengthwise, into separate strips C' as shown in Figs. 15 and 16, so as to separate the two rows of bags from each other.

Beyond the longitudinal slitting knife means are provided for cutting all of the tapes or strips in two between each successive pair of bags. As shown particularly in Figs. 10 and 11, this cutting means includes a hard surfaced roller 47 and a roller 48 having longitudinally extending knives 49 for cutting through the strips between adjacent bags. The knives 49 are spaced apart circumferentially of the roller 48 to distances slightly greater than the width of the closed mouth portions of the bags, and the roller 48 preferably has a peripheral layer 50 of rubber or other resilient material which applies pressure to the bags at their mouths, and provides sufficient traction effect to pull the bags and strips through the machine and deliver the separated or freed bags into a receptacle, which may be in the form of a pair of oppositely inclined chutes 36a.

The outer strips D^2 are preferably of such width that they extend above and below the edges of the inverted V-shaped strip C, and as previously noted, these outer strips D^2 may have printing thereon, so positioned that each section of the strip as applied to the bag will indicate the contents and other desired information regarding the filled package. In Figs. 15 and 16 the two bags of a pair are shown after the center strip C has been slit and all of the strips cut transversely between successive bag pairs.

While the bag mouths are still open, and while passing from the filling nozzles to the closing and sealing rollers 46, sections of a cord E may be looped, by hand or otherwise, down into each bag. The knives 49 which cut the strips may also cut the cord between successive bags, so that the closed and sealed bag may be as shown in Fig. 18. When it is desired to open the bag it is merely necessary to tear or cut away a portion of the end of one strip so as to be able to grasp an end of the cord and then pull upwardly on one end of the cord. It will not only separate the two opposed strips, but also separate the opposite walls of the bag itself, and completely open the bag for the discharge of its contents.

It will be understood that the cord E should not be of twisted fibers, such as an ordinary cotton thread or cotton string, because it would permit air leakage along the cord. The cord should preferably be a single strand of some plastic material, such as polyvinylidene chloride, sold by Dow Chemical Co. under the trade-mark "Saran," and which has high tensile strength.

The particular forms of my improved apparatus hereinbefore described are adapted for the filling and closing of chains of bag pairs, but my invention in most of its aspects may be utilized for filling chains of a single row of bags.

In Fig. 23 I have shown bags A which may be similar in all respects to those hereinbefore referred to, but arranged in a single row, and connected as a chain by two strips C^3, each of which may be similar to one-half of the strip C shown in Fig. 6. Each of these strips C^3 is secured to the outer side wall or panel of each bag of a series, and may have its upper edge flush with the upper edge of the bag wall. Only the top half of the inside faces of these strips are adhesively secured to the bag walls, so that the lower edge portion of each strip may be free of the bag wall and outwardly flared to form an inverted V-shaped groove between the bag wall and the strip, and serving to receive a bag supporting member, the same as does the inverted V-shaped strip C hereinbefore referred to. Thus a single row of bags may rest on a pair of supports, instead of two rows of bags resting on a single support as in Figs. 1 to 6 and 10 to 14.

The strips may have slits or apertures C^4 between successive bags, and for the same purpose as the slits or apertures D' shown in Fig. 6, namely to insure registry of the chain of bags with the filling mechanism.

In the apparatus illustrated for filling chains of bags of the type shown in Fig. 23, there are provided a pair of feed wheels **50** rotatable with a horizontal shaft **51**, and spaced apart to a distance sufficient to permit the chain of bags to pass therebetween. These wheels have their peripheries beveled so as to extend between the outer bag walls and the lower free edge portions of the strips or tapes C^3, as shown in Fig. 24.

The feed wheels **50** advance the chain of bags and deliver it onto a pair of bars or rails **50a**. These have their upper edges horizontal and tangential to the peripheries of the feed wheels, and in the same vertical planes as said wheels, so that as the wheels advance the chain the latter passes from the wheels to the rails. To insure the proper feeding the bags may be held down on the wheels by a guard **52**. Intermediate of their ends these rails spread apart to open the bags to permit filling, and then converge to close the bags, as will be referred to more in detail hereinafter.

Suitable means are provided for moving filling nozzles down into the bags and advancing them with the bags to fill the latter, and then up out of the bags to permit the closing. While projecting into the bags, valve mechanism opens to permit the delivery of a measured charge of material into each bag.

In the apparatus shown in Figs. 20, 21 and 22, there is provided a supply vessel **53** mounted on a suitable frame **54** and having a discharge port **55** in the bottom wall **56**. Beneath the bottom wall there is provided a measuring member **57** secured to a vertical shaft **58**, and having a series of pockets **59**, each of the required capacity to fill one bag to the desired extent, and each having a discharge port **60**. Beneath the measuring member is a stationary plate **61** which has a discharge slot **62** over which the ports **60** in the bottoms of the pockets may move.

The stationary discharge port **55** of the supply vessel **53** and the discharge port or slot **62** which which are in non-rotary parts, are circumferentially spaced so as to be out of registry. Thus, as the measuring pockets move around the axis of the shaft **58** they come beneath the port **55**, and the pockets are filled; and they then move to the position where the ports **60** register with the ports **62** where the pockets discharge.

In order to keep the material in the supply vessel or hopper agitated, and to insure free flow into the pockets, there may be provided an agitator **63** in the form of an arm or blade **64** secured to the upper end of the shaft **58**, and movable along the bottom wall of the hopper and over the ports **55**.

Below the stationary plate **61** there is provided a rotatable nozzle-carrying plate **66** having an annular row of nozzles **67** extending down from the ports **60**. This plate is secured to the shaft **58** so as to rotate with the annular row of pockets **59**, but the pockets communicate with the nozzles only while in registry with the port **60** in the stationary plate **61**. Preferably each nozzle **67** has a sleeve or nozzle extension **67a** which may be lowered into a bag to properly direct the material into the bag. These sleeves or nozzle extensions are normally held in raised position, and lowered only when the nozzle is over a bag.

As shown, the frame supports an annular member **68** having a cam groove in its peripheral surface, and each nozzle has a pin or lug **69** extending into this groove. The member **68** overlies the path of movement of the bags and dips down at one point, or at least the groove does, so that, as a nozzle moves to a point over a bag, the pin **69** moves down the incline in the groove and then up again, and the dwell in the lower position is such that when the nozzle registers with the port **62** it will have its lower end in the bag, as shown in Fig. 21. When the nozzle passes beyond said port the nozzle is pulled up out of the bag by the reverse incline in the control groove.

Thus it will be seen that the measuring pockets travel in a circular path, and while traveling in an arc of the path they are over the bags, and discharge through the nozzles which move down and then up.

The feed wheels **50** are preferably so spaced that the bags between them are in flat or collapsed condition, and the same applies to the receiving ends of the rails **50a**, but as these rails extend beneath the path of movement of the nozzles they spread apart to open the bags. The rails then curve to guide the bags along an arcuate path beneath the nozzle, and concentric with the shaft **58**. After passing the end of the filling position of the nozzles the rails then converge to bring the opposite walls of the bags together, and thus close the bags.

The feed wheels **50** may be idlers, or may be driven to advance the bags, but preferably the advancing of the bags is effected primarily by means at the discharge end in cooperation with the filler nozzles. As shown, a pair of pulleys **70** are positioned at the delivery end of the rails **50a** and support belts **71** which have parallel runs which press the strips C^3 to close the bags and discharge them from the apparatus. The pulleys **70** may be heated so that they will cause the opposite walls to be sealed together if said walls be of thermoplastic material, or will activate adhesive and seal the bags if the mouth portion of the bags be coated with adhesive which is non-tacky at ordinary atmospheric temperature. The same means shown in Figs. 10 and 11 may be employed to cut the strips into sections, or the bags may be freed from the strips as shown in Figs. 1, 2 and 4.

The central shaft **58** which advances the rotating measuring pockets, and the rotating nozzles, may be driven in any suitable manner. As shown, there is an electric motor **72** which may be connected to the shaft **58** by suitable gearing **73**, and this same motor may serve to drive the pulleys **70** and belts **71**, and if desired, drive the feed rollers **50**.

It will be noted that in all forms illustrated the bags are connected by one or more strips or tapes which form or coact in forming inverted V-grooves; that the bags are supported by one or more members extending into such grooves; and that means are provided for opening the bags, filling them, and then closing them in succession as they travel along the supports which are in said inverted V-grooves.

In those constructions or arrangements where strips are removed from the bags, any portion of the adhesive which remains on the bag wall may be readily wiped off or removed by solvent.

Although in the drawings I have shown bags having conventional fold-over bottoms, it is obvious that the bag bottoms might be provided

with or reinforced by strips or tapes for closing or reinforcing the bottoms, as shown in Figs. 12 and 13 of my copending application Serial No. 30,647. In such cases the bottoms of all adjacent bags would be severed in the center of the space between the bags prior to the point where they reach slopes on the table **20**, and by cutters indexed by the slits or perforations D'.

If it is not desired to leave these tapes on the bags they may be previously removed by their reactivation and withdrawal as described for the removal of tapes D. This can be accomplished at the time the bags are made, and not necessarily in synchronism with the bag filling mechanism.

If it is desired that the bags be retained in chain formation during bag filling and sealing, the severing of these bag bottom connecting tapes may be later accomplished by extending the knives **49** for the full bag lengths, and providing additional rollers for carrying the knife extensions, similar to the roller **48** and backing roller similar to roller **47**, and opposite to the lower part of such elongated knives **49**. Such additional rollers would be at the proper elevation to engage these tapes after the bags have been filled.

While I have shown and described types of bag fillers which lend themselves to automatic filling in a continuous manner, it will be obvious to those skilled in the art that non-rotating types of hoppers and chute fillers may be juxtaposed over the bags opened by the tapes or tabs. Thus the filling, closing, sealing, and/or separating or unchaining operations can be performed by non-rotating parts at successive stations, by the use of one or more Geneva movements timed to operate in a progressive cycle. By these modifications or any of them, fillers and sealers already well known to the trade may be utilized, but with somewhat lower output per hour.

Having thus described my invention what I claim as new and desire to secure by Letters Patent is:

1. An apparatus for filling bags which are connected together at their upper ends as a chain and by means of flexible strip material connected to the bags adjacent to their upper ends, said apparatus having means for engaging said strip material and thereby supporting said bags in an upright position, means engaging said strip material for advancing the bags along the supporting means, means in the path of movement of the bags for delivering predetermined amounts of material to said bags, means for applying heat and pressure to the top portions of said bags and said strip material to close and seal said bags and cutting means spaced along the path of movement of the bags for severing the strip material transversely between successive bags to separate the bags from the chain after they have been closed and sealed.

2. An apparatus for filling and closing bags which are connected together at their upper ends as a chain of pairs of bags, the two bags of each pair being attached to and along opposite edge portions of a strip bent along a line extending lengthwise thereof to inverted V-shape, and said bags having their outer walls connected together by flexible strips, means for engaging said first mentioned strip for advancing the bags to and from filling position, and means for applying heat and pressure to the second mentioned strips for closing and sealing said bags.

3. An apparatus for filling and closing bags connected together at their upper ends in pairs as a chain by means of a flexible strip, means for advancing said bags and strip, a pair of rotary members for closing the ends of said bags in succession, and means for freeing said bags from said strip after filling and closing.

4. A bag filling and closing apparatus adapted for use with a plurality of bags having their upper open ends connected together at their upper ends in pairs to opposite edge portions of a flexible strip of material bent along a line extending lengthwise thereof to inverted V-shape, and having their outer walls connected in series by flexible strips attached to said bags by adhesive material softening upon the application of heat, and said bags having thermoplastic walls, said apparatus including means engaging said first mentioned strip for advancing the bag pairs in succession to and from filling position, means for applying heat and pressure to said second mentioned strips to close and seal the bags, means for slitting said first mentioned strip lengthwise, and means for cutting all of said strips into sections, and between successive bags.

5. A filling and closing machine comprising a series of bags connected together at their upper ends as a chain by flexible strips, and including a pair of bars for engaging said strips and supporting said bags, said bars receding from and then approaching each other in the direction of their lengths, whereby said bags in advancing along said bars have their opposite walls moved away from and then toward each other.

6. A filling and closing machine comprising a series of bags connected together at their upper ends as a chain by flexible strips, and including a pair of bars for engaging said strips and supporting said bags, said bars receding from and then approaching each other in the direction of their lengths, whereby said bags in advancing along said bars have their opposite walls moved away from and then toward each other, and means in the path of movement of said bags for discharging a predetermined amount of material into each bag while said walls are moved apart.

7. A bag filling machine including a series of pairs of bags, a pair of bag supports which recede from and then approach each other in the direction of their lengths, and serving to support flexible strips attached to opposite walls of said series of bags, whereby said bags are opened and then closed as they move along said supports, and means above the path of movement of said bags for delivering charges of material to said bags in succession while moving along said supports.

8. An apparatus for continuously advancing, opening, filling and closing bags comprising a vertically extending bar, a flexible tape, a series of bags connected together at their upper open ends by said tape, said bar engaging said tape to support said bags and hold them upright and suspended, with their filling openings facing upwardly, means for advancing said tape and bags along said bar, means engaging the outer side of said bags and pulling them away from said tape for progressively opening the bags, and means for discharging material into each bag while it is open.

9. A machine for opening, filling and closing bags comprising a vertically extending frame member, a flexible inverted V-shaped strip, two rows of bags connected at their open tops to the opposite sides of said V-shaped strip, a pair of flexible strips connected to the outer walls of said bags, said frame member engaging in and supporting said V-shaped strip slidably with the bags suspended on opposite sides thereof, and

means for engaging the pair of strips connected to the outer sides of the bags to progressively advance the bags and progressively open them.

10. An apparatus for progressively opening, filling and closing bags arranged in two rows, the bags being secured together in pairs at their upper ends to a connecting strip, and the bags of each row being connected together at their upper ends by a separate strip, said apparatus having a supporting member along which said first mentioned strip may slide endwise, means for engaging said second mentioned strips and advancing them along diverging lines to progressively open said bags, a filling device having separate nozzles for filling each row of bags, and means for acting on the outer side of each bag as it advances to progressively close the filled bags.

11. A bag filling and closing machine for a plurality of bags connected in series by a pair of strips detachably engaging the opposite outer sides of the bags at their upper ends, said machine having means for engaging said strips to advance the bags to and from a filling station, means for engaging the strips and pulling them outwardly along diverging paths to open the bags at the filling station, and means beyond said filling station for closing said bags.

12. An apparatus for filling bags comprising stationary means to support a chain of bags, a flexible tape, a series of bags connected to said tape, said stationary means engaging and supporting said tape to hold the bags upright and suspended therefrom, means for engaging said tape and advancing it and the bags connected thereto, means in the path of movement of said bags for delivering predetermined amounts of material to said bags in succession, and means for closing said bags by pressing the walls thereof toward said tape and its supporting means.

13. A machine for filling bags comprising a vertically extending bar to support a chain of bags, a first flexible strip presenting an inverted V-shaped groove, a series of bags connected to said strip at their upper ends, said bar engaging in said V-shaped groove and supporting said strip and the bags connected thereto for movement along said bar, a second flexible strip connected to the opposite sides of said bags, means for pulling the first strip to advance the bags to and past filling position, and means to press said upper ends of said bags together to seal them while they are connected by at least one of said strips.

14. An apparatus for filling bags which are connected together at their upper ends as a chain and by means of flexible strip material, said apparatus having means for engaging said strip material thereby to hold the bags upright and suspended, means for engaging said strip material to advance the bags connected thereto, means in the path of movement of said bags for delivering material to said bags in succession, means for closing said bags, and means spaced along the path of movement of said bags for severing said strip material between successive bags to separate the bags from the chain after the bags have been sealed.

15. A filling apparatus comprising bags which are connected together at their upper ends as a chain of pairs of bags with the two bags of each pair attached to and along opposite edge portions of a strip bent along a line extending lengthwise thereof to inverted V-shape, and including a bag support extending into said V and along which said strip may move with the two bags of each pair on opposite sides thereof, a filling means having a pair of discharge spouts overlying said support to discharge material into said pairs of bags in succession, means adjacent the end of said support for pressing the open upper ends of said bags together to seal them, and means spaced along the path of movement of said bags to sever the chain to separate the bags after the bags have been sealed.

16. A bag filling and closing machine adapted for use with a plurality of bags having their open end portions connected together at their upper ends in pairs to opposite edge portions of a flexible strip of sheet material bent lengthwise to inverted V-shape, said machine including a bag support for engaging said strip within the inverted V, and along which said strip may move endwise to advance the bags, means for delivering to the bags measured quantities of material while said strip is moving along one part of its path of movement on said support, a pair of rollers between which the open ends of the pairs of bags pass in succession and acting to close said ends, and means spaced along the path of movement of said bags to cut said strip transversely to separate said chain into units comprising not more than two bags.

17. An apparatus for filling bags comprising a bag support having an edge portion, a strip bent to inverted V-shape along a line extending lengthwise of said strip, a plurality of bags attached at their upper ends to and along opposite edge portions of said strip thereby forming a chain of pairs of bags, said edge portion of said bag support engaging in said V-shaped strip and supporting said chain for movement along said edge portion with the two bags of each pair on opposite sides of said edge portion, means for engaging said strip to move the latter endwise and thereby advance said bags in succession to and from a filling position, means adjacent the end of said bag support for engaging and pressing said upper edges of said bags together to seal them, and means spaced along the path of movement of said bags to separate the sealed bags from each other.

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