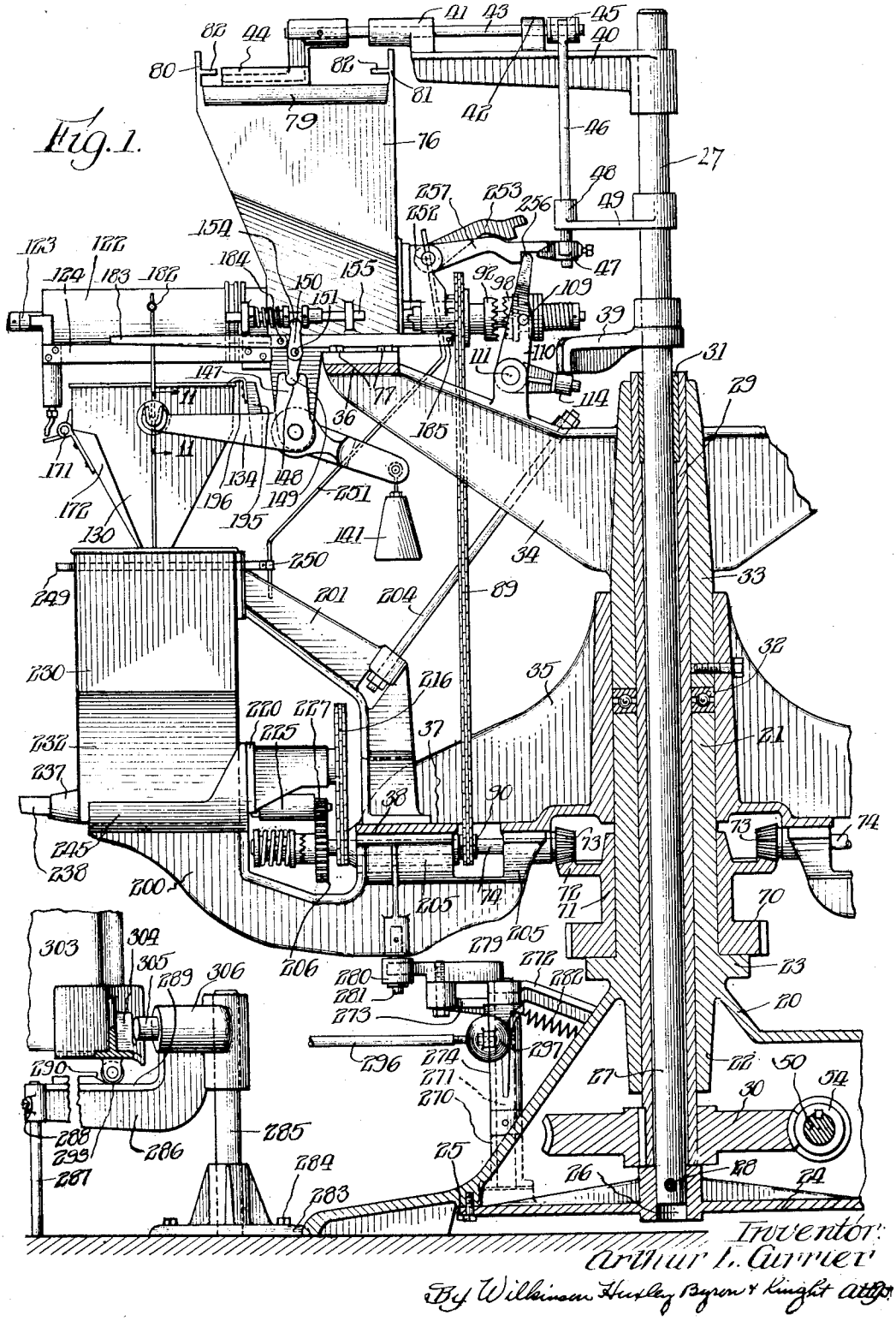
April 3, 1934. A. L. CURRIER 1,953,646

FILLING MACHINE

Filed March 20, 1929 8 Sheets-Sheet 1

Fig. 1.



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April 3, 1934. A. L. CURRIER 1,953,646

FILLING MACHINE

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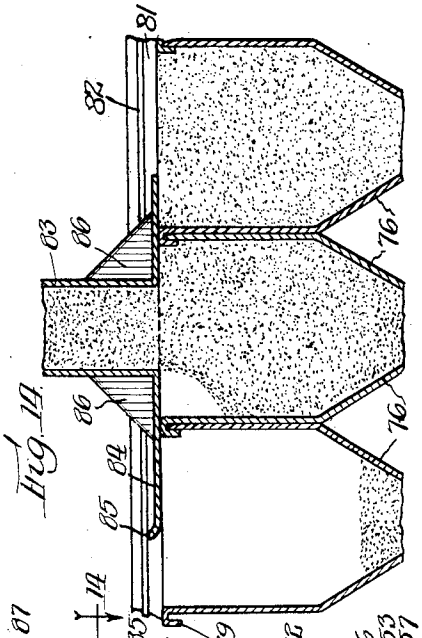


Fig. 14.

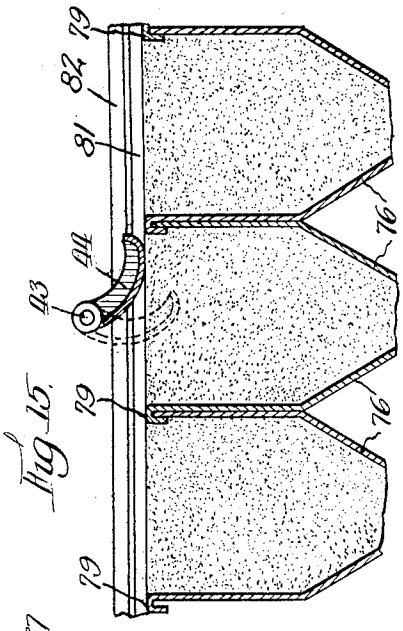


Fig. 15.

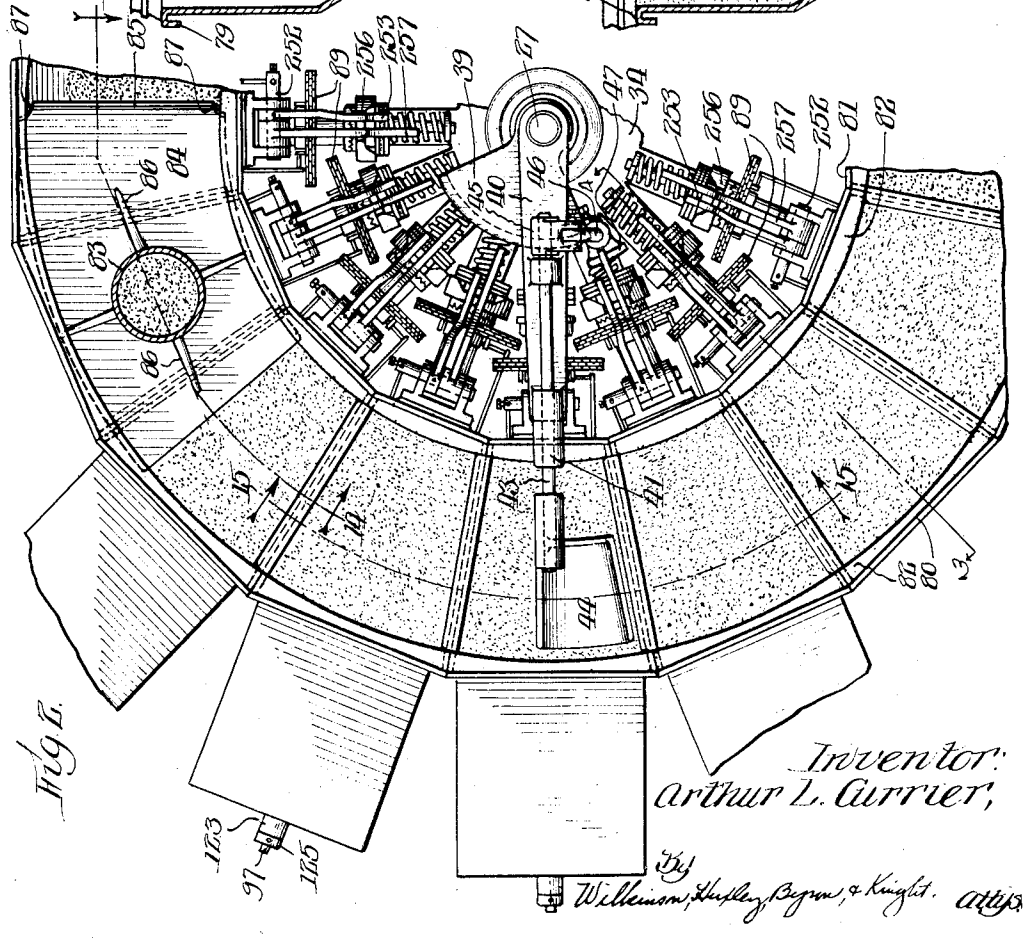


Fig. 2.

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April 3, 1934. A. L. CURRIER 1,953,646

FILLING MACHINE

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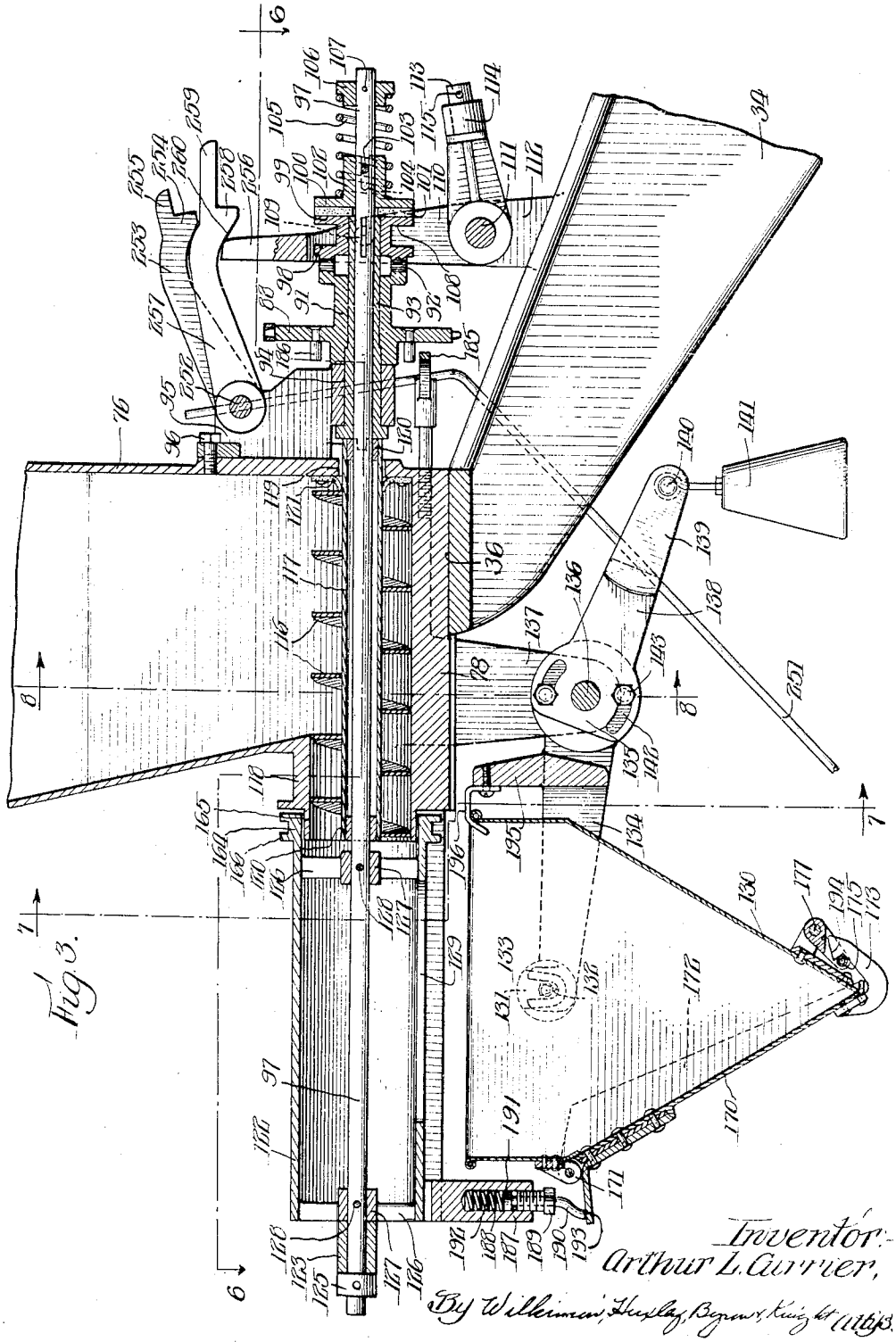


Fig. 3.

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April 3, 1934. A. L. CURRIER 1,953,646

FILLING MACHINE

Filed March 20, 1929 8 Sheets-Sheet 4

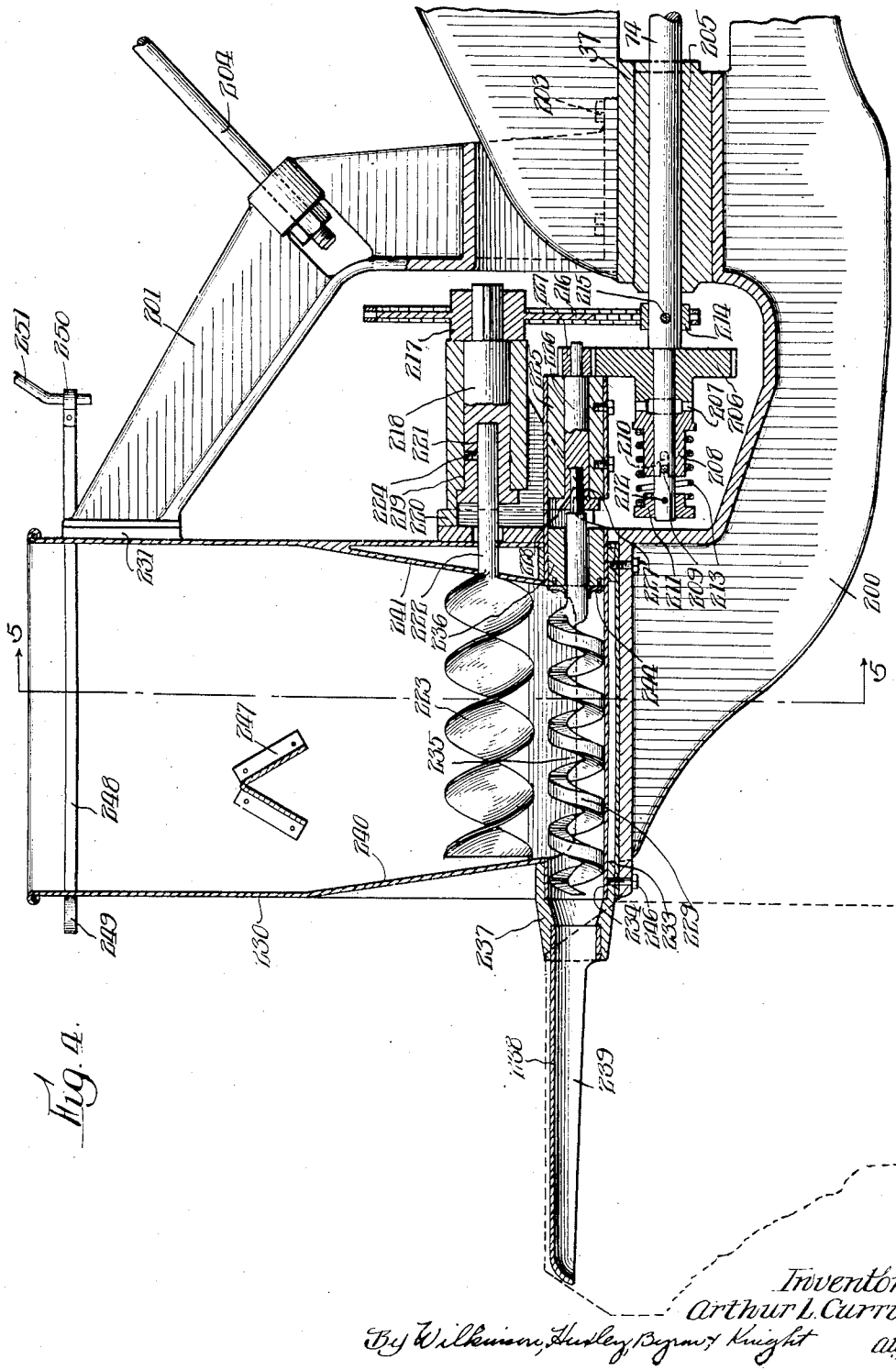


Fig. 4.

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April 3, 1934. A. L. CURRIER 1,953,646

FILLING MACHINE

Filed March 20, 1929 8 Sheets-Sheet 5

Fig. 6.

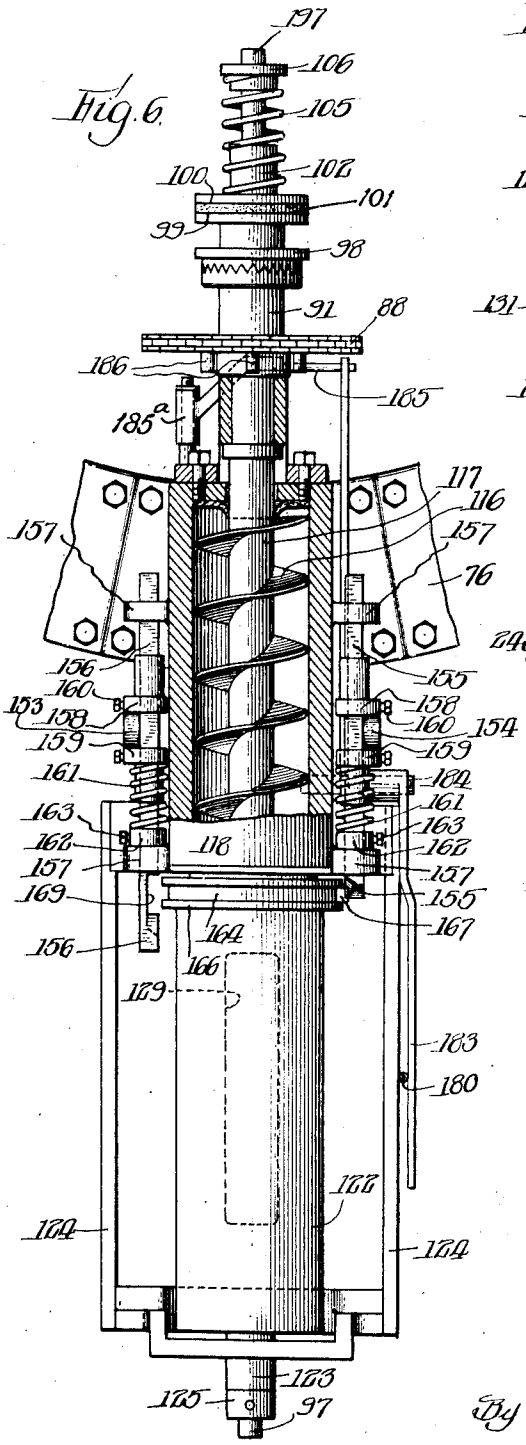
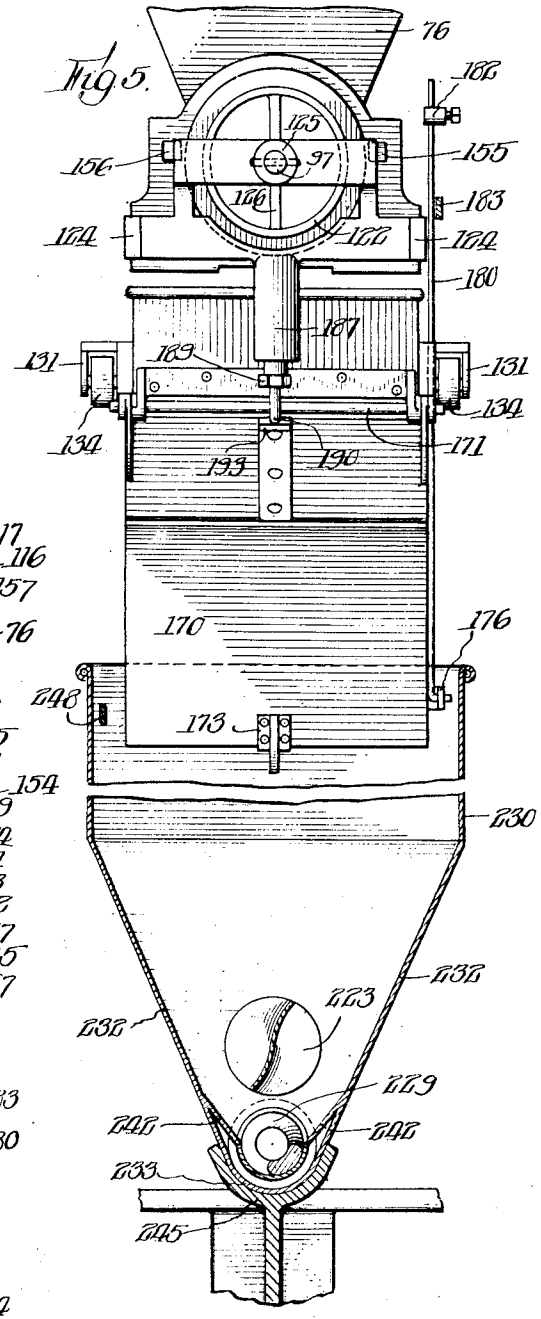


Fig. 5.

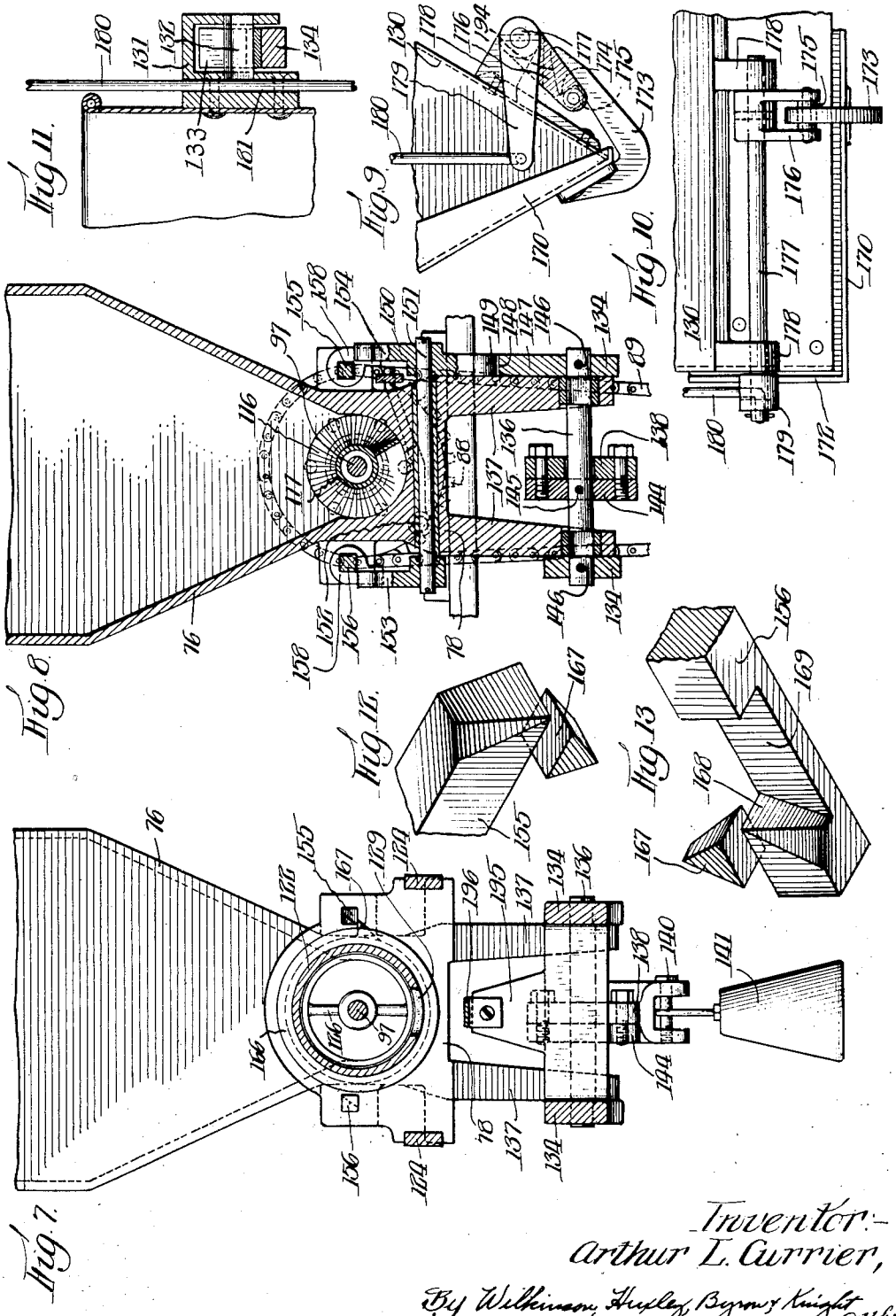


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April 3, 1934. A. L. CURRIER 1,953,646

FILLING MACHINE

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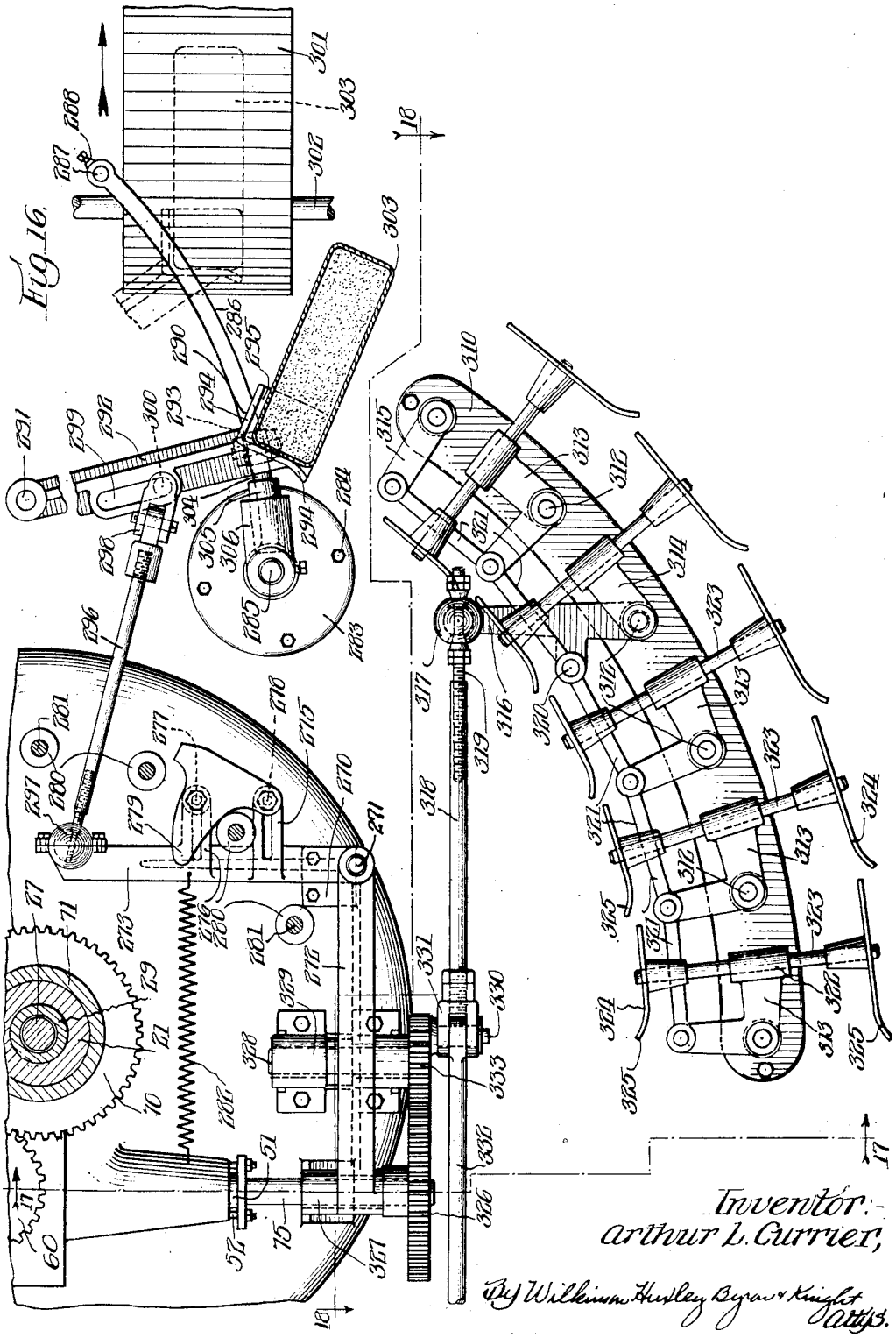
Inventor:-
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April 3, 1934. A. L. CURRIER 1,953,646

FILLING MACHINE

Filed March 20, 1929 8 Sheets-Sheet 7

Fig. 16.



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April 3, 1934. A. L. CURRIER 1,953,646

FILLING MACHINE

Filed March 20, 1929 8 Sheets-Sheet 8

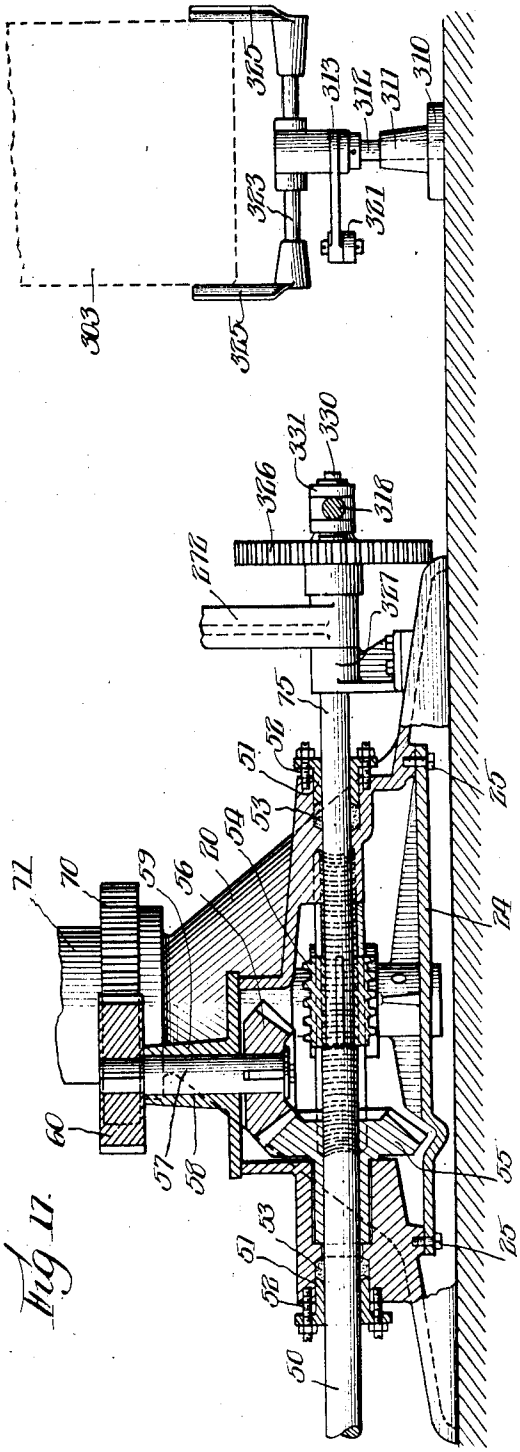


Fig. 17.

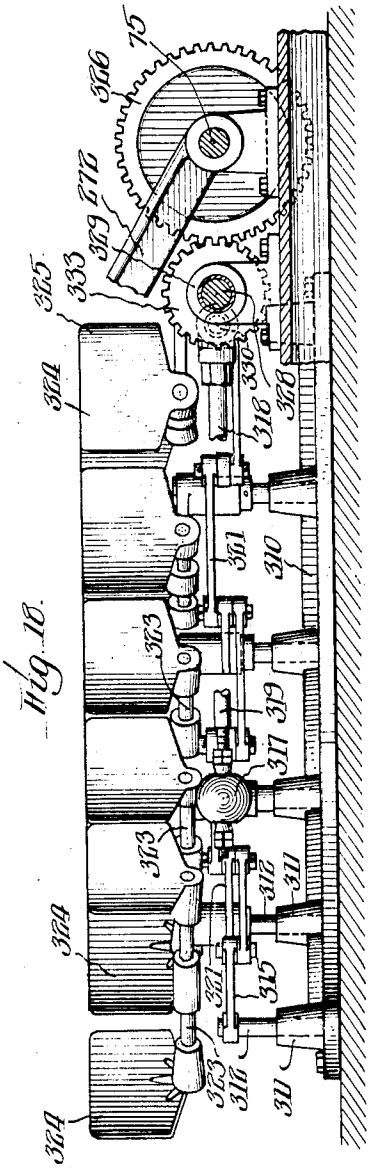


Fig. 16.

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Patented Apr. 3, 1934 1,953,646

UNITED STATES PATENT OFFICE

1,953,646

FILLING MACHINE

Arthur L. Currier, Ashburnham, Mass., assignor, by mesne assignments, to Cornell Bag Corporation, a corporation of Delaware

Application March 20, 1929, Serial No. 348,380

25 Claims. (Cl. 249—17)

This invention relates to machines of the type employed for filling containers with a predetermined amount of materials, by weight, and is herein illustrated as embodied in a machine adapted for filling bags with powdered, granular, or other finely divided substances, such as for example, cement, lime, sugar or substances similar in consistency and character.

An object of this invention is to provide a novel machine having all of the necessary instrumentalities embodied in a single unitary compact structure, and preferably driven from a single source of power, or in other words, provided with, in addition to all of the required instrumentalities, gearing and other connecting devices whereby the various parts of the machine are driven in synchronism, and each caused to function in combination with the other parts in a manner to accomplish a filling operation which is substantially automatic in character.

Another object of this invention is to provide a machine having a plurality of bag filling units all of which function simultaneously but successively to fill a plurality of bags.

Another object is to provide a machine, which has a plurality of bag filling units, each adapted to fill a bag in one cycle of operation, and each unit of which starts and completes its cycle successively with the cycle of each other unit whereby only one bag is presented, completely filled at any one instant, but the entire machine operating to fill one bag in the time interval expressed by the time required for one unit to complete one cycle divided by the number of units embodied in the machine.

Another object is to provide a machine, the operation of which requires that an operator, located at a given position relative to the machine, merely places bags on the filling nozzles as the various units of the machine pass the position of the operator, the remaining operations of the machine being wholly automatic in character, including discharge of the filled bags.

Another object is to provide a machine, the units of which travel in an endless path, and preferably a machine which rotates, whereby the parts may be so constructed and connected as to perform one or more complete filling operations or cycles during the travel of the machine through one complete cycle. In this way the operator or operators may be stationed at given locations and the parts of the machine will conveniently present themselves to the operator, at such predetermined times as the operation of the machine requires, and, further, a machine so arranged permits a discharge station or stations to be properly located and adapted to receive the filled bags as they are successively presented in filled condition.

Another object of this invention is to provide a machine which segregates charges of material more accurate in weight than have heretofore been obtained by machines of this character, and, in accomplishing this object, it is a further object to provide a machine in which the charge of material to be placed in any one bag is weighed by a single scale unit, but the total or complete charge of which is determined by the total of a plurality of smaller charges, each of which is approximately an even fractional part of the weight of the completed charge. In other words, any particular scale, in compiling a complete weighed charge for a bag, undergoes a plurality of separate and independent weighing operations each one of which weighs out and segregates that fractional quantity of the weight of the entire charge which, when increased by a predetermined number of similar charges, will equal the total charge. This manner of operation in practice has been found to make for extremely accurate weights, as the law of average is availed of to minimize the error, and this acts to offset undercharges against overcharges in compiling each complete charge.

The inaccuracy which occurs in obtaining weights in machines of this character has been found to be due to factors such as splashing of the material, variations in the consistency of the material and like disturbing conditions and behavior, the presence or occurrence of which tends toward an average over any period of operation of the machine, and not to the mechanical operation of the mechanism. By precision of manufacture and construction, a machine can be made to exactly duplicate its movements of operation, consequently it appears that inaccuracy, when such occurs, is caused by the inability of duplicate movements of the same apparatus to perform exactly the same operation upon the material treated.

In the applicant's machine, it will be noted that each completed charge is compiled by successive operations of the same scales, and that, by compiling the completed charge from a plurality of smaller charges, the minute inaccuracies which may in some instances appear in the smaller weighed amounts will be averaged in the completed charge. Another feature of advantage in this manner of operation is that, inasmuch as it is easier to construct machines to determine the

weights of relatively small bulks, than it is to construct one for weighing larger bulks, the scale mechanisms in the present machine are actually better instruments than could be constructed to weigh the complete charges in one operation.

Another object of this invention in furtherance of the production of more accurate weights, is to provide, in a machine of the above described character, means for substantially instantaneously terminating the flow of material into the scales device, which means is operative in response to the movement of the scales itself as produced by the predetermined and proper weight of material contained therein, and after which, no further feeding is desired.

Another object is to provide a machine of the above described character in which supply hoppers are provided for each unit, each of which hoppers has a capacity in excess of the amount of material constituting the full charge for one bag; together with means provided by which the hoppers are re-charged to approximately full capacity for each cycle of operation of the particular unit with which it is associated.

In carrying this object forward, it is a further object of this invention to provide means, acting in cooperation with the hoppers, which will function to disconnect, or render inoperative, any particular unit during one or more cycles of the operation of the machine, in the event that, at the moment the cycle of operation is about to commence, the hopper associated with the particular unit does not contain material in quantity sufficient to constitute a full charge for one bag. If the hopper has not been charged to the required extent after the travel of the unit through another cycle of movement of the machine, the said means will remain effective to withhold the operation of that particular unit, and so on until the hopper becomes adequately charged to carry on the normal operation.

The mechanism referred to will in addition be effective to start the operation of such inactive unit only after the hopper of that unit has been charged with material in quantity sufficient to constitute a complete charge, and then only at the moment when that unit arrives at the point at which its cycle of operation normally commences.

It is a further object of this invention to provide means, for automatically charging the supply hoppers, of such character that gravity alone may be utilized to perform the feeding operation. For this purpose the hoppers of the various units are caused to successively pass in cooperative relationship with a supply pipe through which the material is fed, preferably by gravity, from a storage bin located above the machine; and the various cooperating parts are constructed and arranged so that each hopper will be supplied with the desired quantity of material. The cooperating parts are further constructed to effect an automatic cut-off of the feed, without liability or possibility of overcharging the hoppers, or of loss of material by splashing or escapement of dust or other particles into the atmosphere. This latter liability is highly undesirable, and the avoidance thereof requires the exercise of considerable care in handling materials such as cement, for instance.

Another object is to provide a machine of the above character, the rate of production of which is determined by the machine speed, and is not dependent upon the speed of the operator in effecting the required manipulations. In the present invention, the speed of the machine will be adjusted to conform to the convenience of an average industrious worker, and with the machine so running, the operator is compelled to work at the rate of speed determined by the machine, and in this manner the output of the machine may be assured without liability of reduction due to delay by the operator.

Another object of this invention is to provide means readily accessible to the operator, for manual manipulation, by which any unit of the machine may be rendered inactive. This means has utility if for any reason the operator is unable to locate a bag on the nozzle of a particular unit, as it will enable him in such an event to disconnect that unit from operation, whereby the machine will not feed the material through the nozzle, when there is no bag located thereon to receive it.

A further object of this invention is to provide a machine in which the material to be bagged is first weighed into charges, then deposited into an independent container from which it is finally fed into the bag. In this type of construction, the delicate weighing mechanism is not affected or in any way modified to adapt itself to operation jointly with the bag filling mechanism, other than by their associated relationship. Furthermore, in such a construction, the sole function of the bag filling mechanism is to force all of the charge received by it from the scales mechanism, into the bag and, due to the fact that the charge for a single bag is deposited into the bag filling mechanism in successive fractional charges, the conditions under which the bag filling mechanism functions are more nearly constant than they would be if a complete bag filling charge was dropped bodily into the filling mechanism.

This type of construction also eliminates the dumping of relatively large quantities of material, such as would be particularly undesirable, in case, for example, of a complete bag charge of cement, weighing in the neighborhood of 95 pounds.

A further object of this invention is to provide mechanism, in connection with a machine of the above described character, for automatically discharging the filled bags as they are presented to that portion of the cycle of travel of the machine through which the units travel, after the individual units have completed the filling operation, and a further object is to provide, if desired, mechanism, operative during the filling of the bags, for shaking or jigging the bags in a manner to settle the material therein and facilitate the introduction of the last portion of the material introduced into the bag.

A further object of this invention is to provide a machine which has a larger output for a given size of machine, accomplishes a better filling performance as to correctness of weight and compactness of the charge in the bag, and involves less care and expense in operation and maintenance, than machines heretofore provided, and also one which requires a minimum of attendance by operators for the output obtained.

The machine herein contemplated, in addition, embodies certain principles of operation which are fundamentally more correct, for the performance of bag filling operations, than in other known machines, and the various instrumentalities thereof are capable of being adjusted or regulated as to speed and operation relative to each other so as to control the various features there-

of, such as the number of scale operations in one cycle, the weight segregated as a complete charge, and the portion of the entire cycle of the machine which will be taken up with the bag filling operations of the various units, as distinguished from the portion of the cycle through which the filled bags are merely carried idly awaiting discharge.

Through adjustment the machine is further capable of providing the starting point for the operation of the cycles of the various units at any point in their path of travel, which adjustment permits the machine to be installed without regard for front or back, in any convenient location, with freedom of selection as to where the operator's station and the discharge mechanism shall be located.

The construction of the machine is relatively inexpensive to produce, as many of its parts are fairly simple in form and admit of being made from inexpensive materials and by inexpensive processes, and, in addition, a large proportion of the parts are of duplicate size and shape, which makes for a reduction in the production cost.

Although, in the present embodiment of this invention, there is shown a machine having sixteen units, it is to be understood that any number of units could be employed, as this does not effect the principle of the invention. The present invention will be more readily understood by referring to the following description in connection with the accompanying drawings, but the invention is not to be considered as limited thereby in any respect. The full scope of the invention will appear after an understanding of the illustrated embodiment and an appreciation of the advantages the invention produces therein.

It is to be understood that various additional objects, not specifically enumerated above, are contemplated for this invention and these will appear to one skilled in the art as the following description proceeds.

Referring now to the drawings;

Figure 1 is a fragmentary side elevational view, partly in cross section, of a bag filling machine, embodying the present invention.

Figure 2 is a fragmentary plan view of the machine shown in Figure 1.

Figure 3 is an enlarged elevational view in cross section of the upper portion of a bag filling unit of the machine on line 3—4 of Fig. 2, no material being shown in the device.

Figure 4 is a view similar to Figure 3, and on the line 3—4 of Fig. 2, but disclosing the lower half of a bag filling unit.

Figure 5 is an enlarged end elevational view, partly in cross section, on the line 5—5 of Fig. 4, of the mechanism constituting a bag filling unit.

Figure 6 is an enlarged plan view, partly in cross section, on the line 6—6 of Fig. 3, of the mechanism shown in Figure 3.

Figure 7 is a cross sectional elevational view taken on the line 7—7 of Figure 3 looking in the direction of the arrows.

Figure 8 is a cross sectional view similar to Figure 7 taken on the line 8—8 of Figure 3, looking in the direction of the arrows.

Figure 9 is an enlarged detail side elevational view of the bottom of the scales can disclosing the latching mechanism hid from view in Fig. 1 by the top of the hopper of the filling mechanism.

Figure 10 is a fragmentary elevational view of the construction shown in Figure 9 looking from the right.

Figure 11 is a fragmentary view in cross sectional elevation, on the line 11—11 of Fig. 1, showing a portion of a scales can and latch releasing mechanism.

Figure 12 is an enlarged perspective view of a control bar and shut off cylinder lug located on one side of the unit and

Figure 13 is a similar view of the other control bar and shut off cylinder lug at the opposite side of the unit.

Figure 14 is a cross sectional view in elevation of the hopper and feed pipe construction, taken on the line 14—14 of Figure 2 and looking in the direction of the arrows, and

Figure 15 is a view similar to Figure 14, taken on the line 15—15 of Figure 2, and looking in the direction of the arrows.

Figure 16 is a plan view, partly in cross section, of the bottom part of the mechanism disclosing the jigging device and the bag discharging apparatus.

Figure 17 is a side elevational view partly in cross section of the mechanism shown in Figure 16 taken on the line 17—17 and looking in the direction of the arrows.

Figure 18 is a side elevational view, partly in cross section taken on the line 18—18 of Fig. 16 and looking in the direction of the arrows.

In the following description of the disclosed machine the various parts will be treated separately, and the description and disclosure will cover only a single bag filling unit, inasmuch as the various units of the machine are of duplicate construction, and the operation of all will be understood by the description of one. The machine herein disclosed is provided with 16 units, but it is to be understood that any number of units are contemplated.

First, will be described, the main frame of the machine and the various gearing elements, together with certain other parts which are not duplicated in each of the bag filling units.

Frame construction and gearing mechanism

By referring to the drawings, it will be noted that the invention is disclosed as embodied in a machine comprising a pedestal or frame 20, of any suitable construction, herein shown as round, constituting the base on which the machine is supported and also a housing for parts of the gearing mechanism hereinafter more fully described.

The base 20 is adapted to be mounted on the floor and, if desired, secured by any suitable means, and is provided centrally with a vertically arranged sleeve 21. The bottom of the sleeve preferably extends inwardly of the pedestal, as at 22, and further has a flange 23 immediately above the upper portion of the pedestal. Inside the pedestal, a horizontally disposed web or support 24 is provided, and this web is secured to the inside of the pedestal by means such as bolts 25. Support 24 has an opening 26, centrally located, in which is positioned a vertically arranged post 27 held against rotation by means such as the pin 28 at the bottom thereof. Positioned around the post 27, is a rotatable sleeve 29 which also fits within the upstanding sleeve 21 on the pedestal. The sleeve 29 has a worm gear 30 keyed to the bottom end thereof, and a bushing 31 around post 27 constitutes a bearing for the sleeve at its upper end.

On the upper end of the vertical sleeve 21 is mounted an anti-friction bearing 32, which serves as a thrust bearing for rotatably supporting the rotary portion of the machine.

Sleeve 33 of the rotating frame has its lower edge in engagement with bearing 32, and surrounds and is rigidly attached to sleeve 29. Formed integrally with sleeve 33, or otherwise rigidly attached thereto, are the upper and lower spider frames 34 and 35. These spider frames may be of any suitable construction, but are preferably formed as castings comprising a hub portion and a plurality of supporting radially extending arms, the number of arms being preferably the same as the number of units to be embodied in the machine.

The upper end of each arm of the upper spider is provided with a table 36 adapted to form a support for the upper portion of the particular unit associated therewith, which unit is attached and arranged in a manner hereinafter more fully described.

The upper and lower surfaces 37 and 38 of each arm of the lower spider constitute supporting surfaces for additional frame parts adapted to support the lower portion of the particular bag filling unit associated therewith. This construction will also be hereinafter more fully described.

Mounted on the post above the upper spider is a cam segment 39 adapted to be adjustably fixed thereto against rotation whereby, it will serve as a stationary part of the mechanism and yet be capable of being adjusted to any angular position about the post.

A bracket 40, having bearing lugs 41 and 42 on its upper surface, is adjustably fixed to the top of post 27 and extends radially outward therefrom. These bearings 41 and 42 constitute a mounting for a shaft 43 having a shoe 44 fixed to the outer end thereof and a crank arm 45 fixed to the inner end thereof. Pivotally connected to the outer end of crank arm 45 is a rod 46 having a lug 47 adjustably secured to its lower end, and having sliding engagement in an opening provided through the outer end 48 of a bracket 49. The bracket 49 is also carried on the post 27 and is adjustably fixed against rotation thereon.

Referring now to Figures 1 and 17. The machine is preferably driven from any suitable source of power connected to give rotation to a shaft 50, which shaft extends into and through the housing provided by the frame pedestal 20. This shaft is mounted in bearings 51 at the opposite walls of the casing, which bearings are supported by means of bolts 52, which bolts also serve to compress packings 53 and thereby seal the bearing openings against the leakage of oil or other lubricant from the housing. The shaft intermediate its length within the housing is provided with a worm 54, keyed thereto, which worm is disposed in proper relationship for driving engagement with the worm gear 30 previously referred to. By this gear connection, it will be obvious that the power shaft 50 is effective for rotating the frame portion consisting of the upper and lower spiders of the machine.

The shaft 50, in addition, is provided with a beveled gear 55 keyed thereto and in mesh with a beveled gear 56, keyed to a vertical shaft 57 mounted in a bearing 58 provided in a portion 59 of the pedestal housing. It will be noted that the pedestal housing is constructed to provide the necessary space to accommodate the shafts, gearing and bearings, as described.

The upper end of the shaft 57 projects above the housing and is keyed to a gear 60 which is in mesh with a second gear 70, mounted for rotation on the vertical sleeve 21 of the pedestal housing. By referring to Figure 1, it will be noted that gear 70 has a bearing fit on the sleeve 21 and is supported at its lower surface on the flange 23. The gear 70, in addition, has an integrally formed upstanding sleeve 71 on which is formed a beveled gear 72 which meshes with a plurality of small beveled gears 73, one each for each bag filling unit. The beveled gears 73 are keyed to the shafts 74 to drive the lower half of the several bag filling mechanisms in a manner hereinafter more fully described.

By this gearing arrangement, it will be obvious that the rotation of the power shaft 50 will, in addition to driving the rotary frame of the machine, drive the beveled gear 72 and in turn the beveled gear 73 at a speed and direction such as will impart to the shafts 74 the proper rotary movement for the operation of the machine, it being understood however, that the gear ratios and direction of drive are selected to produce the proper drive of the machine, taking into account the bodily movement of the machine around the beveled gear 72 in addition to the driving effect of the beveled gears 72 and 73 independently of the bodily rotation.

By referring to Figure 17, it will be noted that the driving shaft 50, which is extended as at 75, serves as a driving shaft for other parts of the machine, in a manner and for a purpose hereinafter described.

Supply hopper construction and arrangement

Referring now to Figures 1, 2, 3, 14 and 15, it will be noted that each unit is provided with a hopper 76 which is, in the present illustration, shown as a casting of particular shape, having a bottom 78 adapted to be positioned on and secured to the table 36 of the upper spider frame portion. The hoppers are secured by means such as bolts 77 extending through the casting flange and screwed into the outer end of the associated arm of the upper spider 34.

The hopper 76, secured in the manner described, also constitutes a supporting frame for a large portion of the mechanism constituting the upper part of each unit.

As shown in Figure 2, it will be noted that each hopper is constructed in plan as a sector of an annulus whereby they collectively form an annulus, or in other words, they are designed so that the total number of hoppers, namely, one for each unit, will form a completed annulus when the various hoppers are placed side by side. As shown in Figure 14, each hopper is preferably provided with an overhanging lip 79 adopted to overlie and fit with the adjacent edge of the next hopper. The hoppers are, in addition, as shown in Figure 1, provided with outer upstanding flanges 80 and inner upstanding flanges 81, each provided with an inwardly projecting flange 82 spaced slightly above the upper surface of the overhanging lip 79, all in a manner and for a purpose hereinafter more fully described.

From this, it will appear that the annulus of hoppers, having their upstanding flanges 80 and 81 in abutment, will constitute, in effect, a trough into which the material to be bagged may be supplied.

The material to be bagged is preferably stored in relatively large quantity in a bin located above the machine, which bin is provided with a downwardly extending pipe 83 terminating in a horizontally disposed flange 84 adapted for sliding engagement with the upper edges of the overhanging lips 79 positioned between each of the individual hoppers. In order to eliminate any

liability of these parts catching during the operating of the machine, the leading edge of the flange 84 is up-turned as at 85. The flange is also preferably reinforced by means such as webs 86 shown in Figures 2 and 14. The flange 84, in plan, is the sector of an annulus in shape, and is of such length that it will serve as a cover plate for each hopper, as it approaches the filling pipe 83, in such manner that any particular hopper is completely covered during the filling interval. This construction prevents splashing and loss of material due to escapement of dust and other particles into the atmosphere. Likewise the trailing portion of the flange 84 is of such length as to maintain any hopper completely covered until the filling operation has been completely accomplished.

It will also be noted from the disclosure in Figure 2 that the side edges of the flange 84 underlie the flanges 82 provided on the hopper walls so as to completely close the hoppers during the filling operation. The leading edge 85 of the flange is cut away, as shown at 87, to prevent interference with the flanges 82.

From this construction, it will be observed, knowing that the supply pipe 83 is stationary and that the machine rotates relative thereto, that, as long as the material is supplied through the pipe 83, the respective hoppers, as they pass thereunder, will become completely charged up to the level of the upper surfaces of the overhanging lips 79, in the manner shown in Figure 15. Also that this mechanism is one which is capable of utilizing gravity alone for feeding the material into the hoppers, with the elimination of all liability or possibility of the hoppers being over-charged, or of loss of material due to splashing or escapement of dust or other particles into the atmosphere.

At this point, it is considered well to explain that the capacity of each hopper is preferably slightly in excess of the amount constituting one complete charge for a bag, the excess amount constituting, in quantity, a safe margin over one complete charge, to prevent the delivery of incompletely filled bags in the event of slight loss or other mishap. By this arrangement, all of the desired results are accomplished without overloading any of the parts of the machine and without involving excess operations.

Scale mechanism and feed therefor

By referring to Figures 1 and 3, it will be noted that the feed mechanism for the scales is driven by means of a sprocket 88 which in turn, is driven by a sprocket chain 89 in mesh therewith which chain is driven by a sprocket 90, keyed to the shaft 74 of the particular unit. The sprocket 88 is made integrally with or fixed relative to a sleeve 91 having a clutch face 92 on its inner face.

Sprocket 88 and sleeve 91 are rotatably mounted on a sleeve 93 which is in turn rotatably mounted in a bearing 94 carried by a bracket 95 secured to the rear surface of the hopper 78. This bracket may be formed integrally with the hopper, or formed as a separate part and secured by means such as bolts 96. Positioned within the sleeve 93 is a shaft 97, rotatable relatively to the sleeve. Slidably mounted on the end of the sleeve 93 is a clutch part 98 having clutch teeth for cooperative engagement with the clutch part 92. The clutch part 98, although slidably mounted on the sleeve, is feathered thereto so as to rotatably drive the sleeve 93 when the clutch parts 98 and 92 are in driving relation. The opposite end of the clutch part 98 is provided with a friction face 99 arranged in opposed relationship to a friction face 100 between which faces friction material 101 is disposed. The friction face 100 is a part of an element 102 mounted on the shaft 97 and keyed against rotation relatively to the shaft but capable of longitudinal sliding movement thereon. This connection is effected by means of a pin 103 passed through a slot 104 in shaft 97. The element 102 is backed up by a coil spring 105 having its inner end in engagement with an abutment 106 fixed to the shaft 97 by means of a pin 107.

The clutch part 98 is provided with a circumferential groove 108 adapted for cooperation with trunnions 109 carried by an operating bell crank lever 110. The bell crank lever 110 is pivotally mounted on a shaft 111 carried in a bracket 112 on the upper surface of the arm of the upper spider frame member 34.

The outer end 113 of the horizontally disposed arm of the bell crank lever 110 is formed as a bearing stud on which is mounted a roller 114, held against displacement by means of a pin 115. This roller is adapted to come in contact and cooperate with the cam segment 39 previously described and shown in Figure 1, and throw the clutch elements 98 and 92 out of engagement during the portions of the travel of the various units during which the lower portion of the bell crank lever is in contact with the cam segment. Upon continued movement of the machine, such as will cause the roller to pass out of engagement with the cam element 39, it will be observed that the clutch immediately moves back into driving relationship under the action of the coil spring 105.

The bottom portion of the hopper is formed semi-circular in cross section, as shown in Figure 8, and positioned within this semi-circular bottom is a conveyor screw 116 fixed to a sleeve 117. It will be noted that the hopper is provided with an extension 118 having a circular opening therein adapted to accommodate the outer portion of the conveyor screw 116. Coaxial with the screw opening of the bottom of the hopper is an opening 119 in the back wall of the hopper through which extends the shaft 97 and the sleeve 117 of the screw. It will be noted that the inner diameter of the sleeve 117 is larger than the diameter of the shaft and that the sleeve is supported by the shaft through the instrumentality of rings 120 located between the shaft and the ends of the sleeve. The opening 119 is closed against accidental escape of material by means of a flexible washer 121, as shown in Figure 3. The forward end of the shaft 97 extends beyond the hopper and is mounted in a bearing 123 carried by a support 124 extended from the hopper, and has, rigidly mounted thereon, a cut-off cylinder 122, and is secured against longitudinal movement by means of a collar 125 which is fixed to the shaft by means of a pin as shown.

The cut-off cylinder comprises merely a cylindrical tube having spiders 126 adjacent its ends provided with hubs adapted to fit on and be secured to the shaft 97 by means of pins 128. The cut-off cylinder is provided with an opening 129 extending longitudinally thereof and of relatively small width, as shown in Figure 7. By means of mechanism hereinafter more fully described, the sleeve is held against rotation except under predetermined conditions when it is

permitted to rotate through arcs of only 180 degrees at a time, but, during the time when the scales can is being filled, the parts are arranged to maintain the cut-off cylinder in the position shown in Figure 3, whereby the opening 129 is disposed downwardly or, in other words, so as to provide an opening through which the material fed from the hopper, by means of the screw 116, can pass into the scales can 130.

The scales can is, as shown in Fig. 11, provided near its top, on its opposite sides, with brackets 131, provided with knife-edge bearing elements 132 adapted for bearing engagement with cooperating bearing parts provided in openings 133 in the outer ends of yoke arms 134 of scales lever 135. The yoke arms 134 of the scales lever are supported on a shaft 136 and secured thereto, as shown in Fig. 8 at 146. This shaft is mounted with bearing engagement in brackets 137 formed as an integral part of, or otherwise rigidly attached to, the hopper casting 76 previously described. The scales lever 135 also comprises an arm 138 terminating in a yoke 139 which has, pivotally connected thereto by means of a pin 140, a suitable weight 141. It is to be noted that the arm 138 of the scales lever is angularly adjustable relative to the arms 134 of the yoke by means of slots 142 and bolts 143 connecting the arm 138 to a disc member 144.

The disc member is secured by means of a pin 145 to the shaft 136 between the brackets 137 so as to constitute, with the yoke arms 134, a scales lever or beam 135.

The bearing connection between the shaft 136 and the supporting brackets 137 may be of any suitable character, but is preferably of knife-edge construction, such as is used in scale mechanisms of this character.

As shown in Figure 1, one of the arms 134 of the scales can yoke is provided with an integrally formed arm 147, constituting with the arm a bell crank located on one side of the particular unit. The end of the arm 147 is provided with a recess 148 adapted to receive the rounded end 149 of a lever 150 which is fixed on a shaft 151 which is mounted in a bearing 152 provided in the hopper casting 76.

This shaft has provided, on its opposite end, a crank 153 also fixed thereto and extending upwardly and corresponding to the upper arm 154 of the lever 150. These last two named arms constitute means for actuating slide bars 155 and 156 located on opposite sides of the unit and operable to control the movement of the cut-off cylinder. The slide bars 155 and 156, as shown in Figure 6, are mounted to slide in bearings provided in lugs 157 formed on the opposite sides of the hopper casting. These slide bars are each provided with a pair of opposed lugs 158 and 159 mounted in spaced relation thereon and so arranged so as to embrace the opposite sides of the upper rounded ends of the arms 153 and 154 respectively.

The lugs 158 are preferably rigidly secured to the slide bars by means of screws 160 whereas the lugs 159 are slidably mounted on the bars against springs 161 between them and lugs 162 secured to the bars by means of screws 163.

The inner edge of the cut-off cylinder preferably projects, as at 164, in a manner to overlap an end extension 165 on the hopper casting. The portion 164 of the cut-off cylinder is provided with a grooved flange 166, in which groove is provided a lug 167 located in a predetermined relationship to the opening 129 of the cylinder.

Referring now particularly to Figures 6 and 12, it will be noted that the slide bar 155 is provided with a specially formed end adapted, when projected, to engage the lug 167 of the cut-off cylinder, whereby the cylinder is held against rotation in one direction. It will be understood, from a description hereinafter, that the cut-off cylinder has a tendency to rotate only in one direction and that the bar 155 is effective to prevent rotation thereof.

Referring now to Figures 6 and 13 it will be noted that the slide bar 156 is provided with a portion 168 corresponding in construction to the end of the bar 155 but in inverted position and in opposed relation thereto, which portion is connected to the bar proper by a restricted portion 169 of such size and arrangement that the space provided thereby permits the passage of the lug 167 when the restricted portion of the bar is opposite the path of travel of the lug 167.

These two bars, when they move together, constitute an escapement for the cut-off cylinder. This is due to the fact that the end of the bar 155, when the bars are projected in the position shown in Figure 6, constitutes a stop preventing further rotation of the cylinder, and when the bars are retracted so that the lug 167 can pass the end of the bar 155, the portion 168 of the bar 156 moves into the path of the rotating lug 167 so as to stop further rotation thereof. Again, when the bars move forwardly, the lug 167 is permitted to escape the portion 168 of the bar 156, whereby additional rotation of the cylinder is permitted, but only for 180 degrees, or until the lug 167 engages the end of the bar 155 which was projected into the path of travel of the lug 167 at the time portion 168 was withdrawn from that path.

In this way, the cut-off cylinder is maintained with the opening 129 disposed downwardly until such time as the scales can contains an amount of material such as will cause the movement of the scales lever arm 147, lever 150, and arms 153 and 154, retracting slide bars 155 and 156. The cut-off cylinder, upon release of lug 167 by retraction of bar 155, immediately and quickly, by means hereinafter more fully described, rotates through an arc of 180 degrees, whereupon lug 167 contacts portion 168. This brings the opening 129 to its upward position and shuts off the feed into the scales can.

Referring now to Figures 1 and 3, it will be noted that the scales can 130 is of general rectangular shape in horizontal section and has downwardly tapering walls. Outer wall 170 is pivoted at 171 near the top of the hopper and constitutes a door having flanges 172 overlapping the side walls of the can to insure a tight fit. The bottom edge of the door is provided with a hook element 173, better shown in Figures 9 and 10, preferably located centrally of the width of the can and of angular construction as shown. On the end of the hook a lug 174 is provided adapted to be locked by a roller 175 carried on the end of a bell crank lever 176.

The bell crank lever is pivotally mounted on the shaft 177 carried in bearings provided in a bracket 178 secured to the lower edge of the can. Arm 179 of the bell crank lever extends from the end of the shaft substantially horizontally to the mid-line of the can and has, pivotally connected thereto, a rod 180. This is clearly shown in Figure 9. The rod extends upwardly and is mounted in an opening 181 provided in the bracket 131 on the side of the can so as to have a sliding fit therein,

and is extended upwardly as shown in Figure 1 and provided with a lug 182 secured adjacent the upper end thereof.

A lever 183 is pivoted to a portion of the hopper casting on a pivot 184, and has one end positioned to be contacted by the lug 182 carried on the rod 180 when the rod is moved downwardly by the can descending in a dumping operation. The opposite end of the lever 183 extends, as shown in Figure 6, to a position in close proximity to the driving sprocket 88, and has a rod 185 connected thereto, which rod is pivoted at its other end, as shown at 185a. The rod 185 is positioned adjacent the path of travel of lugs 186 mounted on the sprocket 88. The construction of the lever 183 is such that under the action of gravity, the arm extending toward the sprocket outweighs the other arm so that, normally, the lever is in such position that the rod 185 is out of contact with the lugs 186.

However, it will appear that upon the downward movement of the can to an extent which will bring the lug 182 into contact with the lever 183, the opposite end of the lever will be moved upwardly so as to cause the rod 185 to engage the moving lugs 186. The lugs impart a rapid oscillatory movement to the lever which movement is in turn imparted to the lug 182, all of which serves to release the bell crank and hook latch for the hopper door.

Accordingly, when the scales can has descended under the influence of the weight of the material contained therein to a predetermined extent, the can door is opened whereby the contents thereof are discharged or dumped into the hopper positioned therebeneath and forming a part of the bag filling portion of the unit.

The support 124, which extends forwardly from the hopper and serves as mounting for the outer bearing of the shaft 97, is provided, as shown in Fig. 3, with a depending element 187 having an opening 188 therein the bottom end of which is closed by means of a bored bolt 189. Positioned through the bore of the bolt is a rod 190, having a head 191 on the upper end thereof in engagement with the bottom of an enclosed spring 192. The bottom of rod 190 forms a yieldable abutment which is adapted to be contacted by an arm 193 secured to the upper portion of the scales can door adjacent the hinge. In operation, when the can has been emptied and ascends under the influence of the weight 141, the arm 193 is brought into relatively forceful engagement with the stem 190 in a manner to force the door of the can to closed position.

Also, during ascending of the can immediately upon lug 182 leaving its position of contact with the lever 183, the bell crank lever is allowed to assume its latching position under the influence of gravity. When the door is closed by engagement of lug 193 with rod 190, the upper beveled face 194 of hook 173 engages roller 175 and swings it out of the way, but as soon as the door is fully closed the roller drops back beneath the hook.

Formed as a portion of the scales can yoke between the arms 134 is an upstanding lug 195 which is provided with a spring finger 196 secured thereto and formed in a manner to overlie the adjacent upper edge of the scales can when the can is in the maximum raised position. This finger is slightly yieldable and serves to receive and absorb the momentum of the scales can in its upward movement and to hold lug 193 against rod 190.

Bag filling means

The details of this portion of the units of the present machine constitute the subject matter of the applicant's co-pending application, Serial No. 283,785, filed June 8th, 1928, entitled "Screw feeding devices", but a brief description will be herein given so that its relationship to the other parts of the machine will be better understood.

Referring now particularly to Figures 1 and 4, it will be noted that this portion of the mechanism is supported from the lower spider frame by means of a frame piece 200, which is secured by any suitable means, such as bolts 203, to the under-surface 38 of the lower spider. The upper frame piece 201 is braced, or supported in part, by a rod 204 secured thereto and having its upper end secured to the upper spider frame 34. The lower frame piece 200 is provided with bearings 205 for the shaft 74, which shaft is driven by means of beveled gear 73 as previously described. The shaft 74 at its forward end is reduced so as to receive a gear 206 having a clutch face 207, a clutch element 208 having a slidable driving connection with the shaft by means of a pin 209 and slot 210, and a spring abutment 211 secured by means of a pin 212. Positioned between the spring abutment and the clutch element is a coil spring 213 which acts to force the clutch element in clutching engagement with the gear 206 at all times, the gear being held against axial movement in the right hand direction as shown in Figure 4 by means of the shoulder provided on the shaft. This means serves to connect the gear 206 for rotation with the shaft, but in the event of unusual resistance, such as by clogging, for instance, permits slippage of the gear on the shaft so as to prevent any liability of damage to the parts.

A sprocket 214 is keyed to shaft 74 by means of a pin 215, and drives, through the instrumentality of the chain 216, a sprocket 217 located thereabove and keyed to a shaft 218. Shaft 218 is mounted in a bearing 219 provided in a portion 220 of the frame. Shaft 218 is also provided with an opening 221 adapted to receive the shank 222 of a screw impeller 223, and said shank is fixed therein by means of a set screw 224. Positioned below the shaft 218 is a bearing 225 supported by a portion of a hopper tube 234, which bearing receives, for rotation, a shaft 226 having gear 227 on one end thereof in mesh with the gear 206. The opposite end of the shaft 226 is provided with a flat sided opening 227' for receiving a flat sided shank end 228 of a screw 229.

The hopper 230 of the filling portion of the unit may be formed of any suitable material, but is herein shown as made of sheet metal with sloping shedding surfaces thereof provided by separate pieces 241 and 242 welded to the walls of the hopper. The hopper is preferably of generally rectangular shape at its top portion and of such size as to receive the lower end of the scales can therein. The upper portion of the hopper is supported or braced, as at 231, by frame piece 201 which extends upwardly from, and is mounted on, the upper surface of the lower spider. As shown in Figure 5, the side walls 232 of hopper 230 taper inwardly and terminate in a rounded bottom 233. Spaced from the bottom and extending through the hopper is a tube 234 having an opening at its top, as at 235, and this tube receives the screw impeller 229. At the back end of the tube, a block 236 is provided having an opening for loosely receiving the shank of the screw in such a manner

that it offers no substantial support for the screw, the screw preferably being supported by its engagement with the lower surface of the tube.

At the forward end of the tube, a sleeve 237 is provided having a tapering opening therein and a recess for receiving and rigidly supporting a nozzle 238. The nozzle is adapted to receive a bag thereon, by extending into the valve opening thereof, and support the bag during the filling operation. The nozzle, it will be noted, is cut away on its under side as at 239 to assist in the filling operation.

The front and rear walls 240 and 241 of the hopper are inclined diagonally inwardly so as to direct the material into the opening 235 provided in the upper portion of tube 234. Likewise the side walls are provided with shedding surfaces 242 connecting with the edges of the tube opening 235. By this construction, the material is fed directly into the tube and in between the flights of the feeding screw 229.

The opening at the back end of the screw in the block 236, is preferably closed by means of a flexible washer 244 as shown in Figure 4 to prevent the escape of material. The hopper it will be noted in Figure 5 is supported in a yoke 245, secured by means such as the bolts 246 to the outer end of the frame piece 200.

The upper screw 223 is preferably of the usual twisted construction as shown in Figure 4 whereas the feeding screw 229 is helical in shape. The upper screw is connected through the sprocket gearing connection to rotate many times slower than the feeding screw and in the opposite direction, and the upper screw serves to maintain the feeding screw 229 filled to a maximum with material. In other words, the upper screw is designed to feed from left to right as shown in Figure 4, or in the opposite direction from the feed of the screw 229. This overcomes the tendency of the feeding screw to draw material mostly into its back end, and causes the material to be distributed between the flights of the feeding screw as long as there is any material in the hopper. The feeding screw is preferably of a special construction with the outer portion of the feeding surfaces slightly in advance of the remainder of said surfaces and with the entire screw longitudinally hollow, all of which, together with the arrangement of the upper screw, is set forth in the applicant's co-pending application referred to.

It is to be understood that the present machine is not to be limited to this particular type of feeding screw arrangement, as it is obvious that other operative feeding devices may be employed in combination with the other parts of the machine as the function of this mechanism is merely to feed into the bags all of the material discharged from the scales.

Extending transversely of the hopper 230, a V shape baffle plate 247 is preferably provided in cases where the material being bagged by the machine is of a consistency which will render it liable to splash when it is dumped from the scales can. This baffle serves to prevent such a substantial quantity of material being suspended in the air at the time the scales can is ascending as might prevent the scales can door from effectively closing and latching.

Positioned for sliding relationship in slots provided in the upper portion of the can 230, is a bar 248 provided with a handle 249 projecting from the outer surface of the hopper 230, in a position readily accessible to the operator. This rod is provided at its opposite end with an opening at 250 for receiving the lower end of a rod 251. This rod is provided with a double bend and extends upwardly as shown in Figures 1 and 3 and is positioned through a shaft 252 mounted in bearings provided in the bracket 95 positioned at the rear of the upper hopper 76 previously described.

Fixed upon shaft 252 is a dog 253 having a tooth 254 and an extension 255. This dog is arranged and constructed to be controlled manually by means of the handle 249 actuated by the operator, to engage an extended end 256 of the bell crank lever 110, the latter of which is constructed to control the clutch mechanism 92—98 driving the upper portion of the unit.

In other words, when the bell crank 110 is positioned so as to disengage the clutch by means of its contact with the cam segment 39, if the operator pulls the handle 249 outwardly through the instrumentality of the rod 251 and the shaft 252, the dog 253 is caused to move downwardly into the path of the upper end 256 of the bell crank, so as to prevent the movement of the bell crank and the closing of the clutch under the influence of the spring, by the contact between the upper end 256 and the tooth 254 of the dog.

Mechanism for automatically disconnecting units when supply hopper is insufficiently charged with material

Loosely mounted on the shaft 252 is a second dog 257 having a tooth 258 and extension 259. This dog also has a cam surface 260 which normally engages the upper end 256 of the bell crank lever, so that, during the bag filling operation of the machine, the dog 257 rests on the upper end of the lever as shown in Figure 3.

It is to be understood that each unit of the machine is equipped with dogs of the above described character and that, as shown in Figure 1, at a single location in the circumferential path of travel of the dog 257, the stationary lug 47 is provided. This lug is provided with a cam face, or, in other words, an inclined face sloping upwardly in the direction of travel of the dog so that the extension 259 on the dog will be caused by a contact with the cam face to lift the dog upwardly so that its tooth 258 will offer no resistance to clutch engaging movement of the bell crank lever 110.

By comparing Figures 3 and 1, it will be appreciated that, during the bag filling operation, the relationship of the dog 257 and the bell crank lever 110 is as shown in Figure 3 and that, when the particular unit is traveling through that portion of the circumference of travel during which the bell crank lever moves the clutch out of engagement by contact with the cam segment 39, the inward movement of the bell crank lever lifts the dog by sliding contact with the cam face 260 thereof and then permits the dog to drop down with the bell crank lever locked behind the tooth 258. This occurs during every cycle of the machine, but upon continued travel of the particular unit, and if the lug 47 is in raised position, the dog 257 will be lifted by the lug 47 in a manner to permit the lever and clutch to move to engaging position when the bell crank lever disengages the cam segment 39.

As hereinbefore described, the position of the lug 47 is determined by the rod 46, shaft 43, crank 45 and the shoe 44, and by referring to Figure 15, it will be noted that the position of the shoe is determined by the contents of the

hopper positioned thereunder at the moment. These parts are so arranged that the position of the shoe 44 is determined by the contents in the hopper 76 of the particular unit which is, at that moment, in cooperating relationship with the lug 47. It will also be observed that when the shoe 44 falls, as in the dotted line position shown in Figure 15, the lug 47 is also lowered, the lowering action being accomplished by gravity as the shoe 44 is constructed together with the other parts so that, if not supported by the material in the hopper, the parts will fall to the lower position. It will therefore be observed that when any particular unit approaches the position of the shoe 44, if the hopper thereof is full, the shoe 44 will remain raised as in the position shown in Figure 1 and consequently will exert a lifting action on the dog 257, but, on the contrary, if the particular hopper is not full, or, in other words, contains less material than constitutes a complete charge for a bag, the lug 47 will be lowered by the lowering of the shoe and the dog 257 will not be raised, whereby the clutch will not be permitted to come in driving connection. In such an event, the particular unit will remain in-operative after the roller of the bell crank 110 passes off of the cam segment 39. It is also observed that the unit will remain in-operative until the hopper thereof has become sufficiently charged to bring the shoe 44 and the lug 47 in the raised position shown in Figure 1, and also that when the hopper is so charged that the cycle of operation of the particular unit is resumed at the proper position in the circumference of movement of the machine or, namely, at the starting location of the cycle of all of the units.

It will also appear that, irrespective of the above mechanism, the operator is capable, by movement of the handle 249 outwardly, to render in-operative any particular unit for as long a period as he desires. This may be one or more cycles, and this control mechanism will be utilized in the event the operator is unable to properly place a bag on the receiving nozzle prior to the commencement of the filling operation. The movement of the handle 249 moves the dog 253 to lower position but the extension 255 of the dog, which serves to form a support to engage the upper end 256 of the bell crank lever, is not long enough to be influenced by the lug 47.

At this point, attention is directed to Figure 2, where it will be noted that the sprockets 88 are arranged in staggered relation one to the other whereby these elements are provided with the proper clearance. This is accomplished by merely shortening the length of every other sleeve 91 between its sprocket 88 and the face 92 of the cooperating clutch.

Bag discharging mechanism

Referring now particularly to Figures 1 and 16, it will be noted that a bracket 270 is mounted on the pedestal frame and serves as a support for the vertically arranged shaft 271, the upper end of which is supported by means of a bracket 272, which is anchored by having its end pivoted on the shaft 75 as shown in Figures 16 and 17. Mounted for rotation on the shaft 271 is the lever 273 having an enlarged bearing 274 on the shaft and provided with slotted lugs 275 and 276. Positioned through the slotted lugs are bolts 277 and 278 which are rigidly attached to a cam plate 279 and constitute, with the slots, an adjustable mounting therefor. This cam is of special construction and, when mounted in the proper adjusted position, constitutes a means which is adapted to contact rollers 280 mounted on spindles 281 rigidly carried, one in each of the frame pieces 200. These rollers are shown in Figure 16 in their relative spaced positions, that is, one for each unit. Understanding now that the cam plate 279 is rigid with the lever 273 and that it is disposed in the path of the rollers 280, it will be observed that the movement of the rollers 280 with the machine will, by engaging the cam plate, force a movement of the lever 273 in a clockwise direction as shown in Figure 16, and that, immediately upon a roller passing the end of the cam plate, the lever 273 will be caused to quickly swing back to the position shown in Figure 16, by means of a spring 282 which has one end fastened to the lever and the other end fastened to the frame.

Secured to the floor in a suitable location relative to the machine is a pedestal 283 secured by means of bolts 284 and having an upstanding shaft or post 285 carried thereon. This post forms a mounting for the track bar 286 which is supported at its outer end by means of a vertical rod 287 adjustably secured in the end thereof by means such as a bolt 288. This track bar is arcuate in shape and is provided with an upper surface constituting a track on which a pivoted ejecting arm, hereinafter described, is supported. The track is provided at its innermost end with a depression 289 having an inclined face 290 whereby the ejector arm will be lowered at its inner retracted position and be raised immediately upon being thrust outward on the track.

An ejector arm 292 is pivoted on a vertical shaft 291 which may be mounted in a pedestal or any other suitable support. At the free end of the ejector arm is provided a roller bearing 293 adapted to roll on the upper surface of the track bar 286. The outer end of the ejector arm is also provided with angularly arranged walls 294 and a base plate 295 forming a corner pocket, for receiving one lower corner of a bag as it is presented in filled condition, and for exerting a lifting and removing thrust upon the bag in such a manner as to remove the bag from the filling nozzle. The ejector arm 292 is connected for operation by the lever 273 through the instrumentality of a connecting rod 296 which is connected by means of a ball and socket joint 297 to the lever 273 and to arm 292 through a pivot connection 298 and a slide connection provided by means of a slot 299 in arm 292 and a pin or roller 300 on connector 298. These parts are arranged to permit the proper adjustment.

It is to be understood in this connection that the ejector arm 292 is given a bag ejecting movement about its pivotal mounting, and that the track bar 286 is provided of such arcuate shape as to constitute a track for the roller 293 of the ejector bar.

Positioned adjacent the track bar is a conveyor belt 301 moved in the direction of the arrow by means of a pulley on shaft 302, all of any desired and suitable construction. The level of the upper run of the conveyor belt 301 or, in other words, the portion which travels in the direction of the arrow, is so determined that the conveyor receives the forward edge of the bag as it is thrust from the nozzle in the discharging operation.

It will be understood in view of this construc-

tion that the bags are successively brought to the position indicated in Figure 16 by the bag 303, at which point they are contacted by the walls 294 of the ejecting arm. At the instant the bag is brought to this position, the roller 280 of the trailing unit operates the mechanism by contact with the cam plate 279 so that the bag, after arriving in the position shown in Figure 16, is first lifted so that the weight thereof is partially taken off of the nozzle. This lifting action is accomplished by the lifting of the ejector arm as the roller 293 travels up the incline 290 and proceeds on the upper level of the track bar. The curvature of the track bar conforms substantially to the component movements of the bag during ejectment, that is radially outwardly and circumferentially with the machine so that the movement of the arm forces the bag directly off of the nozzle. When the bag is about half removed a very small portion of the weight being supported by the nozzle, the forward side has a tendency to drop and falls upon the conveyor belt 301 which exerts, in addition, a pulling force tending to remove the bag. Inasmuch as the weight of the bag at this time is substantially removed from the nozzle, there is no tendency for the end of the nozzle to tear the valve opening as the bag is finally removed therefrom.

It will be understood that, under the action of the spring, the ejector arm is caused to immediately move back to position to receive the next bag and to be actuated by the next roller 280. The impact of the return movement is cushioned by means of a lug 304 carried on the ejector arm coming in contact with a spring plunger 305 mounted in a housing 306 formed as a part of, or rigidly with, the end of the track bar structure. This construction is clearly shown in Figures 1 and 16.

Jigging or bag shaking mechanism

Referring now particularly to Figures 16, 17 and 18, it will be noted that the present structure embodies mechanism for jigging or shaking the bag by contact between the lower portions of the walls of the bag and reciprocating mechanism, while the bag is traveling through that portion of the circumference in the cycle of operation during which the last portion of the filling operation is being accomplished.

This mechanism preferably comprises an arcuate base plate 310 secured to the floor in position to underlie the path of the bags as they are carried on the nozzles of the various units, and provide with a plurality of upstanding lugs 311 and shafts 312. Pivotally mounted on certain of the shafts are bell crank levers 313 on one of said shafts a bell crank lever 314, and on the end shaft a link 315. The bell crank lever 314, has an extended arm 316 provided with an end 317 connected to a rod 318 by an adjustable threaded connector 319. The arm 316 is provided, intermediate of its length, with a pivot 320 which is pivotally connected by means of links 321 with the ends of the bell crank levers 313 and the link 315, in the manner shown in Figure 16. The other arm of each of the bell crank levers 313 and 314 has mounted thereon a rod support 322 extending substantially transversely to the path of travel of the bags.

Mounted in each support is a rod 323 having secured to its ends upstanding plates 324 arranged and adapted to contact the lower portion of the end walls of the bag in the manner shown in Figure 17, where the bag is represented in dotted lines. The edges of the plates 324 are preferably curved slightly outwardly, as at 325, so as to avoid any interference between the bag and the edge of the plates during the relative movement of the bag therebetween.

It will readily appear from an understanding of this construction that a reciprocation of the rod 318 will impart a reciprocatory movement to each of the rods 323 and its pair of bag engaging plates. It will further appear that the parts are so arranged that a bag depending from the nozzle will, in its course of travel while its filling is being completed, pass directly between the spaced plates in such a manner that the lower portions of the walls thereof will be rapidly contacted and vibrated by the movements of the plates.

The reciprocatory movement of the rod 318 is produced by a gear 326 which is mounted on the extended end of the shaft 75 which end is supported in a bearing 327 mounted on the frame pedestal. In mesh with the gear 326 is a smaller gear, 333, mounted on a shaft 328 carried in bearings 329. Gear 333 is provided with an eccentric crank pin 330 to which the end 331 of the rod 318 is connected.

Although a jigging unit such as shown in Figure 16 may serve adequately, in some instances it may be desirable to provide two such units, one of which will be placed in the path of travel ahead of the unit shown, and, in such an event, the construction thereof will be similar to that herein illustrated and described, and it will be operated by means of a rod 332, as shown in Figure 16. This rod, it will be noted, is connected to the same crank pin 330 as rod 318, and is disposed between the yoke end 331 of the rod 318.

Operation of machine

Here the operation of the machine will be summarized without detailed reference to the numerous cooperating parts, setting forth more particularly the final results accomplished by the machine.

In operation, it is first necessary to locate the feed pipe, extending from a supply bin above, at such location in the circumference of the machine that each hopper passing thereunder is filled prior to the commencement of the bag filling cycle. The location of the cam segment 39 determines the point in the circumference of the machine at which the filling cycle of each unit begins.

It is important at this point to understand that each hopper located at the top of the machine is of such capacity, considering both the weight of a completely filled bag and the weight of the charge selected for one scale operation, that, when it is full, it contains sufficient material to fill the bag with a slight excess thereover, which excess, however, is not sufficient to cause an additional weighing and scale dumping operation. In other words, a cycle of any particular unit, having once been commenced, can do no more than fill the bag, after which even though the upper scale filling screw is in operation, it will be ineffective because the scale will not dump again until the hopper has been again charged by passing under the supply pipe. It will therefore be seen that the quantity of each of the upper hoppers is substantially that of a complete bag but that, in each operation, a slight excess is left in the hopper because the excess of the previous operation constitutes the first of the charge of the next cycle of operation. Accordingly, the location of the hopper filling pipe should be before the location of the cam segment to produce the desired operation.

It will also appear that, by varying the capacity of the upper hoppers and the weight effective to dump the scales mechanism, the machine may be readily adapted to fill bags of various capacities and by charges compiled from different numbers of independent scale operations.

With the parts so arranged and the machine started, and the operator positioned at a location in the circumference just ahead of that point where the filling cycle of each unit commences, the operator places a bag on the nozzle of each unit as the nozzle passes in front of him. After a bag has been placed on a particular unit the continued movement of the machine causes the clutch 92—98 to be engaged by the bell crank lever 110 passing out of engagement with the cam segment, so as to start the turning of the upper screw 116. The upper hopper at this time is completely charged and the cut-off cylinder is in such position that its opening 129 is disposed downwardly and accordingly the screw operates to feed the material into the scales can. The scales can at this moment may have some material already contained therein supplied from the excess material in the previous cycle. After the machine has traveled a distance sufficient to complete the charge in the scales can, it starts to move downwardly and, at this instant, through the lever mechanism previously described, the bars 155 and 156 are caused to move to a position to permit rotation of the cut-off cylinder.

The cylinder at once moves rapidly through 180 degrees or until the lug 167 catches portion 168 of the bar 156. This rotation is caused by the friction mechanism comprising the friction faces 99 and 100 and friction material 101, which imparts rotary movement to the shaft 97 when the cut-off cylinder is free to rotate, and which permits the shaft to remain stationary through slippage of the friction device when the cut-off cylinder is held by the lugs. Through this means, the rotation of this cylinder is extremely rapid and its movement to the position where the opening 129 is located at the top serves to cut off the flow of material into the can, whereby the can is filled with only the exact quantity desired.

The scales can at this point descends until the lug 182 contacts the lever 183, the opposite end of the latter of which is forced into engagement with the lugs 186 on the sprocket 88, which serves to impart a vibratory movement to the latching mechanism of the scales can. This releases the door of the can and causes its contents to be deposited into the hopper 230 of the bag filling mechanism below. This charge is immediately fed into the bag, as the feeding screw therein is in rotation at all times when the machine is in operation. As soon as the can is relieved of the weight of its contents, it is swung upward by weight 141, the door being automatically closed at the end of this movement, and bars 155 and 156 being shifted back to their original position and allowing another 180° movement of the cut-off cylinder, placing the opening therein downwarn and discharging its contents into the can.

This operation will be duplicated so that, in the course of travel of the machine, the scales of each unit makes the prescribed number of dumps or weighing operations to complete the charge for one bag, after which the hopper 78 contains material in insufficient quantity to cause the scales to undergo a further dumping operation.

It will be further understood that the speed and capacity of the upper feeding screw will be determined, relative to the rotary speed of the machine, so that the scales can will receive material in quantities sufficient to cause the requisite number of scale operations before the machine has traveled through a complete circumstance or has reached the location of the upper hopper feeding pipe.

In the event an operator is unable to place a bag on the nozzle of a particular unit as above described, he merely pulls the handle 249 so as to bring the dog 253 to its lower position to prevent the engagement of the clutch of that particular unit when the bell crank lever 110 passes off of the segment cam. Likewise, if the hopper of that particular unit has not been completely charged, shoe 44 allows the cam lug 47 to fall to a position where it will not release the dog 257, and therefore the clutch cannot be re-engaged. This of course will be effective to render the particular unit inoperative until the cam lug 47 is raised by a full hopper.

As the bag approaches a completely filled condition, the lower end thereof passes between the plates of the jigging mechanism whereby its contents is settled, rendering the last portion of the charge more easily introduced into the bag. By this mechanism, together with the improved bag filling impeller construction, it has been found in practice that a charge of predetermined weight can be introduced into a bag of smaller volume than has heretofore been possible. This makes for considerable saving in the cost of the bags.

After complete filling of the bags, the lower inner corner of each, upon continued movement of the machine, is finally brought in contact with the discharging arm which at this instant is caused to move outwardly in a manner to remove the bag from the nozzle. The discharging arm first operates to partially support the weight of the bag and then to move it forward where its outer edge engages the conveyor belt which acts with the discharging arm to completely remove the bag from the nozzle without liability of tearing the valve opening as it passes from the end of the nozzle.

Each filling unit may be passed through two or more filling cycles during each revolution of the machine by repeating the charging tube 83, the clutch cam, and the jigging and discharging mechanism as many times as there are desired cycles in one revolution.

From the above description, it will appear that a new and useful machine is provided having all of the above stated advantages and accomplishing all of the above stated objects. The invention is not to be limited by the present disclosure, the scope of which is set forth in the appended claims.

I claim:

1. A rotary filling machine comprising a plurality of hoppers arranged in an annular series about the axis of the machine, a delivery spout beneath which the hoppers pass in succession, the hoppers having side flanges forming a trough for receiving the end of the spout, a plate pivoted in said trough at one side of said spout, means normally discharging a hopper after it arrives under said plate, and connections from said plate preevnting the operation of said discharging means when the plate tilts down into the hopper beneath a predetermined level.

2. In combination, a filling spout, a member mounted at one side of said spout, a measuring hopper, means for moving the hopper beneath the spout and then beneath said member, means normally discharging the contents of said hopper

after it arrives beneath said member, and connections between said member and said discharging means preventing the operation of the discharging means when the member descends into a hopper more than a predetermined amount.

3. In combination, a filling spout, a plate pivoted on one side, the pivot being approximately on a level with the bottom of the spout, a measuring hopper, means for moving the hopper beneath the spout and beneath the plate, means for discharging the hopper after it arrives beneath the plate, and connections from said plate preventing the operation of said discharging means when the free edge of said plate drops into the hopper below a predetermined level.

4. A filling machine having in combination, means for supplying material and a scales mechanism constituting means for compiling charges by a plurality of separate and independent weighings, and means for continuously feeding material to said scales mechanism during the period of a predetermined number of weighings of said scales mechanism, and said mechanism including means for intercepting the flow of the material fed while each weighed quantity is being dumped.

5. In a machine of the character described, the combination of a supply hopper, a feeding screw in said hopper, a source of power, a clutch for connecting and disconnecting said screw to said source of power, means for normally disengaging and engaging said clutch periodically, and means responsive to the variations in quantity of material in said supply hopper operative to prevent said clutch from re-engaging when said supply hopper contains less than a predetermined amount of material.

6. A filling machine having in combination, a supply hopper, a scales mechanism, means for feeding material from said supply hopper to said scales mechanism, and means for driving said last named means for a predetermined period and for automatically cutting off said last named means after said predetermined period.

7. A filling mechanism having, in combination, a supply hopper, weighing mechanism and feeding means, said mechanism comprising a weighing can, means to dump the can when it has received a predetermined weight of material, and means to catch material fed towards the can while it is being dumped, and said feeding means comprising means to feed material from said supply hopper to said weighing mechanism continuously during a plurality of dumpings of the can, and means to automatically stop the feeding after a predetermined plural number of dumpings.

8. A filling mechanism having, in combination, a supply hopper, a weighing can, means for dumping the weighing can when it has received a predetermined weight of material, an impeller for driving material from said hopper to a position over said can, means controlled by the dumping of said can for catching material above the can while the can is being dumped and dropping it into the can after the dumping operation, means for driving the impeller continuously during a plurality of dumpings of said can, and means for automatically stopping the impeller after a predetermined plural number of dumpings of the can.

9. A filling mechanism having, in combination, a supply hopper, a weighing can, means for dumping the weighing can when it has received a predetermined weight of material, a substantially horizontal screw conveyor running from said hopper to a point above the can, means including a clutch for driving said screw, and means for automatically opening said clutch after a predetermined plural number of dumpings of said can.

10. A bag filling machine comprising a hopper, a scales mechanism, a conveyor for moving material from the hopper to said mechanism, a driving means for the conveyor, a clutch for connecting and disconnecting said driving means to said conveyor, means for charging into a bag material weighed by said scales mechanism, automatic means controlling said clutch, and manual means for controlling said clutch, said manual means being in position to be operated by an attendant placing a bag in charge-receiving position, whereby the normally timed periodic weighing and discharging of material may be interrupted if a bag is not in positon to receive the charge.

11. A rotary filling machine comprising a plurality of filling units, each unit comprising supply and scales mechanism and filling mechanism, the supply and scales mechanism of each unit being mounted directly above said filling mechanism of said unit, means connecting said mechanisms for operation, means for rotating said units bodily, and means for driving said mechanisms.

12. A filling machine having in combination a pedestal, a rotary frame on said pedestal, material feeding mechanism on said frame, means for driving said material-feeding means, a clutch for said last named means, a member adjustably fixed to said pedestal, and means actuated by contact with said member to disconnect said clutch.

13. A filling machine having in combination, a pedestal, a frame rotatably mounted on said pedestal and a filling unit mounted on said frame, comprising filling mechanism and supply and scales mechanism, means for driving said filling mechanism and driving means, including a clutch, connecting said filling mechanism and supply and scales mechanism and means for disconnecting said clutch.

14. A filling machine having in combination, a pedestal, a frame rotatably mounted on said pedestal and a filling unit mounted on said frame comprising filling mechanism and supply and scales mechanism, means for driving said filling mechanism and driving means, including a clutch, connecting said filling mechanism and supply and scales mechanism and means for disconnecting said clutch, said last named means being fixed to said pedestal but adjustable for any selected position in the circumference of said machine.

15. A rotary filling machine having charge forming mechanism, in combination with a supply hopper, said hopper having a capacity of substantially one charge, means for filling said hopper for each revolution of said machine, means for feeding material from said hopper to said charge forming mechanism at a rate of at least the contents of said hopper in less time than the time consumed in one revolution of said machine.

16. A rotary filling machine having charge forming mechanism, in combination with a supply hopper, said hopper having a predetermined capacity, means for filling said hopper for each revolution of said machine, means for feeding material from said hopper to said charge form-

ing mechanism, and means for starting the operation of said last named means at a predetermined point in the rotation of said machine and beyond the location of said hopper supply means, said feeding means feeding one hopper of material in the interval said machine travels from said predetermined point to the location of said hopper filling means

17. A filling machine comprising a filling unit, said unit comprising a scales mechanism, a filling mechanism and a scales supply mechanism, said latter mechanism being constructed to operate periodically to supply material to said scales mechanism, said scales mechanism being constructed to perform a plurality of weighing and discharging operations for each feeding period of said supply mechanism, and said filling mechanism operating to discharge its contents into a bag.

18. In a bag filling machine, a delivery hopper, means for discharging material from said hopper into a bag, a weighing can in position to dump material into said hopper, a measuring hopper, and means to feed material from the measuring hopper into said can, the operative load of the weighing can being substantially an aliquot part of the capacity of the measuring hopper and of the desired charge for one bag.

19. In combination, a hopper, a weighing can, and means to feed material from the hopper to the can, said feeding means comprising a laterally apertured cylinder mounted rotatably upon a horizontal axis above said can, means to feed material from the can into the cylinder, means to turn the cylinder, and control devices operated by the movement of the can and allowing the cylinder to turn to position said lateral aperture upward when the can moves downward, and to position said aperture downward when the can moves upward.

20. In combination, a hopper, a weighing can, a laterally apertured cylinder mounted upon a horizontal axis above said weighing can and a propeller in the bottom of said hopper and discharging into said cylinder, means constantly tending to rotate said cylinder, a stop for stopping the cylinder with its aperture downward, a stop for stopping the cylinder with its aperture upward and connections from the can releasing the first said stop when the can moves downward and releasing the second said stop when the can moves upward.

21. A filling machine having a scales mechanism, comprising a can and a hollow cylinder mounted above the can and with its axis substantially horizontal, a screw conveyor discharging material into the hollow of said cylinder, said cylinder having an opening in one side thereof, and means for turning the cylinder to move its open side upward when the can descends and to move its open side downward when the can rises.

22. A filling machine having a supply hopper and a scales mechanism, comprising a can and balancing weight therefor, said supply hopper having a rotary impeller for supplying material to said can, and means interposed between said impeller and can for cutting off the feed to said can, said interposed means being connected by a slip connection to rotate with said impeller, and provided with means for holding it against movement and for permitting movement thereof, and means for controlling said last named means by the movement of said can.

23. A filling machine comprising a scales, means for feeding-measured charges of material to said scales and means for delivering weighed material into a bag, said scales delivering weighed charges of material to said last named means automatically as long as material is fed thereto.

24. A filling machine having a bag receiving nozzle, means for feeding material through said nozzle comprising an impeller and a hopper, a scales mechanism for feeding material to said hopper and means for feeding material to said scales mechanism, and automatic means for stopping the last said feeding means after it has fed an amount of material sufficient to supply a predetermined plurality of weighings.

25. A filling machine having a bag receiving nozzle, means for feeding material through said nozzle comprising an impeller and a hopper, and a scales mechanism constructed to weigh out a plurality of duplicate small charges, collectively constituting one bag charge, and deliver said charges to said hopper.

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