Dec. 26, 1939. A. SOWDEN 2,184,474

PACKING MACHINE FOR CONTAINERS AND THE LIKE

Filed March 31, 1938 4 Sheets-Sheet 1

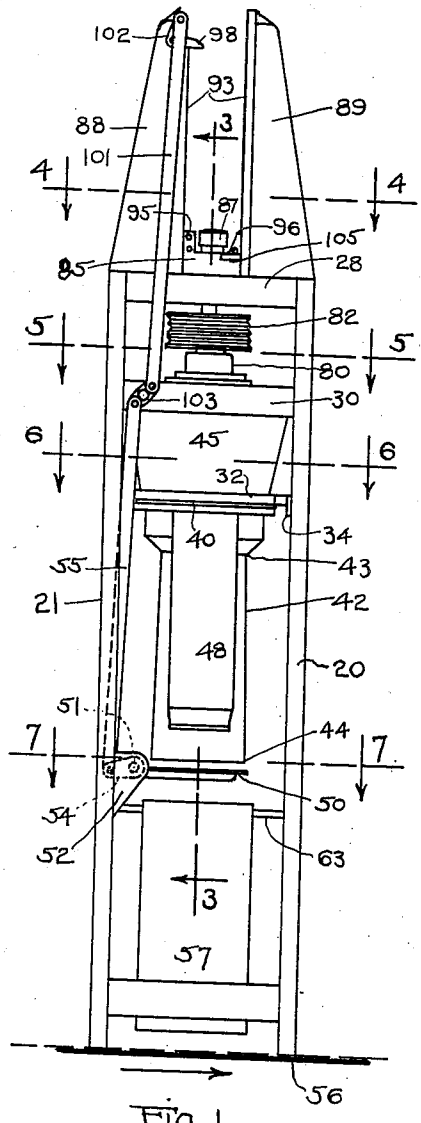


Fig. 1.

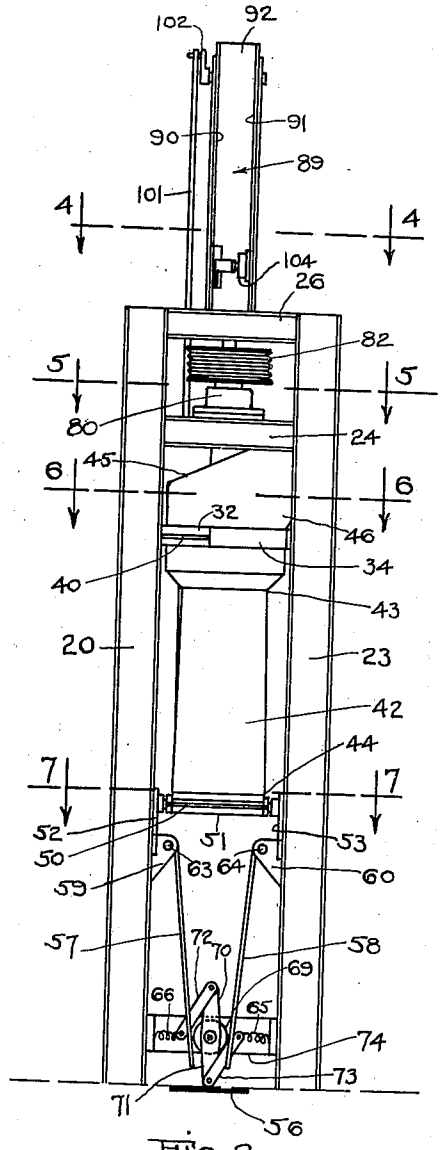


Fig. 2.

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PACKING MACHINE FOR CONTAINERS AND THE LIKE

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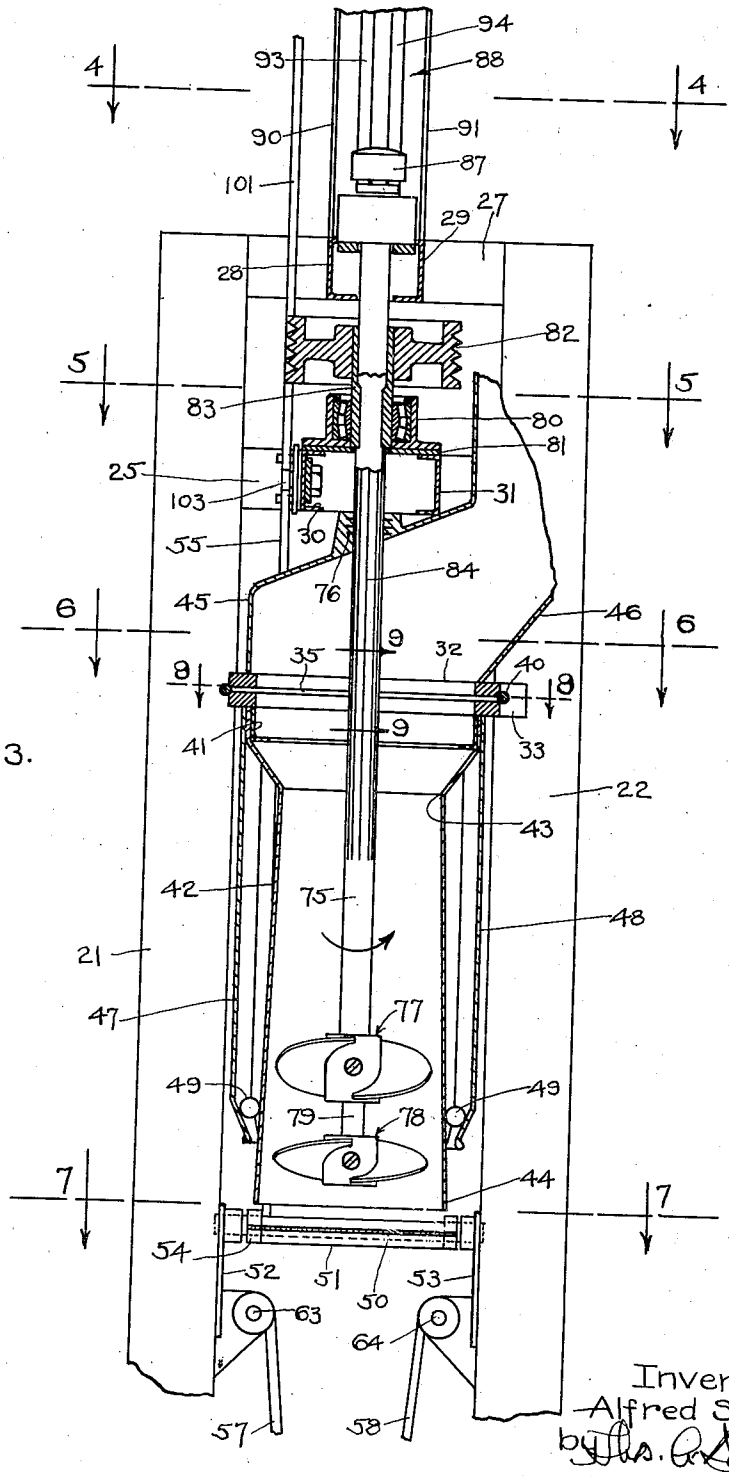


Fig. 3.

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PACKING MACHINE FOR CONTAINERS AND THE LIKE

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Fig. 4.

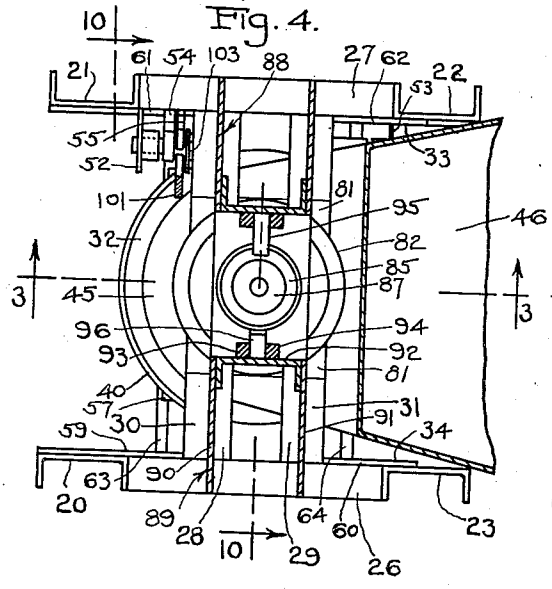


Fig. 5.

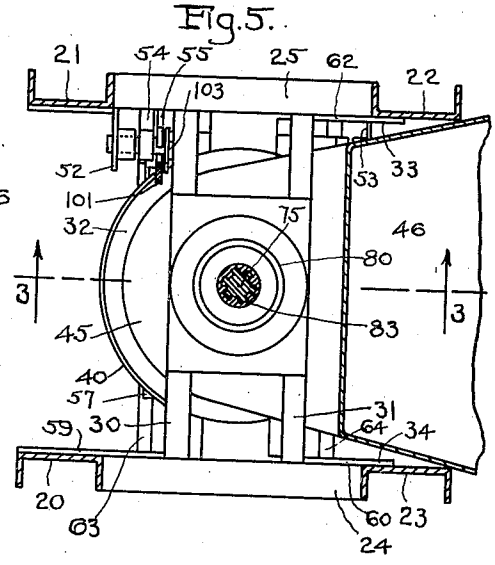


Fig. 6.

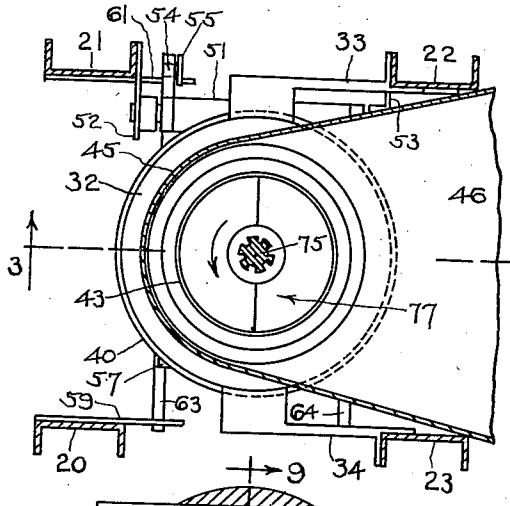
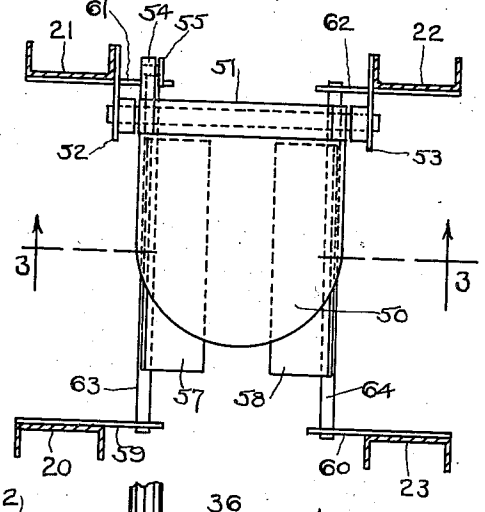


Fig. 7.



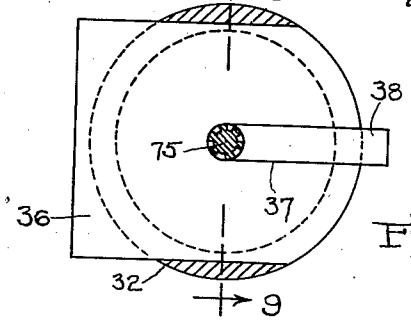


Fig. 8.

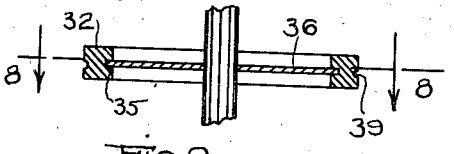


Fig. 9.

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PACKING MACHINE FOR CONTAINERS AND THE LIKE

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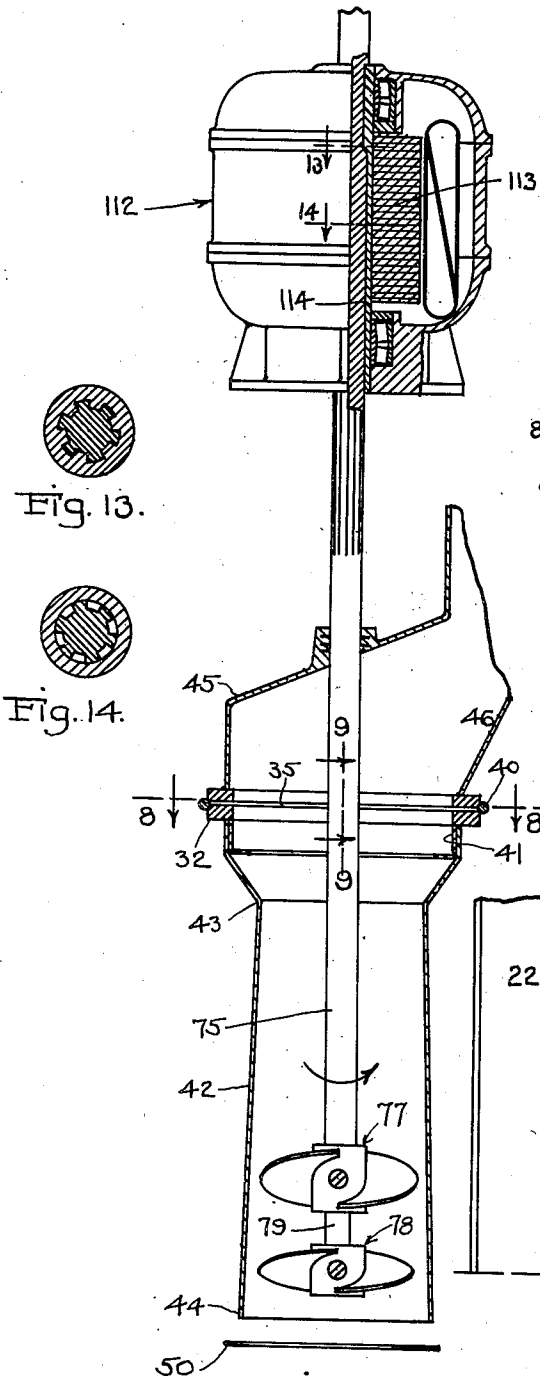


Fig. 12.

Fig. 13.

Fig. 14.

Fig. 10.

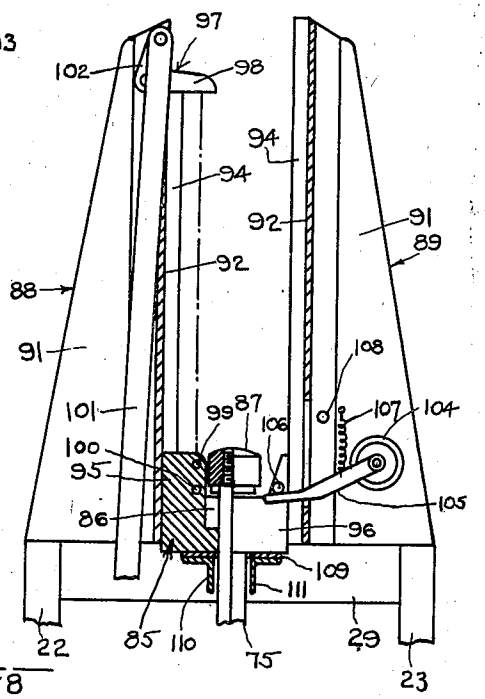
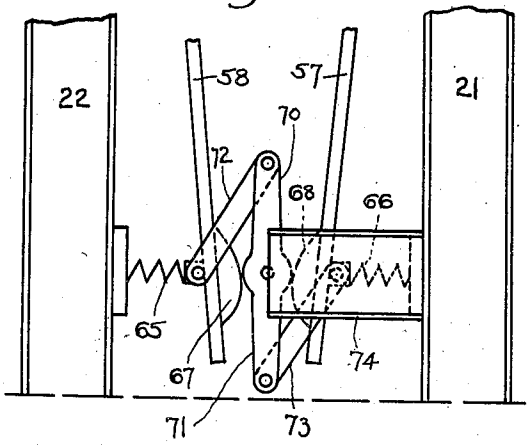


Fig. 11.



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Patented Dec. 26, 1939 2,184,474

UNITED STATES PATENT OFFICE

2,184,474

PACKING MACHINE FOR CONTAINERS AND THE LIKE

Alfred Sowden, Arkansas City, Kans.

Application March 31, 1938, Serial No. 199,225

5 Claims. (Cl. 226—23)

This invention relates to improvements in machines for packing material into containers, and the like. It relates especially to machines for filling and packing material into bags and similar containers, but the features of the invention are not necessarily limited to such use. I shall illustrate and describe a particular application of the invention as used for the filling and packing of such materials as flour, bran, feed, fertilizer, etc., into bags, since such applications constitute an important use of the invention, but in so doing I do not intend to limit the usefulness of the invention, except as I may do so in the claims to follow.

When such materials as flour and the like are introduced into the container, they are more or less completely loosened and in fluffy or air bound condition, and a body of such material cannot be uniformly packed or compressed by application of a compressing force to one end of such body. The action of compressing the material must be attended with a release of the air from the body of material, and furthermore the application of the compressing force to one end of such a body must necessarily compress the material at such end to a greater extent than the compressing which will be produced at the far end. Such a scheme is also attended with serious limitations as to the speed with which the action can be carried on.

The present invention relates to an improved form of machine in which the material is compressed in a regular and continuous manner as it is introduced into the bag or other container, from the beginning to the end of the filling operation, so that when such operation is completed the entire mass or slug of material will be uniformly compressed or packed throughout the length of such body. Generally I contemplate the use of means to support the bag during the filling and packing operation, with means in the form of a vertically movable impeller or rotor working within the bag during the operation of introducing the material thereinto, and which impeller or rotor is pressed down with a uniform pressure during the entire operation, so that as the material is introduced into the bag the impeller keeps working its way higher and higher until the operation is completed, the impeller working at all times on the top portion of the mass of material contained within the bag. By this means I produce a very fast working machine, and one which will completely fill the bag with a continuous release of the contained air so as to avoid excessive blowing and loosening of the material during the filling operation; and especially I produce a machine which will pack the material with a uniformity from bottom to top which cannot be attained by any other form of machine with which I am familiar. Such an arrangement is to be clearly distinguished from one in which the compressing action takes place on the top of a previously introduced slug of material.

As a simple form or embodiment of my invention I provide an arrangement in which the pressure exerted on the impeller is due to the weight of the impeller and the shaft by which it is supported and driven, said impeller and shaft resting at all times on the top of the mass of continuously introduced material, and being supported thereby, and thus exerting at all times a continuous and uniform pressure on the material as it is introduced, so that the compressing action is uniform throughout the entire body of material, no matter how high the column of material, or how deep the bag, may be. Generally, also, I support the bag stationarily, as distinguished from allowing the bag to fall or descend during the filling operation; thus ensuring the uniformity of pressure on the entering material, since, if the bag were to be allowed to descend as it became filled the weight of the bag and contained material would continuously increase with attendant difficulties of counterbalancing and the like.

I have provided means to release the filled bag, allowing it to descend to a conveyor or the like, when filled, and clearing the machine preparatory to another filling operation. In this connection, I have provided automatic means for effecting such release at the proper time, the supporting platform dropping, and permitting the bag to descend. I have also provided means to dampen the descent of the filled bag so that it will reach the conveyor without excessive impact. When the bag thus filled is released and allowed to descend to the conveyor the impeller and shaft are also allowed to descend preparatory to another filling operation; and I have also provided means to dampen the fall of these parts so as to avoid shocks and damage incident thereto.

When the filling is accomplished with a preweighed or predetermined amount of material, the extent to which the bag will be filled will depend to some extent on variable conditions, so that for some materials the exact height to which the impeller and shaft will rise will correspondingly vary. I have therefore also pro-

vided means permitting adjustment of the point at which the platform will be released to meet this variable condition.

In order to avoid entrance of flour or dust into the bearings and other moving parts it is desirable to provide an arrangement in which the shaft exposed within the bag shall be smooth and free of splines or other irregularities. I have therefore provided an arrangement in which this result may be accomplished.

During the packing operation and as the material is introduced into the bag it undergoes a progressive, although rapid, compressing action at the impeller. That is, at the instant the impeller commences its compressing action on a portion of newly introduced material, such material is loose, and quickly undergoes a compressing action which reduces its volume to some extent. As this action proceeds continuously, the material being continuously introduced, and the packing proceeding continuously, and the impeller rising in harmony therewith, the so introduced material undergoes the compressing action during a very small interval of time, a fraction of a second; and as a further feature of my invention I sometimes find it desirable to provide an impeller having its flights of variable pitch from top to bottom, that is, in which the axial distance between the flights at the top is greater than at the bottom, so that the action of these flights will correspond to the progressive compressing or packing action. Generally it will be found sufficient, in using this feature, to provide a construction in which the impeller is in two sections, the upper section having the steeper flights, and the lower section having the easier flights, so that they correspond substantially to the packing action aforesaid.

In connection wtih the impeller construction, it will also generally be found desirable to use an arrangement in which the impeller is "double threaded", that is, having two sets of flights spaced one half turn from each other on the shaft. This is desirable due to the rapidity with which the shaft rotates, and the rapidity with which the packing action proceeds. In this connection, I have provided an arrangement intended for such high speeds of operation as the filling of one hundred pound bags at rates of upwards of twenty per minute with flour and similar material, and such speeds require a very even and continuous flow of the material and its packing into the bag in even manner in order to avoid excessive blowing due to air contained within the bag.

I have also provided a simple and effective means to support the bags on the machine during the filling operation and one which will permit of ready release of the filled bags.

As a further feature of my invention I have provided an arrangement which lends itself readily to direct drive by a suitable motor, so that the benefits of such direct drive may be secured. In this connection, this also makes possible the use of the high impeller and shaft speeds necessary for such rapid filling operation as are desirable.

I have also provided an arrangement whereby the machine may be readily cut off from the chute or duct through which the material is supplied to the machine, as when it may be desired to discontinue operations for an interval of time.

A further feature and object of the invention is to provide an arrangement which can be readily built from structural parts, and from parts which are susceptible to manufacture at low cost and by simple manufacturing operations.

Other objects and uses of the invention will appear from a detailed description of the same, which consists in the features of construction, and combinations of parts hereinafter described and claimed.

In the drawings:

Figure 1 shows a front elevation of a machine embodying the features of my present invention, the same being located over a travelling belt which travels towards the right for removal of the filled and packed bags;

Figure 2 shows an elevation at right angles to that of Figure 1;

Figure 3 shows a fragmentary vertical section through the principal operative parts, being taken on the lines 3—3 of Figures 1, 4, 5, 6 and 7, looking in the directions of the arrows, the impeller and shaft being at their bottom position, and the platform being in raised position to support a bag in operative position;

Figure 4 shows a horizontal section on the lines 4—4 of Figures 1, 2 and 3 looking in the directions of the arrows;

Figure 5 shows a horizontal section on the lines 5—5 of Figures 1, 2 and 3 looking in the directions of the arrows;

Figure 6 shows a horizontal section on the lines 6—6 of Figures 1, 2 and 3 looking in the directions of the arrows;

Figure 7 shows a horizontal section on the lines 7—7 of Figures 1, 2 and 3 looking in the directions of the arrows;

Figure 8 shows a fragmentary horizontal section through the position of the cut off slide, being taken on the lines 8—8 of Figures 3, 9 and 12 looking in the directions of the arrows;

Figure 9 shows a vertical fragmentary cross-section through the cut-off slide, being taken on the lines 9—9 of Figures 3, 8 and 12 looking in the directions of the arrows;

Figure 10 shows a fragmentary vertical or elevation view of the upper or head portion of the machine, partly in section, and it shows the construction of the vertical slide at the upper end of the shaft, the platform release means, and the means for dampening the downward movement of the shaft and connected parts at the completion of the filling and packing operation;

Figure 11 shows a fragmentary view, partly in section, through the lower portion of the stand, looking in the direction opposite to that of Figure 2, and showing the means for dampening the downward movement of the filled bag as it descends to the convevor:

Figure 12 shows a fragmentary vertical section similar to that of Figure 3, but illustrating a modified construction in which the shaft is directly driven by a suitable electric motor, the shaft passing up through the quill or hollow shaft of the rotor of the motor;

Figure 13 shows a fragmentary horizontal section on the line 13—13 of Figure 12, looking in the direction of the arrows, showing the splined drive to the upper portion of the shaft; and

Figure 14 shows a horizontal fragmentary section on the line 14—14 of Figure 12, looking in the direction of the arrows, beneath the splined drive to the shaft.

Referring first to the arrangement shown in Figures 1 to 11 inclusive, I have therein shown a frame including the four vertical channel posts 20, 21, 22 and 23. Just above the position of the chute through which the material is supplied there are the cross members 24, joining the posts 20 and 23, and 25, joining the posts 21 and 22; and at the upper ends of the posts the cross

members 26 and 27 connect the upper ends of the posts 20 and 23, and 21 and 22, respectively. Also, the members 28 and 29 extend between the cross members 26 and 27, and the members 30 and 31 extend between the cross members 24 and 25, so that the entire frame is brought into a rigid but light structure.

A bag supporting head is carried by the posts 22 and 23. This head includes the circular member 32 which is provided with the brackets 33 and 34 which connect to the posts 22 and 23 and are supported thereby as best shown in Figure 6. This member 32 is provided with the transverse slot 35 reaching across the member from front to rear, so that a cut off slide 36 may be slipped across the member to cut off inflow of material. This slide is provided with the slot 37 which reaches partially across the slide to accommodate the impeller shaft presently to be described. The back portion of this slot may also be closed by a supplementally small, slide 38, set into place from the back side of the machine, if desired, and up to the position of the shaft. The member 32 is also preferably provided with an encircling groove 39 to receive a circular band of rubber or the like, and thus cover over the exposed opening of the slot when the slide is not in place during the running of the machine. Such a band 40 is shown in place in Figures 3, 4, 5, 6 and 12.

Connected to the member 32 is a downwardly extending ring 41 to which may be detachably connected the bag tube 42 as best shown in Figures 3 and 12. The tube 42 is preferably formed with an enlarged portion at its upper end, tapering rapidly to a smaller neck 43, and then flaring gradually to its lower end 44. The material is to be introduced into and packed within the bag holder, and due to such flare the slug so packed may easily descend into and be contained within the bag at the conclusion of the operation to be presently described. Connected to the member 32 there is also a head member 45, having the chute connection 46 through which the material is fed to the packing and filling machine, usually from a location at a higher elevation, and usually from a suitable weighing machine.

The bag tube may be removed from the member in convenient manner, not shown in detail, and another tube of greater or smaller size substituted as desired, according to the operations to be performed. Connected to the upper end of the bag tube, or to the member 32, there are the depending arms or fingers 47 and 48 which are spaced away from the body portion of the tube to allow the bag to be conveniently set upwards into place around the tube. For this purpose the arms 47 and 48 preferably have their lower ends beaded as shown in Figure 3, and turned inwardly towards the bag tube; and if desired one or more balls such as 49 may be set between each of these arms and the bag tube so that the bag may be readily set upwards into place, but will be retained in place with sufficient force, but not to prevent ready downward movement away from the tube at the conclusion of the operation.

Beneath the lower end of the bag tube and the bag thereon, is a platform 50 upon which the weight and pressure of the bag and its contents is supported during the filling and packing operation. This platform is preferably carried by a hinged bracket 51, hinged to the bracket members 52 and 53 which are carried by the posts 21 and 22 respectively. This platform bracket 51 is also provided with an outwardly reaching arm 54 to which is connected a link 55, which link is controlled and operated from above in the manner presently to be described. By this means the platform is supported in horizontal position during the filling operation, and it sustains the weight of the bag and filled material, as well as the packing pressure, and when the link is released the platform is allowed to swing down and allow the filled and packed bag to descend to the conveyor 56 (see Figures 1 and 2), which conveyor is placed substantially at floor level and travels from left to right when viewed as in Figure 1.

If the filled bag were to be allowed to descend directly to the conveyor upon the freeing of the platform, the bag would come to the conveyor with considerable impact, and damage might result. I have therefore provided a suitable dampener. The same includes the side plates 57 and 58 which are hinged at their upper edges to suitable brackets 59, 60, 61 and 62, by means of the shafts 63 and 64, as best shown in Figures 2, 3 and 7. Springs 65 and 66 normally press the lower end portions of these plates inwardly towards each other, and if desired the lower edge portions of the plates may be provided with the protuberances 67 and 68 which will produce an amplified retarding action just before the bag reaches the conveyor, but above all, will result in production of a side pressure against the lower edge portion of the bag, with release of pressure from the upper portion of the bag, so that the movement of the conveyor travelling laterally will not tend to tilt the bag and cause it to fall over as it comes onto the conveyor. In other words, the bag will be delivered upright onto the surface of the conveyor.

If desired, a suitable shock absorber may be connected to the lower portions of the plates 57 and 58 to control their action and dampen the same. This is the hydraulic shock absorber shown diagrammatically at 69. It may be of any suitable form, such as the so-called Houdaille type. It has the arms 70 and 71 connected to the plates 57 and 58 by means of the links 72 and 73, respectively, so that the sudden lateral forces exerted on the plates at the instant of filled bag release, will be cushioned, and the bag will be eased down onto the conveyor. This shock absorber is carried by a cross member 74 connected to the lower portions of the posts 21 and 22 at the side of the machine away from the direction of bag travel.

There is a vertical shaft 75 which is axially carried with respect to the bag tube, and is driven at relatively high speed in suitable manner. This shaft extends down through the hood 45, and is preferably sealed therethrough in relatively dust tight manner, as by the felts 76 (see Figures 3 and 12). The lower end of this shaft carries the impeller, which in the form shown includes the upper and lower sections 77 and 78. The section 77 has its flights of steeper pitch than the section 78 as shown in Figures 3 and 12, so that the incoming material first encounters these steeper flights which act to rapidly compact the material, and then the material is subjected to the action of the flights of lesser pitch by which the material is further compacted and the action thus completed. In the form shown the two sets of flights are in the form of individual impellers, but manifestly a single impeller might be used with its flights of progressively

smaller pitch. Or in some cases it may be found satisfactory to use only a single pitch of the flights, in which one of the impellers may be dispensed with, and the flights may in such case be of uniform pitch.

Generally it will be found satisfactory to use an arrangement in which the flights are relatively short, encircling only a portion of a revolution, as shown, in which they constitute only a half turn. It will also in many cases be found desirable to use a double threaded arrangement as shown, each flight making only a half turn, and the flights operating in succession on the material. It is convenient to provide the lower portion of the shaft 75 with a portion 79 of reduced size onto which the impeller sections are set and held in place by the set screws as shown.

The shaft passes up from the hood 45, and through a roller bearing 80, which is carried by the plate 81 on the cross members 30 and 31 of the frame of the machine. Above the said cross members and roller bearing, is placed the pulley 82, shown as being of the multi-groove, V-groove type. This pulley may, of course be driven in any convenient manner. A quill 83 is placed on the shaft at the position of the pulley, and the pulley is connected to this quill. The shaft is splined for a distance vertically according to the vertical travel which it must make during the filling operation, such splines being shown at 84. It will be seen that with this arrangement the shaft is at all times driven irrespective of its vertical travel.

The upper end portion of the shaft carries a head member 85, best shown in Figure 10. For this purpose there is a suitable bearing 86 set into said head member so that the shaft may rotate freely, but the head member will nevertheless travel up and down with the shaft, and the head member is incapable of axial movement along the shaft. A nut 87 is threaded onto the extreme end of the shaft as shown.

Extending upwardly from the main portion of the frame are the stands 88 and 89, (see Figures 1, 2, 3, 4 and 10). Each of these includes the side plates 90 and 91, with the channel section 92 between them; and each of the channel sections carries a pair of vertical guide bars 93 and 94 which thus provide a vertical groove. The head member 85 is provided with the side portions 95 and 96 which travel in such grooves vertically.

At the upper end of the stand 88 there is a bell crank 97 pivoted to the stand, and with its arm 98 adapted to reach over into alignment with the side of the portion 95 of the head member. A trip pin may be set into one or the other of the holes 99 or 100 of the side portion 95, so that when the shaft and head member reach the upper limit of travel said pin will move against the arm 98 and rock the bell crank. A link 101 connects to the other arm 102 of the bell crank, and it will be noted from Figures 1 and 10 that when the bell crank stands with its arm 98 horizontal, said link 101 has passed dead center so that no amount of pull downwardly on the link can rock the bell crank to the left. The arm 98 of the bell crank reaches through a slot of the stand 88, and said arm of the bell crank rests against the floor of such slot to limit rocking movement of the right. Thus when the platform 50 is to be supported horizontal the bell crank is held against further rocking movement towards the right in Figures 1 and 10. There is a lever 103 pivoted to the cross member 30; and the upper end of the link 55 connects to one end of said lever, and the lower end of the link 101 connects to the other end of said lever. When the platform is loaded the link 55 is in compression, and the link 101 is in tension, so that the action as hereinabove explained will occur.

It will be noted that as soon as the shaft and its head have reached the upper limit of movement, the bell crank will be slightly rocked towards the left, and as soon as dead center is passed the tension of the link 101 will swing the bell crank suddenly full over, so that the platform will be suddenly released, and the filled bag will be delivered as already explained. After the bag has been thus delivered the platform may be again raised and the bell crank turned over, either by hand or otherwise, preparatory to another operation. Generally this may be accomplished by merely swinging the platform into horizontal position which will serve also to throw the bell crank over into "set" position.

It will be noted that upon the release of the platform, with consequent dropping of the filled bag, the shaft and impeller are allowed to fall, due to the fact that the force which caused them to rise was the engagement of the impeller with the top portion of the material within the bag. Such falling of the shaft and impeller might result in damage thereto, and would be objectionable in any case. I have therefore provided means to check such fall. The same, in the form shown, takes the form of a shock absorber 104 of suitable form, such as a hydraulic type hereinbefore mentioned, mounted on the stand 89, and having the arm 105 reaching through a slot of said stand to a position where it may be engaged by a pin 106 on the head member as the latter nears the lower limit of its travel. A spring 107 may be provided for restoring the arm 105 of the shock absorber to its initial position when the shaft and head member again rise during another filling and packing operation, and a pin 108 may limit the movement of the arm 105 under the force of such spring. The bottom travel of the head member and shaft is limited by the engagement of the head member 85 with a plate 109 carried by the cross members 28 and 29, or by angle bars 110 and 111 carried thereby, as shown in Figure 10.

It is noted that the splines 84 on the shaft should be of sufficient length to permit driving engagement with the quill 83 during the maximum travel needed for filling bags of the maximum capacity intended for use in the machine. In the form shown in Figures 1 to 11 inclusive these splines travel down into the upper portion of the enclosure when the shaft and impeller are low down, so that at such times the splines are subject to the dust and other material within such enclosure. Such material does not, however, escape to the atmosphere.

In the modified arrangement shown in Figures 12, 13 and 14 I have provided means to drive the shaft directly by means of an electric motor. The same is designated as 112, and is shown as of an alternating current type, such as an induction motor. It has the rotor 113 which is mounted on the quill 114, and the shaft 75 passes up through this quill. The upper end of the quill has the teeth to engage the splines of the shaft, the lower portion of the quill being untoothed as shown, especially by comparison of Figures 13 and 14, which are sections at the points designated on Figure 12. The motor may be mounted in any convenient manner above the hood 45, and due to

the height of the motor itself, it will generally be found that when the teeth of the quill are formed near the upper end of the quill the shaft may be so proportioned as respects the splines that the full upward movement during a filling operation may be accomplished even when the splines do not enter into the hood during the full lowering movement of the shaft and impeller. It will be understood that the shaft above the motor of Figure 12 is provided with a head such as the head **85**, and that the operations are to that extent the same as heretofore explained.

This arrangement and means and process for filling and packing the bags is well adapted for high speeds of operation. In fact speeds equal to normal motor speeds may be used, such as from 1200 to 1750 revolutions per minute, so that the direct motor drive is very well adapted to this work.

The operation and sequence of events will be readily understood, but the following explanation is also desirable. When the platform has been raised and latched up, a bag is placed up over the tube **42**. The new weighed body of material is then fed down through the chute **46** from above, and as it descends into the upper portion of the tube **42**, and down through the same, the rapidly rotating impeller forces the first portions of such material against the bottom of the bag supported on the platform. As further material descends so that the space beneath the impeller becomes fully occupied, the impeller rests on the material so far compacted, and still further increments of the material flow in and the impeller keeps working on them, working its way higher and higher as the material continues to flow in, but at all times the impeller compacts the material to the extent determined by the weight of the shaft and the impeller and the head **85**, all which parts must be supported solely by the engagement of the impeller blades with the so compacted material. The direction of rotation is, of course, such as to tend to make the impeller feed its way upwards through the material, as shown by the arrows in Figures 3 and 12. It will be noted that the compacting and packing operation is at all times that due to the weight of the shaft and connected parts, so that the compacting or packing action is perfectly uniform throughout the height of the mass, from the bottom to the top. Also, this compacting action proceeds uniformly throughout the entire mass, and proceeds as the material enters the bag tube **42**, as distinguished from an arrangement in which the entire mass of material is compressed from one end thereof, in which case such uniformity cannot be secured.

It will also be noted that if desired a certain additional packing action might be secured by allowing the impeller to remain in contact with the upper portion of the compacted or packed mass of material, whereupon the rotations of the impeller would of themselves exert a certain amount of jarring action on the entire mass. In such case, however, the weight exerted on the entire mass would be due to that of the shaft and connected parts. In this connection it may be mentioned that in some cases a weight of substantially two hundred fifty pounds will be found satisfactory for the filling of bags of flour containing substantially one hundred pounds of flour.

While I have herein shown and described only certain embodiments of the features of my invention, still I do not intend to limit myself thereto, except as I may do so in the claims to follow.

I claim;

1. In a machine of the class described, the combination of means to support a bag vertically with its open end up, a platform beneath the lower closed end of the bag, means to support said platform permitting the same to swing down away from the bag support, means to convey the filled bags laterally away from the filling position, means to dampen the falling movement of the bags as the platform is permitted to swing down comprising a pair of plates pivotally mounted at the sides of the bag to swing about horizontal axes, and spring means tending to move said plates towards each other, and means to supply loose material to the upper open end of the bag, and to compact said material within the bag, substantially as described.

2. In a machine of the class described, the combination of means to support a bag vertically with its open end up, a platform beneath the lower closed end of the bag, means to support said platform permitting the same to swing down away from the bag support, means to convey the filled bags laterally away from the filling position, said means travelling transversely of the axis of swing of the platform and in direction from such axis across the vertical alignment of the bag, together with means to dampen the fall of the bag from the platform, comprising spring pressed means to engage the side faces of lower portion of the bag adjacent to the lateral conveying means, substantially as described.

3. In a machine of the class described, the combination of a tubular bag support mounted in vertical position, means to secure the upper end of a bag embracing said support, to the support, means to direct material laterally and downwardly into the support and into the so-supported bag, a vertically extending shaft extending centrally downwardly through the support and said shaft being vertically movable, means to support said shaft, and means to continuously drive the shaft while permitting such vertical movement thereof, comprising a motor above the upper end of the bag support and having a stationary stator, and also having a rotary rotor, in alignment with the shaft, and a splined connection between the rotor aforesaid and the shaft, together with an impeller on the lower end portion of the shaft, the splines of said connection being such as to permit vertical movement of the shaft and impeller substantially equal in amount to the vertical dimension of the bag, substantially as described.

4. In a machine of the class described, the combination of means to support a bag in vertical position with its upper end open, means to direct material into said upper open end, a vertical shaft reaching downwardly axially of the bag, means to support said shaft to permit vertical and rotary movement thereof, an impeller on the lower end portion of said shaft, and means to drive the shaft continuously while permitting vertical movement of the shaft, comprising a motor mounted above and in alignment with the shaft and impeller, and including a stator and a rotor within the stator, together with a splined connection between the rotor and the shaft, and said splined connection permitting shaft drive during vertical shaft movement substantially equal in amount to the vertical dimension of the bag being filled, substantially as described.

5. In a machine of the class described, the combination of a vertical bag tube, means to support a bag on said tube with its open end

facing upwardly, means to direct material into said upper open bag end, a platform beneath the bag when in such position, means to pivotally support the platform along one edge thereof, a vertically extending shaft extending downwardly into and concentric with the bag tube, means to support said shaft in such position while permitting both rotary and vertical axial movements of the shaft, means to drive the shaft during its axial movements, a catch for supporting the platform in substantially horizontal position, and an element carried by the shaft to engage the catch at the upper limit of shaft movement and disengage the platform, to thereby permit the same to swing down and deliver a bag supported thereon, substantially as described.

ALFRED SOWDEN.