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PACKING MACHINE

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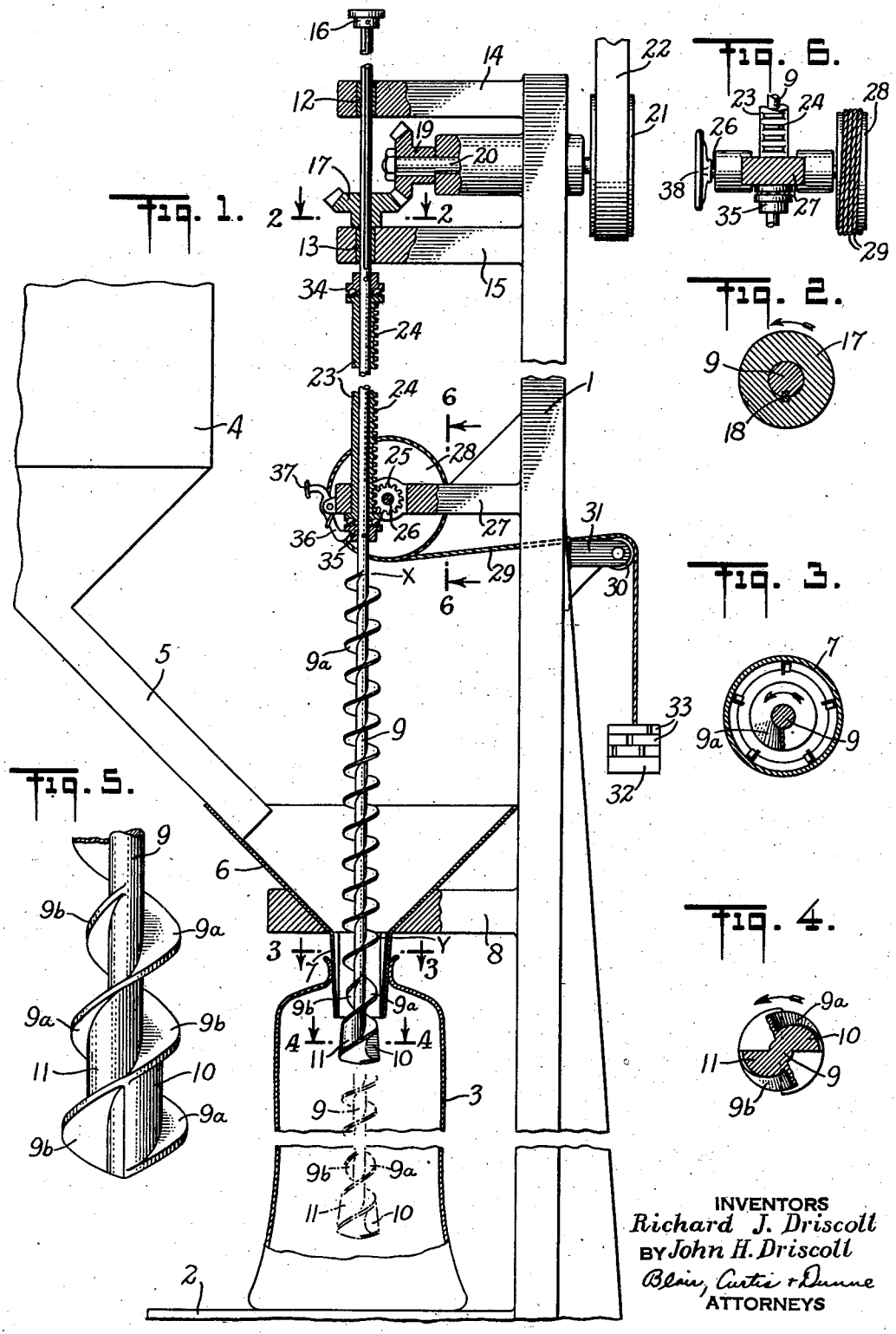


Fig. 1.

Fig. 6.

Fig. 2.

Fig. 3.

Fig. 5.

Fig. 4.

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PACKING MACHINE

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8 Claims. (Cl. 226—23)

This invention relates to packing machines and particularly to machines for filling and packing bags or other containers with materials to be stored or shipped therein.

It is an object of the invention to provide an improved apparatus for packing materials in a bag or other container.

It is a further object to provide apparatus of the character described which is efficient and durable in operation.

It is a further object to provide packing apparatus which is adapted to pack the material in the bag or container tightly and thereby increase the amount of material which may be packed in a bag or container.

It is a further object to provide packing apparatus which is rapid in operation to reduce the time required to pack a bag or container with material.

Other objects will be in part obvious and in part pointed out hereinafter.

One illustrative embodiment of the invention is shown in the accompanying drawing, in which:—

Figure 1 is a side elevation partly in section of a machine embodying the invention.

Fig. 2 is an enlarged section taken on the line 2—2 of Fig. 1.

Fig. 3 is an enlarged section taken on the line 3—3 of Fig. 1.

Fig. 4 is an enlarged section taken on the line 4—4 of Fig. 1.

Fig. 5 is an enlarged side elevation of the lower end of the feeding and packing screw or auger viewed from the right in Fig. 1.

Fig. 6 is a section taken on the line 6—6 of Fig. 1.

As conducive to a better understanding of this invention it may be noted that packing machines are used to fill and pack various types of containers with materials such as cereal products, flour, feed, bran, gypsum, cement, lamp black, molybdenum, brewers' grains, clay products, chemicals, linseed meal, dried milk, and many similar materials, and it will be understood that the expression "material" as used in the specification and claims is intended to include such materials and all other materials which are susceptible of being packed in a receptacle or container.

In filling bags or other containers with material it is desirable for purposes of economy that the bag or container be quickly filled with material and that the material be tightly packed in the bag or container to increase the amount of material which the bag or container is capable of holding.

In the past, material has been fed into a bag or container by means of a rotating screw or auger which presses the material toward the bottom of the bag or container, the bag or container being gradually lowered from the screw or auger as it fills with material. Such a screw or auger produces initially a fairly tight packing of the material adjacent the screw or auger but fails to spread the material laterally of the screw or auger with sufficient force to pack tightly the material throughout the entire bag or container, with the result that no uniformly tight packing of the bag or container is possible.

In our copending application Serial No. 52,101 filed November 29, 1935, as a division of our copending application Serial No. 754,988 filed November 27, 1934, we disclose and claim a packing machine having a screw or auger provided with means (therein called an "expander") which operates to spread and pack the material laterally of the screw or auger, thus tightly packing the material toward the sides of the bag or container.

In said copending application the pitch of the spiraled channel of the screw or auger is substantially uniform and one expander is located in the channel near the lower end of the screw or auger to produce the laterally tight packing.

We have discovered that more efficient results can be obtained by providing two spiraled channels for a distance above the lower end of the screw or auger, and by locating an expander in each of the two channels at opposite sides of the screw or auger.

This arrangement which will now be described in connection with the description of the apparatus shown in the drawing increases the efficiency of the machine by permitting a tighter packing in much less time.

Referring to Fig. 1, the filling and packing apparatus is supported by a frame 1 which may be provided with a base 2 upon which the bag or container 3 may rest during a filling and packing operation.

The material which is to be packed in the bag 3 may be kept in a bin 4 suitably supported adjacent the machine and provided with a spout 5 down which the materials may flow into a funnel 6 having a spout 7 which extends into the bag 3. The funnel 6 may be supported by a bracket 8 extending from frame 1.

The material which flows into the funnel 6 is fed therefrom into the bag 3 by a rotating screw

or auger 9 which is vertically movable in the spout 7 as hereinafter explained to permit the lower end of the screw to be lowered into the bag at the start of a filling and packing operation and to be gradually and automatically raised during the filling and packing operation. In Fig. 1 the position of the screw 9 in the bag during an early stage in a packing operation is shown in dotted lines, and its position during a later stage in the packing operation is shown in full lines.

The screw 9 is provided with two spiraled channels designated respectively 9a and 9b. The channel 9a is continuous from the point designated X in Fig. 1 to the lower extremity of the screw, but preferably from the point designated Y in Fig. 1 to the lower end of the screw its pitch is substantially doubled.

The second channel 9b extends from just below the point Y to the lower end of the screw and its pitch is substantially the same as the increased pitch of the channel 9a.

For purposes of illustration, if the pitch of the channel 9a between the points X—Y in Fig. 1 is two inches, the pitch of the channel 9a below the point Y and the pitch of the channel 9b would be substantially four inches.

Located within the channel 9a near the lower extremity of the screw 9 is an expander 10 shaped as shown in Fig. 4 to press the material laterally toward the sides of the bag upon rotation of the screw 9.

On the opposite side of the screw 9 and located in the channel 9b is a second expander 11. The two expanders 10 and 11 are preferably located directly opposite to each other on opposite sides of the screw 9 to balance the screw and permit its rotation at high speed. The expanders are preferably formed as integral parts of the screw.

The screw 9 is mounted for rotation and to permit vertical movement in bearings 12 and 13 carried respectively by brackets 14 and 15 extending from frame 1. To limit the downward movement of the screw 9, a thrust bearing 16 may be adjustably secured to the screw above the bracket 14. The screw 9 may be rotated by a gear 17 having a vertical keyway connection 18 with the shaft of the screw 9 to permit the screw 9 to move vertically within the gear 17. Gear 17 may be driven by a gear 19 on a shaft 20 to which is fixed a drive pulley 21. Drive pulley 21 may be driven by a belt 22 from a motor or line shaft.

To insure a tight packing of the material in the bag or container 3 and to vary the tightness of the pack, means are provided to control the upward movement of the screw in the bag during a filling and packing operation. It will be apparent that when the screw 9 is lowered into the bag 3 and is rotated to feed and pack the material in the bag, the increasing amount of material which is fed into the bag will force the screw upward as the bag is filled with material. In the absence of resistance to this upward thrust of the material the resulting packing will be less tight than if resistance to the upward thrust of the material is provided. And the amount of resistance provided will control the tightness of the pack. To provide the desired amount of such resistance the shaft of the screw 9 is surrounded above the channel 9a by a sleeve 23 provided on one face with a rack 24 which meshes with a gear 25 on a shaft 26 journaled in a bracket 27 extending from frame 1. Secured to the other end of a shaft 26 is a drum 28 around which is trained a cable 29 which passes over a pulley 30 carried by a bracket 31 secured to frame 1. Secured to the lower end of the cable 29 is a seat 32 upon which weights 33 may be placed. The arrangement is such that the weights 33 tend to rotate the drum 28 and the gear 25 in a counterclockwise direction and through rack 24 move sleeve 23 downward. Movement of sleeve 23 upward or downward moves the screw or auger 9 upward or downward through the action of thrust bearings 34 and 35 respectively secured to screw 9 above and below sleeve 23.

For holding the screw 9 in raised position against the force of the weights 33 after a filling operation has been completed, and while an empty bag or container is being located beneath the spout 7, a spring-pressed latch 36 is pivoted to the bracket 27 in position to snap under and hold thrust bearing 35 when the screw 9 is in raised position. After the filled bag or container has been removed and an empty bag or container is positioned for filling beneath the spout 7, the latch 36 may be released by pressing on handle 37 of the latch. Thereupon the screw 9 will drop down into the bag in a position to start a filling operation, its downward movement being limited by the position of the thrust bearing 16 on the upper end of the shaft of the screw 9.

The screw 9 may be manually raised or lowered by turning a hand wheel 38 (see Fig. 6) which is secured to shaft 26.

The operation of the machine should be clear from the foregoing description. With an empty bag 3 resting upon the base 2 beneath the spout 7, the handle 37 is pressed to release the latch 36 and permit the screw 9 to drop into the bag until arrested by the thrust bearing 16 or the hand wheel 38. The machine is then started and rotation of the screw 9 will feed the material from the funnel 6 through the spout 7 into the bag 3. Continued rotation of the screw 9 will pack the material downwardly and laterally in the bag. The weights 33 will tend to press the screw 9 down into the bag and thereby permit the expanders 10 and 11 to pack the material tightly in the bag. Gradually the increasing tightly packed material will force the screw 9 toward the top of the bag and when the bag is completely filled and packed the latch 36 will snap under thrust bearing 35 and hold the screw 9 in raised position until the filled bag is removed and an empty bag placed in position for filling.

It will be noted that when the bag has been filled the lower end of the screw 9 which carries the expanders 10 and 11 will have risen up into the spout 7. When in this position the expanders 10 and 11 will substantially fill the end of the spout 7 and will press sufficient material against the sides of the spout 7 to close the spout and prevent material from passing therethrough while the filled bag is being removed and an empty bag positioned for a filling operation.

The many advantages of the packing apparatus hereinbefore described may be summarized as follows: The double spiraled channels of the screw 9 and the double expanders located therein balance the screw 9 for purposes of rotation and permit rotation at higher speeds, increase the amount of material which may be packed in a given length of time, and increase the lateral packing surface of the screw 9 without increasing its diameter.

The use of the double expanders balances the

screw by equalizing the pressure of the packed material from opposite sides of the screw.

The use of the double spiraled channels and expanders permits locating the expanders at the lowest extremity of the screw 9 where the packing is mostly performed, and when so located the double expanders serve to close the spout of the funnel when the bag has been filled and while it is being removed and replaced by an empty bag.

The increased pitch of the spiraled channels adjacent the lower end of the screw facilitates the passage of the material through the spout during the final filling operation.

The vertically movable screw and the control therefor eliminate the necessity of lowering the bag during a filling and packing operation and thus eliminate the necessity for a movable platform for the bag. It also permits controlling the tightness of the pack.

It will be understood that the invention is not to be limited to the specific embodiment shown for purposes of illustration as the inventive features may be variously embodied without departing from the invention.

It will also be understood that all of the features of the invention need not be used conjointly as they may be used in various combinations as defined in the subjoined claims.

We claim:

1. Apparatus for packing material in a container comprising a tube for insertion in the container, a rotatable screw extending through the tube and having a free end extending beyond the tube end, a plurality of expanders associated with the convolutions of the screw, and means to rotate the screw.

2. Apparatus for packing material in a container comprising a rotatable screw having a spiraled channel increased in pitch adjacent the lower extremity of the screw, a second spiraled channel located adjacent the lower extremity of the screw, and means on said screw to force said material laterally in the container.

3. Apparatus for packing material in a container comprising a rotatable screw having a spiraled channel increased in pitch adjacent the lower extremity of the screw, a second spiraled channel located adjacent the lower extremity of the screw, and an expander located in each channel.

4. Apparatus for packing material in a container comprising a rotatable screw having a spiraled channel increased in pitch adjacent the lower extremity of the screw, a second spiraled channel located adjacent the lower extremity of the screw, and expanders located on opposite sides of the screw.

5. Apparatus for packing material in a container comprising a rotatable screw having a spiraled channel increased in pitch adjacent the lower extremity of the screw, a second spiraled channel located adjacent the lower extremity of the screw, and expanders located in the channels opposite each other.

6. Apparatus for packing material in a container comprising a tube for insertion in the container, a rotatable screw extending through the tube and having a free end extending beyond the end of the tube, a plurality of expanders associated with the free end of said screw, means to rotate the screw, and means to lower and raise the screw.

7. Apparatus for packing material in a container comprising a rotatable screw having a spiral channel increased in pitch adjacent the lower extremity of the screw, a second spiral channel located adjacent the lower extremity of the screw, expanders located on opposite sides of the screw, means for rotating said screw, and means for lowering and raising the screw.

8. Means for filling a casing with filler material comprising, in combination, an imperforate tube for insertion in the casing through which the filler material may be fed into the casing, a rotatable screw extending into the tube and having its end projecting exteriorly thereof, a plurality of expanders located on the projecting end of the screw, and means for rotating the screw.

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