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APPARATUS FOR FILLING BAGS

Filed March 4, 1946

2 Sheets-Sheet 1

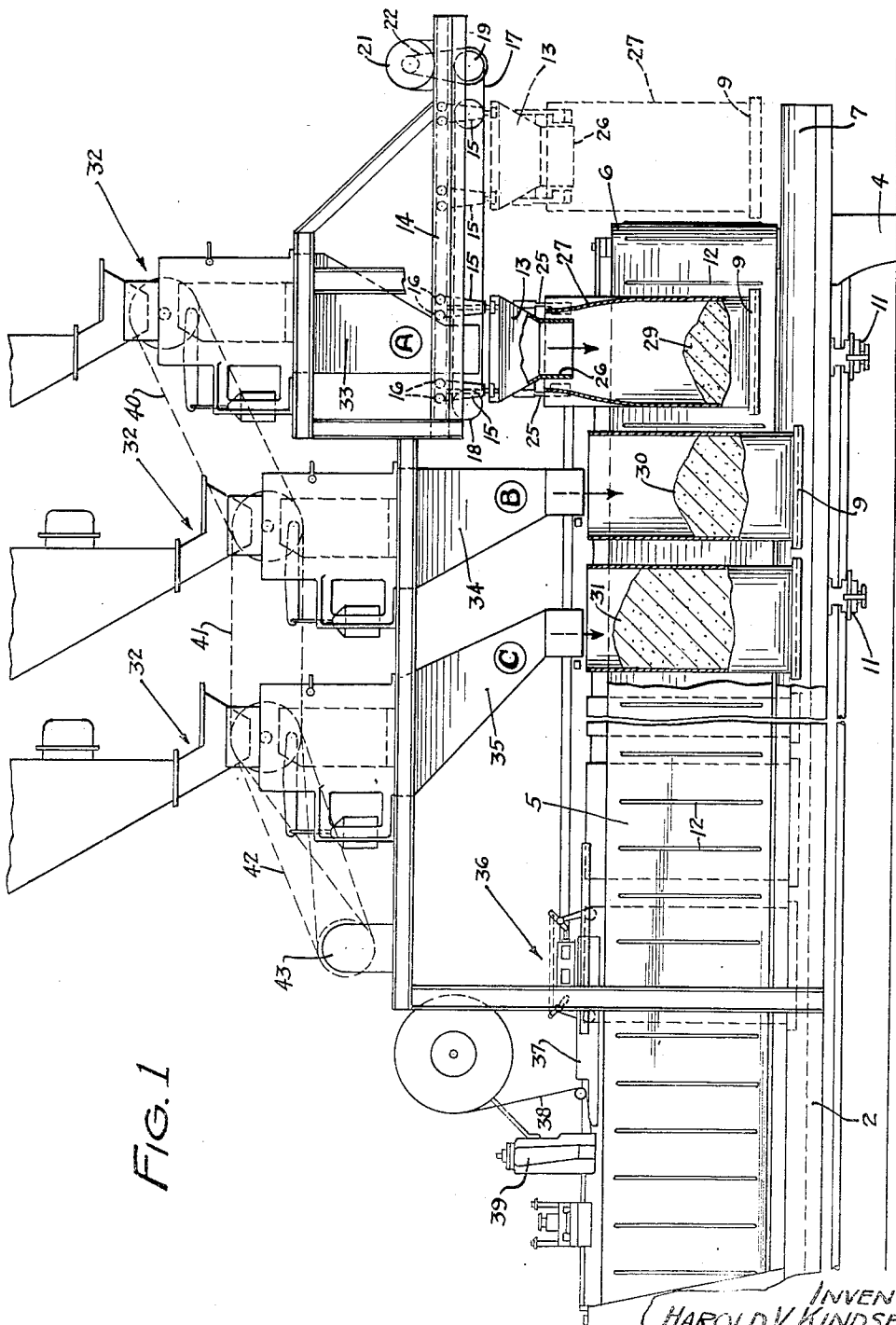


FIG. 1

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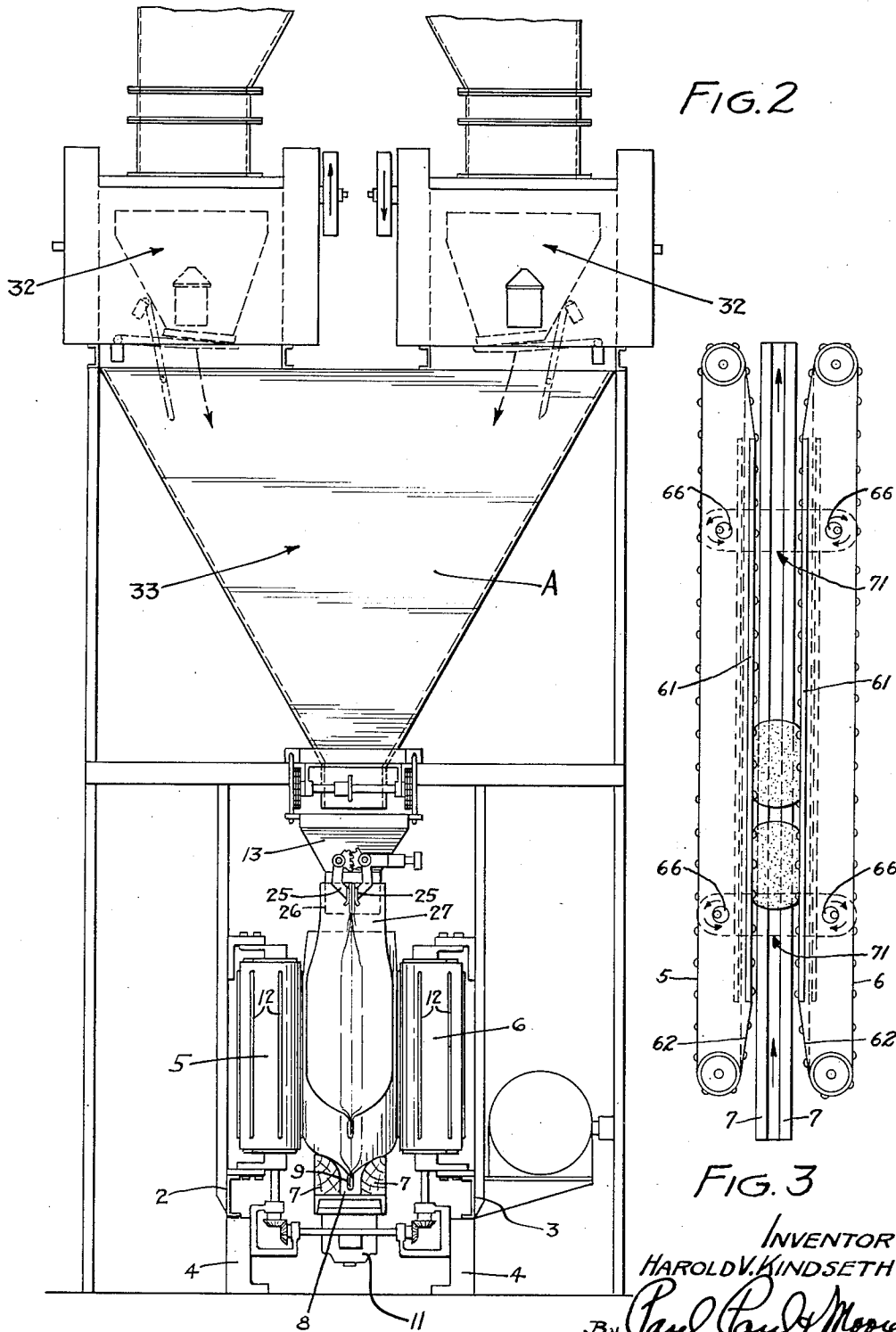
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2 Sheets-Sheet 2



## UNITED STATES PATENT OFFICE

2,548,222

## APPARATUS FOR FILLING BAGS

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6 Claims. (Cl. 226—55)

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This invention relates to new and useful improvements in methods of and apparatus for filling bags, and more particularly to a unique method of filling relatively large bags such as fifty to one hundred pound bags, whereby such bags may be expeditiously filled with the contents of the bags firmly compacted therein.

Large bags are frequently difficult to quickly fill with a finely pulverized or comminuted material such as flour, and various other materials which may be highly aerated whereby such materials have a tendency to entrain considerable air when delivered into bags, particularly if the material is to be firmly compacted in the bags.

Heretofore, one bag has been filled at a time, and the material has usually been delivered into each bag from a conventional filling hopper while the bag body may be subjected to a shaking or vibratory action to cause the material to settle therein. If the material is not firmly compacted in the bags before the bag tops are closed and sealed, subsequent handling of the filled bags may soon cause the loose material therein to settle or become more compacted in the bags, whereby the bag bodies become loose and shapeless, which is very undesirable for various well known reasons. Heretofore, to insure reasonably thorough compacting of the material in each bag, it has been necessary to slowly deliver the material into each bag from the filling hopper to allow ample time for the material to become firmly settled in the bags. This method has therefore been rather slow because of the time required to fill each bag.

It is therefore highly desirable that some method be provided whereby relatively large bags may be quickly filled with the assurance that the material in each bag will be firmly compacted therein so that when each bag has received its full charge, and its open top is closed and sealed, the contents of the bags is not likely to relatively settle or become more firmly compacted therein from subsequent handling of the bags, which may cause the bag walls to become relatively loose and unsightly.

An object of the present invention, therefore, is to provide an improved method of filling relatively large bags, whereby such bags may be quickly and expeditiously filled with any finely pulverized or comminuted material, such as flour and the like, which heretofore has been considered difficult to quickly compact in bags because of the inherent aerated condition of such materials, and whereby such material may be quickly introduced into the bags and firmly com-

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pacted therein in a relatively short interval of time.

A further object is to provide an improved method of filling large bags which consists in simultaneously delivering predetermined partial charges into a plurality of bags as they are progressively advanced along a predetermined path, whereby each bag is subsequently filled by successively delivering therein a plurality of predetermined partial charges, the bags simultaneously being subjected to a shaking or vibratory action to cause the material to become firmly compacted therein as the partial charges are successively delivered thereinto.

A further object is to provide an apparatus for filling relatively large bags comprising a suitable conveyor for advancing the bags along a predetermined path in spaced relation, and a plurality of bag filling hoppers being arranged over the conveyor having means controlled by the movement of the bags through the apparatus for causing each of said bag filling hoppers to deliver a partial charge into each bag as it passes thereby, whereby the bags will subsequently be filled with a plurality of successive charges of material simultaneously as the bag bodies are subjected to a vibratory action, and whereby the material delivered into each bag will become firmly compacted therein, after which the bag tops may be closed and sealed with the assurance that the walls of the bag body will not become slack and unsightly as a result of the contents of the bags further settling therein from subsequent handling of the filled bags.

A further object of the invention resides in the provision of an apparatus having means for advancing the bags along a predetermined path and simultaneously subjecting them to a vibratory action to cause the material delivered thereinto to become firmly compacted therein, and a plurality of filling stations being arranged along the path of travel of the bags, each comprising a bag filling hopper having one or more weighing buckets therein, and each bag filling hopper having means controlled by the movement of the bags through the machine to cause each bag filling hopper to deliver a predetermined partial charge into each bag as it passes thereby, and whereby said bags are constantly being vibrated as they receive successive partial charges from said stations, thereby assuring that when each bag has received its full charge, the contents thereof will be firmly compacted therein so that the bag tops may be closed and sealed as the bags are successively discharged from the machine.

Other objects of the invention reside in the manner of delivering the empty bags to the first filling station; in the means for advancing the bags through the apparatus in spaced relation and whereby the bag bodies are constantly being subjected to a vibratory action to cause the partial charges of material delivered thereinto to become firmly compacted therein; in the spacing of the bag filling hoppers along the path of travel of the bags, whereby two or more such hoppers may simultaneously deliver partial charges of material into adjacent bags advancing through the apparatus, and whereby each bag will subsequently be filled to capacity; and in the provision of such an apparatus which is extremely simple and inexpensive in construction, and is highly efficient and expeditious in performance.

Other objects of the invention will appear from the following description and the accompanying drawings and will be pointed out in the annexed claims.

In the accompanying drawings there has been disclosed a structure designed to carry out the various objects of the invention, but it is to be understood that the invention is not confined to the exact features shown, as various changes may be made within the scope of the claims which follow.

In the drawings:

Fig. 1 is a side elevation of a bag filling and closing machine embodying my invention;

Fig. 2 is an end view of Fig. 1; and

Figure 3 is a schematic plan view of a mechanism for horizontally actuating the inner belt runs to cause them to impart a patting action to the bag bodies.

The novel apparatus herein disclosed is shown comprising a suitable supporting frame which may be composed of longitudinally extending side beams 2 and 3 supported on legs 4 as shown. A pair of longitudinally extending side belts, generally designated by the numerals 5 and 6, are mounted adjacent to a pair of longitudinally extending bag-supporting members or rails 7, adapted to carry the weights of the bags and to impart a vibratory action thereto in a vertical direction. The bag-supporting members 7, as best shown in Fig. 2, are preferably spaced apart laterally to provide a gap 8 therebetween for receiving the usual bottom closure 9 of the bag bodies, which, as here shown, is formed by folding a sealing tape over the flattened bag walls and suitably securing it thereto, it being understood that the apparatus herein disclosed is particularly designed for filling fifty to one hundred pound bags. The means for imparting a vibratory or shaking action to the bag-supporting members 7 is diagrammatically indicated at 11 in Figs. 1 and 2.

The side belts 5 and 6 are shown provided with vertically disposed cleats 12 spaced apart lengthwise of the belts and adapted to engage the bag bodies and advance the bags through the machine as they are simultaneously being vibrated by the spaced members 7.

Means is preferably provided for imparting a limited lateral movement to the inner runs of the belts 5 and 6, or those portions of the belts which directly engage the bag bodies, thereby to cause the belt runs to impart a patting action to the bag bodies, which, in conjunction with the vibratory or shaking action imparted thereto by the members 7, indicated at 11 in Figures 1 and 2 will cause the contents of the bags to become

more quickly and firmly compacted therein. A mechanism for thus causing the side belts to impart a patting action to the bag bodies is shown in my co-pending application Serial No. 643,573 filed January 26, 1946, now Patent No. 2,458,387 of January 4, 1949, and, as indicated in Figure 3, are shown comprising opposed backing plates or members 61 arranged to engage the outer surfaces of the inner runs 62 of the side belts 5 and 6. The backing plates 61 are horizontally adjustable by suitable means not shown in the drawings, to vary the spacing therebetween in accordance with the size of bags to be passed through the machine.

To cause the backing plates to impart a patting action to the bag bodies, there is diagrammatically indicated in Figure 3, a plurality of eccentrics 66 mounted for rotary movement about vertical axes and driven by suitable mechanisms, generally indicated by the numeral 71. The eccentrics 66 impart a limited horizontal movement to the opposed backing plates 61, which in turn is imparted to the inner belt runs 62 and therefore to the bag bodies. The backing plates or members 61, operate simultaneously with the bag vibrating members 7, whereby the combined actions of the members 7 and the horizontally movable plates or members 61 will cause the contents of the bags to become thoroughly and completely settled and compacted in the bags as they travel through the apparatus.

One of the important features of the present invention resides in the novel method employed for delivering the material into each bag as the bags are advanced through the machine by the conveyor belts 5 and 6.

In the apparatus as illustrated in Fig. 1, three filling stations are provided, designated by the reference characters A, B, and C. It is to be understood that the number of filling stations may be varied as desired without departing from the scope of the invention.

Station A is shown comprising a funnel-like hopper 13 suspended beneath a track 14 by suitable hangers 15, shown provided with anti-friction rollers 16 adapted to travel back and forth upon the tracks 14.

The hopper 13 travels between the full and dotted line positions indicated in Fig. 1, and such action is imparted thereto by an endless chain 17 mounted on suitable sprockets 18 and 19 which may be driven from a motor 21 by a suitable belt or chain 22, and which has an operative connection (not shown) with the hopper 13, preferably through one of the hangers 15.

The funnel-shaped hopper 13 is provided fore and aft with pairs of grippers indicated by the numeral 25, adapted to grip the bag top walls when the bag top is manually fitted over the lower end portion 26 of the hopper 13. The operation of the chain 17, which reciprocates the funnel-like hopper 13 upon the tracks 14, may be continuous, and its connection with the hopper 13 is such that the hopper 13 will temporarily come to substantially a standstill at each end of its travel, whereby the operator will have ample time to secure an empty bag 27 to the hopper 13 and also whereby when the empty bag depending from the hopper 13 reaches substantially the full line position shown in Fig. 1, the bag 27 may receive a partial charge from station A, after which the grippers are actuated to release the partially filled bag 27 and permit it to drop by gravity onto the longitudinally ex-

tending bag supporting members 7, as indicated in Fig. 2.

The reciprocal movement of the funnel-like hopper 13 is in timed relation to the travel of the bags through the machine, whereby the bags are successively advanced through the machine in spaced relation, and as each bag passes beneath stations B and C, it will receive a partial charge of material, as indicated by the numerals 30 and 31. When three stations are utilized, as shown in Fig. 1, one-third of a full charge of material may be delivered into each bag at each of stations A, B, and C, and whereby as each bag receives its partial charge from station C, such charge will complete the filling of the bag.

To expedite the delivery of material into each bag, two weighing buckets 32 may be provided at each station, as shown in Fig. 2, adapted simultaneously to deliver their weighed charges into the hopper positioned therebeneath for receiving and conducting the weighed material into a bag positioned between the conveying belts 5 and 6.

In stations B and C the weighing buckets 32 may be disposed at a lower level, and have their respective bag filling hoppers 34 and 35 arranged to directly deliver the material into the open bags as they are passing therebeneath, as will be understood.

A suitable bag top closing mechanism, generally indicated by the numeral 36, is interposed in the path of the bag tops adapted to fold the walls of each bag top into flapwise relation, after which the flattened bag top walls may pass through a suitable folder 37 to receive a strip of sealing tape 38, as is well known in the art. The sealing tape may be secured to the bag top walls by stitching from suitable sewing head 39, or it may be adhered thereto with a suitable adhesive. In some instances it may be found desirable to secure the sealing tape to the bag top walls by both stitching and pasting, depending upon the nature of the material contained in the bags.

The weighing buckets 32 of stations A, B, and C may be interconnected for simultaneous operation by suitable belt or chain drives indicated at 40, 41 and 42, from a suitable motor 43.

Means, not shown in detail, may be provided along the path of travel of the bags for controlling the operation of the bag filling hoppers. In some cases it may be desirable to cause all stations to deliver partial charges of material into the respective bags at one time, whereas in other cases it may be found more desirable to have the bag filling hoppers operate in alternate relation.

The main feature of the invention, as hereinbefore stated, resides primarily in the provision of a bag-filling apparatus wherein predetermined partial charges are simultaneously delivered into a plurality of bags from a plurality of bag filling hoppers, whereby the operation of filling the bags may be greatly expedited as compared to the usual method now employed.

This results because the material is delivered into each bag in partial charges, and while the bag bodies are being constantly vibrated both vertically and laterally so that before bag 27 can reach station B, the charge 29 therein will be firmly compacted in the bag. In like manner, as each bag travels from station B to station C, the added charge of material introduced therein from station B will become firmly compacted in the bag before the final charge is delivered into each bag at station C.

Thus with an apparatus such as illustrated in Fig. 1, three bags may be receiving partial charges from stations A, B, and C at one time, as indicated by the arrows in Fig. 1, station A introducing the initial partial charge, station B the second partial charge, and station C delivering the final partial charge to completely fill each bag.

When filling one hundred pound bags in an apparatus such as shown in Fig. 1, the initial charge delivered into bag 27 at station A may be one-third of the total charge to be delivered into each bag, and as each bag reaches station B, it may receive another similar charge therefrom to further complete the filling of each bag. The final one-third charge is delivered into each bag at station C, whereby each bag is completely filled, and may then proceed to the bag top closing and sealing means, shown at 36, 37, and 39.

The apparatus as shown in Figs. 1 and 2 is comparatively simple and inexpensive in construction, and readily lends itself for use in the packaging of various materials which heretofore have been difficult to package in an expeditious manner because of the necessity of having to slowly introduce the material into the bags to allow the material ample time to settle therein during the filling operation.

From the foregoing, it will be readily understood that the outstanding feature of this invention is to provide means whereby large bags may be quickly filled and the material adequately compacted therein in a comparatively short interval of time as compared to present methods now employed. While I have herein shown three stations, the number of stations to be employed may depend upon the nature of the material to be packaged. It will also be noted that each station is shown comprising two weighing buckets 32. The advantage gained by such a construction resides in the fact that both buckets 32 of a given station may be operated to simultaneously dump their weighed loads into their respective hoppers 33, whereby the latter will guide the dual weighed loads into the open top of a bag as shown in Fig. 1. The delivery of the material into the weighing buckets 32 requires time, as is well known, and therefore when two such weighing hoppers are utilized at each station, the time required to deliver a charge into each bag from any station is limited only to the time required to charge and dump weighing buckets 32.

Thus, by this novel method, two, three, or more bags may simultaneously be receiving partial charges from filling stations arranged along the path of travel of the bags. The settling of the material into the bags may be controlled by varying the spacing between stations and also by the intensity of the vibratory and shaking actions imparted to the partially filled bags as they travel from one station to the next. Actual experience has shown that large bags filled in accordance with the above described method will have their contents thoroughly and firmly compacted therein, whereby when the bag tops are subsequently closed and sealed, there is little danger of the contents of the bags becoming further compacted therein as a result of subsequent handling of the bags, thereby assuring that the full and sealed bags will retain their original shapes and symmetric appearance. Also by utilizing a plurality of stations for simultaneously delivering partial charges into two or more bags at the same time, as herein set forth, one

hundred pound bags may be expeditiously and conveniently filled at a relatively greater speed than has heretofore been possible with conventional methods and equipment.

It will be apparent to those skilled in the art that I have accomplished at least the principal objects of my invention, and it will also be apparent to those skilled in the art that the embodiments herein described may be variously changed and modified, without departing from the spirit of the invention, and that the invention is capable of uses and has advantages not herein specifically described; hence it will be appreciated that the herein disclosed embodiments are illustrative only, and that my invention is not limited thereto.

What I claim is:

1. In an apparatus for filling relatively large flexible walled bags, conveying means for advancing the bags along a predetermined path, a plurality of bag filling hoppers spaced apart lengthwise of said travel path, and means controlled by movement of the bags through the apparatus for causing each bag filling hopper to deliver a predetermined partial charge into each bag and whereby successive partial charges are delivered into each bag as the bags are advanced beneath said hoppers thereby to fill the bags.

2. In an apparatus of the class described, means for conveying bags along a predetermined path in spaced relation, a plurality of bag filling hoppers disposed over said travel path and spaced apart lengthwise thereof, means made operable by movement of the bags beneath said hoppers to cause each hopper to deliver a predetermined partial charge into each bag as it passes thereby and whereby said hoppers will simultaneously deliver partial charges into the bags passing therebeneath until the bags are subsequently filled with a predetermined full charge.

3. In an apparatus for filling relatively large bags, means for advancing the bags along a predetermined path, a plurality of bag filling stations along said path with each station having a bag filling hopper, a pair of weighing buckets at each station adapted simultaneously to deliver a partial charge into each bag filling hopper, means at said stations for controlling the operation of their respective bag filling hoppers and whereby each station will deliver a predetermined partial charge into each bag as the bags successively pass said stations, thereby to quickly fill the bags.

4. In an apparatus for filling relatively large bags, means for advancing the bags along a predetermined path, a plurality of bag filling stations along said path with each station having a bag filling hopper, a pair of weighing buckets at each station adapted simultaneously to deliver a partial charge into each bag filling hopper, means at said stations for controlling the operation of their respective bag filling hoppers and whereby each station will deliver a predetermined partial charge into each bag as the bags successively pass said stations, thereby to quickly fill the bags, and means for imparting a shaking action to the bag bodies and simultaneously imparting a patting action to the opposed sides of each bag, thereby to cause the material to quickly settle in the bags as the bags advance from one station to the next.

5. In an apparatus for filling relatively large bags, a bag filling station, a conveyor for delivering empty bags to said station to receive a charge, said conveyor comprising a plurality of coacting opposed jaw gripping elements adapted to grip the adjacent opposed top wall portions of the empty bags and to pendantly support each bag body from its top while receiving a charge.

6. In an apparatus for filling relatively large bags, a bag filling station including a conveyor for delivering empty bags to said station to receive a charge, said conveyor comprising a plurality of coacting opposed jaw gripping elements adapted to grip only opposed wall portions of each bag mouth, and whereby the empty bag bodies are suspended from their tops while receiving a charge.

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