

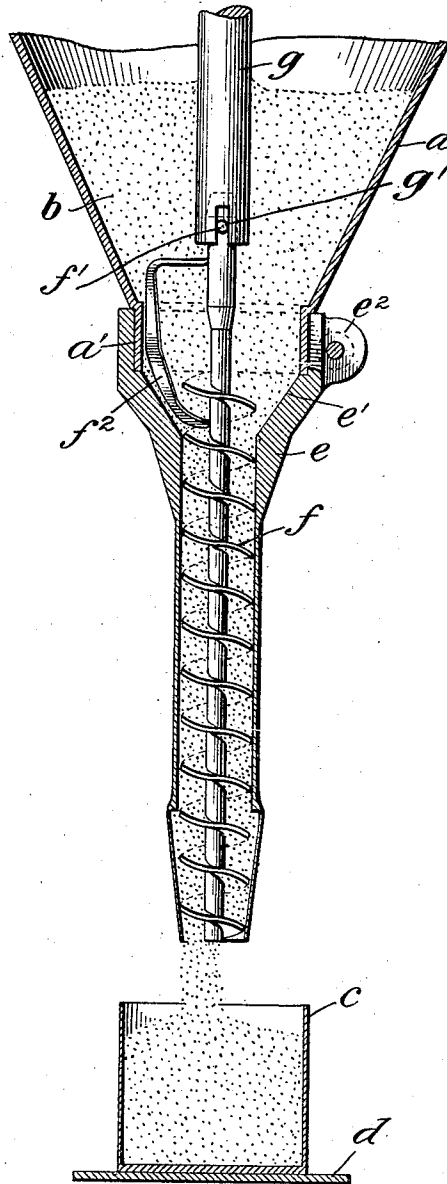
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FEED FOR POWDER IN AUTOMATIC PACKAGING MACHINES

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UNITED STATES PATENT OFFICE.

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FEED FOR POWDER IN AUTOMATIC PACKAGING MACHINES.

Application filed December 7, 1920. Serial No. 428,897.

To all whom it may concern:

Be it known that I, BENJAMIN F. ADAMS, a citizen of the United States, residing in Tenafly, in the State of New Jersey, have invented certain new and useful Improvements in Feed for Powder in Automatic Packaging Machines, of which the following is a specification, reference being had to the accompanying drawing, forming a part hereof.

This invention relates to a feed for free flowing powder in packaging machines wherein a predetermined weight is to be fed into a container. In machines of this character, two objectionable conditions always persist, in that, first, compounded powders are agitated and the constituents unmixed and, second, the powder when agitated and fed to the container is aerated so that its density is lowered and that predetermined weight for which the container is designed can not be received. Any compounded powder having constituents of different densities, if agitated, will become unmixed in that the constituents will seek levels dependent upon their relative densities. In known feeds for machines of this type, however, a continuous agitation is necessary in order to prevent clogging and to insure a continuous flow of powder. Again, violent agitation of powder necessarily produces aeration and when the powder is permitted to drop from the discharge opening of the feed into a container this degree of aeration is greatly increased. All known feeds for such machines result in such aeration, so that the powder deposited within the container is of much less density than the powder in the machine hopper and this density must be increased to normal before the container can hold the predetermined weight. It is now the common practice to employ at least two fills, the primary fill being followed by a compacting of the powder by some suitable mechanical means, after which a secondary fill is employed to bring the contents up to the predetermined weight. In the secondary fill the powder is nevertheless aerated, so that the volume of the container must always be greater than that which would be required were the density of the powder unchanged during the filling operation.

The problem presented in the feeding of powder is, therefore, different from that encountered in the feeding of any other kind

of material, whether solid or liquid. A study and understanding of the problem has led to its solution by the means which constitute the subject matter of this application, such means in themselves comprising elements which, in form, have been used in different relations in other fields. The principal object of the invention is to provide a feed for automatic packaging machines which shall transfer the powder from the machine hopper to the container without unmixing and without aeration. The improved feed transfers the powder in a continuous and uniform stream of uniform density and without interruption and without agitation, from the machine hopper to the container. A further object of the invention is to provide such a feeding device in which the driven element can be readily interchangeable with like elements of different lengths so as to meet the requirements for containers of various heights, so that the material can always be discharged directly into the mouth of the container.

The means for accomplishing these and other objects will now be described with reference to the accompanying drawing which shows in vertical section the improved feed in its relation to the machine hopper and to a container.

The lower portion of a machine hopper of usual form is indicated at *a*, the powder therein being indicated at *b*. The container into which the powder is to be fed is indicated at *c* and may rest on a platform scale, indicated at *d*, which, upon introduction into the container of a predetermined weight of powder, initiates operation of automatic devices for cutting off the flow of powder, transferring the container on to a belt conveyor for delivery and placing in position on the scale the succeeding container for filling. These devices form no part of the present improvements and so have not been illustrated in detail.

Heretofore two types of feed for the powder have been widely employed. In one type, a slotted plate is arranged in the lower end of the hopper *a* and a star wheel oscillates on the plate constantly to agitate the powder and move it into line with the slots through which it drops by gravity. After passing through the plate the powder drops into a container beneath the hopper. The constant and violent agitation of the powder

by the container causes the constituents thereof to separate and seek levels depending on their relative densities, thereby unmixing the powder, and also causes aeration of the powder and considerable reduction in its density as a whole. This aeration is greatly increased when the powder falls through the air from the plate into the container, there being no means of minimizing the extent of this fall nor of varying it for containers of different heights. In the second type of feed which is often employed the powder is conveyed from the machine hopper through a horizontal passage in which may be mounted a screw or other type of conveyor. Constant agitation of the material to insure its continuous movement into such horizontal passage is necessary and a horizontal conveyor acting on the material received in the horizontal passage compacts the material at different points along its length into different densities, the density at the place of discharge, of course, being the least. This compacting tends to cause clogging and an irregular flow. Again, the fall of the powder from the point of discharge into the container is through a distance which cannot be proportioned to the height of the container and is usually so great as to cause additional aeration. In accordance with the present invention, the feed of the powder is always in a vertical direction from the hopper *a* into the container *c*, is always continuous and uniform, and, being in such an unbroken stream, the powder retains its same density. In accomplishing the result a feed casing *e*, formed at its upper end as a funnel *e'*, is secured, as by means of a split clamp *e''*, to a circular flange *a'* formed at the lower end of the hopper *a*. Within the feed casing *e* is mounted a vertical auger *f* which extends from a point within the funnel section *e'* preferably below the lower discharge end of the casing *e*. The upper end of the auger *f* is connected detachably with a vertical drive shaft *g* which may have in its lower end a transverse slot *g'* to receive a pin *f''* at the upper end of the auger *f*. In order to prevent clogging of the powder at points somewhat remote from the auger *f* and in the funnel section *e'* of the casing *e* there is mounted on the auger *f* a knife *f''* which may pass around on the inner wall of the funnel section *e'* when the auger *f* rotates so as constantly to scrape the powder on the walls of the casing and prevent its clogging in that section. The powder in the funnel section *e'*, of course, rests on the upper surface of the spirals of the worm extending into such section and when the auger is rotated the powder finds its way partly under the action of gravity and partly under the confinement of adjacent spirals of the worm to lower levels in the casing *e*.

The machine hopper *a* will, in any machine, always be at a fixed distance from the platform scale *d*. It would obviously not be practical to change this distance without great expense. In the improved machine the lower end of the hopper *a* is formed with a depending flange *a'* to which can be clamped the upper end of the casing *e*. This casing *e* is of a length dependent upon the height of the container *c* so as to provide for the discharge of the powder from the casing *e* directly into the mouth of the container.

The underlying object of the invention is to effect the transfer of powder in a continuous stream from this hopper *a* into the container *c* without interrupting the stream so that at each point the powder remains of the same density. Not only does this insure the deposit of a predetermined weight of powder within the container at the known density of such powder, thereby permitting the container to be made definitely of minimum volume for a given weight, but it precludes the possibility of unmixing or rearranging the constituents so as to change the powder from a homogenous mix into a stratified mass. In operation, when the container *c* is in place, the shaft *g* will rotate the auger *f*. The powder passing into the funnel section *e'* of the casing *e* will move downwardly in the casing along the blades of the auger *f* until it reaches the point of discharge where it will drop directly into the mouth of the container. No agitation of the powder, as such, is resorted to. The knife *f''* constantly moves in the mass of powder and prevents its clogging and facilitates its free flow. No extended drops of the powder are permitted at any points, so that aeration is avoided. The powder at the lower end of the casing *e* is of exactly the same density as the powder within the hopper *a*, the cross section of it not having been disturbed at any point. By adapting the length of the casing *e* to the height of the container *c* the fall of the powder in a continuous stream insures the deposit of it at the same density as that in the hopper. The results flowing directly from the provision of a feed which absolutely prevents unmixing will be appreciated without further statement. The advantages derived from preventing aeration are of great importance to the manufacturer as well as to the user. The capacity of any known machine will be practically doubled. There will not be a primary and secondary fill since a primary fill finds the powder deposited in the container with its normal density. The container receives a predetermined weight of powder at this density and acting on the platform scale *d* results in conveying of the can to the compressor mechanism for capping. The mechanical devices heretofore

necessary for compacting the powder after the primary fill are eliminated and duplicate mechanism for effecting the secondary fill is avoided. The cost of the machine is thereby materially lowered, its efficiency greatly increased by the simplification, a substantial amount of time saved and the volume of the container for a predetermined weight more accurately established. The adaptability of the machine for containers of varying heights by the mere interchange of feeds gives a flexibility and insures the maintenance of all of the advantages described herein. In feeds heretofore employed the height of the container has never been taken into account since the extent of fall of the powder and the resulting aeration have never been thought determinable.

I claim as my invention:

1. An apparatus for transferring powder from a hopper to a package with no agitation or aeration whereby the mix and density of the powder are unchanged, comprising a drive shaft extending down into the hopper, a vertical feed casing of substantial length at the lower end of the hopper, an

auger feed mounted in said feed casing and detachably engaging with the said drive shaft, and means for detachably securing the feed casing to the lower end of the hopper, whereby the auger feed and feed casing may be changed at will according to the height of the package being filled.

2. An apparatus for transferring powder from a hopper to a package with no agitation or aeration whereby the mix and density of the powder are unchanged, comprising a drive shaft extending down into the hopper, a vertical feed casing of substantial length at the lower end of the hopper, an auger feed mounted in said feed casing and detachably engaging with the said drive shaft, a knife carried by said auger feed, and means for detachably securing the feed casing to the lower end of the hopper; the feed casing, auger feed and knife being changeable at will from below, according to the height of the container being filled.

This specification signed this 3d day of December, A. D. 1920.

BENJAMIN F. ADAMS.