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ROTARY DISCHARGE ELEMENT FOR HOPPERS, HAVING HELICAL POCKETS AND AN AXIALLY SLIDABLE SHIELD FOR ADJUSTABLY OCCLUDING SAID POCKETS

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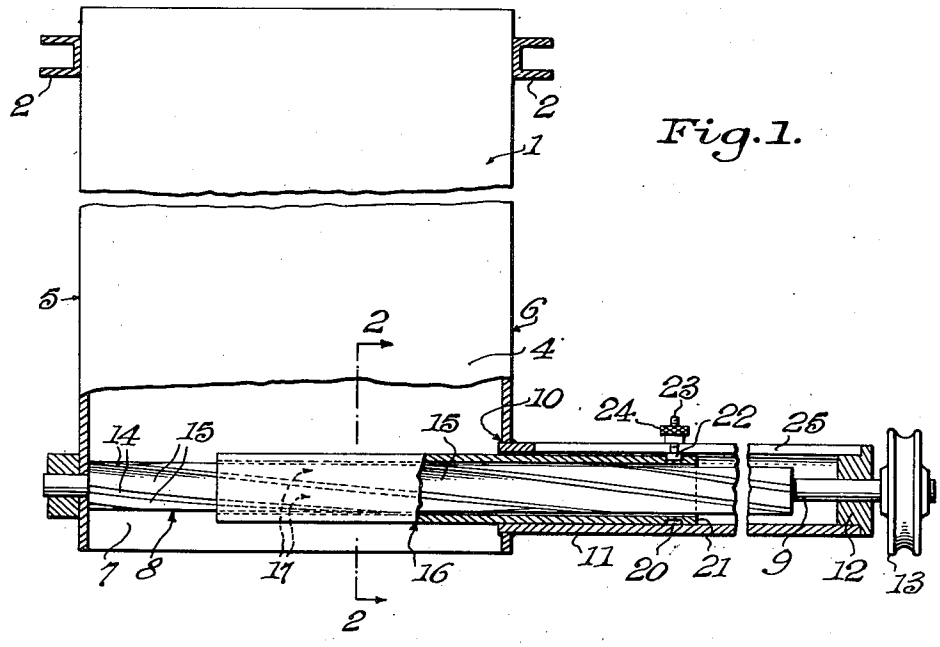


Fig. 1.

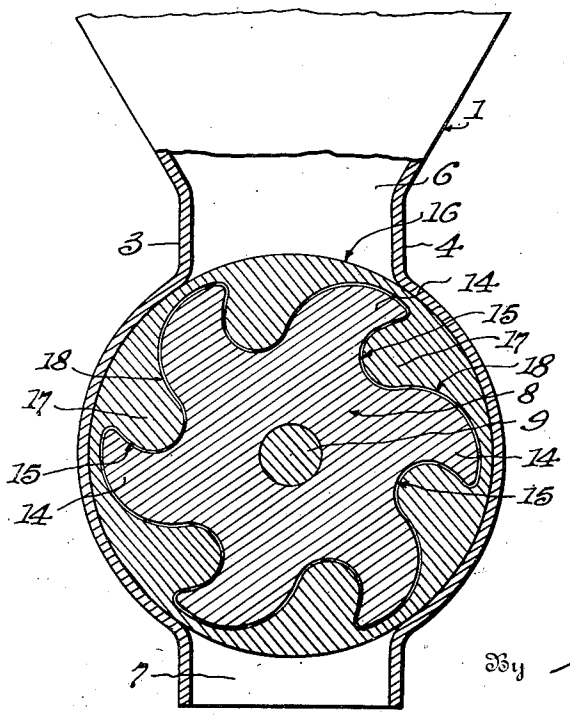


Fig. 2.

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ROTARY DISCHARGE ELEMENT FOR HOPPERS, HAVING HELICAL POCKETS AND AN AXIALLY SLIDABLE SHIELD FOR ADJUSTABLY OCCLUDING SAID POCKETS

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3 Claims. (Cl. 222—303)

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This invention relates to an improved feeding mechanism whereby granular and powdered materials may be fed at variable rates. It also relates to mechanisms of the character described which are provided with a rotary pocket type feed valve having a slidable shield mounted thereon whereby a variable volumetric feed may be provided at a constant R. P. M. of the feed valve.

Numerous feeding mechanisms have heretofore been made for use with dry materials, but insofar as the applicant is advised, these devices leave much to be desired, from the viewpoint of their first cost, maintenance or dependability in operation.

Insofar as prior art mechanisms utilizing rotary pocket type feed valves are concerned, variations in the rate of feeding are usually provided by dividing the hopper into sections and closing off certain sections with a vertical shield to reduce the rate at which the mechanism feeds. However, such feeding devices have inherent defects in that the rate of feeding can only be increased or decreased by steps and the portion to be used cannot be reduced in width beyond a critical point, which is determined by the size of the particles and character of the substance being fed, and beyond which the material will not readily feed at a constant rate. One of the major purposes of this invention is, therefore, the provision of an improved feeding mechanism to provide a variable feed of solid particles at a constant R. P. M. of its rotary valve.

Another purpose is to provide a feeding apparatus of economical construction which is efficient and dependable in operation, and which makes use of a rotary feed member whereby varying rates of feed may be obtained at an identical R. P. M. of the feed member.

Another purpose is the provision of a novel shielded rotary feed member whereby the rate of feed through a feed hopper apparatus may be infinitely varied, within the capacity of the mechanism without changing the R. P. M. of the rotary element.

A yet further purpose is the provision of a feeding mechanism with a rotary feed member having a slidably mounted shield whereby the mechanism may furnish infinitely variable rates of feed at a constant R. P. M.

The other and further purposes of this invention will become apparent from the accompanying drawing, the following specification and the claims appended hereto.

In the drawing,

Fig. 1 is a partly end elevational view of a

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preferred embodiment of this invention in which certain portions of the device are broken away and other parts are shown in section, and

Fig. 2 is an enlarged sectional view taken along the lines 2—2 of Fig. 1.

Referring now to the drawing, 1 indicates a hopper supported by any suitable means, such as overhead beams 2. This hopper may be any suitable shape or construction, but in the form illustrated it is made of integral inwardly inclined side wall portions 3, 4, and of integral downwardly tapering end wall portions 5, 6. At its base, these hopper wall portions may be formed substantially as shown to provide a feed outlet 7 having a tubular rotary valve or feeder 8. This feeder is secured to a rotatable shaft 9 and its function is to feed the material out of the hopper as it is rotated. Both the feeder and the shaft, for a purpose which will become apparent as the specification proceeds, conveniently may be made approximately twice as long as the outlet opening as may be readily understood by referring to Fig. 1.

The wall portion 5 is adapted to rotatably support one end of the shaft. The opposite wall portion 6 is provided with a circular open portion 10 in which there is fixedly secured, by any suitable means such as welding, an elongated tubular projection 11 having a larger diameter than the feeder and adapted to receive a hereinafter mentioned tubular shield slidably mounted on the feeder. This tubular projection houses such portions of the feeder, the shield and the shaft as extend outside the hopper. There is provided at the outer end of this projection a rigidly secured bearing 12 through which the shaft extends and beyond which it may be provided with any suitable drive means such as a driven pulley 13.

The rotary feeder 8 is longitudinally recessed to provide a plurality of evenly spaced-apart wing portions 14. These portions may be made in any suitable form to provide elongated recessed portions or pockets 15 which preferably extend the entire length of the feeder and provide a means whereby, when the feeder is rotated, predetermined volumes of powdered, granular or crushed materials may be fed through the outlet when the pockets are rotated from their uppermost to their lowermost position on the feeder. In the embodiment shown, the wing portions and the pockets are spirally formed around the inner portions of the feeder to provide a continuous flow of materials from the hopper.

For certain purposes, for instance when the

fed materials are to be discharged into evenly spaced-apart buckets carried on a chain or belt moving below the outlet, these wings and pockets should extend in a straight line between the end portions of the feeder in order to make certain that the material be discharged in the buckets.

A circular metal shield 16 having a smaller outside diameter than the inside diameter of the tubular projection 11 and a larger inside diameter than the outside diameter of the feeder is slidably mounted on the feeder in a manner which may be well understood by referring to the accompanying drawing.

This shield may advantageously be made slightly longer than one-half the length of the feeder. It is so formed and recessed as to have inwardly extending projections 17 and outwardly extending pockets 18 which mesh respectively with the feeder pockets and wings in a manner adapted to fill such portions of the feeder pockets which are encircled by the shield.

The function of this shield is to provide a means whereby any desired rate of feed within the capacity of the feeding mechanism may be obtained by longitudinally moving the shield on the feeder in and out of the hopper outlet to such an extent as to provide the rate of feed desired. When the feeding mechanism is to be operated at full capacity at any given R. P. M. of the feeder, the shield is entirely retracted from the hopper outlet in order that all portions of the feeder pockets extending within this outlet may be filled with the material being fed to the hopper and discharge this material out of the hopper at the lower end of the outlet.

When the feeding mechanism is to be operated at a reduced capacity at any given R. P. M., the shield is slidably moved into the interior of the outlet to an extent dependent upon the reduction in the rate of feed desired and its inwardly extending projections or ribs 17 fill such portions of the feeder pockets as the shield encircles and thereby prevent any material from being fed out of these portions of the feeder pockets. It is therefore obvious that the capacity of this shielded feeder in the modification shown in the drawings is limited in direct proportion to the extent which the shield is inserted in the outlet. If the shield be of sufficient length to cover and encircle all portions of the feeder and extend to the end wall portion 5 it will prevent the passage of any of the material into the hopper. As the shield is retracted from the feed outlet into the tubular projection 11 such portions of the pockets as are uncovered will feed the material out of the hopper to the extent that they are uncovered. When the shield is fully retracted from the opening the hopper of course will again operate at its full feeding capacity.

Referring now to Fig. 1, it will be noted that the shield and the tubular projection have been provided with means whereby the shield may be readily moved longitudinally on the feeder and locked in any position adapted to permit any chosen rate of feed within the limitations of the feed mechanism. These means include an annular slot 20 provided at the outer end portion 21 of the shield. In this slot extends the head 22 of a threaded bolt 23 having a knurled nut 24. This bolt extends through an elongated slot portion 25 which is provided in the tubular projection to provide a means whereby the bolt may be moved longitudinally through the tubular projection and then locked in any desired position by merely tightening the nut.

From the foregoing description of the details of the construction of the illustrated embodiment of this invention, its manner of operation may be thoroughly understood.

When the hopper is adequately supplied with granular, powdered and crushed substances fed into the feeder pockets by gravity the material in these pockets is moved downwardly by the rotation of the feed and discharged from the hopper at a rate dependent upon the angular rotation of the feed and upon the extent to which it is not covered and rendered inoperative by the shield.

While one embodiment of the invention is disclosed herein it, of course, will be understood that structural modifications may be made, such as forming a hollow shield of welded plate, without departure from the scope of the invention of the following claims.

I claim:

1. A feeding mechanism for feeding solid materials in the form of small particles, a hopper having a feed outlet in the lower portion thereof, a circular rotatably mounted feeder valve having spaced-apart radially extending helically winding projections forming pockets in said valve to feed the material through said outlet, and extending partly within and partly without said outlet, and a single circular shield slidably mounted on and entirely encircling said valve having inwardly extending helical portions substantially filling said pockets and being adapted to move in and out of said outlet, said hopper having a stationary tubular extension fixedly secured to feed the hopper and forming a housing and a support for the portion of the valve extending without said outlet.

2. A feeding mechanism for feeding solid materials in the form of small particles, a hopper having a feed outlet in the lower portion thereof, a circular rotatably mounted feeder valve having spaced-apart radially extending and helically winding projections forming helical pockets in said valve to feed the material through said outlet, and extending partly within and partly without said outlet, and a single integrally formed shield slidably mounted on and completely encircling said valve having inwardly extending helical portions in meshed relationship with rod completely encircling and substantially filling said pockets and being adapted to move in and out of said outlet, said hopper having a stationary tubular extension fixedly secured thereto and forming a housing and a concentric support for the portion of the valve extending without said outlet, said tubular extension being provided with a longitudinally extending slot and said shield being provided near its outer end portion with an annular slot with a threaded nut and bolt means and being slidably mounted slot on said shield and extending through the slotted portion of the tubular extension in a manner whereby the shield may be moved in and out of said outlet and tightly secured to said tubular extension.

3. In a feeding mechanism of the character described, a hopper having a discharge outlet, a rotatably mounted feeder valve extending partly within and partly without said outlet and being provided with longitudinally extending recessed portions for feeding dry particles through said outlet and a tubular shield, movable without and within said outlet, slidably mounted on said valve and having helically winding and in-

wardly extending portions in meshed relationship with said pockets, said hopper having a tubular extension rigidly secured thereto and forming a rigid stationary housing and a support for the portion of the valve extending without said outlet, said tubular extension being provided with a longitudinally extending slot and said shield being provided with a threaded handle means extending inwardly and perpendicularly into said shield and extending through the slotted portion of the tubular extension in a manner whereby the shield may be moved in and out of said outlet and longitudinally secured with respect thereto.

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