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AUTOMATIC LIVESTOCK FEEDER

Filed Jan. 4, 1961

Fig. 1.

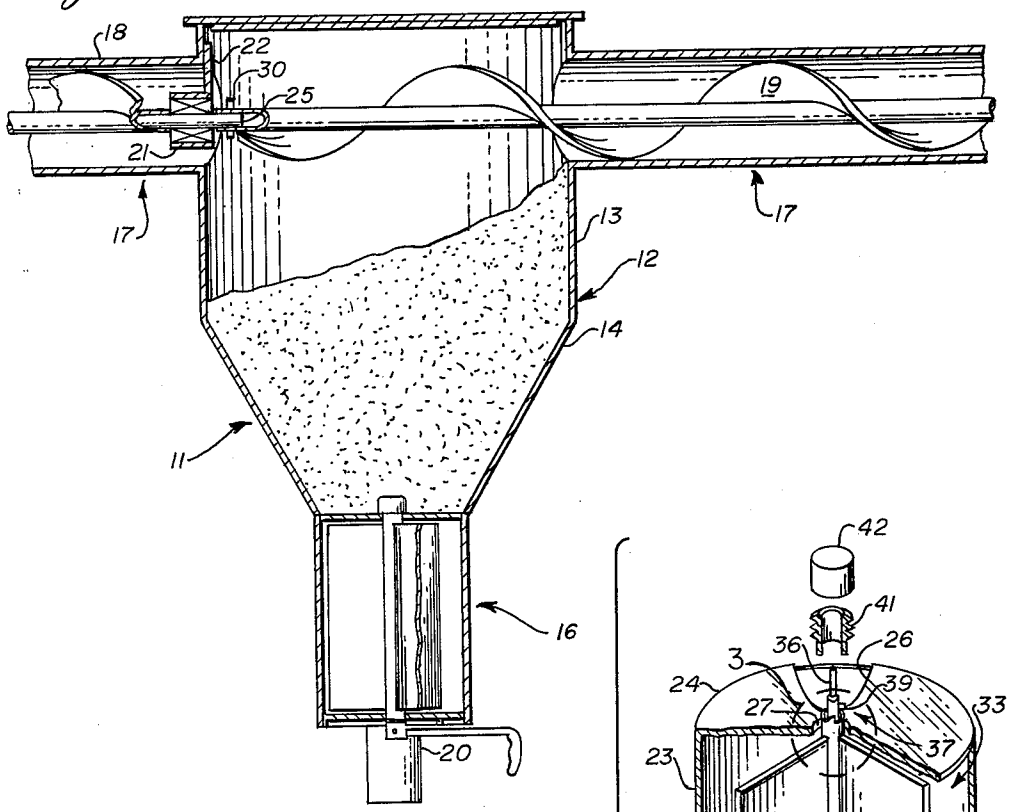


Fig. 3.

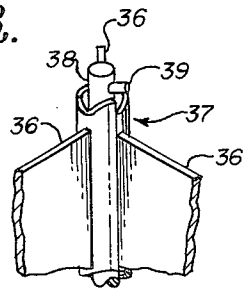
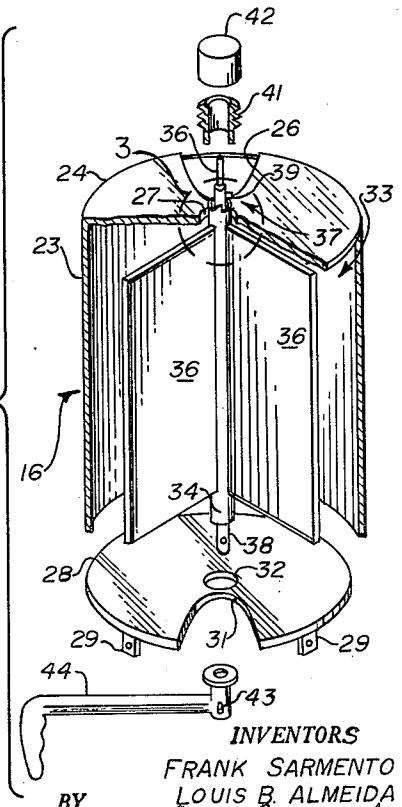


Fig. 2.



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AUTOMATIC LIVESTOCK FEEDER

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The present invention is generally related to livestock feeding systems and more particularly to an automatic feeding system incorporating a novel metering device, wherein such system is capable of feeding both pellet or mash forms of grain.

Heretofore, various feeding systems have been employed for feeding grain of various forms to livestock, fowl, etc. Such prior art systems have been for the most part manual or semi-manual in operation. Several of such systems have also been fully automatic in operation. In the manual or semi-manual types of systems, operation thereof is cumbersome and time consuming and requires constant supervision to effect smooth and continuous operation. Although such systems permit easier feeding during periods of actual physical operation thereof the aforementioned manual supervision and physical effort necessary for proper operation makes such operation an undesirable one.

On the other hand, prior art automatic feeding systems, require very little physical supervision or effort to effect continuous operation. But such systems have been, till the present time, capable of handling only pellet types of feed. Attempts to feed mash or crushed types of feed in such systems have resulted in binding or plugging the various components of the system, which plugging in turn, results in overall system failure and the expenditure of considerable time and effort to correct.

The present invention overcomes the aforementioned problems by utilizing an improved feeding configuration and a completely novel feed metering valve therein. Thus, such invention is capable of feeding with a minimum amount of manual effort and time, either pellet or mash types of grain feeds.

Therefore, it is an object of the present invention to provide an improved cattle or fowl, automatic feeding system capable of handling either pellet or mash types of grain feeds.

It is another object of the present invention to provide a novel feed metering valve wherein minimum physical effort is required to actuate same and where such valve is constantly filled and ready for subsequent use.

Still another object of the present invention is to provide a feed metering valve capable of handling with a minimum of physical effort either pellet or mash types of grain feeds.

Further objects and advantages of the present invention in conjunction with the operation thereof will become apparent by referring to the following description and claims in combination with the accompanying drawing, of which:

FIGURE 1 is a longitudinally-sectioned view of a representative section of the present invention including the novel feed metering valve;

FIGURE 2 is a longitudinally-sectioned expanded perspective view of the metering valve of FIGURE 1 in greater detail; and

FIGURE 3 is a detailed removed view of the vane ratchet drive shown in removed-section 3 of FIGURE 2.

Referring now to the accompanying drawing and in particular to FIGURE 1 there is shown a section **11** of the present invention wherein such section represents a typical portion thereof. Although the invention is herein described with respect to a single section **11**, it is to be understood that in actual application of the invention

a plurality of such sections are disposed in various sequences and configurations. For example, the invention may be arranged in a series of like sections **11** defining a U shape, an L shape, or a straight line, depending on the shape of the confining building or on the desired feeding arrangement. Any change of direction necessary to effect this configuration is accomplished by the use of "elbows" of the desired angle located between the respective sections. Such "elbows" are further described below.

Although the use of such sequences of feeding sections as are mentioned above is well known in the art of livestock feeding systems, the present invention overcomes the problem of feeding both mash or crushed types of grain, by employing certain simple features heretofore not evident in prior art feeding configurations. These features are explained more fully in the description infra.

More particularly concerning the structure of the present invention, section **11** further comprises a hopper **12** formed of a rectangular upper main body **13**, and a tapered lower body **14** depending therefrom. Feed entering the upper main body **13** falls into lower body **14** and is thus available for continually filling a feed metering valve **16** as the latter is operated. Feed is introduced to the upper body **13** by a conventional screw conveyor means **17** which includes an outer containing tube **18**, and a rotating screw herein called a flighting **19** coaxially mounted within the length of the tube **18**, whereby such rotating flighting transports feed therealong in a manner well known in the art of screw assemblies. Tube **18** is horizontally attached to one wall of the body **13** by suitable means such as welding or preferably by bolting thereto. The flighting **19** protrudes beyond the end of tube **18** and the wall of body **13**, to mount on the opposite wall of body **13** by means of a bearing **21**. Bearing **21** is mounted to the body **13** by means of a narrow bearing support **22** which extends upwardly from the bearing. Such a mounting configuration allows maximum clearance along the bearing for passing feed.

In all but the final hopper it is necessary to pass feed therethrough to thus permit filling all subsequent hoppers in the feed system. Therefore, on the bearing side of the intermediate hoppers there is mounted a screw conveyor means **17** identical to that hereinbefore described. The adjoining flightings **19** are secured one to the other within their respective hopper at the bearing **21** by means of a shaft **25** extending therebetween, which shaft passes through the bearing to bear radially thereagainst to provide for low friction rotation of flighting **19**. The shaft **25** is secured to the incoming flighting by a pin **30** and to the outgoing flighting by suitable means, i.e. welding. An electric motor or other mode of rotational power is attached to the input end of the integral lengths of the flighting **19** to rotate the entire length thereof. The "elbows" of previous mention are located along the lengths of flighting where it is necessary to change direction thereof. Such elbows are usually some form of gearbox and chain drive combination and are well known in the art of feeding systems, thus requiring no further explanation.

Referring now to FIGURES 2 and 3, the feed metering valve **16** of previous mention further comprises an outer cylinder **23**, which has welded to the upper end thereof a circular plate **24** to thus provide a sealed end at the upper end of cylinder **23**. The plate **24** is in turn welded against the bottom opening of the lower body **14** of the hopper **12**. A wedge-shaped portion is removed from the plate **24** to form a feed entrance hole **26**. The hole **26** is of such dimension to extend radially inward to closely approach the circumference of a hole **27** drilled through the center of the plate **24**. A lower circular plate **28** similar to plate **24** is fitted concentrically

within and is bolted to the lower end of the cylinder **23** by means of a plurality of flanges **29**. Such flanges **29** are welded to the lower surface of the plate **24**, along its circumference. A wedge-shaped portion is removed from plate **28** to form a feed outlet hole **31**, similar to the entrance hole **26** in plate **24**. The plates **24** and **28** are mounted on cylinder **23** in a configuration to dispose the entrance and outlet holes respectively in a 180° spaced relation. A hole **32** is drilled through the center of the plate **28**.

A rotating, divider vane assembly **33** fits snugly within cylinder **23** and comprises a center axis of a hollow pipe **34** which extends the length of the cylinder **23** to protrude therefrom. The diameter of the pipe **34** is such to fit snugly within the holes **27** and **32** of plates **24** and **28** respectively, and to rotate therein. Vanes **36** are welded along the axial length of pipe **34** to extend radially therefrom at 120° spaced intervals, to thus divide the cylinder **23** into three equal volumes. The vanes **36** are of such dimensions to extend radially to the wall of the cylinder, and axially to the plates **24** and **28**. The upper end of pipe **34** is formed into three tapered shoulders spaced 120° apart along the circumference thereof, thereby forming a three shouldered ratchet **37**. Such ratchet **37** allows unidirectional rotational force to be exerted upon the vanes **36**, preferably in a clockwise direction as viewed from above. A drive shaft **38** extends the length of the pipe **34** to protrude therefrom at either end. The upper end of the shaft **38** has a single projection **39** extending radially therefrom to engage a shoulder in the ratchet **37**. A hollow cylindrical sleeve **41** is coaxially welded to the upper surface of the plate **24** to thus extend above the protruding shaft and pipe. The sleeve **41** is in turn covered with a cap **42**, which is attached thereto by threaded means. The sleeve and cap thereby prevent feed from entering the upper end of the shaft **38** through the hole **27** to cause binding therein.

The lower end of the shaft **38** extends substantially beyond the lower end of the pipe **34** and has a handle **44** attached thereto by means of a set-screw **43**. The handle **44** is mounted on the lower end of the shaft **38** at a substantial distance therefrom to allow sufficient travel in the axial direction of the integral shaft to permit the projection **39** to move upwardly to clear the shoulder after an operation of the metering valve **16**.

Concerning now in detail the operation of the present invention and more particularly the operation of the novel feed metering valve **16**, at such time as the hopper **12** is being filled by the screw conveyor means **17**, feed drops through the upper entrance hole **26** and into the two volumes defined by the vanes and which are exposed to the hole. These two exposed volumes are thus filled and ready for a subsequent feeding operation whenever feed is introduced to the hopper, or as long as feed remains therein. As the above two exposed volumes are being filled, the third volume formed by the vanes is disposed 180° in opposed spacial relation to the upper entrance hole **26** and is therefore not exposed to such upper hole. Rather, such third volume is exposed to the lower hole **31** in the plate **28**, thereby allowing the feed therein to pass from such volume to a waiting feed-trough (not shown) disposed below. Thus during operation of the metering valve **16**, there is always one empty volume, one full volume and one full or filling volume within the cylinder **23**. At no time is it necessary to wait for the valve to fill, as in prior art devices. At such time as the handle **44** is actuated clockwise (as viewed from above) through an operating cycle of 120°, the first approaching filled volume between two vanes is presented to the lower hole **31** in plate **28** as previously described to allow the feed therein to drop therefrom. Simultaneously the previously emptied volume, newly exposed to the upper hole **26** is filled. Although the valve may be operated twice in succession feed is still available due to the fact that there are two volumes exposed to the hole **26** simultaneously, whereby the subsequent volume to approach the hole **26** is being filled even as the valve is being operated.

While the invention has been disclosed with respect to a single preferred embodiment, it will be apparent to those skilled in the art that numerous variations and modifications may be made within the spirit and scope of the invention and thus it is not intended to limit the invention except insofar as defined in the following claims.

What is claimed is:

1. A mash and pellet feed metering valve for dispensing feed from a hopper, the combination comprising a cylinder permanently closed at its upper end and demountably closed at its lower end, said cylinder having an upper hole in the top thereof and a lower hole in the bottom spacially disposed in 180° opposed relation to said upper hole, said cylinder being rigidly sealed to said hopper, a hollow pipe extending axially through the cylinder and protruding through the upper and lower ends thereof, a shaft extending within said pipe to protrude therefrom at either end thereof, a handle affixed to the lower end of said shaft, unidirectional ratchet means connecting said pipe to said shaft at their upper ends, and a plurality of vanes radially affixed to said hollow pipe to divide the length of the volume of said cylinder into three equal axially-extending volumes, wherein two of said volumes are filled through said upper hole and the third of said volumes is simultaneously emptied through said lower hole.

2. An improved feed metering device for dispensing feed from a hopper comprising a containing cylinder rigidly secured to the bottom of said hopper, a circular upper plate rigidly disposed to separate the volumes of said cylinder and hopper, said upper plate having an entrance hole therein, a circular lower plate demountably secured to seal the lower end of said cylinder, said lower plate having an outlet hole therein, said entrance hole being circumferentially spaced from said outlet hole by 180°, vane support means coaxially extending through said cylinder, an uneven plurality of vanes secured to said vane support means to define an uneven plurality of axially extending rotatable volumes within said cylinder, wherein said outlet hole is in register with a single axially extending volume defined by adjacent vanes while said entrance hole is simultaneously in register with a portion of at least two of said axially extending volumes defined by three successive vanes, a handle, and unidirectional ratchet means disposed to rotatably couple said vane support means to said handle, whereupon reciprocal operation of said handle causes said plurality of vanes to rotate in unidirectional motion.

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