June 22, 1926.

1,589,630

J. H. COOPER

NONCLOGGING FEED DEVICE

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Fig. 2

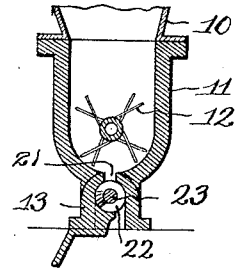
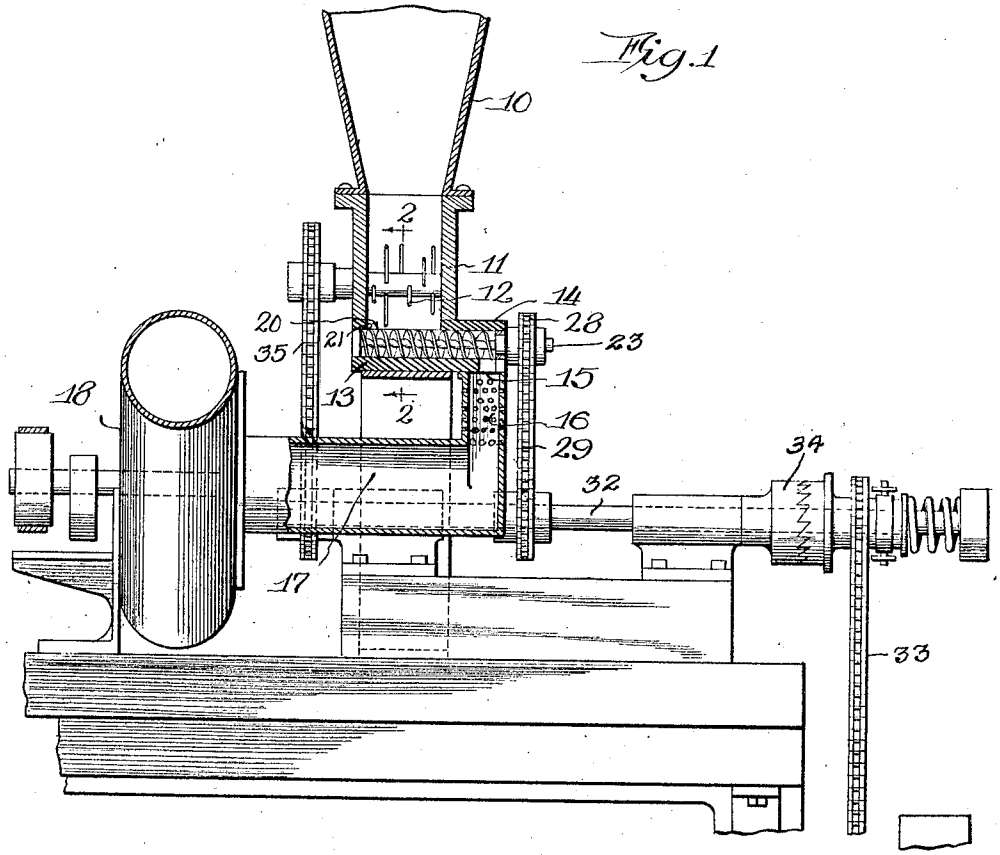


Fig. 1



Witness:
Chas. R. Houser.

Inventor,
James Harold Cooper,
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Fig. 3

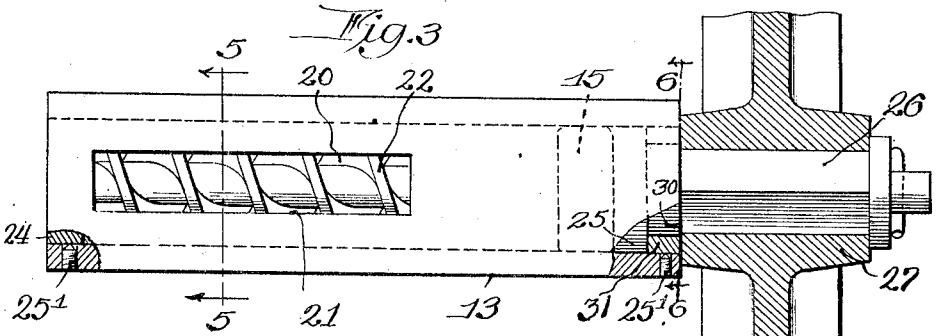


Fig. 4

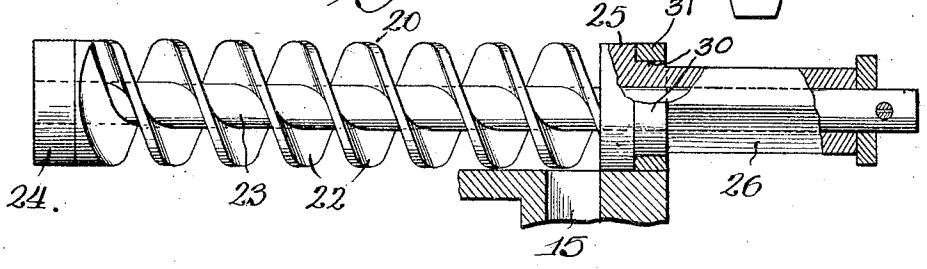


Fig. 5

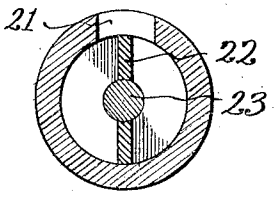
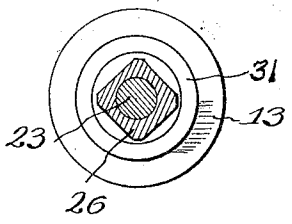


Fig. 6



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Witness:
Chas. K. Kousch.

Patented June 22, 1926. 1,589,630

UNITED STATES PATENT OFFICE.

JAMES HAROLD COOPER, OF MEMPHIS, TENNESSEE.

NONCLOGGING FEED DEVICE.

Application filed September 27, 1924. Serial No. 740,268.

This invention relates to improvements in a non-clogging feed and reducing apparatus, and the invention refers more particularly to improvements in apparatus of this character such as will enable the apparatus to uniformly treat material fed and measured thereby to produce a uniform product in the way of treating it to feed it, to measure it or to reduce it. The adaptation of my invention is herein shown as designed to uniformly feed a powdered or granular material in small quantities where an economical amount of the material, commensurate with the economical use of said material is desired.

A further object of the invention is to provide a feeding apparatus of this character which is structurally designed to self clean the active parts of the feed, measuring or reducing mechanism and thereby prevent clogging in the mechanism, such non-clogging function assisting to maintain uniformity of feed and other treatment in desired quantities.

My improvements are herein shown as designed for feeding a powdered insecticide, such as calcium arsenite, from a receptacle or hopper containing a substantial quantity of such powder into the influence of a distributing medium, such as a blast of air, by which the powder is taken up and distributed over an area predetermined by the blast in the form of an outlet nozzle through which the air and powder are discharged. Such an adaptation of my improvements is shown in the pending application for United States Letters Patent of myself and Louis Carroll Stukenborg, filed August 13, 1923, Serial No. 657,167, for improvements in powder dusting machine, and to which said prior application reference may be made to this adaptation of my invention. However, it will be understood that my invention may be applied in other arts where similar conditions prevail and like utilities are desired. Therefore, the detailed description of a given manifestation of the principles of the invention is not to be taken as limiting but illustrative of a particular machine.

In the drawings showing one embodiment of my invention:

Figure 1 is a part vertical section and elevation of a machine showing my improved novel feed device applied thereto.

Figure 2 is a detail section on the line 2—2 of Figure 1.

Figure 3 is a partial plan and a partial section of the non-clogging feed and measuring device embodying my invention.

Figure 4 is an elevation of a spiral conveyor constituting part of the invention and showing fragments of its mounting.

Figures 5 and 6 are cross sections on the respective lines 5—5 and 6—6 of Fig. 3.

Referring first to the general construction shown in Figure 1, 10 designates a hopper or other receptacle for the powder to be measured and fed; 11 designates a chamber into which the hopper freely discharges, and in which the powder is broken by any suitable form of pulverizing device 12, and 13 designates a horizontal trough arranged beneath and communicating at its upper side with the chamber 11. 14 designates, as a whole, my improved feed mechanism which transfers powder from chamber 11 through the trough 13, an outlet 15 of the trough, and by way of a perforated passage 16 to a conduit 17 which opens centrally into a blast fan 18, all shown and operating as in the aforesaid prior application.

The present invention relates to the feed and measuring apparatus 14 which carries the powder delivered to it from the chamber 11 through the trough 13 and the passage 16 on its way to the blast fan from which it is forcibly delivered in the manner shown in the aforesaid application. In some uses of the feed and measuring apparatus, the powder may be dropped from the outlet 15 upon any suitable element constituting part of a mechanism to utilize the powder so fed. The spiral feed and measuring mechanism is best shown in Figures 3 to 6 inclusive, and is made as follows:

Located within the said trough 13 is a spiral feed screw designated, as a whole, by 20. It is located partially in that part of the trough beneath the chamber 11, and partially in an extended portion of the trough in the bottom of which is formed the outlet opening 15. The trough 13 communicates with the chamber 11 through an inlet opening 21 (Figures 3 and 5).

The said spiral feed and measuring apparatus, having the general form of a spiral screw, is peculiar in its construction and mounting. The part of the structure which carries the spirals 22 is formed as part of a hollowed element which is rotatively mounted or journaled on a shaft 23 that lies axially in the trough by centering disks 24,

25, which are of diameters to fit closely in the ends of the feed trough. The disk 25 has a reduced portion or neck 30 on the outer side; this reduced portion fitting rotatably in a ring 31 whose external diameter is at least as great as that of the disk. The disk 24 and the ring 31 are fixed to the wall of the trough by means of the screws 25′ shown in Figures 3 and 4, or otherwise, and thus serve to hold the spiral screw against endwise movement.

One end of the sleeve on which is formed the spiral screw, or that which extends beyond the outer disk 25, is polysided at 26 to fit within a correspondingly internal fashioned hub 27 of a sprocket wheel 28, shown as driven by a sprocket chain 29. The sprocket chain passes over a wheel on a shaft 32 driven in any suitable way, as by chain 33 acting through a clutch 34. The pulverizing device 12 may be driven from the shaft 32 by a chain 35. The said sprocket wheel is fixed from endwise movement on the polysided end of the sleeve by a washer and pin shown in Figures 3 and 4, holding the opposite end of the hub against the trough 13 and also holding said hub against the disk 25 so as to avoid endwise shifting of the spiral feed screw.

It will be observed from an inspection of Figures 4 and 5 that the feed spirals 22 are formed as a hollow shell constituted by the spiral formation itself, and with the bases of the spirals extending inwardly entirely to the axial shell opening for impingement with the fixed journal shaft 23. Therefore, the spaces between the bases of the spirals are open for free contact of the powder with the shaft 23. Relative movement of the spirals to the shaft 23, therefore, has two effects: first, and principally, to prevent clogging of the powder between the spirals, inasmuch as the bearings for the sharp edges of the bases of the spirals against the shaft serves to self clean the shaft; and second, to constitute means to further reduce the mesh of the powder or other material which is being fed along by the spirals.

Powders, such as calcium arsenite which are frequently used as insecticides for boll weevil, compact or cake readily with any substantial water contact. The construction of the rotative conveyor or feed spirals, in combination with the fixed shaft, prevents compacting of the powder between the spirals. This feed action has the effect to insure a measured amount of powder fed to the outlet 15 and thence to the intake of the blast fan 18. This amount will be controlled by the field conditions and varying amounts of the powder can be spread over the cotton plants simply by substituting gearing or conveyors for spirals of different leads, or by changing the ratio of the driving mechanism for the feed spiral. In practical use, the leads of the spirals have been less than one-half the circumference thereof, which reduces possibility of the entrance of a substance which cannot be delivered at the outlet of the trough. While I have found the latter proportions to produce good results, it is not understood that the invention is intended to be limited to the ratios mentioned.

In practice, it has been found with the adaptation of my novel feed and measuring device that as small a quantity as one pound of calcium arsenite can be distributed over an acre of ground, and this quantity of powder can be distributed with a high degree of uniformity. This fact is mentioned to show the delicacy of operation of my novel feed and measuring apparatus, and it has been found in practice that the proper lethal effect of the powder cannot be produced much under two pounds per acre.

The foregoing has regard to the adaptation of my improved feed and measuring apparatus to a dusting machine, but it will be understood that said apparatus, so far as its delicate measuring characteristics are concerned, can well be adapted to other uses where the powder falls from the discharge outlet 15 into the influence of any other element where the functioning of the machine to which the invention is applied utilizes the powder for other purposes. The delicate uniform feed and measuring characteristics above mentioned are desirable in adaptation of my invention to a powder dusting machine, for the reason that efficient lethal powders are expensive, and dusting machines with which I have heretofore been familiar cannot control the measured feed to the minimum limits herein specified. In other adaptations the amount of the powder fed may be considerably greater than hereinabove indicated, but the uniformity of feed and non-clogging action of the elements will be maintained.

The contact of the edges of the roots of the spirals 22 with the shaft 23, which are in relative rotation by reason of the positive rotation of the spiral body, prevents clogging of the powder and, therefore, insures the discharge of the powder from the trough in a non-lumpy and uniform mesh. This is an important feature of the feed measuring and reducing mechanism beyond or aside from the uniformity of feed. While the shaft 23 on which the spiral unit rotates is herein shown as being fixed, it is only necessary that there shall be a relative movement between the spirals and the shaft.

While the construction of the illustrated embodiment of the invention has been described with considerable particularity, it is understood that the disclosure is intended to be illustrative and not limitative, and that, therefore, the invention is not limited

to such details except as to claims where specific structures are set forth, and as imposed by the prior art.

I claim:

1. In combination, a rotative tubular body exteriorly formed as a feed spiral open at the periphery, the roots of the turns of which extend to the bore of the body, and a journal on which said body is mounted to turn.

2. In combination, a rotative tubular body exteriorly formed as a feed spiral open at the periphery, a supporting journal on which the shell is mounted and relatively to which the shell moves, the said journal being exposed between the turns of said spiral.

3. In combination, a rotative tubular body exteriorly formed as a feed spiral open at the periphery, and a fixed journal on which the shell is rotatively mounted and between the turns of which spiral it is exposed to a powder enveloping said spiral.

4. In combination, a rotative tubular body exteriorly formed as a feed spiral open at the periphery, a journal on which said shell is mounted, the turns of the spiral at the roots thereof turning on the outer face of said journal, and means to drive said spiral.

5. In a feed device, a fixed journal and an exteriorly open spiral rotative thereon with the turns of the spiral spaced along said journal to expose the journal between said turns whereby the roots of said turns constitute self-cleaning elements.

6. In a non-clogging feed and measuring device, a trough having feed and exit openings, a shaft extending axially through said trough with means to axially and non-rotatively support it, and a hollow spiral rotatable on said shaft and relatively to the trough with the shaft exposed between the roots of the turns of said spiral, the spiral being open on the exterior.

7. In a non-clogging feed and measuring device, a trough having feed and exit openings, a shaft extending axially through said trough, a hollow spiral journaled on said shaft with the shaft exposed between the roots of the turns of said spiral, the spiral being open on the exterior and means for centering said shaft in said trough.

8. In a non-clogging feed and measuring device, a trough having feed and exit openings, a shaft extending axially through said trough, a hollow spiral rotatable on said shaft and relatively to the trough with the shaft exposed between the roots of the turns of said spiral, and shaft-centering and supporting discs.

9. In a non-clogging feed and measuring device, a trough having feed and exit openings, the latter opening into a free air space, and a spiral conveyor within said trough between said openings comprising a fixed journal and an open spiral mounted to rotate thereon relatively to the trough.

10. An exteriorly open spiraled self-cleaning measuring device and a shaft on which it is journaled and exposed between the turns of the spiral, the roots of said turns being sharp and scraping said shaft.

In witness whereof I claim the foregoing as my invention, I hereunto append my signature this 17 day of September, 1924.

JAMES HAROLD COOPER.