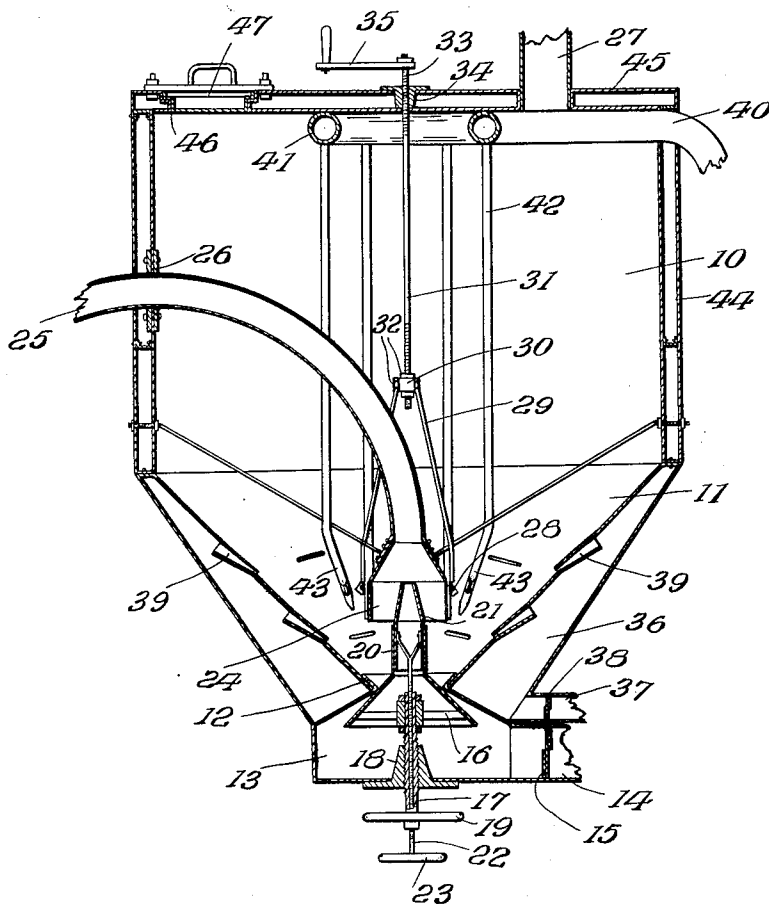


H. B. PRUDEN.
CONTAINER FOR COMMINUTED MATERIAL.
APPLICATION FILED JAN. 7, 1916.

1,339,977.

Patented May 11, 1920.



WITNESSES:

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CONTAINER FOR COMMINUTED MATERIAL.

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Specification of Letters Patent.

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Application filed January 7, 1916. Serial No. 70,834.

To all whom it may concern:

Be it known that I, HARRY B. PRUDEN, a citizen of the United States, residing at Chicago, in the county of Cook and State of Illinois, have invented certain new and useful Improvements in Containers for Comminuted Material, of which the following is a specification.

This invention relates to the handling and storing of comminuted material and especially to means for storing comminuted fuel and means for discharging the fuel from the storage means.

Heretofore storage tanks have been employed for comminuted material, but it has been found to be practically impossible to properly discharge all of the material from such tanks when desired, there being always a residue of undischarged material.

One important object of the invention consists, therefore, in the provision of a tank for the storage of comminuted material which is of improved construction so that, by certain arrangements of the parts all of the material may be discharged from the tank when desired.

A second important object of the invention is the provision of improved means for regulating the amount of material discharged.

A third important object of the invention is the provision of means of improved character and which affords a combined siphonic and vacuum action for the discharge of the material from such tank.

A fourth important object of the invention is the provision of air jet means for forcing material toward the bottom of a tank of this description, the means being of improved character.

A fifth important object of the invention is the provision of means for producing the siphonic action from the bottom of the tank and other means, in combination with the last mentioned means for producing an agitating air jet or blast around the siphonic means, both of these means being capable of regulation relative to each other and for the amount of siphonic and agitating actions produced.

It is a well known physical fact that finely comminuted material, such as coal dust will absorb moisture very rapidly from the atmosphere and that tanks containing such

coal dust frequently have the dust caked against the sides.

A further important object of the invention is the provision of means whereby the material within the tank may be prevented from absorbing moisture.

With the above and other objects in view, the invention consists in general of certain novel details of construction and arrangements of parts hereinafter fully described, illustrated in the accompanying drawings, and specifically claimed.

In the accompanying drawing, like characters of reference indicate like parts throughout the view which shows a vertical median section through an apparatus for storing and discharging comminuted material as constructed in accordance with this invention.

The apparatus herein shown and described is to be understood as typical of one preferred form of such apparatus and it will be obvious, from what follows hereinafter, that the size, proportions and details of this apparatus may be varied to meet the particular requirements of different cases without departing from the material principle involved and claimed.

The drawing illustrates, in vertical longitudinal section, one form of apparatus capable of carrying the invention into effect.

In the form of the device illustrated in the present embodiment, there is provided a tank having an upper cylindrical portion 10 and a lower inverted frusto-conical portion 11 having its lower end opening as at 12 to an air chamber 13 which receives air from an air inlet pipe 14, the latter being controlled by a suitable gate or valve 15. In order to regulate the amount of air passing through the opening 12 there is provided a frusto-conical valve 16 of such size as to close the opening 12 completely when seated therein and this valve is provided with a hollow stem 17 threaded through a box 18 fixed in the bottom of the chamber 13. On the valve stem is an operating wheel 19 so that by manipulating the wheel, the valve 16 may be moved toward or from its seat.

The valve 16 is hollow and has a tubular upward extension 20, wherein slides an adjustable nozzle 21. This nozzle is supported on a valve stem 22 threaded through the hollow stem 17 and operated by a hand

wheel 23. By this means the relative positions of the valve and nozzle may be varied, both to each other and to the remaining parts.

5 Surrounding the upper end of the nozzle is what is preferably termed a siphon inlet 24 and from the upper end of this inlet a discharge pipe 25 leads upward and outward through one side of the cylindrical
10 portion 10 of the tank, suitable packing 26 being provided to prevent passage of air around the pipe. The upper part of the tank 10 is provided with an inlet, preferably valve controlled, such as the pipe 27.

15 By means of this construction material fed into the tank through the pipe 27 may be ejected through the pipe 25. To do this the gate 15 is opened and the wheels 19 and 23 so manipulated that the air flowing into
20 the tank around the valve 16 will cause the formation of a dust cloud below the inlet 24, while the air passing through the nozzle 21 will set up a siphonic action and cause this dust cloud to flow through the discharge
25 pipe 25. In order to regulate the extent of outflow I surround the lower end of the inlet 24 with an adjustable sleeve valve 28 supported by a spider 29 which carries at its
30 upper end a nut 30 through which passes a stem 31, the latter being locked in position by lock nuts 32. This provides adjustment of the sleeve relative to the stem 31. In order to move the sleeve up and down, the
35 upper end of the stem 31 is threaded as at 33 and passes through a box 34, being provided at its outer end with an operating handle 35. By this means the sleeve may be moved up or down to open or close the space between the inlet 24 and the bottom of the tank.

40 In order to overcome the lodging of the material on the bottom of the tank as well as to assist in forcing material toward the bottom, it is preferred to surround the tank bottom with a chamber 36 having an air
45 inlet 37 controlled by a gate or valve 38. Leading from the chamber 36 are certain downwardly directed jet nozzles or louvers 39 so that the air under pressure in the chamber 36 will flow downward through
50 these louvers and carry the comminuted material down with it, while at the same time agitating it so that the air entering around the valve 16 is assisted in the formation of the dust cloud. To further aid in this operation there is provided at the upper end
55 of the tank an air inlet pipe 40 carrying air under pressure to a centrally disposed ring pipe 41 from which depend a series of pipes 42 provided at their lower ends with downwardly and inwardly directed nozzles 43, these nozzles preferably terminating just
60 above the mouth of the inlet 24. Thus, while the air from the chamber 36 agitates and forces downward the outer portion of the tank contents, the air entering through

the nozzle 43 performs the same action for the inner portion of said contents.

It is to be noted that practice has shown that the arrangement thus set forth not only produces an ejector action through the discharge pipe 25, but that this arrangement does not increase pressure in the tank 10, producing instead a partial vacuum in said tank.

As heretofore noted comminuted material 75 is very hygroscopic and thus has a marked tendency to cake when moist. It is found that single walled tanks fail to prevent access of moisture to comminuted material held therein. In order to overcome this objection, I surround at least the upper portion of the tank 10 with an outer wall 44 and likewise provide an outer top wall 45. I then exhaust the air from between the inner and outer walls so that a vacuum space 85 exists between such inner and outer walls. There is also provided in the top a manhole 46 and this is closed by vacuum walled doors 47, so that the entire upper part of the tank is completely surrounded by a vacuum. It 90 is not necessary to surround the chamber 36 in this manner, as suitable provision is made for heating and drying the air entering through the several air inlets, the particular provision not being necessary here to be 95 shown as the same form no part of this invention.

The operation having been described in detail, it is deemed merely necessary to state that the material, contained in a vacuum 100 walled tank, is fed downward and agitated by air pressure and is formed into a cloud and ejected by a combined siphonic and vacuum action, the pressure in the pipe 25 being greater than that in the tank 10. 105

What is claimed as new is:—

1. The combination with a storage tank for comminuted material, of a discharge pipe leading from the tank, means for supplying air to the material in planes oblique 110 to its path of travel, and means to produce siphonic action in the pipe and a partial vacuum in the tank.

2. The combination with a storage tank for comminuted material, of a discharge 115 pipe leading from the tank, air supply means to produce siphonic action in the pipe and a partial vacuum in the tank, and other air supply means arranged to force the material in the tank downward and in a direction oblique to its natural path and to simultaneously agitate the same. 120

3. The combination with a storage tank for comminuted material of a discharge pipe leading from the tank, air pressure means 125 discharging obliquely to the natural path of the material, and other means for supplying an upwardly flowing current of air in regulable quantities to the discharge pipe whereby an injector action is produced 130

in the pipe and a partial vacuum in the tank.

4. The combination with a storage tank for comminuted material of a discharge pipe leading from the tank, air pressure means discharging obliquely to the natural path of the material, said first mentioned means being further arranged to force the material in the tank downwardly and simultaneously agitate the same, and means for injecting an upward discharge current of air in regulable quantities to the discharge pipe.

5. The combination of a storage tank for comminuted material, of pneumatic means for discharging material from the tank including means for producing a dust cloud at the point of discharge, and other pneumatic means discharging obliquely to the normal path of movement of the material for forcing material to the point of discharge and simultaneously agitating the material.

6. The combination with a storage tank for comminuted material having an opening in its bottom, of a valve controlling the opening, a discharge pipe leading from the tank and having its inlet end alined with the opening, an adjustable air jet nozzle discharging air under pressure into the pipe away from the opening in the tank, and means for supplying the air to the material in planes oblique to its path of travel.

7. The combination with a storage tank for comminuted material having an opening in its bottom, of a valve controlling the opening, a discharge pipe leading from the tank and having its inlet end alined with the opening, an air jet nozzle discharging air under pressure into the pipe away from the opening in the tank, pneumatic means for forcing the material toward the opening and simultaneously agitating said material, and downwardly and inwardly directed air jet nozzles spaced above and surrounding said opening.

8. The combination with a storage tank for comminuted material provided with an inverted frusto-conical bottom having its lower end open, a hollow cone valve controlling the opening, a jet nozzle carried by the valve, a discharge pipe extending from the tank and having its inlet end alined with the nozzle, and means to supply air to the nozzle and opening simultaneously.

9. The combination with a storage tank for comminuted material provided with an inverted frusto-conical bottom having its lower end open, a hollow cone valve controlling the opening, a jet nozzle carried by the valve, a discharge pipe extending from the tank and having its inlet end alined with the nozzle, means to supply air to the nozzle and opening simultaneously, and means to control the positions of the valve and nozzle.

10. The combination with a storage tank for comminuted material having an opening in its bottom, of a valve controlling the opening, a discharge pipe leading from the tank and having its inlet end alined with the opening, an air jet nozzle discharging air under pressure into the pipe away from the opening in the tank, means to control the positions of the valve and nozzle, and valve means to control the flow of material toward the inlet end of the discharge pipe.

11. The combination with a storage tank for comminuted material provided with an inverted frusto-conical bottom having its lower end open, a hollow cone valve controlling the opening, a jet nozzle carried by the valve, a discharge pipe extending from the tank and having its inlet end alined with the nozzle, means to supply air to the nozzle and opening simultaneously, means to control the positions of the valve and nozzle, and valve means to control the flow of material toward the inlet end of the discharge pipe.

12. A receptacle for comminuted material having a dry air chamber covering its bottom, said bottom having obliquely discharging openings affording communication between the interior of the receptacle and the dry air chamber, said dry air chamber and bottom being arranged to provide a central opening, and means to supply air to the central opening separately from the air chamber.

13. A receptacle for comminuted material provided with a dry air chamber covering its bottom, said bottom having obliquely discharging openings affording communication between the interior of the receptacle and the dry air chamber, said openings being inwardly and downwardly directed, said dry air chamber and bottom being arranged to provide a central opening, and means to supply air to the central opening separately from the air chamber.

14. The combination with a container for comminuted material having a bottom of inverted frusto-conical form and being surrounded by a dry air chamber, said bottom being provided with obliquely and downwardly directed openings and having their lower ends open, an air chamber below the opening, a hollow cone valve in said opening, an adjustable nozzle carried by the valve, a discharge pipe having its inlet end within the conical bottom, a sleeve valve surrounding the inlet end of the discharge pipe, means to supply air to the air chambers, and means to control the positions of the valves and nozzle.

15. The combination with a container for comminuted material having an upper cylindrical portion forming a vacuum chamber, the bottom of the container being of inverted frusto-conical form and being sur-

rounded with a dry air chamber, there being obliquely and downwardly directed openings in the bottom, an air chamber below the bottom having controlled port communication
5 with the interior of the container, and air agitating and ejecting means for the material held within the hollow of the bottom.

16. In a device of the class described, a
10 container having a conical bottom with an opening at the apex thereof, an adjustable valve controlling said opening, said valve being hollow and formed with a nozzle, an air chamber communicating with the opening and with the nozzle of said valve, means
15 for supplying said chamber with air, means

for adjusting the nozzle relative to the valve, and an exhaust conduit, the entering end of which is in substantial registry with said nozzle.

17. In a device of the class described, a
20 container having a substantial conical bottom, an air injector nozzle located at the apex of said bottom, means for supplying said nozzle with air, an outlet passage having its entering end substantially in registry
25 with said nozzle, and means for directing currents of air downwardly along said conical bottom.

In testimony whereof I affix my signature. 30

HARRY B. PRUDEN.