C. E. RORK.

ADJUSTABLE FEED VALVE.

APPLICATION FILED NOV. 7, 1917.

1,287,756.

Patented Dec. 17, 1918.

2 SHEETS—SHEET 1.

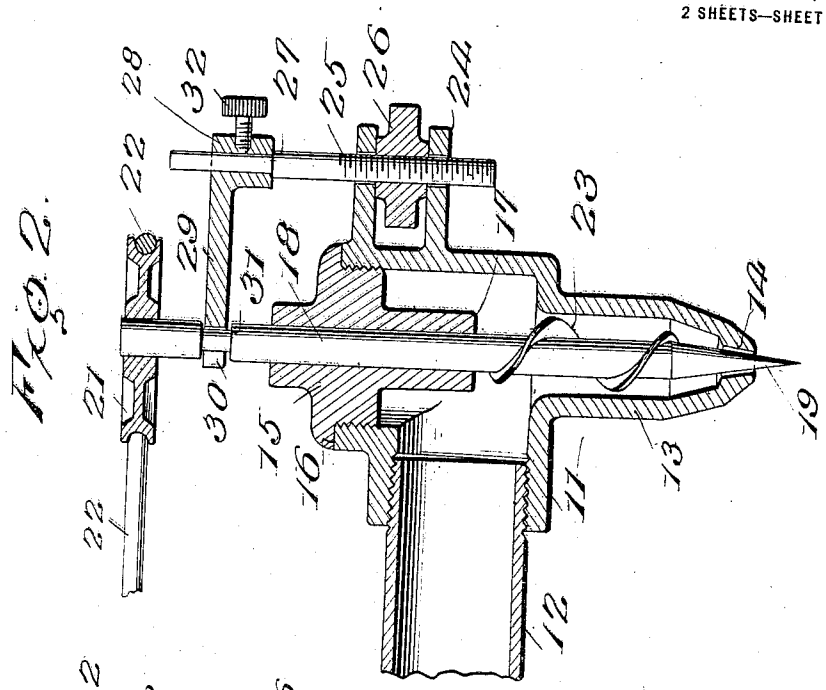


FIG. 2.

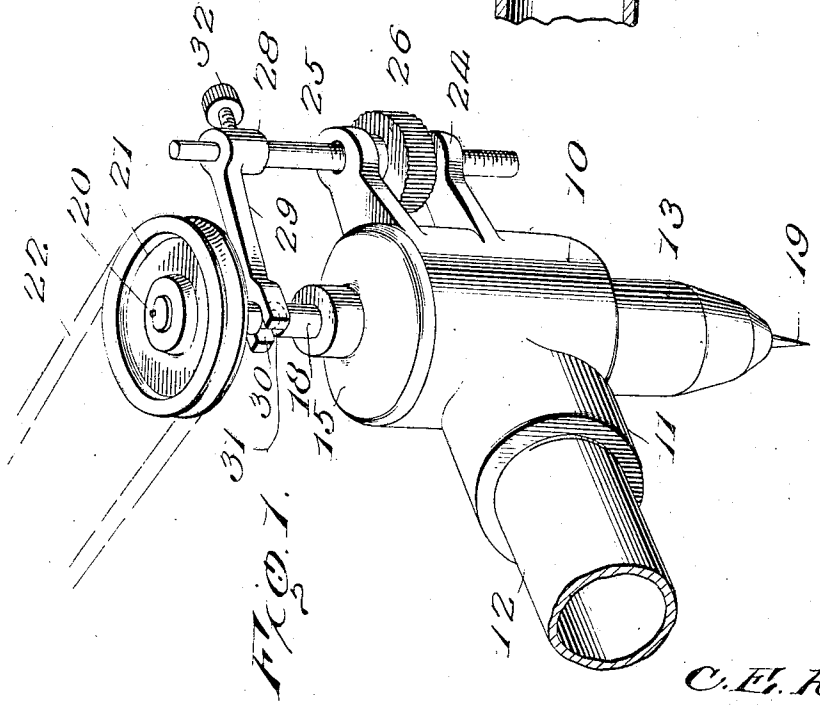


FIG. 1.

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2 SHEETS—SHEET 2.

FIG. 4.

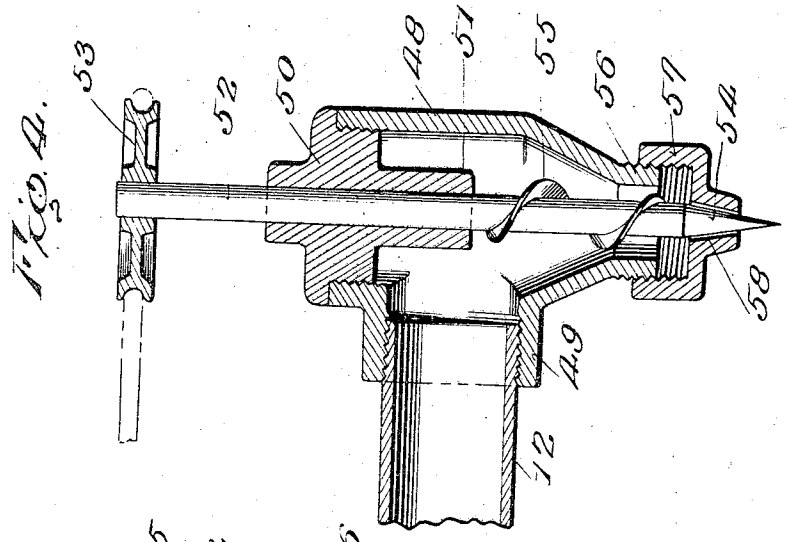
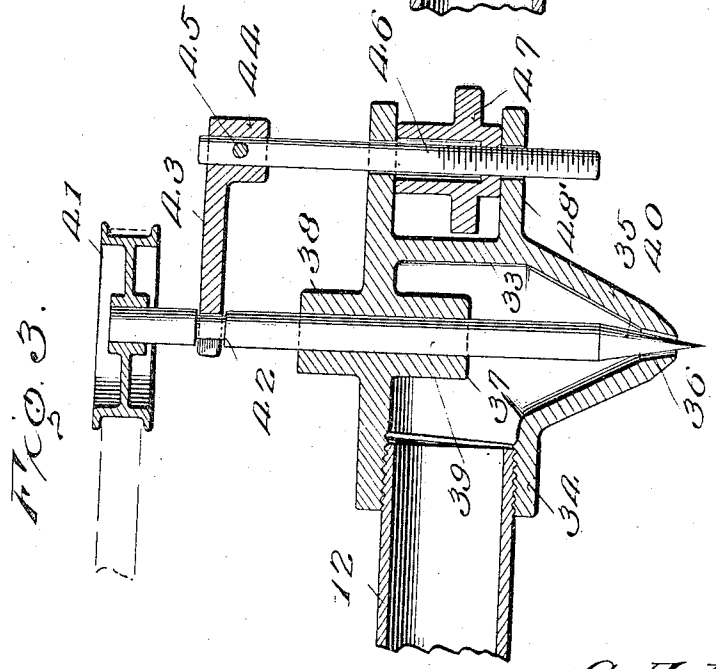


FIG. 3.



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UNITED STATES PATENT OFFICE.

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ADJUSTABLE FEED-VALVE.

1,287,756. Specification of Letters Patent. Patented Dec. 17, 1918.

Application filed November 7, 1917. Serial No. 200,805.

To all whom it may concern:

Be it known that I, CHARLES E. RORK, a citizen of the United States, residing at Douglas, in the county of Cochise and State of Arizona, have invented certain new and useful Improvements in Adjustable Feed-Valves, of which the following is a specification.

My invention relates to new and useful improvements in adjustable feed valves for liquids and has for one of its objects the provision of a valve which will feed a liquid at an exact rate for any length of time and which may be adjusted to vary the rate at which the liquid is fed either before the feeding of the liquid is started or while the liquid is being fed.

Another object of my invention resides in providing a feed valve which is capable of feeding a heavy viscous liquid or a light liquid with equal facility and accuracy.

A still further object of my invention consists in constructing the feed valve so that there will be no exposure of unfed liquid to the air in order that volatile liquids may be fed without evaporation.

A still further object of my invention is to provide for a force feed when necessary and to so arrange the valve proper that even while running it may be widely opened momentarily to discharge particles of dirt or sediment and may be quickly returned to its previously adjusted position.

With these and other objects in view, my invention will be more fully described, illustrated in the accompanying drawings and then specifically pointed out in the claims which form a part of this application.

In the drawings:

Figure 1 is a perspective view of my improved feed valve;

Fig. 2 is a central vertical sectional view;

Fig. 3 is a view corresponding to Fig. 2 illustrating a modified form of construction;

Fig. 4 is a corresponding view showing a still further modified construction.

Corresponding and like parts are referred to in the following description and indicated in all the views of the drawings by the same reference characters.

My improved feed valve includes a body or casing 10 which may be of any desired size and shape and formed of any suitable material but which is preferably substantially cylindrical, as shown in Figs. 1 and 2. This valve casing is provided at one side with an inlet branch 11 which is preferably internally threaded for convenient connection with a liquid supply pipe 12 and at its lower end is formed with a reduced extension or outlet branch 13 formed at its end with a frusto-conical discharge orifice or valve seat 14.

The valve casing at its top is formed with an internally threaded opening to receive the hood or bonnet 15 which forms the closure of the casing and which is preferably provided with a peripheral flange 16 engaging the upper end of the casing to form a close joint. This bonnet is formed with an axial opening and interiorly with a depending bearing sleeve 17 in alinement with the opening, the bonnet and sleeve together journaling a spindle 18 for free rotation. This spindle at its lower end is tapered to provide a conical needle valve 19 coöperating with the discharge orifice or valve seat 14 and capable in one position of completely closing such orifice. Secured by a key 20 or other suitable means upon the outer end of the spindle 18 is a pulley 21 over which a belt 22 may be trained so that the spindle may be rotated at any desired speed. Interiorly of the casing and below the sleeve 17 the spindle is provided with a helical feed or pressure blade or thread 23 which during rotation of the spindle will act to force liquid contained in the valve casing through the orifice 14.

Projecting laterally from the valve casing 10, preferably at a point opposite the inlet branch 11, are a pair of vertically spaced bracket arms 24 through which is freely movable the shank of an adjusting screw 25 which has threaded engagement with an adjusting nut 26 located between and bearing against the opposed faces of the bracket arms. The upper portion of this adjusting screw 25 is reduced to provide a stop shoulder 27 and slidably mounted upon the reduced portion of the screw is a sleeve 28 having a laterally directed arm 29 formed with a forked terminal 30 the fingers of which engage in an annular channel 31 formed in the spindle 18. A thumb screw 32 serves as a means for clamping the sleeve 28 upon the reduced portion of the adjusting screw 25.

In operation the liquid to be fed is supplied to the pipe 12 and discharged through the space between the needle valve 19 and the valve seat 14. Obviously, by proper manip-

ulation of the adjusting nut 26 the spindle 18 and consequently the valve 19 may be raised and lowered at will to vary the size of the annular discharge passage and consequently to vary the rate at which the liquid will be fed. In case a heavy viscous liquid, such as coal tar or the like, is being fed the spindle may be driven so that the feed screw 23 will assist in forcing the liquid through the discharge passage. If this is the case, of course, the spindle should be driven at a constant rate of speed in order that uniform rate of feeding of the liquid may be assured. If at any time the discharge passage becomes clogged because of foreign matter the thumb screw 32 may be loosened and the sleeve and, consequently, the spindle may be quickly raised to completely open the orifice 14 and permit the material clogging the outlet to escape. The spindle and sleeve may then again be lowered until the sleeve engages the stop shoulder 27 when the valve will be at the identical point of adjustment which it previously occupied. The thumb screw may then be tightened to avoid any possibility of upward movement of the spindle due to the thrust of the feed screw 23 against the liquid being fed.

In Fig. 3 of the drawings I have illustrated a modified form of construction in which the valve casing 33 is formed with an inlet branch 34 to receive the pipe and with a tapering frusto-conical discharge branch 35 having the frusto-conical discharge orifice or valve seat 36. This casing however, is closed at its top and its closed top is formed interiorly and exteriorly with alined sleeves 37 and 38 which journal the spindle 39. The spindle 39 terminates in a conical needle valve 40 but is not provided with any feed screw or blade. A pulley 41 is keyed or otherwise secured to the outer end of the spindle and the spindle below this pulley is formed with a circumferential channel 42 to seat the forked terminal of the arm 43 of the supporting sleeve 44 corresponding to the arm and sleeve 29 and 28. In the present instance, however, a pin 45, or equivalent means, permanently and non-adjustably secures the sleeve 44 upon the upper end of the adjusting screw 46. This does not permit any vertical movement of the spindle relative to the adjusting screw 46 but does away with the necessity of providing the feed screw with the stop shoulder. Of course, the adjusting screw operates in an adjusting nut 47 located between brackets 48', corresponding to the brackets 24.

Obviously, the operation of this feed valve is substantially identical with that previously described with the exception that it can be opened and closed only by manipulation of the adjusting nut 47 and the further exception that there is no force feed provided for, although the turning of the spindle and valve, however, facilitates steady and constant feeding of the liquid and does away with any likelihood of clogging of the discharge orifice through gumming of the liquid being fed.

In Fig. 4 I have illustrated a still further form of feed valve including a cylindrical casing 48 having the inlet branch 49 for connection with the pipe 12. This casing is open at its top and is closed by a hood or bonnet 50 corresponding to the bonnet 15 and formed with a bearing sleeve 51 to journal the spindle 52 which at its outer end carries the pulley 53 and which at its lower end is tapered to provide the conical needle valve 54. A pressure or feed screw 55 is formed upon the spindle within the casing in order to provide for a force feed. The discharge branch of this valve casing, however, terminates in a cylindrical externally threaded nipple 56 and threaded about the nipple is a cap 57 formed centrally with a frusto-conical discharge orifice or valve seat 58. With this form of my invention the adjusting screw and nut are done away with as the size of the discharge opening may be readily adjusted by turning the cap 57.

From the foregoing description it will be apparent that I have provided a valve for feeding liquids which may be adjusted during use, which will insure a constant feed of liquid at uniform speed, which will feed viscous liquids with the same facility and accuracy as light liquids and which will protect any unfed liquid from contamination by foreign matter and from evaporation.

While the feed valve above described is capable of general application it is primarily intended for feeding oils and other re-agents to flotation machines, or for feeding liquid re-agents to solutions in chemical processes or in any place where a constant rate of liquid feeding is required.

Of course, the pressure feed blade or thread may be employed upon any of the spindles, or spindles without such feed blade may be employed with various forms of valve casing structure and controlling mechanism disclosed. Furthermore, although I have shown the discharge orifices as frusto-conical they may be of uniform diameter throughout their length under which circumstances the taper of the needle valves will be the sole controlling feature regulating the rate of feed of liquid. For these reasons I reserve the right to make any changes in construction which may seem advisable depending upon the use to which the valve is to be put and which may fall within the scope of the appended claims.

Having thus described the invention, what is claimed as new is:

1. A feed valve including a body having an inlet passage and a discharge orifice, a spindle rotatably mounted in the body and

having a valve coöperating with the orifice, means for rotating the spindle, brackets carried by the body, an adjusting screw freely movable through the brackets, an adjusting nut engaging between the brackets and having threaded engagement with the screw, and an arm extending from the adjusting screw and operatively engaging the spindle whereby the spindle may be adjusted toward or away from the orifice.

2. A feed valve including a body having an inlet passage and a discharge orifice, a spindle rotatably mounted in the body and having a valve coöperating with the orifice, means for rotating the spindle, brackets carried by the body, an adjusting screw freely movable through the brackets, an adjusting nut engaging between the brackets and having threaded engagement with the screw, an arm extending from the adjusting screw and operatively engaging the spindle whereby the spindle may be adjusted toward or away from the orifice, and means for temporarily moving the spindle relative to the adjusting screw and returning it to original adjusted position.

3. A feed valve including a body having an inlet passage and a discharge opening formed with a valve seat, a spindle rotatably mounted in the body and having a valve coöperating with the valve seat, means for rotating the spindle, an adjusting nut operatively supported by the body, an adjusting screw having threaded engagement with the nut and having a reduced upper terminal providing a stop shoulder, a sleeve movable upon the reduced portion of the screw and engaging the stop shoulder, means for securing the sleeve in place and releasable for freeing the sleeve, and an arm extending from the sleeve and operatively engaging the spindle whereby movement of the nut will cause corresponding adjustment of the spindle although the spindle is at all times free for turning movement.

4. In a feed valve a body having an inlet and a discharge passage, a spindle rotatably mounted in the body and having a valve coöperating with the discharge passage, means for rotating the spindle, and means for positively adjusting the spindle in opposite directions and consequently the valve irrespective of the rotation of the spindle to vary the position of the valve relative to the discharge passage.

5. A feed valve including a body having an inlet and an outlet passage, a spindle rotatably mounted in the body and carrying a valve coöperating with the outlet passage, an adjusting nut supported by the body, an adjusting screw having threaded engagement with the nut, and an arm adjustably fixed to the adjusting screw and operatively engaging the spindle whereby movement of the screw will be transmitted to the spindle although the spindle is at all times free for rotation.

6. In a feed valve, a body having an inlet and an outlet passage, a spindle slidably and rotatably mounted in the body and having a valve coöperating with the outlet passage, means for rotating the spindle, and means for adjusting the spindle to shift the valve toward or away from the outlet passage, said latter means rigidly holding the valve in adjusted position against movement away from the outlet passage.

7. A feed valve including a body having an inlet passage and a discharge orifice, a spindle rotatably mounted in the body and formed at its lower end to provide a valve coöperating with the orifice, a helical feed blade formed on the spindle, and means carried by the upper end of the spindle for receiving driving means therefor.

8. A feed valve including a body having an inlet passage and a discharge orifice, a spindle rotatably mounted in the body and formed to provide a valve coöperating with the orifice, a helical feed blade formed on the spindle, means for rotating the spindle, and means for adjusting the spindle to bring the valve toward or away from the orifice and acting to simultaneously shift said blade.

9. A feed valve including a body having an inlet passage and an outlet passage, a spindle rotatably mounted in the body and having a valve fixed with respect thereto and coöperating with the outlet passage, means for rotating the spindle, and means for positively adjusting the spindle in opposite directions for positioning the valve toward or away from the outlet passage, the said latter means being operable to permit the free movement of the spindle and consequent shifting of the valve toward or away from the outlet passage.

10. A feed valve including a body having an inlet passage and an outlet passage, a spindle rotatably mounted in the body and having a valve fixed with respect thereto and coöperating with the outlet passage, means for rotating the spindle, and means for positively adjusting the spindle in opposite directions for positioning the valve toward or away from the outlet passage, the said latter means being operable to permit the free movement of the spindle and consequent shifting of the valve toward or away from the outlet passage and including means for limiting the valve in adjusted position when moved toward the outlet passage.

11. A feed valve including a body having an inlet passage and an outlet passage, a spindle rotatably mounted in the body and having a valve coöperating with the outlet passage, means for rotating the spindle, an adjusting screw, and means engaged with the spindle and connected with the screw for

bodily movement therewith for positioning the valve toward or away from the outlet passage.

12. A feed valve including a body having an inlet passage and an outlet passage, a spindle rotatably mounted in the body and having a valve coöperating with the outlet passage, means for rotating the spindle, an adjusting screw, and connecting means having fixed engagement with the spindle and rigid engagement with the screw for positioning the valve toward or away from the outlet passage, said connecting means being releasable from the screw whereby the spindle may be freely moved to position the valve toward or away from the outlet passage.

13. A feed valve including a body having an inlet passage and an outlet passage, a spindle rotatably mounted in the body and having a valve coöperating with the outlet passage, means for rotating the spindle, an adjusting screw, rigid connecting means between the screw and the spindle for positioning the valve toward or away from the outlet passage, said connecting means being releasable from the screw whereby the spindle may be freely moved to position the valve toward or away from the outlet passage, and means carried by the screw to coöperate with said connecting means for limiting the valve in adjusted position toward the outlet passage.

In testimony whereof I affix my signature.

CHARLES E. RORK. [L. S.]

Copies of this patent may be obtained for five cents each, by addressing the "Commissioner of Patents, Washington, D. C."