Sept. 11, 1934. H. P. SAUGMAN 1,972,955

EJECTOR

Filed May 24, 1932

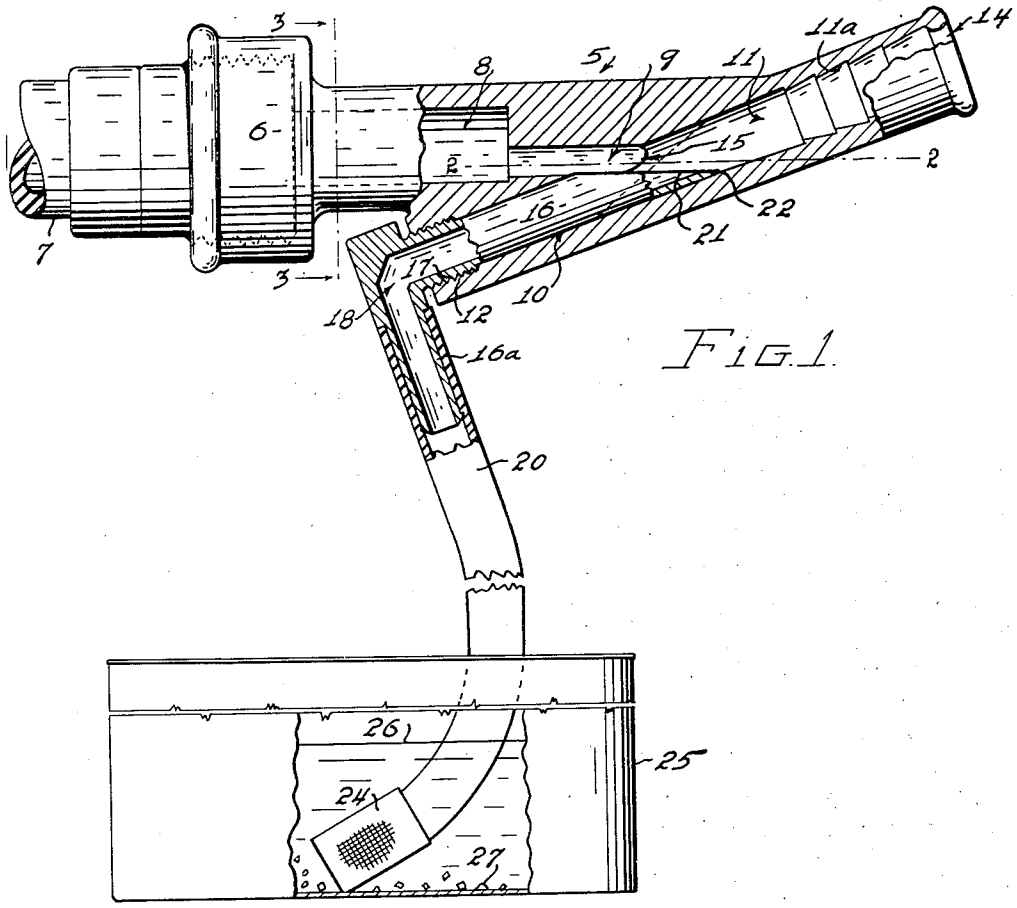


FIG. 1.

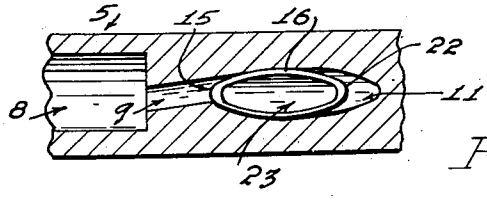
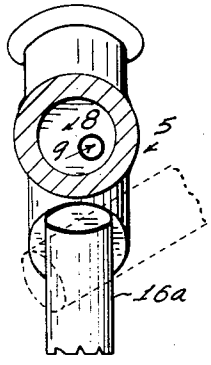


FIG. 2.

FIG. 3.



INVENTOR.

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1,972,955

EJECTOR

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Application May 24, 1932, Serial No. 613,190

3 Claims. (Cl. 103—262)

My invention relates to ejectors and the like and while it is applicable to all uses to which ejectors and like devices have been applied, the invention has for one of its objects to provide a device whereby the motivating fluid may be caused to induce another fluid or substance and so provide a thorough mixture or solution which is then delivered as such in a desirable spray form.

For example; in the treatment of lawns and the like with strong fertilizers such as ammonium sulphate, great care must be taken to insure spreading the material so evenly and lightly that a subsequent sprinkling will produce the properly attenuated solution. This involves spreading the sulphate by hand and then accomplishing the solution thereof by a subsequent operation. Not only is the method tedious but uncertain as well.

The usual types of injectors, ejectors, aspirators and analogous devices have certain inherent short-comings which I have overcome by my invention, while at the same time I have developed my invention along such lines that fertilizers of the above type may be readily applied to a lawn or the like without exercise of skill.

Another object of the invention is to provide improvements in ejectors and like devices whereby the product is a finely divided spray which need not be discharged at high velocity or with high pressure in order to insure results.

Still another and important object of my invention is to provide an ejector suited to a wide variety of other applications in which the amount of induced material or fluid may be regulated by regulating the flow of the motivating fluid, and whereby in the case of solutions made by the device, a given strength may be had while varying the amount of the solution. In this connection it is another object of the invention to provide for suddenly or gradually reducing the suction effect without having a reverse flow such as is common to present similar devices.

My invention provides for having a control valve situated at the orifice of suction while controlling the flow of the motivating fluid by such valve, so that the pressure of the motivating fluid, and therefore its velocity, is unchanged; only the mass or volume of the motivating fluid being changed by the valve so that the amount of induced fluid or material is virtually proportional.

It is another object of the invention to provide a device performing as above and in which the valve is simple and inexpensive, and in fact in which device those parts which form the valve serve other functions as well.

In fact, by my invention two simple parts provide the complete ejector, control valve therefor, and a mixing valve as well as a spray nozzle.

A further object of the invention is to provide a device capable of carrying out all the objects, purposes and steps of this invention which is manufactured at low first cost and which is efficient, long lived and substantially fool-proof.

In carrying out my invention I provide a body or casting having two converging fluid courses which intersect at an acute angle. Where one intersects the other a port is formed. In the suction or induction fluid course there is provided a sleeve having one end external to the body and by which the sleeve may be turned, while the other end of the sleeve is formed so that in one position the sleeve will eclipse the other fluid course while in still another position it will leave it totally unobstructed.

It is directly at this end of the sleeve that fluid is induced by the motivating fluid, and therefore no matter to what degree the motivating fluid is throttled, the suction action thereof is directly at the same part of the sleeve at all times. This arrangement also results in a definite suction effect even tho the flow of motivating fluid is reduced to a minimum; whereas in usual devices of this sort reduction of flow results in an even more reduced suction effect, to the point where it is not uncommon for the motivating fluid to "back-up" thru the induction course. Where my device is to be employed for creating and holding a vacuum without inducing fluid, it will be found that the feature of having the same velocity of fluid at the suction orifice has decided advantages.

Further explanation of my invention is best made by reference to the accompanying drawing in which:

Figure 1 is an enlarged vertical section of one practical embodiment of my invention; this embodiment not only being capable of carrying out all the objects of the invention but also providing a combination ejector, mixing valve, shut-off valve, hose nozzle and sprinkler.

Figure 2 is a fragmentary section on a line 2—2 of Fig. 1.

Figure 3 is a section on a line 3—3 of Fig. 1.

More specifically, 5 indicates a body casting having an integral fitting 6 whereby it is attached to a pressure supply of water such as provided by the common garden hose 7. Rising from the fitting 6 is a cavity 8; which together with a smaller drilled hole leading therefrom as at 9 is known hereinafter as the main fluid course or the pressure course.

Considering the device in horizontal position; there is provided in the body 5 a forwardly inclined bore; respective parts of which are indicated at 10 and 11 respectively. Part 10 of this bore is open at its inner end adjacent and just below the fitting 6. At this point it is internally threaded as at 12, while all portions of bore 10 are of uniform diameter.

Part 11 of the aforesaid thru bore is of increasing diameter outwardly and terminates in

a discharge or sprinkler orifice 14 of suddenly reduced diameter.

The drilled hole 9 leads from the cavity 8 to the bore 10—11 and where it enters said bore it provides an opening or port 15 hereinafter known as the valve port, or the main orifice. Viewing the drilled hole 9 from the side as shown in Figure 1 it is seen to be horizontal altho decentered with respect to the horizontal cavity 8. Viewing the drilled hole 9 from the top of the device it is seen to incline to one side so that it intersects with the bore 10—11 at one side of the said bore. Since the drilled hole is smaller in diameter than bore 10—11 it provides thereat a characteristic port which is offset with regard to the center of the bore 10—11. This disposition of the drilled hole tends to impart a swirling action in bore 11 and on the part of fluid entering it from the main orifice; while at the same time this fluid undergoes only very slight angular changes of direction. Within bore 10, which is of uniform diameter throuout there is fitted the rotary sleeve 16, which is externally threaded as at 17 to thread into the threaded part of bore 10. This sleeve provides a co-extensive suction bore 18. A portion 16*a* of the sleeve is external to the body 5 and adjacent the fitting 6. Portion 16*a* is disposed at right angle to the sleeve and over this portion is fitted a small suction hose 20. To avoid confusion of lines in the drawing portion 16*a* is shown integral with sleeve 16 altho it is understood that to facilitate assembly it is pressed, welded, threaded or otherwise secured in a well known manner to the sleeve. By this portion 16*a*, which forms a handle for sleeve 16, the latter may be turned on threads 12 and 17 respectively thru an angle greater than 180 degrees.

The inner end of the sleeve as at 21 is mitered along a line parallel to the center line of the drilled hole. In other words; the inner end of the sleeve is cut along the horizontal altho the plane of the sleeve is inclined upwardly forwardly. This miter on the sleeve results in a sharp tip 22 for the sleeve while the open end of the sleeve provides the elliptic suction orifice 23.

The device as a whole is shown attached to a common hose while the suction hose is shown as provided at the lower end with a suction screen 24 submerged in a container 25. Said container in this case is assumed to contain a solution, or partial solution of ammonium sulphate entirely too strong for direct application.

With the parts in the position shown in Figure 1, water entering bore 10—11 thru the port 15 is caused to take a spiral course and move out thru bore 11. This change of direction of the water from the median of the drilled hole 9 to the same general direction as the median line of the suction sleeve, results in a decided induction on the sleeve. This raises the induced fluid thru the hose and as the induced fluid leaves the suction port and enters the swirling stream in bore 11 it is very thoroughly mixed therewith. The result, in the case of ammonium-sulphate or the like, is that the nozzle end of the device discharges a greatly attenuated solution in the form of a finely divided spray. This spray is well adapted for proper distribution of the solution over a lawn.

While the device is in operation the nipple 19 may be employed as a handle to turn the sleeve in bore 10. This will move the tip of the sleeve over the main orifice and so reduce the flow of water while the open end of the sleeve remains unobstructed. Now, while less water is issuing from the main orifice the velocity at which it issues is the same to all practical intents and purposes and the vacuum created does not change except as the amount of water issuing will have a suction effect sufficient only to induce less fluid thru the sleeve.

This act of throttling the motivating fluid at the exact point where other fluid is induced to the device, results in a decrease of induced fluid closely coinciding with reduction of the amount of motivating fluid. Thus while the amount of fluid issuing from the nozzle may be varied, the percentage of mixture will be substantially constant. Also, right down to where the motivating fluid, and therefore the action of the entire device, is shut off, the device will act as an ejector and at no time will fluid back thru the suction channels.

The device is suited for use for delivering a spray consisting of water or other liquid mixed with air or gas. If the suction hose is disconnected and the nipple left open to the air, a finely divided aerated spray will be formed. Attached to a hose the device will serve as a sprinkler nozzle under all conditions and the rotary sleeve provides a regulating and shut-off valve for the main orifice. Those skilled in the arts to which this pertains will find many other uses to which this device can be applied and all such uses are within the scope of this invention.

While I have described a specific embodiment of my invention such is done only by way of example and does not limit my invention to the construction and arrangement of parts as shown and described.

I claim:

1. In a device of the class described, a body provided at one end with a hose connection, and a thru bore to said body opening at one end adjacent to and apart from the hose connection and opening at the other end in a spray discharge opening remote from said hose connection, a motivating-fluid passage leading from said hose connection thru said body to communication with said bore at an acute angle and forming thereat a main orifice dividing said bore respectively into a suction bore and a discharge bore, a rotary sleeve in said suction bore having its inner end terminating in a port disposed on a plane substantially parallel to the median line of said motivating-fluid passage whereby the sleeve normally leaves said port unobscured and is movable to eclipse said main orifice.

2. The device as in claim 1 and in which said sleeve continues rearwardly and outwardly of said suction bore to a point adjacent said hose connection and there turned to provide a nipple adapted to receive a suction hose and further adapted to be engaged to manually operate said sleeve.

3. In a device of the class described a body provided with a thru bore and a motivating fluid passage intersecting said thru bore at an acute angle to form thereat an orifice, a rotary sleeve in said thru bore terminating in an end paralleling the median line of said passage; said sleeve having its end disposed to normally leave said orifice open and being movable to close said opening.

HARTVIG P. SAUGMAN.