Oct. 26, 1954 H. J. MILLER 2,692,564

EJECTOR DEVICE

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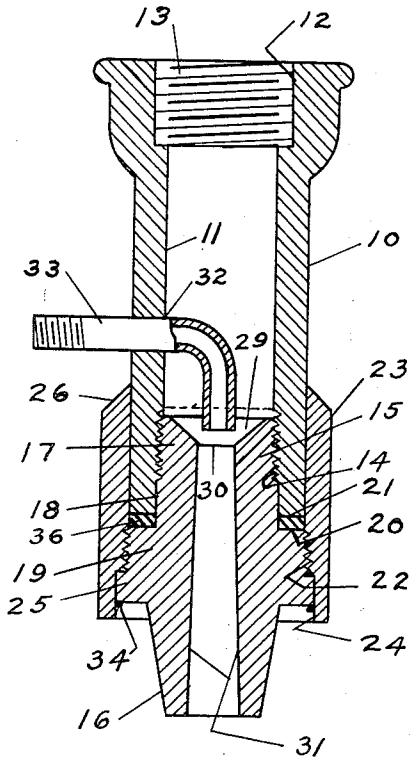



FIG. 2.

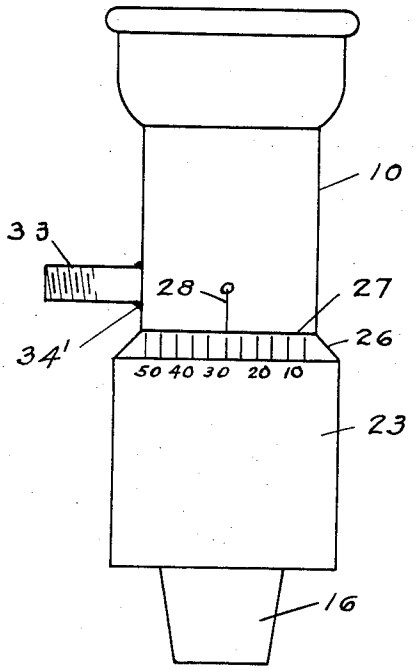



FIG. 1.

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## EJECTOR DEVICE

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5 Claims. (Cl. 103—273)

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This invention relates to an ejector device suitable for use wherever it is desired to force a liquid or any type of fluid out of a tank with considerable velocity.

One object of the invention is to produce a high vacuum in an ejector device which will closely approximate 30 inches.

Another object of the invention is to vary the degree of vacuum in order to suit the particular nature of the work in which the ejector device is used.

A further object of the invention is to afford visual means to indicate the degree of vacuum obtained with the ejector device.

Still another object of the invention is to provide an ejector device comprising a minimum of parts and of maintenance consonant with a high degree of efficiency.

These and other objects of the invention may be attained by means of the construction illustrated in the accompanying drawing in which:

Figure 1 is an elevation of the ejector device and

Figure 2 is a vertical section therethrough.

Referring to the drawing more in detail, the ejector device comprises a body 10, preferably of cast brass although any other suitable material may be used. The body 10 has a cylindrical bore 11 therein terminating in an upper enlarged chamber 12 having internal threads 13 to threadedly receive a pipe or hose (not shown) supplying a liquid or other fluid under high pressure to the bore 11 of the body. The lower end of the body 10 is internally threaded at 14 to receive the upper threaded end 15 of a nozzle element 16. This nozzle element comprises an upper extension 17 having a smooth cylindrical peripheral portion 18 beneath the threads 14. This smooth portion 18 is enlarged at 19 to form a ledge 20 normally spaced from the bottom end 21 of the body 10. The clearance between ledge 20 and bottom end 21 is for the purpose of permitting adjustment of the nozzle element 16 within the body for reasons to be further explained. A gasket 36 is positioned between ledge 20 and end 21 to prevent leakage therethrough.

The enlargement 19 is provided with peripheral threads 22 adapted to receive a sleeve 23 having internal threads cooperating with threads 22.

The bottom end of the sleeve is internally enlarged at 24 to receive the bottom flange 25 of the sleeve 23. After the device has been calibrated, the flange 25 and the enlargement 24 are soldered as shown at 34 so that the sleeve 23 and the

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nozzle 16 will rotate as a unit. The upper end of the sleeve is tapered at 26 towards the body 10 to provide a fine upper edge 27. The taper 26 carries indicia showing its division into 360°. These indicia cooperate with an index and stop mark 28 carried by the body 10 in proximity to the fine edge 27. In this manner, the upper end of the sleeve 23 constitutes a vernier from which readings may be had of the position of the nozzle element 16 within the body 10.

The nozzle element has an internal bore therethrough comprising an upper conical chamber 29, as shown, having a throat or constriction 30. From this constriction, the inner walls of the bore taper outwardly and downwardly, as shown at 31, to the bottom end of the nozzle element. It has been found that in order to secure the best results, the length of the nozzle bore should not be less than five times the diameter of the throat 30 nor more than 10 times the said diameter.

The walls of the body 10 are provided with an opening 32 adapted to snugly receive a jet tube 33. This tube is preferably soldered or brazed at 34' to the outer wall of the body 10. After entering the bore 11 of the body, the jet tube is bent downwardly with the axis of this bent portion coinciding with the axis of the bore 11. The bent portion of the jet tube terminates within the conical chamber 29 of the nozzle bore.

The ejector device operates as follows: The upper end of the body 10 being connected to a source of fluid under pressure, a high suction is created at the throat 30 through conversion of pressure head into velocity head. The result is forced ejection of the fluid admitted through the jet tube 33. It has been found that with a $\frac{3}{16}$ in. throat, the velocity head has sufficient force to eject liquid a distance of 42 feet. The corresponding or resulting kinetic energy released sets up a high vacuum at the point of approach between the jet tube 33 and the bore of the nozzle. The jet tube acts as a choke or valve and the closely regulated choking or valve action permits a re-forming of the stream after the velocity head is established.

The adjustability of the nozzle permits the location of the nozzle bore selectively at such distances from the outlet of the jet tube as to secure any desired results. Furthermore, the location of the nozzle may be observed on the vernier and the settings may be recorded for subsequent uses.

Following a series of experiments with the instant device, it has been found that a vacuum of from 30 to 31 in. has been attained with the

walls of the conical chamber 29 making an included angle of approach of between 40 and 50°.

While a single embodiment of the features of the present invention has been shown herein, it is not intended to limit the invention thereto as other embodiments may come within the scope of the appended claims.

What is claimed is:

1. An ejector device comprising a body, means for admitting pressure fluid to said body at the upper end thereof, a nozzle threaded at the lower end of the body, said nozzle having a conical inner chamber at its upper end and an axial passage tapering outwardly from said chamber to the lower end of the nozzle, a jet tube protruding through the body and having an opening within said conical chamber, a sleeve mounted outwardly of the body, and connecting means between said sleeve and said nozzle whereby the sleeve rotates the nozzle to vary the distance between the conical chamber and the opening of the jet tube.

2. An ejector device as set forth in claim 1, wherein the inner walls of the conical chamber make an angle of from 40 to 50° with the longitudinal axis of the body.

3. An ejector device as set forth in claim 1, wherein the conical chamber and the axial passage in the nozzle form a throat in the plane in which they meet, the length of said passage being comprised between 5 and 10 times the diameter of the throat.

4. An ejector device comprising a body, means for admitting pressure fluid to said body, a nozzle in said body having an ejector passage therethrough, a jet tube in said body having an opening adjacent said passage, means for adjusting the nozzle in the body to vary the distance between the opening of the jet tube and the ejector passage, means for indicating the amount of such adjustment including a rotatable sleeve mounted on said body, and means for connecting the sleeve to the nozzle, whereby the nozzle is rotated by the sleeve for adjusting the nozzle in the body.



5. An ejector device comprising a body, means for admitting pressure fluid to said body, a nozzle in said body having an ejector passage therethrough, a jet tube in said body having an opening adjacent said passage, means for adjusting the nozzle in the body to vary the distance between the opening of the jet tube and the ejector passage and means for indicating the amount of such adjustment including a rotatable sleeve mounted on the body, connecting means between the sleeve and the nozzle, whereby the sleeve and nozzle are rotatable together, the indicating means comprising indicia between said sleeve and body.

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