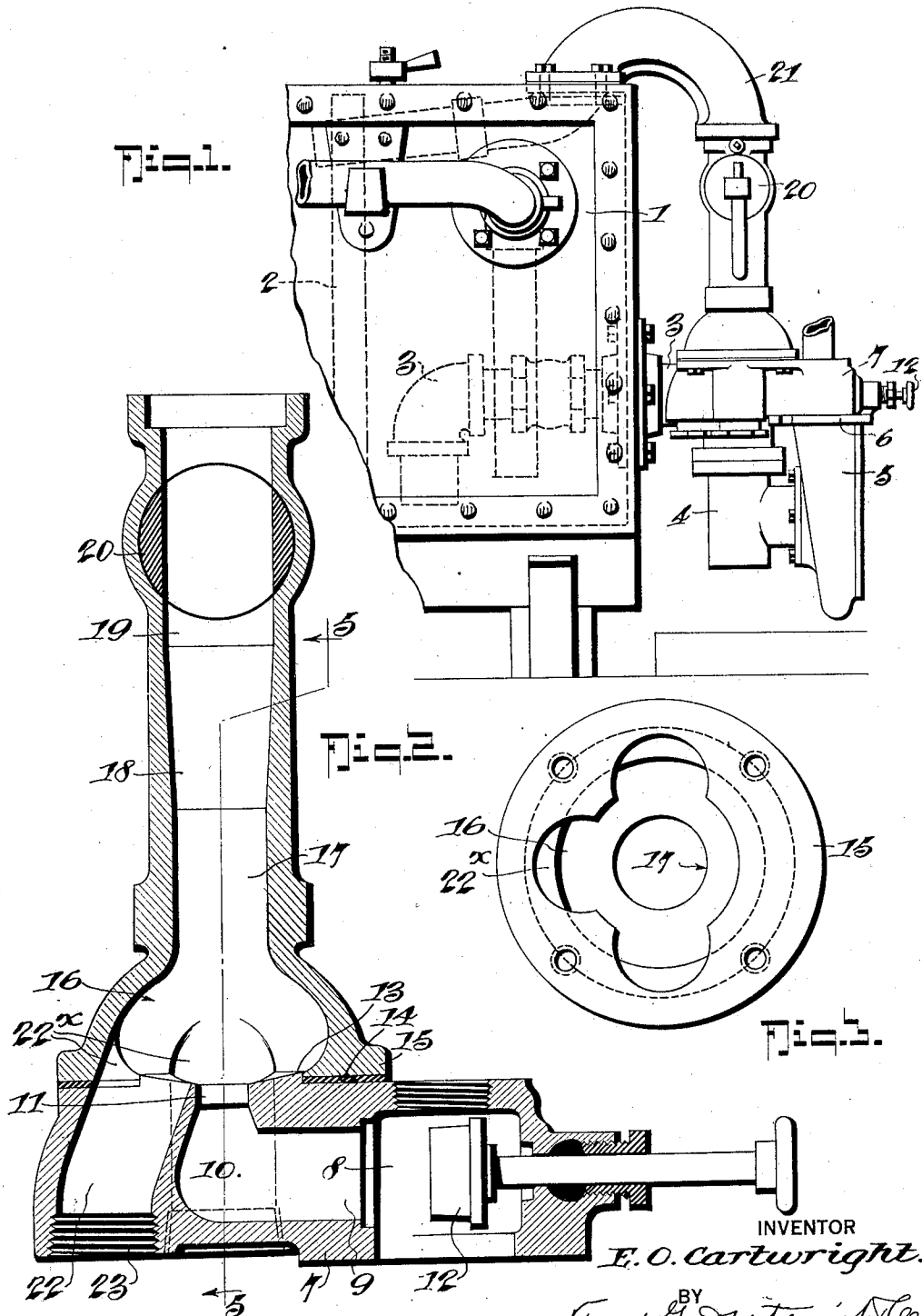


E. O. CARTWRIGHT.
EJECTOR OR INJECTOR.
APPLICATION FILED JULY 26, 1919.

1,369,398.

Patented Feb. 22, 1921.

2 SHEETS—SHEET 1.



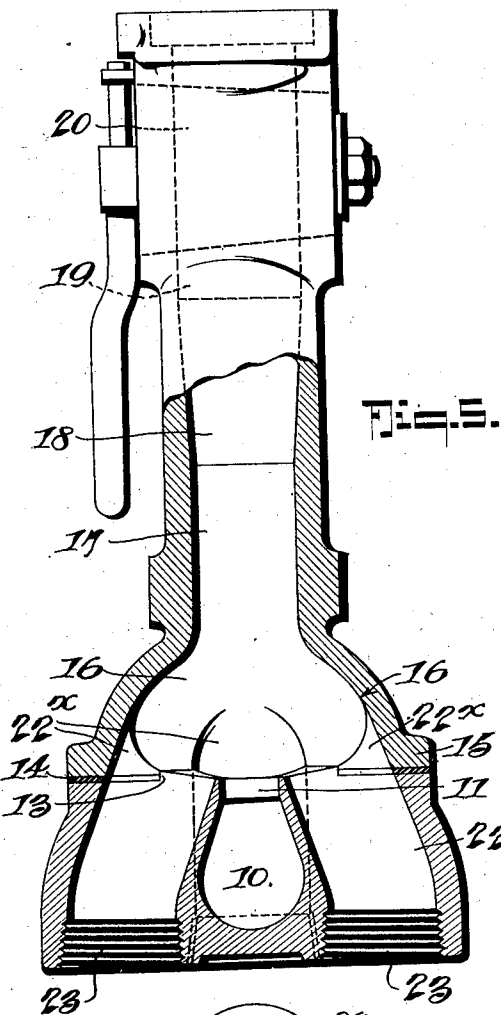
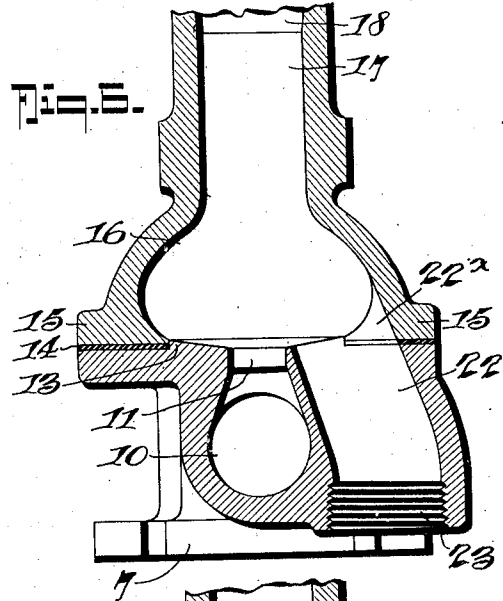
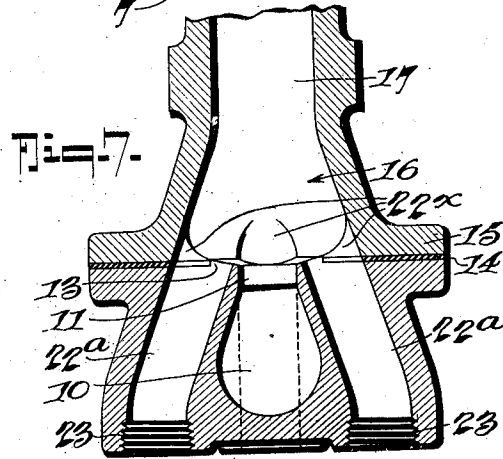
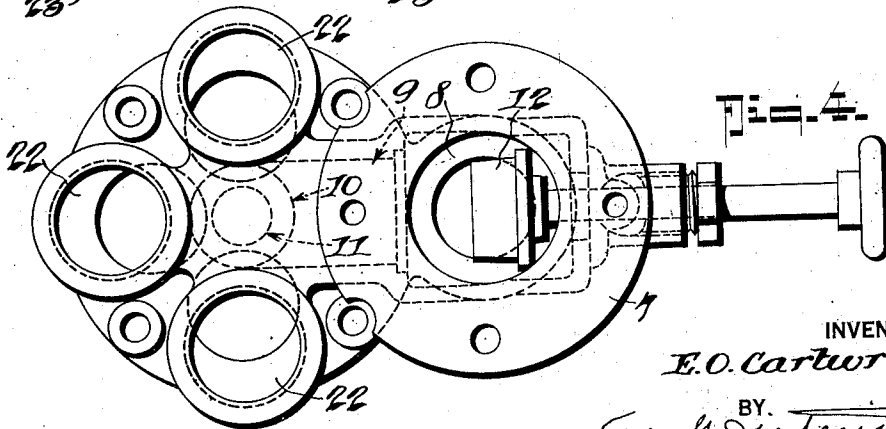
INVENTOR
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BY
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UNITED STATES PATENT OFFICE.

ERNEST O. CARTWRIGHT, OF SPRINGFIELD, OHIO, ASSIGNOR TO CHARLES F. GARDNER, OF SPRINGFIELD, OHIO.

EJECTOR OR INJECTOR.

1,369,398.

Specification of Letters Patent.

Patented Feb. 22, 1921.

Application filed July 26, 1919. Serial No. 313,490.

To all whom it may concern:

Be it known that I, ERNEST O. CARTWRIGHT, a citizen of the United States, residing at Springfield, in the county of Clark and State of Ohio, have invented a new and Improved Ejector or Injector, of which the following is a specification.

This invention relates to the art of ejectors or injectors, wherein the motive fluid is a liquid and the material which is drawn up by way of the suction duct is also a liquid but containing more or less solid and abrasive material, said ejectors (or injectors) being especially adapted for use in portable pumping apparatus of the general type disclosed in my application Serial No. 259,668, filed October 25, 1918.

When injectors of the general type used in apparatus such as disclosed in my application aforesaid, are worked in situations where the supply or pressure fluid is screened away from the mass being lifted by the ejector, the size of the openings in the screen is an important factor in the operation of the jet. Under certain conditions, a screen of sufficiently small mesh to properly protect the jet from obstructions will become so clogged with the lighter constituents of the mass that, without the use of cleaning arrangements, not enough water will pass through to supply the jet, which condition can be remedied only by the employment of larger openings in the screen used.

The apertures for the passage of pressure fluid in the cone type of jet (see my application Serial No. 281,272, filed March 7, 1919) are of comparatively restricted area and require the use of a relatively small mesh screen to properly protect it, and increased size of apertures would call for greater quantity of pressure fluid in order to maintain efficiency, which greater quantity of fluid would have to come through larger openings in the screen, all resulting in increased duty of the operating mechanism, which is undesirable.

To make possible the use of an aperture of sufficient area to give the efficiency of the cone type jet, and at the same time avoid the poor results of the jets wherein the suction is frequently broken down by the diffusion and deflection of the suction columns, when entering from one side, I have invented the construction herein shown and described.

The present invention includes those novel features of construction, combination and arrangement of parts, all of which will be fully described and specifically pointed out in the appended claims, reference being had to the accompanying drawings, in which:

Figure 1 is a detail elevation of a portion of a pumping apparatus employing the invention.

Fig. 2 is an enlarged vertical section of the ejector which constitutes one of the specific embodiments of the present invention.

Fig. 3 is an inverted plan view of the discharge duct.

Fig. 4 is an inverted plan of the parts shown in Fig. 2.

Fig. 5 is a section on the line 5—5 of Fig. 2.

Fig. 6 is a detail vertical section of another specific embodiment of the invention (differing from the preceding form in having but a single suction duct).

Fig. 7 is a detail vertical section of another form, similar to the form shown in Figs. 1 to 5, inclusive, but in which the combined areas of the several suction ducts approximate the area of the discharge duct or pass.

By reference to the accompanying drawings in which like numerals of reference designate like parts in all of the figures, it will be observed that 1 represents the separation tank which is provided with a screen partition 2 to strain the solids from the liquid, the liquid being removed from the chamber in which it collects, through a duct 3 which connects with the intake 4 of the centrifugal pump 5, the outlet 6 of which delivers into the intake of the base portion 7 of the ejector-injector and passes therefrom through the duct 21 back into the solids compartment of the tank, taking with it the material sucked from the sump via the suction duct 22 and the suction hose (not shown) which connects the suction duct 22 with the sump.

The ejector-injector which constitutes the subject matter of the present invention, consists essentially of a base 7 having a pressure fluid inlet 8 connected by a pass 9 with a chamber 10 that has a restricted outlet 11 lying in the axis of the discharge duct, the base also being provided with one or more suction ducts 22, the entrances to which may be threaded at 23 to receive the couplings or nipples of the suction pipe or hose (not

shown). The pass 9 is controlled by a valve 12.

The base 7 is provided on its upper surface with a flange 13 to fit in a corresponding recess in the flange or base portion 15 of the discharge duct, the latter being provided with a bulbular vacuum chamber 16 into which the jet opening 11 discharges centrally and into which the suction duct 22 discharges to one side of the jet aperture 11, the base portion 15 of the discharge duct being cored at 22^a to form a continuation of the channel of the suction duct 22 (see Fig. 2).

The discharge duct is provided with a straightway pass 17 from the bulbular vacuum chamber 16 and is also provided with an expansion pass 18 of frusto-conical form having its end of lesser diameter communicating with the pass 17 and its end of greater diameter communicating with the straightway pass 19 in which a cut off valve 20 is located for the purposes of shutting off the discharge duct, when it is desired to blow-out or clean the suction duct.

It will be noted from the foregoing that the pressure fluid is supplied to the jet by the suitable pump or accumulator 5 and is forced through the central opening 11 from the pressure chamber 10 into the vacuum chamber 16 where the suction column from the duct 22 is picked up by it and both are propelled by the force behind the pressure fluid through the straight cylindrical pass 17 into the conically divergent pass 18 between the straight section 17 and the final discharge 19.

The vacuum chamber has a base large enough to accommodate, around the center (at which the jet enters) the location, at any desired point, of one or more openings 22 (or 22^a see Fig. 7), leaving a wall of scant section between the jet aperture and the suction aperture or apertures. This brings the suction column into the bottom of the vacuum chamber as nearly parallel to the direction of the jet as possible.

At all points around the center of the chamber except where the suction duct enters, the line of the inside wall is turned toward the center with a radius which makes the wall inclose a bulbular-shaped cavity that equalizes the vacuum at all points around the center, when the jet is in operation and the suction is working.

Now to illustrate, if a fragment the size of the suction duct is brought into the vacuum chamber by the action of the jet, it will be deflected toward the jet by contact with the inside wall of the chamber and, by the continued action of the jet fluid, will be carried into the pressure stream and away, the shape of the chamber tending to consolidate the suction and pressure streams rather than diffuse either.

The proximity of the suction aperture to

the jet and the close approach to parallelism with the direction of the pressure water unite to afford an efficiency approximate to that of the enveloping cone jet, (see my application Serial No. 281,272 aforesaid), while eliminating the disadvantages of other types of ejectors and allowing the use of a jet aperture large enough to remain unobstructed by matter which would not be screened out of the supply fluid, when drawn, by the motive pump, through a screen containing the openings of sufficient area to prevent clogging, when working in the peculiar mass for the handling of which this jet was invented.

One suction duct 22 (see Fig. 6) may alone be employed and it may be located at any desired position around the center, or several ducts 22^a (see Fig. 2) of areas equal to that of the discharge duct may be provided and, in use, all but one may be plugged, the remaining one being that to which the suction hose (not shown) is connected, the several suction ducts 22^a may be employed together (there being separate suction hose connected to the respective ducts 22^a, when in use) but, when this form is used, I prefer to have the combined areas of the ducts 22^a approximate that of the discharge duct.

While I have illustrated several specific embodiments of the invention, I desire it understood that other changes in the details of construction, combination and arrangement of parts may be made without departing from the spirit of the invention or the scope of the appended claims.

What I claim is:

1. In apparatus of the character described, a base provided with a central pressure jet aperture and a suction duct to one side of the same, a discharge duct detachably secured to the base and having a bulbular vacuum chamber and a delivery pass leading therefrom, said suction duct and said jet aperture being directed to discharge into said vacuum chamber, said base having a receiving chamber and a shutoff valve in said receiving chamber, said receiving chamber being in communication with said jet aperture and means whereby said base may be secured to the outlet of a centrifugal pump with the receiving chamber in register with the outlet of the pump.

2. In apparatus of the class described, a base provided with a central pressure jet aperture and a suction duct to one side of the same, a discharge duct detachably secured to the base and having a bulbular vacuum chamber and a delivery pass leading therefrom, said suction duct and said jet aperture being directed to discharge into said vacuum chamber, said base having a receiving chamber and a shutoff valve in said receiving chamber, said receiving chamber being in communication with said jet

aperture, means whereby said base may be secured to the outlet of a centrifugal pump with the receiving chamber in register with the outlet of the pump, and a cock in said discharge duct.

3. In an apparatus of the character described, a base member provided with a central pressure jet aperture and at least one suction duct to one side of the same, a discharge duct, said base and said discharge duct having interengaging portions, a gasket between said base and discharge duct, means for securing said discharge duct to said base, said discharge duct including a bulbular vacuum chamber adjacent to said base into which said jet aperture and said suction ducts lead and discharge, said discharge duct having a delivery pass leading from said vacuum chamber and a shutoff cock in said delivery pass.

4. In an apparatus of the character described, a base member provided with a cen-

tral pressure jet aperture and at least one suction duct to one side of the same, a discharge duct, said base and said discharge duct having interengaging portions, a gasket between said base and discharge duct, means for securing said discharge duct to said base, said discharge duct including a bulbular vacuum chamber adjacent to said base into which said jet aperture and said suction ducts lead and discharge, said discharge duct having a delivery pass leading from said vacuum chamber, a shut-off cock in said delivery pass, said base including a receiving chamber, a shutoff valve in said receiving chamber and a duct between said receiving chamber and said jet aperture, said base adapted to be secured to the discharge outlet of a centrifugal pump with said receiving chamber in communication with the pump outlet.

ERNEST O. CARTWRIGHT.