

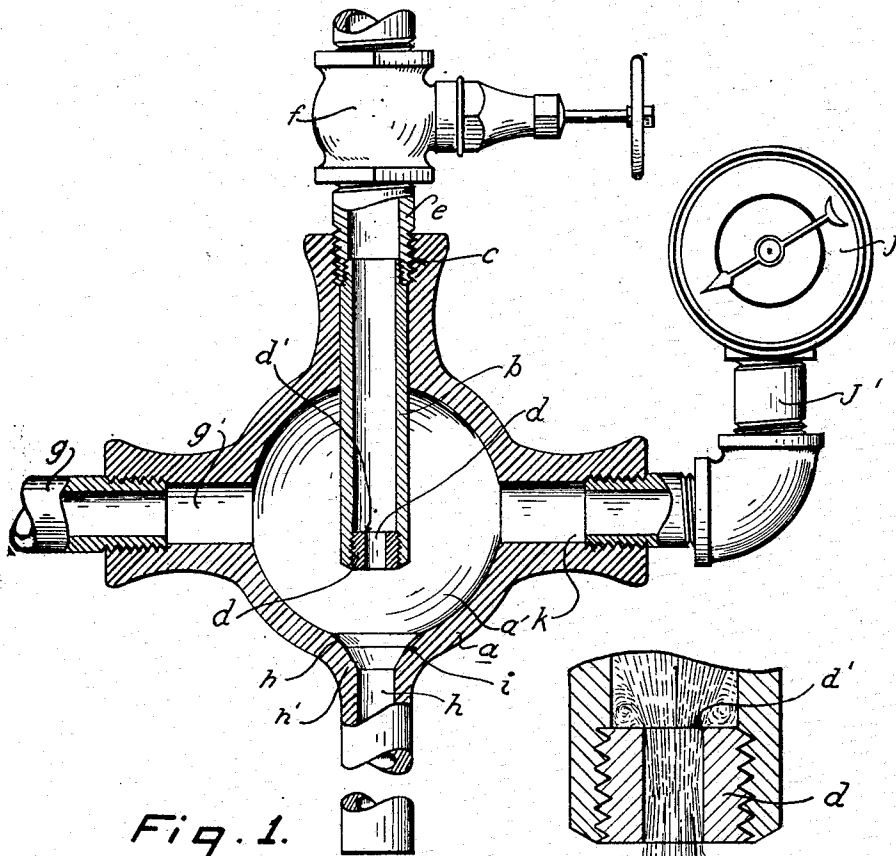
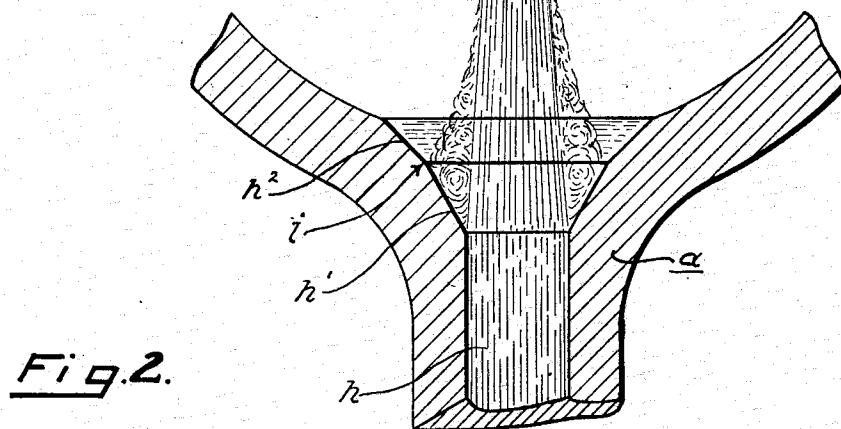
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SUCTION PRODUCING DEVICE

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SUCTION PRODUCING DEVICE

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My invention relates to suction producing devices and particularly to those of the jet type by which fluids are sucked into such device by reason of the reduced pressure therein and forced out of such device by the velocity of the jet which produces such reduced pressures.

The particular object of my invention is to provide a device of this character capable of producing a relatively high reduced pressure, one capable of being set to the desired pressures over a relatively wide range, and one which is adapted to maintain such predetermined reduced pressure without intermission and without fluctuation.

I attain this object by providing a nozzle capable of emitting a jet of relatively high contraction and with a relatively large degree of surface agitation and align an outlet with such nozzle in such a manner that the jet discharged into the latter is arranged to expand and completely fill such discharge opening and the agitated surface of such jet is adapted to be received in the flared mouth of such opening to seal the same and prevent variations and reduced pressures. The discharge outlet is further sealed by a secondary flared portion of lesser inclination than such primary flared mouth, which second flared portion is adapted to receive and hold a portion of the liquid from such jet in relative quiescence.

The details of my invention and the mode of operation thereof are hereinafter described with reference to the accompanying drawing, in which:

Fig. 1 is a section thru such apparatus; and

Fig. 2 is a larger scaled diagrammatic illustration of the relative alinement of such nozzle and the discharge outlet for the jet emitted from such nozzle.

Such apparatus comprises a body *a* defining a spherical chamber *a'* within such body. A nozzle *b* enters thru the sides of such body *a* and is screw-threaded therein at *c* to provide a fluid-tight joint. In the mouth of such nozzle *b* a tip *d* is arranged, which restricts the size of the jet orifices substantially. Such tip *d* is relatively narrow and the inner

corner *d'* thereof is sharp to produce a jet comparable to a square-ring fire nozzle, which produces a jet of relatively high contraction and has the peculiar characteristic of having the outer portion of the jet broken up into minute particles.

A supply pipe *e* provided with an adjustable valve *f* is connected to such nozzle *b*. An inlet pipe *g* admits the fluid to be propelled thru the inlet opening *g'*. The nozzle *b* is arranged to extend in a vertical plane and diametrically thru the chamber *a'*, the orifice of such nozzle being arranged in close proximity to the bottom of such chamber. The inlet opening *g'* is arranged in a horizontal plane substantially normal to the plane of such nozzle and enters thru the wall of the body *a* rearwardly of the mouth of such nozzle.

The discharge opening *h* from such chamber *a'* is, in the main, of uniform diameter and is proportioned relatively to the bore $d/2$ of the nozzle tip *d*. That is, in one size device I provide a nozzle tip having a bore $\frac{5}{32}$ of an inch in diameter and a discharge opening $\frac{1}{8}$ of an inch in diameter, the tip being arranged $\frac{1}{8}$ of an inch from the mouth of such bore and in exact alinement therewith, the nozzle tip being about $\frac{3}{8}$ of an inch thick. I find that the jet produced by such nozzle tip will expand and will strike the surface and completely fill the discharge opening *h* at a point substantially $\frac{5}{16}$ of an inch below its mouth. Above such point, namely $\frac{5}{16}$ of an inch below the inner surface of the body *a*, if continued in a line across the mouth of such discharge outlet *h*, I flare such discharge outlet at an angle substantially 30° from the axis of such opening *h*, such flared portion being referred to in the drawing as *h'*. About $\frac{1}{16}$ of an inch inside of such inner surface of the body *a* I produce a secondary flare *h2* from such primary flare *h'* extending from the axis of such opening *h* approximately at an inclination of 60° .

The jet produced by the nozzle *b* provided with a tip *d* has an outer surface comprising minute water particles which are directly forwarded by the main portion of the jet but diverge slightly therefrom. The angle of

divergence of such outer broken up portion is sufficient, when the parts are proportioned as heretofore set out, to strike the primary flared portion h' slightly inwardly of the point i where the secondary flare h_2 commences. The entire length of such flared mouth bounded by the portion h' is thus filled with such finely divided particles of water or spray which move forwardly with the jet and tend to seal the same with the bore of the discharge outlet h .

In the secondary flare bounded by the portion h_2 relatively quiescent liquid collects, but which tends to drain into the outlet h . The force of the finely divided liquid drawn against the flared mouth h' seemingly prevents the escape of the major portion of the liquid thus collected and if any does drain off into such opening it is immediately replaced.

A characteristic of such apparatus thus described is the relatively high vacuum produced when the inlet opening g' is closed to prevent fluid from being drawn into the chamber a . I have been able to produce conditions of reduced pressure equal to 29½ inches of mercury, such devices being capable of sustaining unvarying reduced pressures from atmospheric pressure to such relatively high reduced pressures, merely by varying the fluid pressure in the supply pipe for the nozzle b .

To check the reduction in pressures within the chamber a' , I provide a pressure gauge j having a pipe j' opening into the chamber at k .

I claim:

1. In a device of the character described comprising a casing defining a chamber, intake and discharge openings communicating with such chamber and entering thru the walls of such casing, and a liquid discharge nozzle also entering thru the walls of such casing and depending centrally into such chamber and alined with such discharge opening, an inwardly projecting relatively thin sharp-cornered, circularly bored flange located in the tip of such nozzle and adapted to contract the discharging stream emitted from such nozzle, the bore of such flange being of a size corresponding approximately to one-half of the thickness thereof and the bore of such discharge opening being spaced from the discharge opening a distance approximately four times the diameter of the aperture of the nozzle.

2. In a device of the character described comprising a casing defining a chamber, intake and discharge openings communicating with such chamber and entering thru the walls of such casing, and a liquid discharge nozzle also entering thru the walls of such casing and depending centrally into such chamber and alined with such discharge opening, an inwardly projecting relatively thin sharp-cornered, circularly bored flange locat-

ed in the tip of such nozzle and adapted to contract the discharging stream emitted from such nozzle, the bore of such flange being of a size corresponding approximately to one-half of the thickness thereof and the bore of such discharge opening being spaced from the discharge opening a distance approximately four times the diameter of the aperture of the nozzle, the mouth of such discharge opening being provided with a primary outwardly flared portion.

3. In a device of the character described comprising a casing defining a chamber, intake and discharge openings communicating with such chamber and entering thru the walls of such casing, and a liquid discharge nozzle also entering thru the walls of such casing and depending centrally into such chamber and alined with such discharge opening, an inwardly projecting relatively thin circularly bored flange located in the tip of such nozzle and adapted to contract the discharging stream emitted from such nozzle, the bore of such flange and the bore of such discharge opening being proportioned and spaced in the manner described, the mouth of such discharge opening being provided with a primary outwardly flared portion, and with a basin-like secondary outwardly flared portion joining and surrounding such primary portion.

In testimony whereof he affixes his signature.

ANDREW C. NELSON.