Dec. 8, 1931. A. E. KINCAID, JR 1,835,603

EJECTOR

Filed July 16, 1928

Fig. 1.

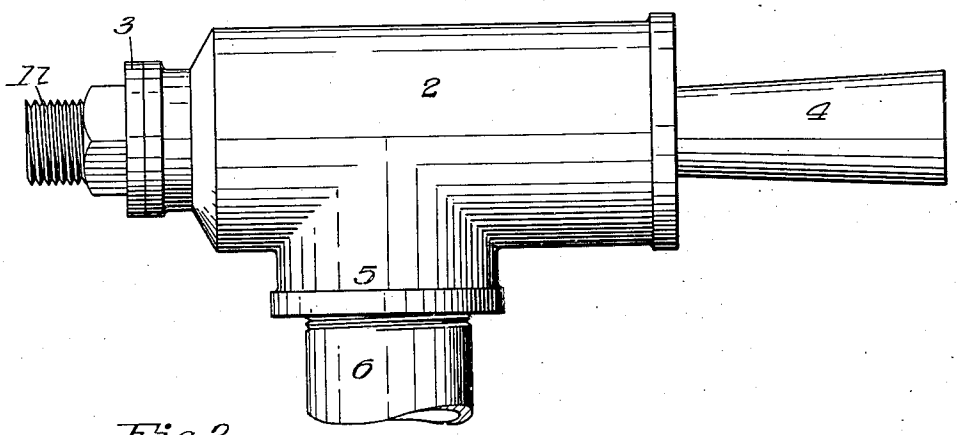


Fig. 2.

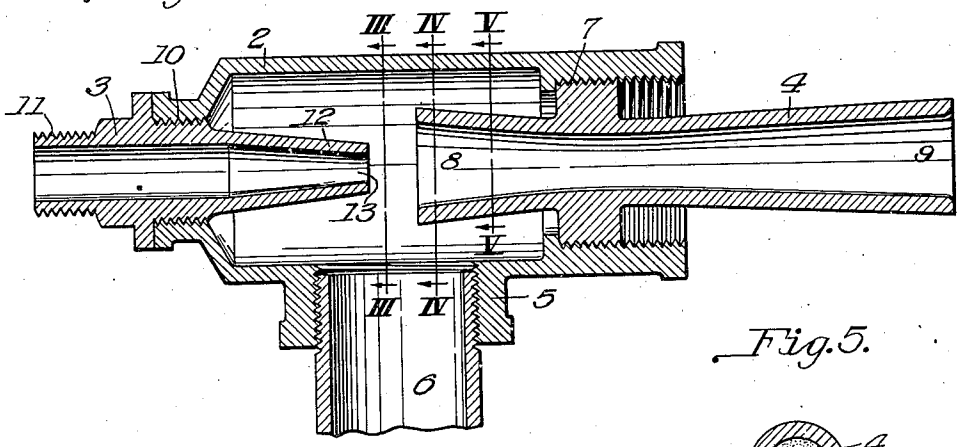


Fig. 5.

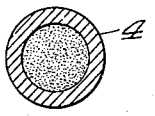


Fig. 6.

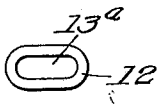


Fig. 3.

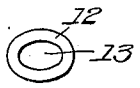
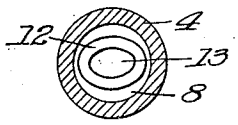


Fig. 4.



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UNITED STATES PATENT OFFICE

ALBERT E. KINCAID, JR., OF PITTSBURGH, PENNSYLVANIA

EJECTOR

Application filed July 16, 1928. Serial No. 293,119.

My invention consists of an improvement in siphons or ejectors of the type utilizing a fluid, as steam or water under pressure, for inducing flow of another fluid.

In devices of this general kind, a jet of water is projected across a lateral inflow opening for induction into a delivery barrel or jet of larger, usually circular, cross section. I have found in practice that with the impelling or current-inducing jet having a cross sectional area properly proportioned to that of the delivery jet of larger size and area, there is a frequent failure to effect complete closure or filling of the delivery jet by the combined inducing and induced flow. The result is more or less inefficiency in use, waste of the inducing fluid, as water, and variation in the flow and volume of the delivered supply.

In my invention I have overcome these and other objections by so designing the water or other inducing jet and its relation to the delivery jet, as to effect a spreading of the impelling current, with reacting distribution within the barrel of the delivery jet, so as to completely fill it at all times during operation.

In the drawings showing one preferred embodiment of the invention:

Fig. 1 is a view of my improved ejector in side elevation;

Fig. 2 is a longitudinal sectional view thereof;

Fig. 3 is a cross section on the line III—III of Fig. 2;

Fig. 4 is a similar section on the line IV—IV of Fig. 2;

Fig. 5 is a cross section on the line V—V of Fig. 2, illustrating the complete filling of the delivery jet;

Fig. 6 is a view similar to Fig. 3, showing a modified form of jet nozzle opening.

The siphon or ejector as a whole comprises three main parts of generally standard well known constructions, to wit, a middle body or barrel 2, an impelling jet nozzle 3, and a delivery jet nozzle 4.

The middle barrel portion 2 is provided with an inlet or supply connection 5 having an interior thread for attachment of a pipe 6, for suction of the fluid to be delivered through the delivery jet nozzle 4. Said nozzle 4 is connected by screw thread engagement 7, intermediate of its ends, with the delivery end portion of the barrel 2 according to standard practice. Nozzle 4 is provided with the inwardly extending receiving portion 8 and the outwardly extending delivery terminal 9. The central delivery opening through nozzle 4 is circular in cross section throughout, flaring or enlarging both inwardly and outwardly as shown from an intermediate minimum diameter, the flare at one or both ends being varied or designed to suit the particular use to which the ejector is applied.

The novel element in the construction is embodied in the impelling jet nozzle 3. As shown, and as is generally understood, it is inserted within the opposite end of the barrel and connected therewith by threaded engagement as at 10, in central alinement with the delivery jet nozzle 4. The outer portion of nozzle 3 is provided with screw threads 11, or annular grooves for attachment of a pipe or hose, for supply of the impelling fluid, as water, or other fluid under pressure.

The inner terminal 12 of jet 3 extends inwardly as shown terminating in front of the receiving end of nozzle 4, with intervening space for circulation of the fluid delivered by pipe 6. The outer portion of jet 3 is of the usual cylindrical cross section, but merges into the final oval or flattened form of delivery opening 13, as indicated in Figs. 3 and 4.

The dimensions of the opening 13 are suitably proportioned, with relation to the circular receiving end 8 of nozzle 4, to discharge thereinto, with sufficient space to receive the induced current, the proportions of both elements varying with the size and capacity of the complete ejector.

By reason of the oval or flattened form of the delivery terminal 13, the stream of impelling fluid issuing therefrom is laterally reduced in one direction and enlarged in a direction at right angles thereto, the result of which is to effect a lateral widening distention of the impelling stream, as it enters the receiving end 8. The immediate result of

such delivery is that the opposite portions of the wider dimension of the jet impinge against the opposite side walls of the receiving opening 8 and are immediately deflected inwardly and also upwardly and downwardly so as to completely fill the opening in the form of a spray.

The impelling jet is thus completely broken up and rearranged in the form of a completely investing spray of commingled particles of fluid, of a consistency amply open to admit and absorb the entire incoming volume of fluid, thereby projecting it through and out of the delivery jet nozzle. As the combined broken up impelling jet spray and the induced stream enter the flaring end 8, they are then immediately condensed into a practically solid stream, entirely filling the minimum diameter of the delivery jet, with delivery issue therefrom in a somewhat expanded form at increased velocity.

The net effect of such construction and operation is to regularly deliver a stream of uniform solidity and without intermittent variations or lapses in efficiency, due to the complete investment within the delivery nozzle of the completely filling impelling and induced currents.

If desired the impelling jet may be flattened at its delivery end, providing the parallel-sided elongated opening 13*a* of Fig. 6. The resulting effect and functional result is substantially the same as above described.

It will be understood of course that the dimensions of both jet members should be carefully designed and proportioned with relation to each other, and to the desired capacity of the device, and that it may be variously changed in design, detail construction or otherwise by the skilled mechanic, but that all such changes are to be understood as within the scope of the following claims.

What I claim is:

1. In an ejector of the class described, the combination of an elongated receiving barrel having a lateral supply connection, a longitudinally central delivery jet nozzle having an inwardly flaring receiving end and an outwardly flaring delivery end with an intermediate minimum diameter positioned on the axial center of the barrel and extending inwardly and outwardly from one end thereof, and an impelling jet nozzle in axial alinement therewith provided with an inwardly tapered oppositely enlarged final flattened opening terminating in front of and spaced backwardly from the flaring receiving end of the delivery jet nozzle, the spaced-apart inner ends of said nozzles being opposite the lateral supply connection.

2. In an ejector of the class described, the combination of an elongated receiving barrel having a lateral supply connection, a longitudinally central delivery jet nozzle having an inwardly flaring receiving end and an outwardly flaring delivery end with an intermediate minimum diameter positioned on the axial center of the barrel and extending inwardly and outwardly from one end thereof, and an impelling jet nozzle in axial alinement therewith provided with an inwardly tapered oppositely enlarged final oval opening terminating in front of and spaced backwardly from the flaring receiving end of the delivery jet nozzle and of substantially less cross area than that of the flared receiving end of the receiving jet nozzle, the spaced-apart inner ends of said nozzles being opposite the lateral supply connection.

3. In an ejector of the class described, the combination of an elongated receiving barrel having a lateral supply connection, a longitudinally central delivery jet nozzle having an inwardly flaring receiving end and an outwardly flaring delivery end with an intermediate minimum diameter positioned on the axial center of the barrel and extending inwardly and outwardly from one end thereof, and an impelling jet nozzle in axial alinement therewith provided with an inwardly tapered oppositely enlarged final oval opening of materially less maximum and minimum dimensions than the diameter of the flaring receiving end of the delivery jet nozzle and spaced backwardly therefrom, the spaced-apart inner ends of said nozzles being opposite the lateral supply connection.

In testimony whereof I hereunto affix my signature.

ALBERT E. KINCAID, JR.