

Patented Feb. 27, 1923.

1,447,103

UNITED STATES PATENT OFFICE.

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TRANSLATING DEVICE.

Application filed May 31, 1922. Serial No. 564,775.

To all whom it may concern:

Be it known that I, HENRY F. SCHMIDT, a citizen of the United States, and a resident of Philadelphia, in the county of Philadelphia and State of Pennsylvania, have invented a new and useful Improvement in Translating Devices, of which the following is a specification, being a continuation in part of my copending application, Serial No. 413,637, filed Sept. 29, 1920.

This invention relates to fluid translating devices and particularly to ejectors in which the fluid to be translated is entrained by rapidly moving motive fluid and is then discharged through a suitable diffuser in which a part of the kinetic energy imparted to the translated fluid by the motive fluid is converted into potential or pressure energy.

Ejectors are frequently employed for pumping or circulating fluids of all kinds, and in particular are commonly employed for removing air from condensers. In order to obtain a large area of entraining surface it is common practice to provide a large number of relatively small nozzles which are usually so arranged as to produce a large conical jet made up of the small jets discharged by the nozzles. The passages through such small nozzles are difficult to machine with sufficient accuracy to ensure that only the correct amount of motive fluid will be discharged through them. Furthermore, the proper construction and assembling of such an ejector is difficult because of the smallness of the parts and the accuracy with which they must be constructed and placed. Dirt also tends to clog up such small nozzles so as to render them more or less ineffective.

I have found that the same high efficiency, or even greater efficiency than has been attained with multiple nozzle ejectors may be obtained with a much simpler ejector provided the parts are arranged in accordance with my invention, as herein described and illustrated. I preferably employ but one nozzle and make the distance between the outlet of the nozzle and the throat of the diffuser so great that the entraining area of the single jet is as effective as the total entraining area of the composite jet discharged by a group of smaller nozzles. The entraining area of a jet of motive fluid in the present application refers to the lateral or superficial area thereof. I have found

that the highest efficiency is obtained when the distance between the mouth of the nozzle and the throat of the diffuser is such that the effective area of the jet discharged by the nozzle is approximately five hundred times the area of the throat of the nozzle. An ejector constructed in accordance with my invention is simple in construction, easy to machine and assemble and is highly efficient in operation.

An object of my invention is to produce a new and improved ejector which is more simple and efficient than other ejectors now in use and known to me.

A further object is to produce an ejector in which an improved nozzle and diffuser arrangement is employed, having the advantages of well known and efficient multiple nozzle ejectors without the disadvantages characteristic of such ejectors.

A further object is to produce a new and improved ejector in which one nozzle produces an entraining area as effective as is ordinarily obtained with a relatively large number of small nozzles.

A further object is to produce a new and improved ejector in which small passages are eliminated without sacrificing the advantages of large entraining surface and high economy characteristic of ejectors having a large number of properly designed and arranged nozzles of small size.

These and other objects which will be made apparent throughout the further description of my invention are attained by means of apparatus herein described and illustrated in the drawing accompanying and forming a part hereof.

The drawing is a diagrammatic sectional view of an ejector embodying the features of my invention.

In the drawing I have illustrated an ejector having a converging combining tube axially aligned with and, as shown, joined to a diverging diffuser tube 6. The junction of the combining tube and the diffuser is called the throat of the ejector and is designated by the numeral 7. Communicating with the large end of the combining tube 5, I have shown an inlet chamber 8 for fluids to be translated, an inlet port 9 being provided on one side thereof. Extending into the inlet chamber 8, I have illustrated a nozzle 10 which, as shown, is adapted to receive motive fluid through a suitable inlet passage

11 and to discharge it in a jet across a part of the inlet chamber 8 into the combining tube 5. The nozzle 10 has a contracted throat portion 12, and a diverging discharge portion 13, as is well understood in the art to which my invention relates.

As illustrated, the distance X from the nozzle 10 to the throat 7 is such that the entraining area of the jet of motive fluid discharged by the nozzle 10 is substantially five hundred times the transverse area of the throat 12. I have found that this relation of areas gives the highest efficiency and enables the ejector to be constructed much cheaper and with greater simplicity than has hitherto been possible with ejectors intended for highly efficient operation.

In operation the fluid to be translated is delivered to the inlet chamber 8. Motive fluid, for example steam, is delivered to the nozzle 10, which is preferably so proportioned as to expand the motive fluid to substantially the pressure existing in the inlet chamber 8. The motive fluid is discharged from the nozzle at high velocity and in the form of a jet. The fluid to be translated is entrained by the jet of rapidly moving motive fluid and is carried through the combining tube 5 and the diffuser 6 in a manner well known to those skilled in the art. It will, of course, be understood that the fluid to be translated fills up the inlet chamber 8 and that part of the combining tube 5 which is not occupied by the jet of motive fluid, and therefore the full area of the jet is in contact with the fluid to be translated and this area is such that the highest efficiency is obtained.

While I have shown my invention in but one form, it will be obvious to those skilled in the art that it is not so limited, but is susceptible of various other changes and modifications, without departing from the spirit thereof, and I desire, therefore, that only such limitations shall be placed there-

upon as are imposed by the prior art or as are specifically set forth in the appended claims.

What I claim is:—

1. In an ejector, a diffuser having a throat, and an expansion nozzle for delivering a jet of motive fluid into the diffuser, the nozzle being spaced from the throat of the diffuser so that the entraining area of the jet is at least five hundred times the area of the throat of the nozzle.

2. An ejector having an inlet chamber, a diffuser communicating therewith and having a throat, and a nozzle having a throat for delivering a jet of motive fluid into the diffuser, the jet having an area of at least five hundred times the area of the throat of the nozzle.

3. In an ejector, an inlet chamber for fluids to be translated, a combining cone communicating therewith, a diffuser for receiving the fluids discharged by the combining cone and connected thereto by a throat and a nozzle for discharging a jet of motive fluid into the inlet chamber and the combining cone and provided with a throat, the nozzle being spaced from the throat of the diffuser such a distance that the effective entraining area of the jet is substantially five hundred times the area of the nozzle throat.

4. A fluid translating device, comprising an inlet chamber for fluids to be translated, a converging-combining tube communicating therewith, a diffuser axially aligned with and connected to the combining tube by a throat, and an expansion nozzle projecting into said inlet chamber for delivering a jet of motive fluid having an effective entraining surface at least five hundred times as great as the area of the throat of the nozzle.

In testimony whereof, I have hereunto subscribed my name this 25th day of May, 1922.

HENRY F. SCHMIDT.