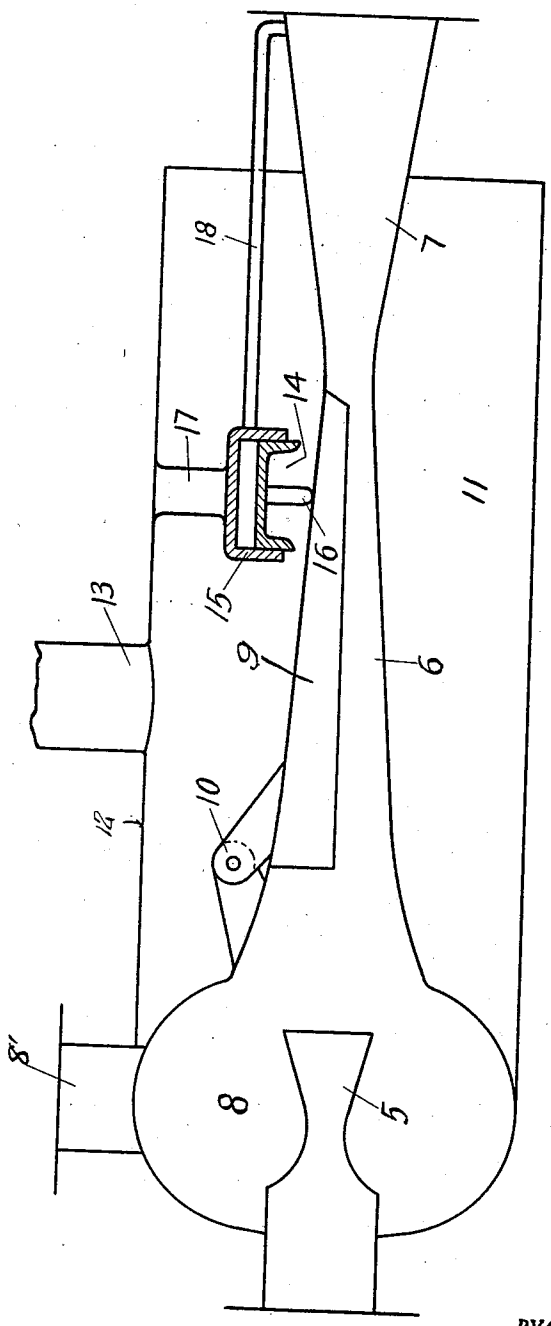
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H. F. SCHMIDT

FLUID TRANSLATING DEVICE

Filed Dec. 31, 1920



Henry F. Schmidt
INVENTOR.

BY
ATTORNEY

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UNITED STATES PATENT OFFICE.

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FLUID-TRANSLATING DEVICE.

Application filed December 31, 1920. Serial No. 434,356.

To all whom it may concern:

Be it known that I, HENRY F. SCHMIDT, a citizen of the United States, and a resident of Swarthmore, in the county of Delaware and State of Pennsylvania, have invented a new and useful Improvement in Fluid-Translating Devices, of which the following is a specification.

My invention relates to fluid ejecting devices, particularly of the Venturi tube type and it has for its object to provide apparatus of the character designated which shall be simple in construction and effective in operation, particularly in that means are provided for preventing the fluids passing the overflow port of the ejector during normal operation from being subjected to the low pressure existing in the vessel with which the overflow port is connected.

The single figure of the accompanying drawing is a diagrammatic sectional view of an ejecting device embodying my invention.

The overflow port of an ejector is ordinarily connected to the vessel which the ejector evacuates, or to some other region of low pressure, so that when the ejector overflows, the resistance to the flow of fluids is as low as possible. The low resistance to the flow of the fluids enables the jet or jets of motive fluid, hereinafter called steam, to quickly accelerate the fluids to a velocity sufficient to cause them to pass the overflow port and to be discharged through the diffuser of the ejector in the usual manner. In certain types of ejectors the low pressure existing at the overflow port causes a certain amount of spilling and evaporation of the fluids passing the port during normal operation. I have found that it is desirable to have this port closed when there is no tendency to overflow and yet to have it free to open as soon as the tendency to overflow does occur. My invention contemplates a new and improved ejector in which the overflow opening is held closed during normal operation of the ejector and yet is free to open as soon as the tendency to overflow occurs.

In the drawing I show an ejector having a nozzle 5, a converging combining tube 6, and a diverging diffuser 7 axially aligned and spaced in the usual manner. As illustrated, the nozzle 5 extends into an inlet chamber 8 to which the fluids to be translated are delivered thru an inlet port 8'. The inlet chamber 8 communicates directly with the large or inlet end of the combining tube 6 and may be considered as an extension thereof.

The overflow arrangement of the ejector illustrated consists of a movable wall 9 forming a part of the wall of the combining tube 6 and hinged to the combining tube at one end by means of a suitable hinge 10. This movable wall 9 is therefore free to swing away from the combining tube 6 about the hinge 10 and to thereby allow the fluids to overflow into an overflow chamber 11. As illustrated, the overflow chamber 11 is formed within a casing 12, which surrounds the major part of the ejector and in which an overflow port 13 is provided. The port 13 is preferably connected with the vessel which the ejector evacuates, so that the pressure existing in the overflow chamber 11 may be as low as possible.

As shown, the movable wall 9 is held against the combining tube 6, or in other words, in its closed position, by means of a piston 14, which operates in a cylinder 15 and is provided, as illustrated, with a stem or projection 16 bearing against the movable wall 9. I have shown the cylinder 15 as mounted on the casing 12 by an arm 17, and as connected with the large end of the diverging diffuser 7 by means of a conduit 18.

In operation the steam discharged by the nozzle 5 entrains the fluids to be translated in the inlet chamber 8 and carries them into the combining tube 6 in a manner well known to those skilled in the art. During normal operation the velocity and momentum of the stream of fluids moving through the combining tube is sufficient to carry the fluids through the combining tube and the diffuser against the discharge pressure at the outlet of the diffuser. The pressure of the fluids as they are discharged is transmitted to the piston 14 by the pipe 18, and therefore the movable wall 9 is held in its closed position by the piston and the fluids passing through the combining tube are not subjected to the low pressure existing in the overflow chamber 11. It will, of course, be understood that the pressure in the overflow chamber 11 is ordinarily relatively low for

the reason that the overflow chamber 11 is usually connected with the vessel which the ejector evacuates.

When starting up, or whenever the velocity of the fluids is not sufficient to carry them through the ejector, the pressure on the piston 14 is sufficiently low to permit the fluids to move the movable wall 9 to its open position so that the fluids are discharged into the overflow chamber 11. Under these conditions the resistance to flow is relatively low and consequently the fluids are quickly accelerated to a velocity sufficient to cause them to pass through the diffuser 7 against the discharge pressure. As soon as this occurs the pressure at the outlet of the diffuser 7 increases and consequently the pressure on the piston 14 builds up and the movable wall 9 is moved to its closed position. The apparatus is preferably so proportioned that during normal operation the force exerted by the piston 14 is sufficient to hold the movable wall 9 tightly closed.

It is evident that the loading of the overflow device, or in other words the force tending to hold the overflow wall 9 closed, varies with variations in pressure of the fluids passing through the ejector. It is also evident that during normal operation the fluids passing through the ejector are not subjected to the low pressure existing in the overflow chamber of the ejector, and that if a tendency to overflow does occur the loading of the overflow device is so reduced that the fluids may overflow with little or no resistance to flow.

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

What I claim is:

1. An ejector comprising an inlet chamber, means for admitting fluid to be entrained to said chamber, a nozzle discharging a jet of motive fluid into said chamber, a convergent-divergent tubular member communicating with said inlet chamber and disposed to receive said jet of motive fluid and fluids entrained thereby, an overflow port in said tubular member, a valve member closing said port, and means responsive to the pressure of fluids at the outlet of said tubular member for holding the valve closed during the normal operation of the ejector, whereby said tubular member constitutes a fluid-tight passage for the fluids during normal operation of the ejector.

2. An ejector comprising an inlet chamber, means for admitting fluid to be entrained to said chamber, a nozzle discharging a jet of motive fluid into said chamber, a convergent-divergent tubular member communicating with said inlet chamber and disposed to receive said jet of motive fluid and fluids entrained thereby, an overflow port in said tubular member, a valve member closing said port, and means responsive to the pressure of fluids at the outlet of said tubular member for holding the valve closed during the normal operation of the ejector, comprising a cylinder, a piston in said cylinder, a rod secured to the piston and engaging the valve, and a conduit connecting the cylinder with the discharge portion of said tubular member, whereby said tubular member constitutes a fluid-tight passage for the fluids during normal operation of the ejector.

3. An ejector comprising an inlet chamber, means for admitting fluid to be entrained to said chamber, a nozzle discharging a jet of motive fluid into said chamber, a convergent-divergent tubular member communicating with said inlet chamber and disposed to receive said jet of motive fluid and fluids entrained thereby, an overflow port in said tubular member, a valve member closing said port, an overflow chamber into which said overflow port opens, and means responsive to the pressure of fluids at the outlet of said tubular member for holding the valve closed during the normal operation of the ejector, whereby said tubular member constitutes a fluid-tight passage for the fluids during normal operation of the ejector.

4. An ejector comprising an inlet chamber, means for admitting fluid to be entrained to said chamber, a nozzle discharging a jet of motive fluid into said chamber, a convergent-divergent tubular member communicating with said inlet chamber and disposed to receive said jet of motive fluid and fluids entrained thereby, an overflow port in said tubular member, a valve member closing said port, an overflow chamber into which said overflow port opens, a cylinder secured to a wall of said overflow chamber, a piston in said cylinder, a rod secured to the piston and engaging the valve, and a conduit connecting the cylinder with the discharge portion of said tubular member, whereby the pressure of the fluids in the discharge portion of the tubular member acts to hold the valve in closed position to provide a fluid-tight passage for the fluids through the tubular member during normal operation of the ejector.

5. An ejector comprising an inlet chamber, means for admitting fluid to be entrained to said chamber, a nozzle discharging a jet of motive fluid into said chamber, a convergent-divergent tubular member communicating with said inlet chamber and disposed to receive said jet of motive fluid and fluids entrained thereby, an overflow port in said tubular member, a valve member closing

said port, an overflow chamber into which said overflow port opens, a cylinder within the overflow chamber and secured to a wall thereof, a conduit connecting the cylinder with the discharge portion of said tubular member, a piston in said cylinder subjected on one side to the pressure of the discharge portions of said tubular member and on the other side to the pressure of fluids within the overflow chamber, a rod secured to the piston and engaging the valve, whereby said tubular member constitutes a fluid-tight passage for the fluids during normal operation of the ejector.

In testimony whereof, I have hereunto subscribed my name this 28th day of December, 1920.

HENRY F. SCHMIDT.