July 14, 1925. 1,545,700

H. F. SCHMIDT

WATER EJECTOR

Filed Feb. 18, 1921

Fig. 1.

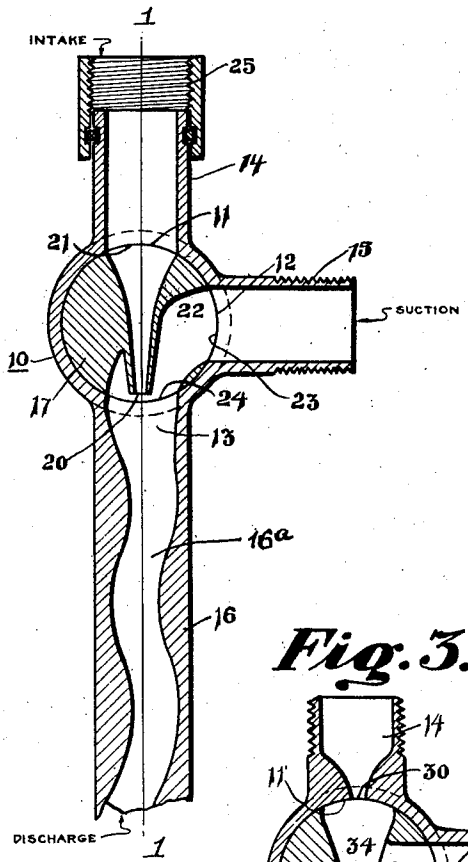


Fig. 2.

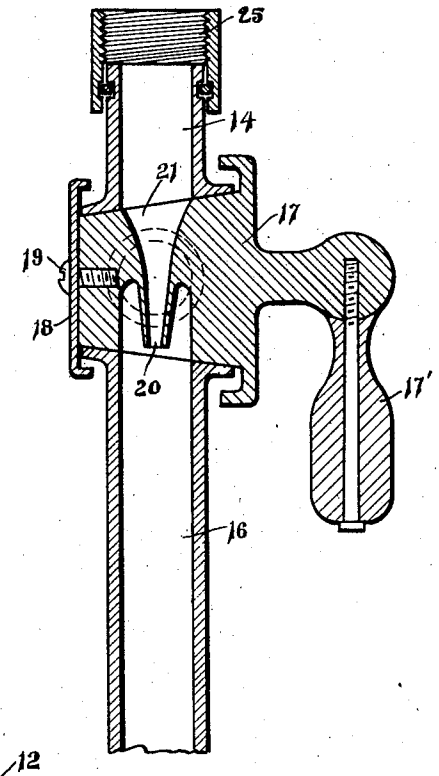
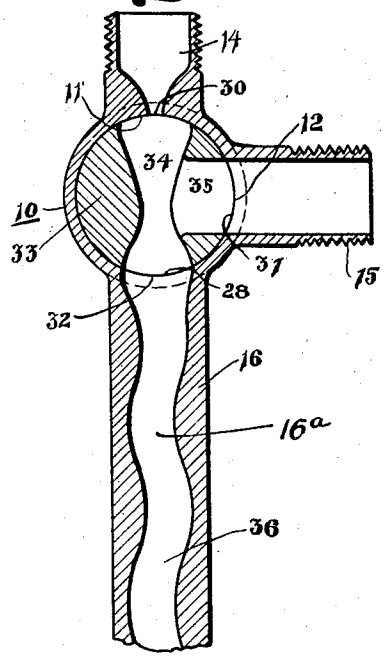


Fig. 3.



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Patented July 14, 1925. 1,545,700

UNITED STATES PATENT OFFICE.

HENRY F. SCHMIDT, OF SWARTHMORE, PENNSYLVANIA, ASSIGNOR TO WESTINGHOUSE ELECTRIC AND MANUFACTURING COMPANY, A CORPORATION OF PENNSYLVANIA.

WATER EJECTOR.

Application filed February 18, 1921. Serial No. 446,144.

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 Water Ejectors, of which the following is a specification.

My invention relates to water ejectors and has for its object to produce an apparatus of the character designated which shall be simple and compact in construction and effective not only to empty a receptacle of water or other fluid but also to deliver fresh supplies of water to the receptacle.

An apparatus embodying the present invention is shown, for example in my copending application, Serial No. 307,705, filed January 30, 1919. The subject-matter of the above mentioned application is a dishwashing machine, in which the apparatus forming the subject-matter of the present invention is used to fill the machine from a water spigot, to discharge water therefrom to a suitable drain by ejector action and to form an ordinary cut-off for the water line as the conditions of operation may require.

In the accompanying drawing, Fig. 1 is a view in section showing an apparatus constructed in accordance with my invention; Fig. 2 is an assembly view in section on the line I—I of Fig. 1; and Fig. 3 illustrates a modification of the construction illustrated in Fig. 1.

In carrying out my invention, an ejector is combined with a three-way valve in a unit structure such that in one position of the valve, water or other fluid may be supplied to a consumption device, such as a washing machine; in another position fluid may be withdrawn from a consumption device by the ejective action of a pressure-fluid supply and in a third position, the consumption device is cut off.

Referring to the drawing for a more detailed description of my invention, I show in Fig. 1 a valve casing 10 having three openings therein, 11, 12 and 13 with which conduits 14, 15 and 16 respectively communicate. The discharge conduit 16 is preferably formed as a tortuous passage and decreases in cross-sectional area below the opening 13 to provide a restricted throat 16^a. Within the body portion of the valve casing 10 is a frusto-conical valve plug 17 having a handle 17′. The valve plug 17 forms with the casing 10 a ground joint connection, and is held in contact therewith by a retainer plate 18 which is secured to the plug by a tap screw 19. The interior of the valve plug 17 has located therein two passages, namely, a restricted passage 20 in the form of an ejector nozzle, the entrance 21 of which is preferably substantially equal in size to the openings 11 and 12, with which it is arranged to register, and a second passage 22 which has openings 23 and 24 disposed substantially at right angles to each other and which are preferably respectively equal in size to the communicating openings 11, 12 and 13. The ejector passage 20 is disposed in one position to align axially with the opening 24 of the passage 22 and, as shown, extends into the passage 22 so that water flowing through the latter passage surrounds the extended portion of the ejector passage for the purposes of facilitating entrainment. The passages in the plug 17 are constructed to register accurately with the openings in the valve casing so as not to impede the flow of fluid therethrough. The apparatus is connected to a source of motive fluid by any suitable coupling device as shown at 25.

Having thus described an apparatus constructed in accordance with my invention, the operation thereof is carried out in the following manner: Assuming that it is required to fill a receptacle such as the washing machine described in the co-pending application hereinbefore mentioned; the port 23 in the valve plug 17 is turned to register with the port 11 in the valve casing and the port 24 correspondingly registers with the casing port 12. In this position, water flows directly through the valve to the machine or other receptacle to be filled. When the machine is filled, the valve plug is turned 180 degrees and all communication through the valve is shut off. After the washing operation has been completed and it is desired to empty the washing machine, the plug is turned 90 degrees, as indicated in Fig. 1, to effect the emptying operation, water passing through the restricted sinuate passages of conduit 16 from the fluid source causing a suction at the mouth of the restriction and drawing water through the

passage 22 with considerable force. It will be noted that the jet of fluid is diffused in the discharge passage.

A modification of the structure illustrated in Fig. 1 is shown in Fig. 3. The conduits 14, 15 and 16 in the valve casing 10 communicate with ports 30, 31 and 32 located in the body portion of the casing. A movable valve plug 33 has a diametrically located passage communicating in one position with the ports 30 and 32 in the conduits 14 and 16. A second passage 35 centrally joins the passage 34 and may establish communication between the conduits 15 and 16, through the port 31, and the passage 34. The port 30 in the stationary or casing member, serves as the throat of an ejector nozzle and the passages 34 and 35 through the plug are utilized chiefly to direct the flow of fluid but it is obvious that they may be so designed to facilitate ejector action in entraining the fluid to be expelled. To assist in the entraining action I have provided a tortuous passage 36 in the conduit 16. The passage facilitates fluid entrainment, in that, it forms an air seal to prevent ingress of air and thereby secures a more effective suction action.

Having thus described a modified form of an apparatus constructed in accordance with my invention, the operation thereof is carried out in a similar manner as heretofore described. The translating fluid enters through an ejector nozzle inlet 30 and draws a fluid through a conduit 31 and discharges the products through a third conduit 32. The valve plug 33 with its communicating passages 34 and 35 serves only to direct the flow of fluid through the valve plug in the filling or emptying operation. The tortuous passage 36 causes the entraining fluid to diffuse and form an effective seal to facilitate entrainment of a liquid to be removed from a receptacle.

While I have shown preferred forms of my invention and have related its use, particularly with a washing machine, it is obvious that it may be utilized to fill and empty any receptacle irrespective of the relative location of the waste water drain.

While I have shown my invention in but two forms, 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. In a device of the character described, a casing member, a plurality of ports in said member, a movable member within the casing member, said movable member arranged to open and close communication between said ports, ejecting means cooperatively associated with the movable member for drawing a fluid through the device, and a sinuous discharge passage therefor.

2. In a device of the character described, a casing member, a plurality of ports in said member, a movable member within the casing member, constructed to open and close communication between said ports, ejecting means cooperating with the movable member whereby a fluid entering one port draws a fluid through a second port and discharges the combined fluids through a third port in the casing member, and a discharge pipe communicating with said third port, said pipe having a restricted throat therein which decreases in cross-sectional area in a direction away from said movable member.

3. In a device of the character described, a casing member, a plurality of ports in said member, a movable member fitting closely within the casing member and constructed to open and close communication between said ports, ejecting means cooperating with the movable member for drawing a fluid through the movable member and the casing, and a discharge passage for said fluid having an irregular formation.

4. In a device of the character described, a casing member, a plurality of ports in said member, a movable member within the casing member, said movable member having passages therein arranged to open and close communication through the ports and the passages of the movable member, ejecting means cooperating with the movable member for drawing a fluid through the device, and a restricted sinuous discharge passage communicating with said ejecting means.

5. In an ejector, the combination of a casing having a pair of inlet ports and an outlet passage, a movable member closely fitting in said casing and having ducts therein adapted to communicate with said ports and said passage and to form a continuous channel through the apparatus, means for operating the movable member whereby communication between the ports and the passages may be opened and closed, an ejector cooperating with the movable member for producing a fluid jet and a projection extending into said passage for diffusing said jet and thereby drawing fluid through one of said ports.

6. In a device of the character described, a casing member, a plurality of ports in said member, a movable plug member fitted within the casing member and adapted to form a joint therewith, said movable member having passages therein arranged to open and close communication through the ports and the passages of the movable member, a means to move the movable member for opening and closing communication between

the ports and passages, ejecting means cooperating with the movable member for drawing a fluid through the device and for producing a fluid jet, and means adapted to diffuse said jet immediately adjacent the place of formation of said jet.

7. In a valve structure, a casing member, a plurality of ports in said member, a movable plug member fitted within the casing member and adapted to form a joint therewith, said movable member having passages therein arranged to open and close communication through the ports and the passages, ejecting means within the movable member whereby a motive fluid enters the ejecting means through one port, draws a fluid through a second port, and discharges the combined fluids through a third port in the casing, and a tortuous discharge passage for said fluid.

8. In combination an ejector casing having three openings therein, a movable valve plug fitted into said casing, a plurality of passages in said plug and means associated with said plug for opening and closing communication between the openings, an ejecting means located in a passage of the plug for drawing a fluid through a second passage of the plug, and a discharge pipe communicating therewith having a restricted throat said restricted throat being below said ejecting means.

9. In an ejector, a conduit, an enlarged body portion in the conduit, a rotatable member fitting into the body portion, a second conduit entering the body portion at right angles to the first conduit, a central passage extending diametrically through the rotatable member and an arcuate passage in the rotatable member connecting the second conduit and having one end in alinement with an end of the central passage, means for rotating the rotatable member whereby fluid may be withdrawn from and delivered to said second conduit, and a third conduit communicating with said first and second conduits and having a sinuous passage therein.

10. In a device of the character described, a casing member, a purality of ports in said member, a movable member closely set within said casing member and constructed to open and close communication between said ports, means on said movable member for forming liquid entering one port into a jet and means operating in addition to any inherent tendency of said jet to separate and effective to disperse said jet and thereby eject through a second port fluid entering a third port.

11. The combination of a casing member having a plurality of ports therein, a movable member within said casing member for opening and closing communication between said ports and for producing a jet of liquid entering through one of said ports and means in the path of travel of said jet for dispersing said jet and thereby drawing fluid through a second port and discharging it through a third port.

In testimony whereof, I have hereunto subscribed my name this 31st day of January, 1921.

HENRY F. SCHMIDT.