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Patented Sept. 9, 1902.

M. T. DAVIDSON & W. A. DREWETT.

EJECTOR APPARATUS.

(Application filed Apr. 18, 1900.)

(No Model.)

3 Sheets—Sheet 1.

Fig. 1.

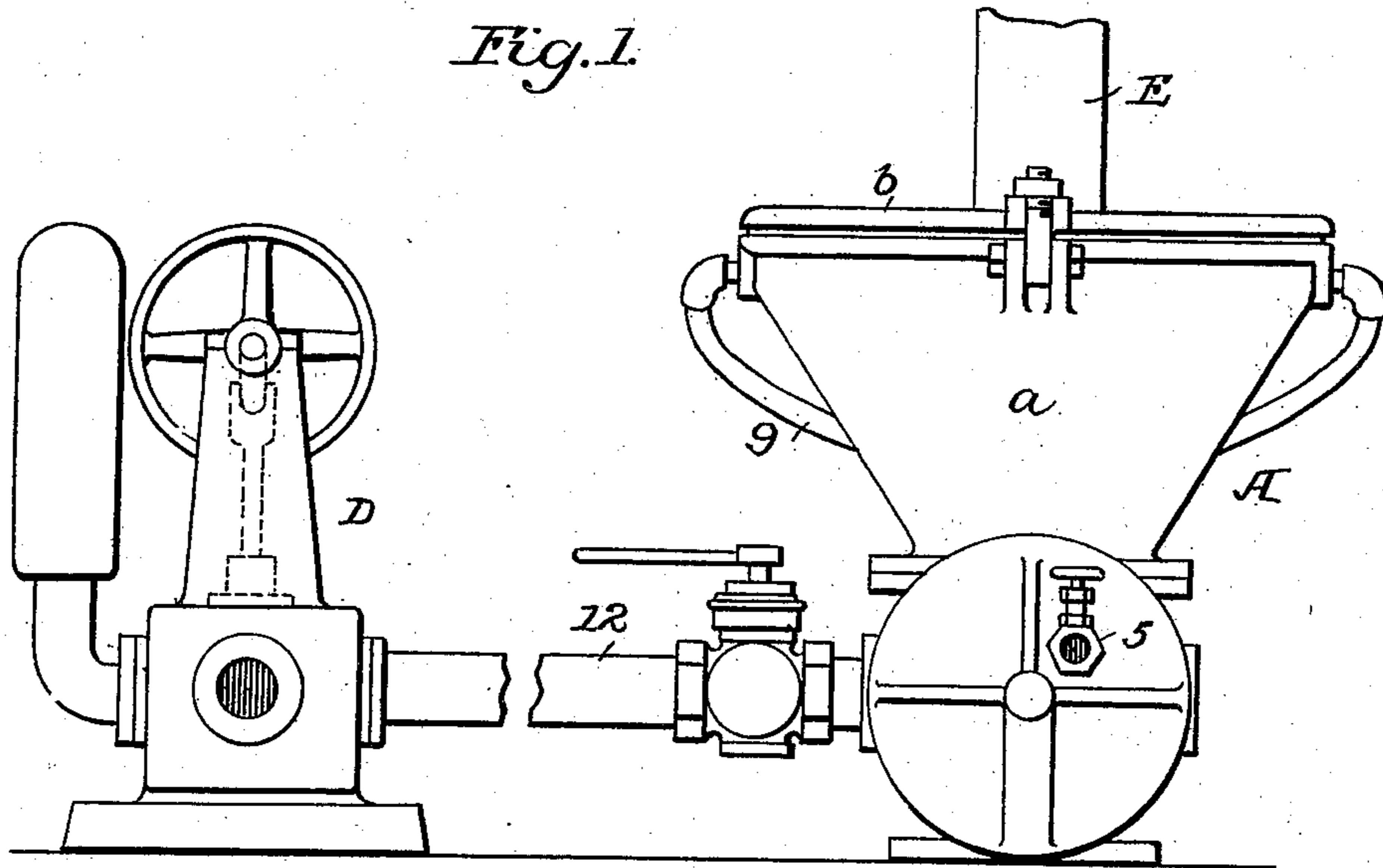
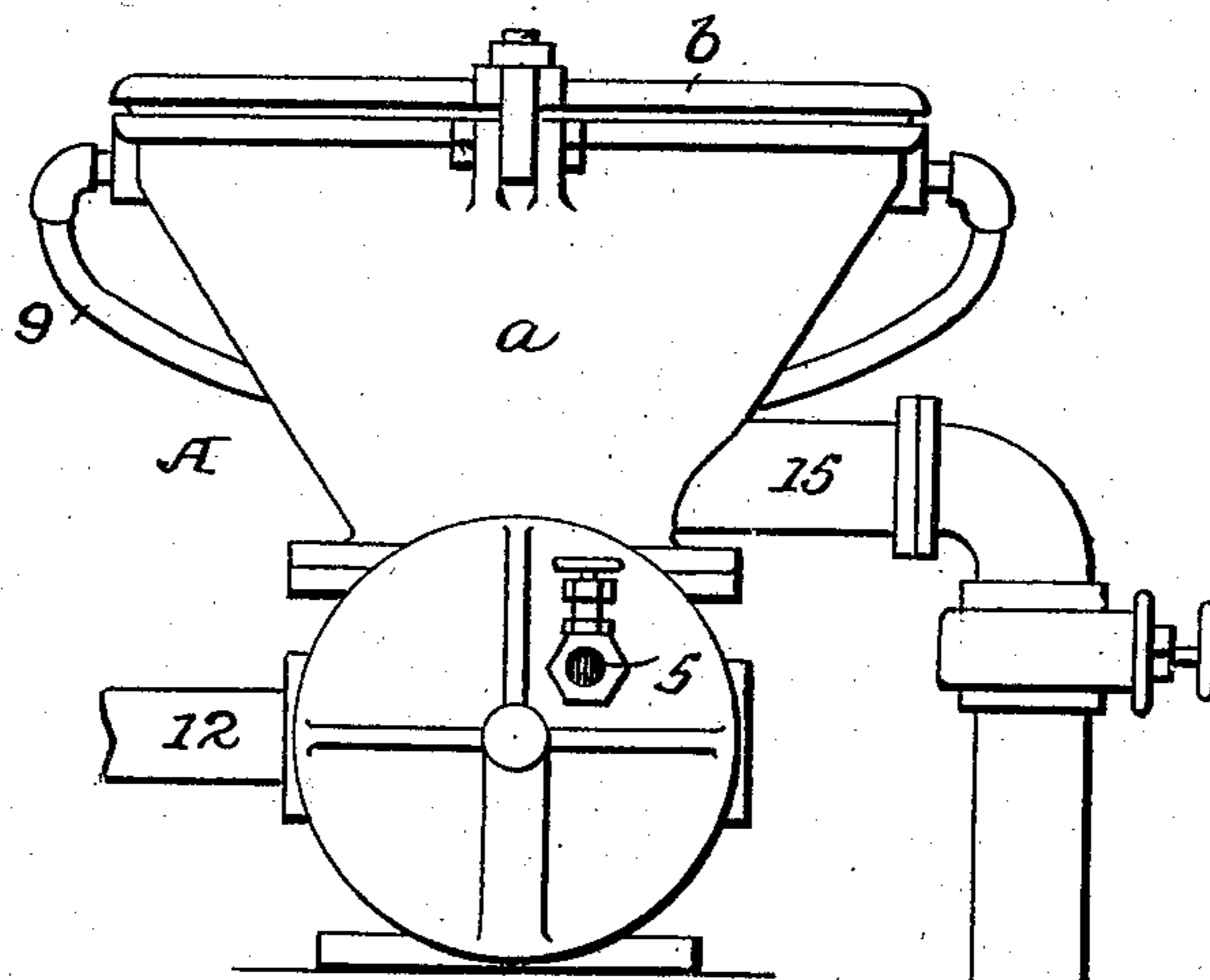


Fig. 4.



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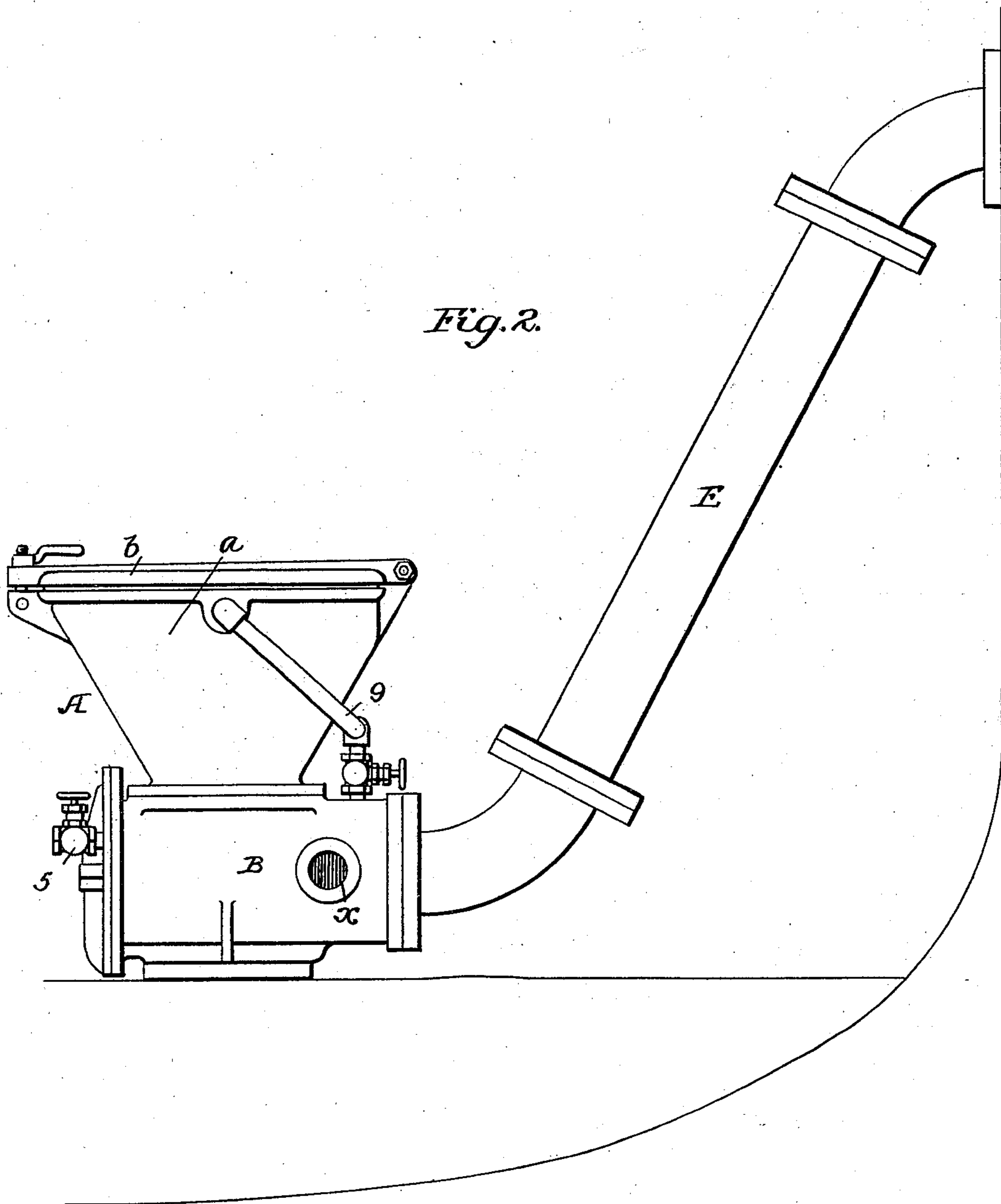
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EJECTOR APPARATUS.

(Application filed Apr. 13, 1900.)

(No Model.)

3 Sheets—Sheet 2.



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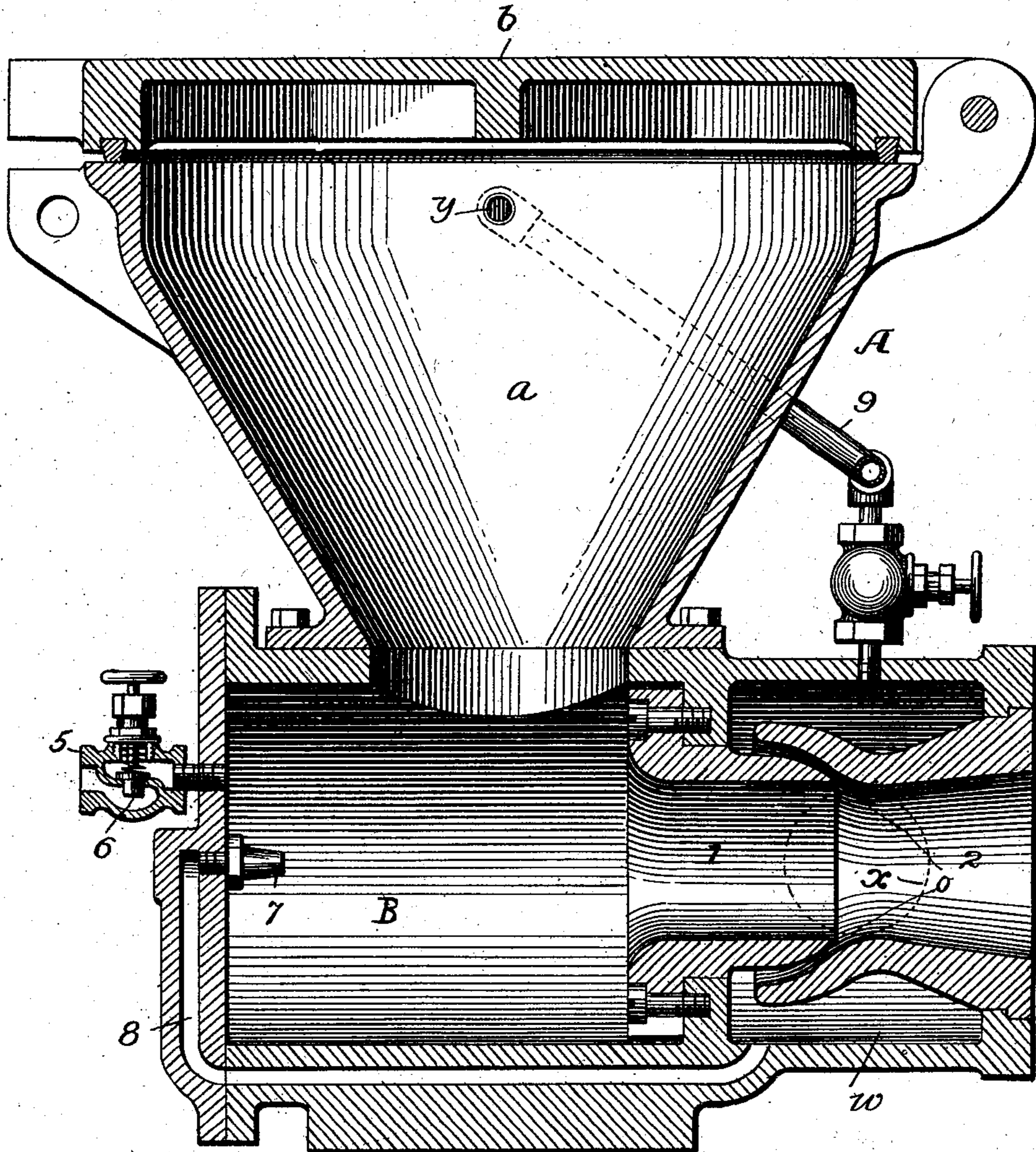
EJECTOR APPARATUS.

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(No Model.)

3 Sheets—Sheet 3.

Fig. 3.



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# UNITED STATES PATENT OFFICE.

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## EJECTOR APPARATUS.

SPECIFICATION forming part of Letters Patent No. 708,757, dated September 9, 1902.

Application filed April 13, 1900. Serial No. 12,766. (No model.)

*To all whom it may concern:*

Be it known that we, MARSHALL T. DAVIDSON and WILLIAM A. DREWETT, citizens of the United States, residing at Brooklyn, in the county of Kings and State of New York, have invented certain new and useful Ejector Apparatus, of which the following is a specification.

Our invention relates to ejector apparatus which is adapted for many and various uses, and more particularly as an ash-ejector for the holds of vessels and the like; and the object of our invention is to provide an improved ejector apparatus which shall avoid the objections to apparatus of this general sort and furnish a practical and efficient means for ejecting material of different kinds; and to these ends our invention consists in the various features of construction and arrangement of parts having the general mode of operation substantially as hereinafter more particularly set forth.

Referring to the accompanying drawings, wherein we have shown a preferred embodiment of our invention which is adapted for use as an ash-ejector for vessels and also for use for ejecting water therefrom, Figure 1 is an elevation of the apparatus. Fig. 2 is a side view of the ejector apparatus and discharge-pipe arranged in the hull of a vessel. Fig. 3 is an enlarged sectional view of the ejector apparatus; and Fig. 4 is a side view of the same, showing a suction-pipe for lifting water.

While our invention may be embodied in different forms and structures adapted for the particular purpose for which it is intended, in the accompanying drawings, wherein we have shown it as embodied in a combined ash and water ejector for use in vessels, it is provided with a receptacle A, comprising a hopper *a*, which is provided with a cover *b*, so connected, as by hinges, that it may be readily thrown open or closed and locked, so as to tightly seal the hopper. Beneath the hopper *a* is the cylindrical or body portion B of the receptacle receiving the material from the hopper. At the delivery end of this receptacle and in the body portion thereof and below the top of the same is arranged what may be termed the "ejector proper," this ejector being so constructed and arranged as

to draw the material from the receptacle, being, as indicated, arranged at the delivery end of the receptacle, in "front," so to speak, of the material deposited in the receptacle, so that the latter can flow by gravity to the ejector. This ejector proper may be variously constructed; but, as shown, it consists of a nozzle, the central passage of which communicates with the receptacle and which is so constructed and arranged that an annular stream of fluid is delivered into the discharge-orifice, which annular stream tends to produce a vacuum in the receptacle and operates to draw or suck the material from the delivery end thereof in contradistinction to driving it therefrom by impact at the rear of the material, as has heretofore been the practice. This nozzle comprises two parts 1 and 2, the former having the throat of central passage and both so arranged as to form an annular orifice *o* for the delivery of the fluid, which fluid is contained in an annular chamber *w*, surrounding the portions 1 and 2 of the nozzle and supplied with fluid through a port *x*, connected to some suitable source of supply, as by means of a pipe 12, with the pump D, by means of which the fluid, as water, is delivered into the discharge-orifice through the annular or ring shaped orifice *o* under pressure.

In order that the ashes or other material to be ejected may be brought into a condition in which they may properly be operated upon by the ejector, we provide means for mixing a suitable amount of fluid with the same, and, as shown, there is a nozzle 7 arranged in the front of the body portion B of the receptacle, which communicates through a channel 8 with the chamber *w*, so that the nozzle is supplied with fluid under pressure, and a small stream of fluid will be ejected into the receptacle in the rear of the material to be discharged, which will be sufficient to moisten or wet the material therein and render it in a practically semifluid state. In order to further facilitate this operation and for the further purpose of aiding the material to pass through the hopper into the body portion of the receptacle and for clearing the hopper, we provide the hopper with one or more ports *y*, which, as shown, are arranged in the up-

per portion thereof and connect these ports through the medium of a pipe 9 with the source of supply of fluid under pressure, and by this means the fluid is forced among the contents of the hopper, which are thereby caused to flow readily into the body portion of the receptacle.

Connected with the receptacle in any desired position, but, as shown, with the body portion B, is a valve-casing 5, having an inlet-valve 6, shown as spring-seated and acting as an air-induction valve to the receptacle, but so arranged as to act as a check-valve and prevent the delivery or escape of any material from the receptacle. The nozzle may be connected with any suitable delivery device, and, as shown in Fig. 2, it is connected to the discharge-conduit or delivery-pipe E, having an opening or port in the side of a vessel above the water-line. In the present instance the receptacle is also provided with means for communicating with the hold of a vessel by means of a suction-pipe 15, constituting a separate branch conduit extending from the side of the hopper *a*, between the point where the ashes enter the receptacle and the water-jet, downward to the hold or bilge of the vessel and having a proper valve.

Such being the general construction and arrangement of parts, the mode of operation will be largely understood from what has been stated; but when it is to be used—as, for instance, in the hold of a vessel—as an ash-ejector the cover *b* is closed and secured to the hopper *a* and the pump D is set in operation. The first operation of the pump, which should be started slowly, is to supply fluid through the chamber *w*, which passes through the nozzle-orifice *o* and flows out through the receptacle, filling the body portion B and the hopper *a* and delivery-pipe E with fluid, unless the same are already filled from prior use. The pressure on the water now being increased, as by the more rapid operation of the pump, a flow or delivery of fluid through the pipe E is produced, and when the fluid is under a proper pressure the flow of the fluid through the pipe E tends to cause a partial vacuum in the receptacle and to draw the fluid therefrom, and the valve 6 then automatically opens, allowing air to flow into the receptacle and forcing the fluid through the ejector. The hopper and receptacle having been practically emptied, the cover *b* is now opened and the ashes or other material to be discharged are placed therein, where they mix with the fluid entering through the ports *y* (when used) and fall into the body B of the receptacle, where they are mixed with the fluid from the nozzle 7 and while in a practically semifluid state are sucked or drawn through the nozzle from the receptacle B and discharged through the pipe E. This operation can be continued indefinitely, and it will be seen that by arranging the ejector at the rear of the receptacle, so that the fluid operates to draw or suck the mate-

rial therefrom in contradistinction to driving it therefrom by impact in case of any accidental clogging or obstruction in the receptacle, the fluid will not flow back therein or overflow therefrom, as is common in the constructions heretofore provided, but will continue to flow through the delivery-pipe as before, and when the obstruction is removed—as, for instance, when a clinker is broken up—it will then be drawn through the nozzle and delivered as before. This feature is of great importance, as it avoids one of the principal objections to ejectors as heretofore constructed, wherein the ejecting fluid was delivered behind the material to be ejected, when if a stoppage occurs the fluid is delivered into the receptacle, causing an overflow. When the material to be ejected has been exhausted, the cover *b* is tightly closed and the pump stopped, and the fluid in the nozzle and rising or delivery pipe E flows back into the receptacle to a greater or less extent, and the apparatus is ready to be operated again when occasion requires. It may be remarked that in the ordinary operation of the pump the water supplied to the pump is usually taken from the sea by means of a suitable connection. When it is desired to utilize the pump as an auxiliary bilge-pump and the ejector as a bilge-water ejector, as in case of emergency, the pump may be arranged to take its water from the bilge, and the receptacle being closed, as above stated, the pump acts directly as an auxiliary bilge-pump, delivering the water from the bilge through the nozzle and delivery-pipe E into the sea. The apparatus can then be utilized as an ejector for the bilge-water by opening the valve in the pipe 15, and in this case the bilge-water will flow into the closed hopper *a* and be sucked therefrom through the nozzle and delivered through the pipe E, and it will thus be seen that in this case the pump D not only acts as an auxiliary bilge-pump, but is caused also to operate the ejector, thereby largely increasing the delivery of the bilge-water from the vessel, due not only to the direct action of the pump, but to the additional ejector action of the apparatus.

What we claim is—

1. An ejector apparatus provided with an ejector-nozzle and means for supplying fluid under pressure thereto, and a receptacle communicating with the nozzle and arranged to permit the contents to pass by gravity to the rear end of the nozzle and means for supplying fluid to mix with said contents, substantially as set forth.
2. An ejector apparatus including a receptacle having a hopper for the solid material to be ejected, and an ejector-nozzle having a central passage communicating at its rear end with the receptacle and with a surrounding annular passage to deliver an annular stream of fluid into the discharge-orifice thereof, substantially as set forth.
3. The combination in an ejector apparatus

of a receptacle and means for supplying fluid thereto, an ejector having a central passage arranged to receive at the rear end the contents of the receptacle passing by gravity thereto, and a surrounding annular passage and means for supplying the latter with fluid under pressure, substantially as set forth.

4. An ejector apparatus including a receptacle for the material to be ejected, an ejector-nozzle located at the delivery end of the receptacle and below the top thereof to receive the material at the rear of the nozzle and constructed to deliver an annular stream of fluid into the discharge-orifice, and means for supplying fluid thereto under pressure, substantially as described.

5. In an ejector apparatus, the combination with a receptacle comprising a body portion and a hopper portion communicating therewith, of an ejector-nozzle located at the delivery end of the body portion of the receptacle, means for supplying fluid under pressure to the nozzle, and connections for supplying fluid to the body portion of the receptacle and to the hopper, substantially as described.

6. In an ejector apparatus, the combination with a receptacle comprising a body portion and a hopper portion communicating therewith, of an ejector-nozzle located at the delivery end of the receptacle and provided with an annular orifice, a chamber communicating with said orifice, means for supplying said chamber with fluid under pressure, and connections from the chamber to the body portion and hopper portion of the receptacle for supplying a stream of fluid thereto, substantially as described.

7. In combination with a vessel and with an ash-ejector of the type wherein ashes are ejected overboard by means of a water-jet

traversing a discharge-conduit, a separate branch conduit adapted to deliver bilge-water to the discharge-conduit and communicating directly with the bilge of said vessel and with said discharge-conduit to deliver bilge-water to the same between the points of inlet to said discharge-conduit of the ashes and the water-jet, substantially as described.

8. In combination with a vessel, a discharge-conduit leading overboard, means for producing a water-jet directed outwardly through said conduit, a supply-conduit connecting said discharge-conduit with a receptacle for ashes and a separate conduit adapted to conduct bilge-water to said discharge-conduit and connecting with the bilge of said vessel, substantially as described.

9. The combination with the hopper and discharge-pipe of an ash-ejector, of a source of fluid-supply to the ejector and means for connecting the hopper and discharge-pipe with the bilge independently of the said source of fluid-supply, substantially as set forth.

10. The combination with the hopper and discharge-pipe of an ash-ejector, of a pump adapted to pump water from the bilge and force it through the ejector and discharge-pipe, and an independent connection leading from the bilge to the hopper and discharge-pipe and through which water may be sucked by the action of the ejector and discharged through said discharge-pipe, substantially as set forth.

In testimony whereof we have signed our names to this specification in the presence of two subscribing witnesses.

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WM. A. DREWETT.

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