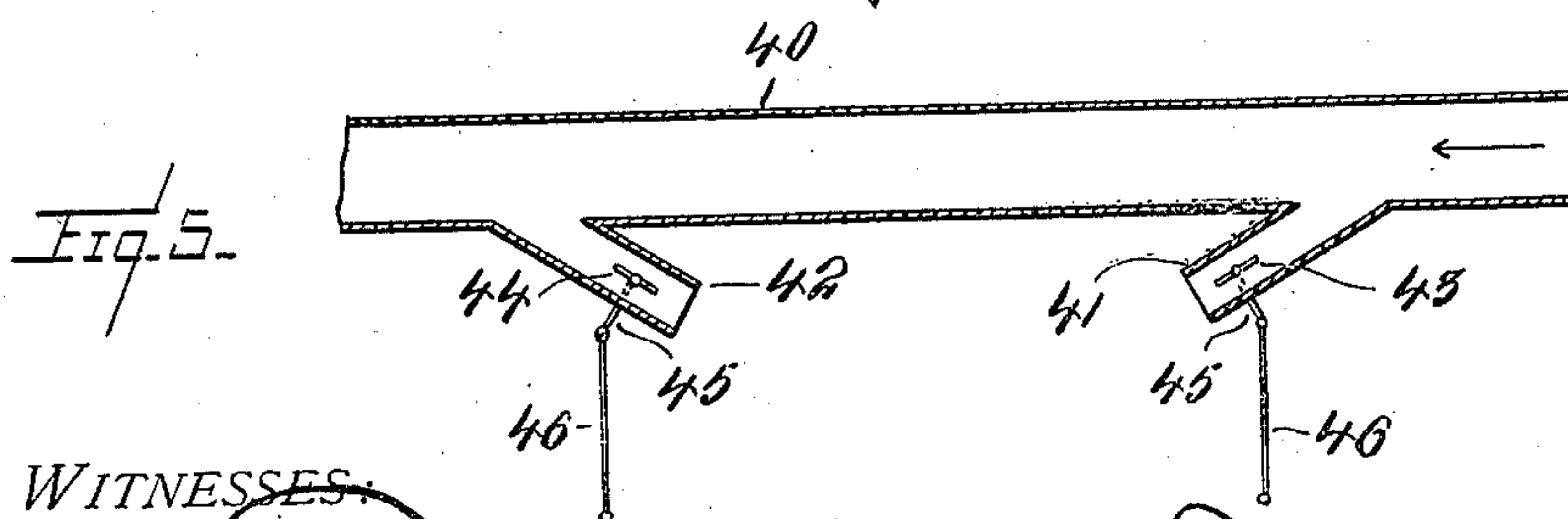
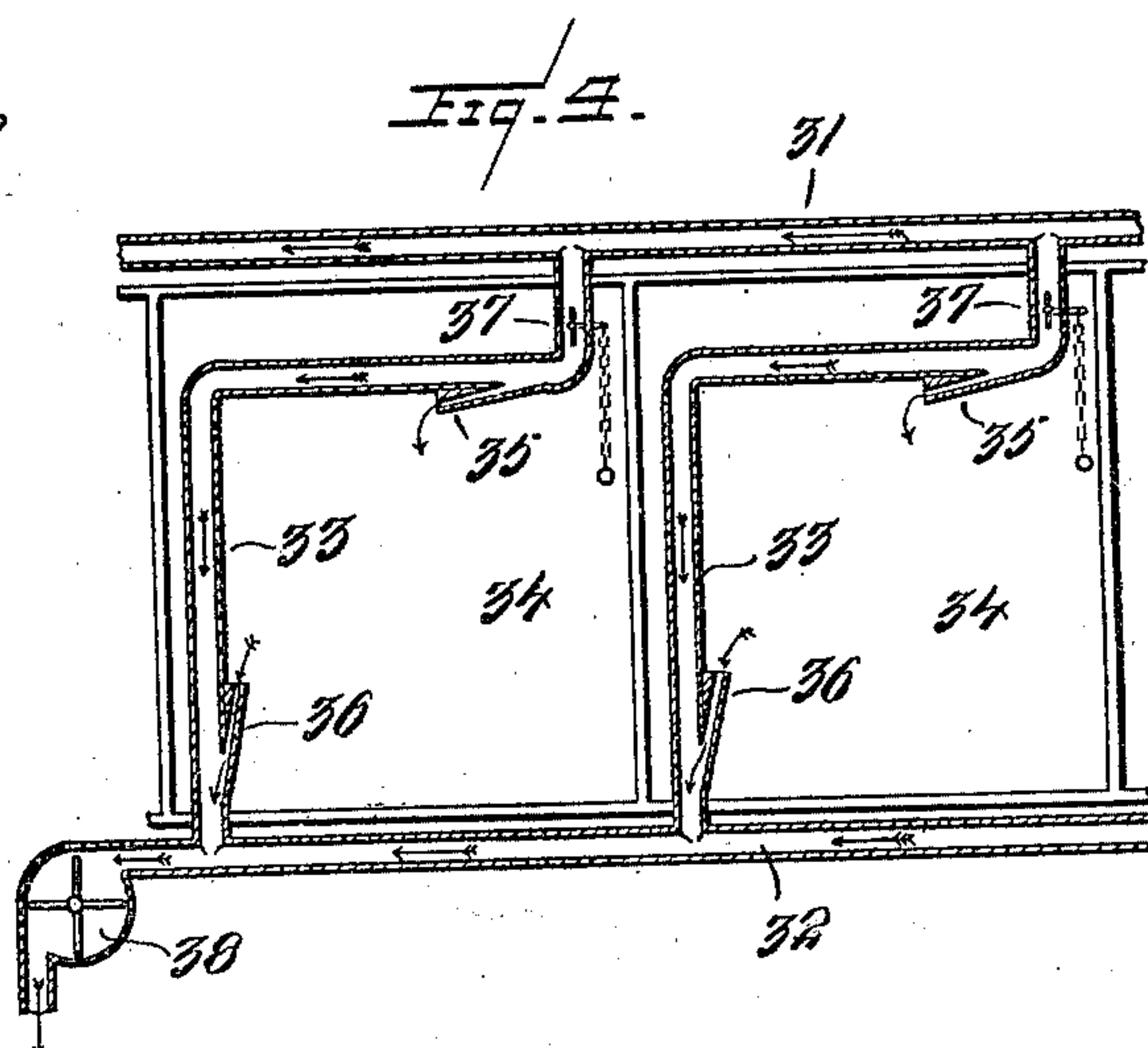
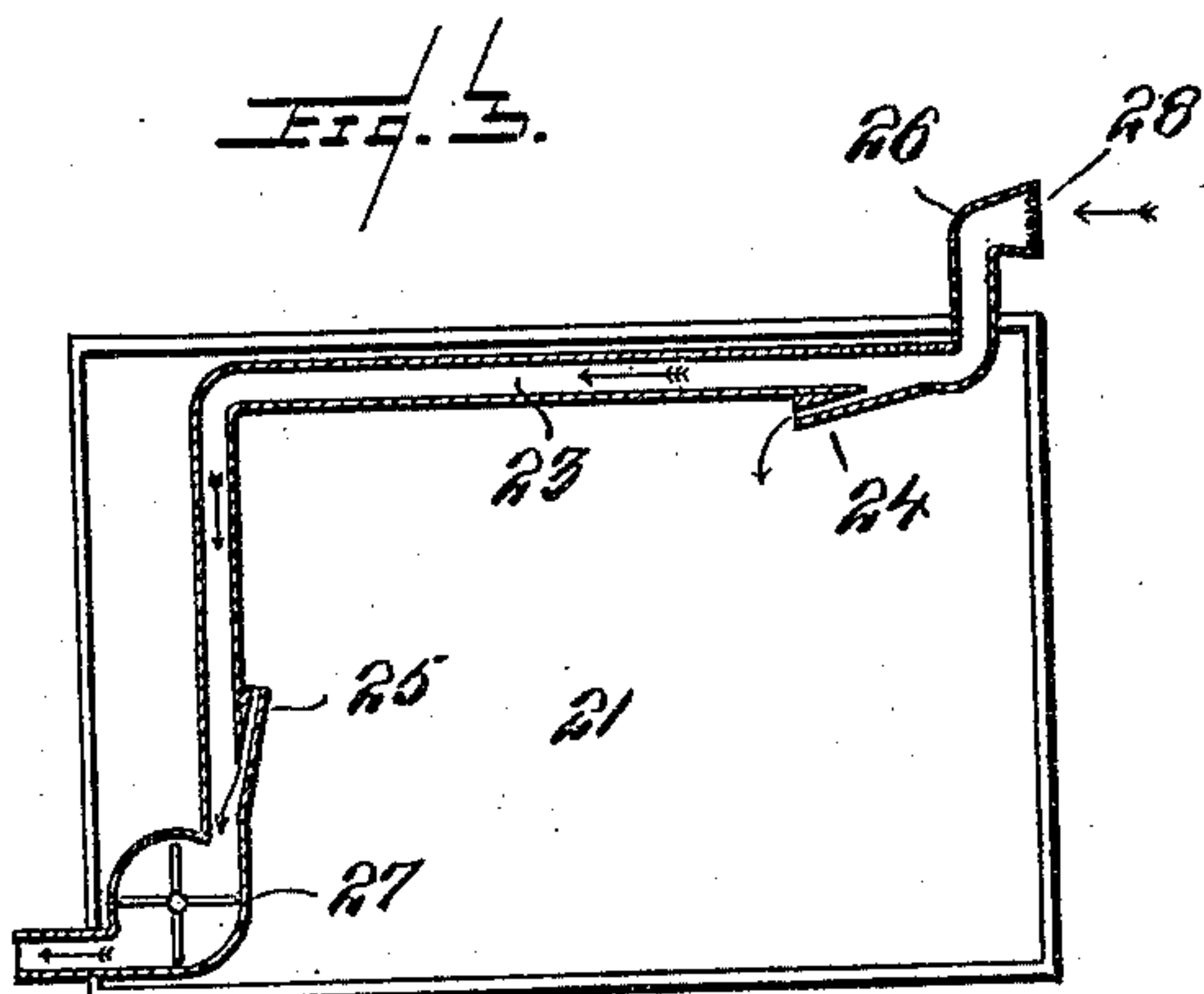
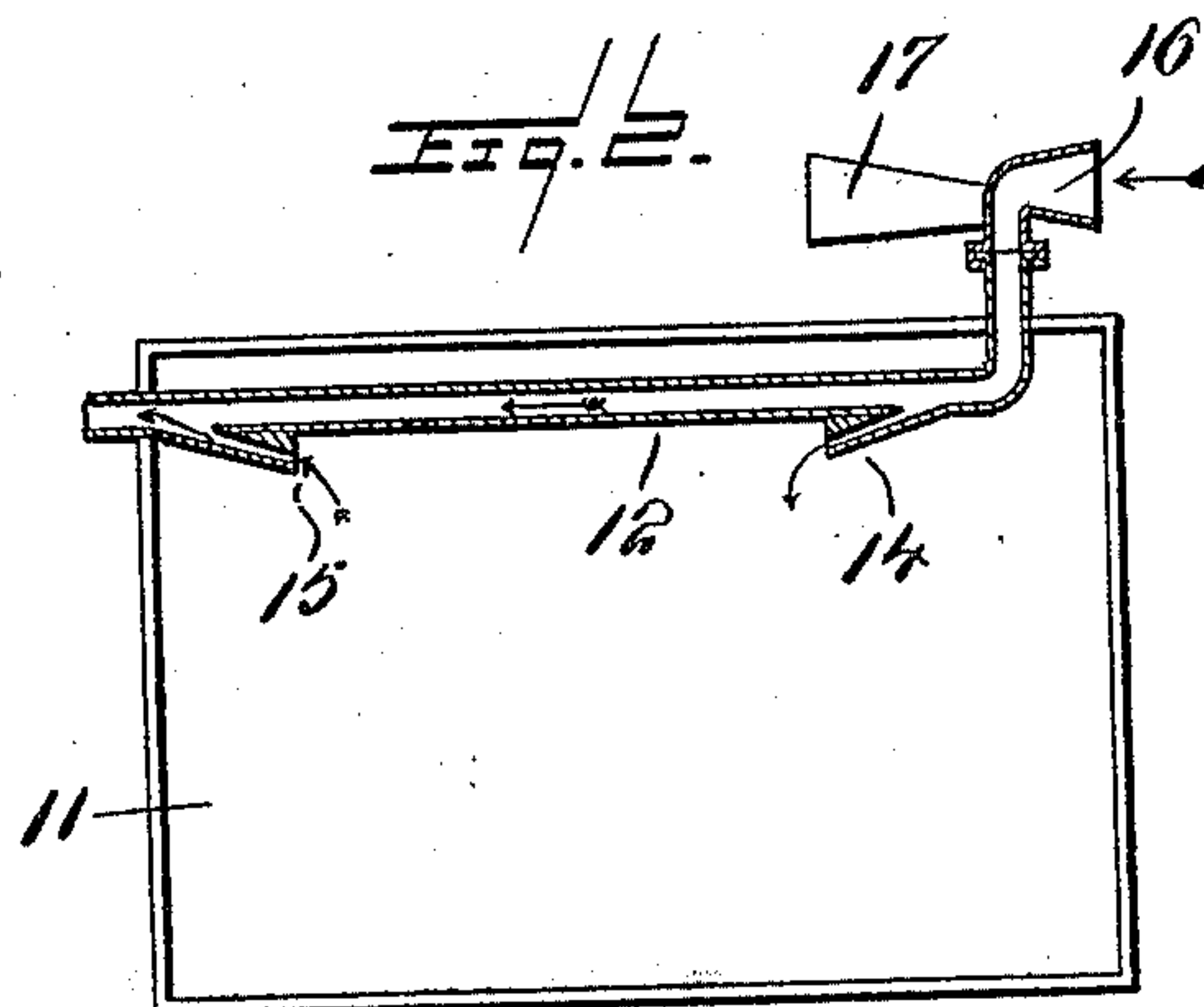
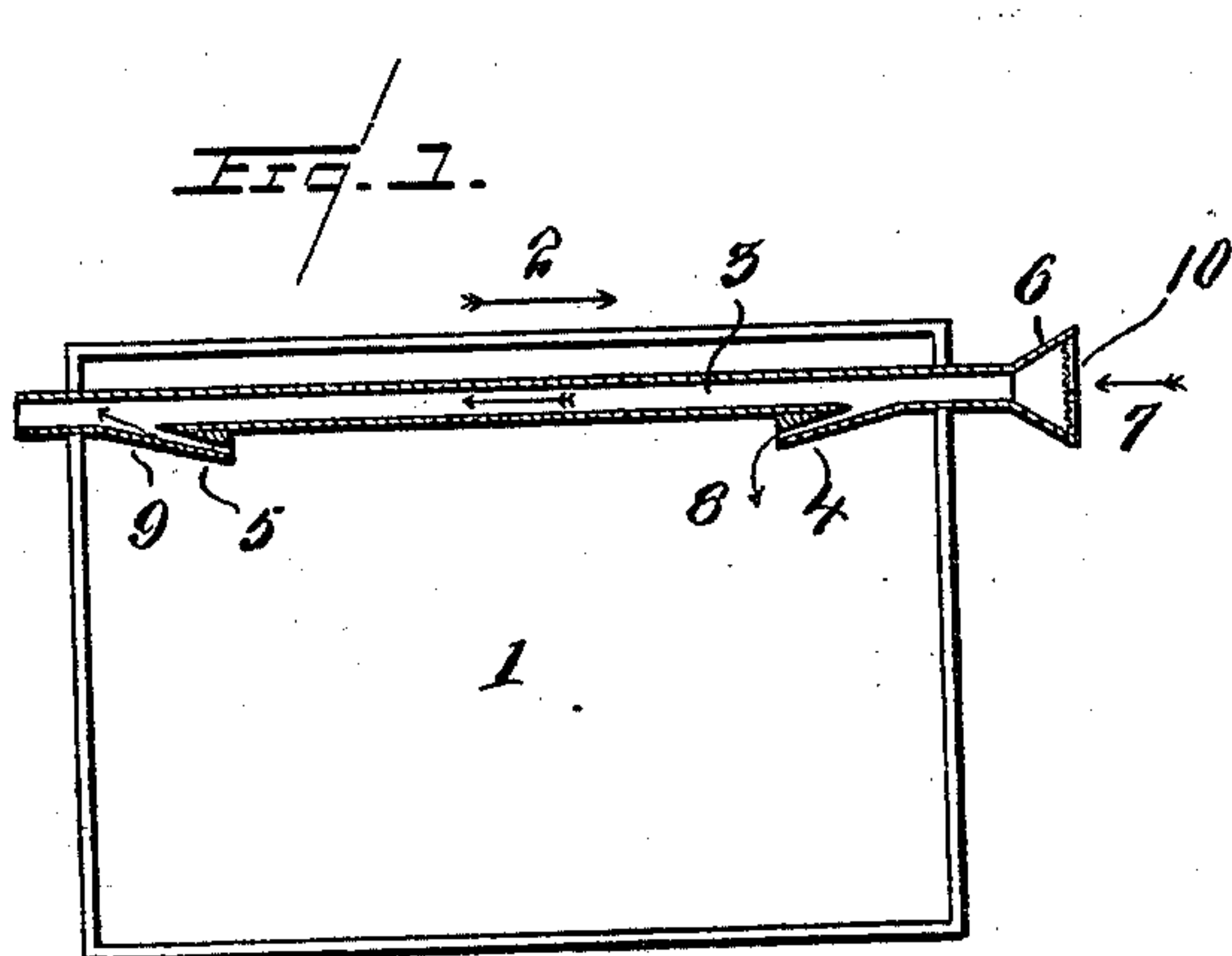


D. HILL.
VENTILATING APPARATUS.
APPLICATION FILED JULY 10, 1908.

960,921.

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WITNESSES:

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Specification of Letters Patent.

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To all whom it may concern:

Be it known that I, DAVID HILL, citizen of the United States, residing at Washington, in the county of Beaufort and State of North Carolina, have invented certain new and useful Improvements in Ventilating Apparatus; and I do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same.

My invention consists in the novel features hereinafter described reference being had to the accompanying drawing which illustrates several forms in which I have contemplated embodying my invention and said invention is fully disclosed in the following description and claims.

I have discovered that by means of the apparatus hereinafter described I can ventilate an inclosed space by means of a single pipe, tube, conduit or passage, which in operation performs two separate and distinct functions, to wit, the discharge or induction into the inclosed space, and second the withdrawal or eduction of air from said inclosed space. This principle of operation as applied to a ventilating system I believe to be new and I have found by experiment that by its application in various forms, such as those hereinafter described, a single pipe, conduit or passage can be made to supply a room or apartment with fresh air, and also to withdraw therefrom portions of the foul or vitiated air.

My invention is applicable to ventilating systems generally but is particularly adapted for use in connection with moving vehicles such as street and railway cars, ships, etc., in which the necessary motion imparted to the vehicle to propel it over the ground or through or upon the water, provides without extra expenditure or apparatus the means for securing the necessary movement of the air current through the passage or passages provided therefor.

In the accompanying drawings I have illustrated various embodiments of my invention, in a diagrammatic manner as the exact details of the apparatus can be and are of necessity somewhat modified in form and appearance to meet the conditions of use, without however, departing from the essential features of the invention, which are fully shown and explained herein.

Figure 1 represents a diagrammatic view

of the application of my invention for ventilating an inclosed space in a moving body or vehicle. Fig. 2 is a similar view showing the invention applied to a stationary body or structure. Fig. 3 is a similar view showing the invention applied to a stationary body having an artificial means for producing the necessary motion of the air. Fig. 4 is a similar view showing a plurality of inclosed spaces, equipped with my invention. Fig. 5 is a modification of one of my ventilating pipes showing dampers in the inlet and outlet ports.

In Fig. 1 I have represented the simplest embodiment of my invention adapted more particularly to moving bodies or vehicles. 1 represents the inclosed space, room or apartment to be ventilated as a street car, the cabin of a yacht, etc., movable in the direction indicated by arrow 2. 3 represents the air conduit extending through the apartment 1 and discharging outside thereof, said conduit being provided with an air induction port 4 having its discharge aperture disposed angularly to the adjacent portion of the conduit and leading in a direction away from the forward end of the vehicle. 5 represents an eduction port leading from the interior of the inclosed space in an inclined direction away from the forward end of the vehicle, into the air conduit. The induction and eduction ports are preferably separated a sufficient distance to insure that the eduction port shall not withdraw the fresh air admitted by the induction port. The air conduit is preferably provided at its forward end, outside of the space to be ventilated and in free communication with the atmosphere, with a funnel shaped portion 6 to assist in inducing the air to enter the conduit in large quantity as the vehicle progresses. The directions of the air currents are indicated by the arrows 7, 8 and 9. As the vehicle moves forward the air is forced to enter the conduit at a slightly increased pressure, and as it passes the induction port a portion of the air will escape therethrough and be discharged into the interior of the space to be ventilated thus slightly increasing the pressure therein. The portion of the air remaining in the conduit will sweep at high velocity therethrough past the eduction port, will induce the suction of air therethrough after the well known principle of operation of injection, and the increased pressure within the

space to be ventilated though slight assists in causing the foul and vitiated air to pass out through the eduction port to be discharged with the air current therein, thus continuously exhausting the foul air while the induction port continually supplies fresh air, and thus inducing a circulation within the inclosed space which tends to keep the air pure and fresh at all times.

This invention is also applicable to inclosed spaces within stationary bodies or structures, in which case means are provided to secure the passage through the conduit of a current of air. Thus in Fig. 2 I have shown a stationary inclosed space at 11 provided with an air conduit 12 extending therethrough and discharging outside the space 11 and having induction and eduction ports 14 and 15 opening into said space. One end of the air conduit is provided with a rotary "cowl" 16 or similar device, provided with a vane 17 which holds its funnel shaped mouth at all times toward the direction from which the wind is blowing, and thus securing the movement of a current of air through the conduit.

Fig. 3 is similar to Fig. 4 except that the cowl is omitted and the conduit 23 is connected near its discharge end with an air forcing device or fan 27, the other end 26 opening directly to the atmosphere. In this figure the induction and eduction ports are indicated at 24 and 25 respectively and the inclosed space is designated 21. It is obvious that an air forcing device could be used with the constructions shown in Figs. 1 and 2 to assist the natural draft, if desired and it may be stated generally that where natural draft is available, as in connection with moving vehicles, I prefer to use it, but I may also employ artificial means to assist the natural draft so produced.

In Fig. 4 I have shown a modification of my invention arranged to ventilate a plurality of adjacent inclosed spaces or apartments, as the state rooms of a vessel, or railway car, the adjacent rooms of a house, etc. In this instance 31 represents the main or trunk inlet conduit, and 32 the main or trunk outlet conduit, both of which are preferably arranged outside of the spaces to be ventilated, although they may pass through the same if desired. 33 represents a by-pass or connecting conduit in each space to be ventilated communicating with the inlet and outlet conduits, and provided within the space or room 34 with induction port 35 and 36 respectively. Each of the by-pass pipes 33 is preferably provided with a suitable damper for controlling the same as indicated at 37. Any desired number of rooms or spaces may be ventilated in this manner, and I may also employ an air forcing device or exhaust fan shown at 38 connected with the trunk outlet pipe or conduit,

if desired. While I have shown an exhaust fan 38 it is obvious that I might employ a fan to force air into the main or trunk inlet pipe if preferred.

It is obvious that I may employ one or a plurality of my improved ventilating pipes in each compartment or room to be ventilated. I also prefer in some instances to provide the inlet for fresh air with a screen, consisting of wire netting or other perforated device to prevent the entrance of snow, hail, birds and foreign matter generally. Such a screen is indicated at 10 in Fig. 1 and at 28 in Fig. 3. I may also provide dampers at any suitable points in the ventilating pipe or pipes for controlling the air in any desired manner. For example, as shown in Fig. 5, I may provide the inlet port 41 and outlet port 42 of the air pipe 40, with dampers, indicated at 43, and 44, each having an exterior operating arm 45 and rod (or chain) 46, so that either or both of said ports may be opened or closed as desired.

It is to be noted that in all the forms of my invention the induction and eduction ports or passages project or extend from the main or trunk pipe or passage, at an angle thereto, and do not extend into the main pipes or passages, the capacity of which is not therefore cut off or diminished.

What I claim and desire to secure by Letters Patent is:—

1. In a ventilating system, the combination with a hollow body to be ventilated, of an air conduit having an inlet and discharge outside of said body and having a free and uninterrupted interior passage from the inlet to the outlet, of induction and eduction passages, extending angularly from and externally to the said conduit, and opening at their inner ends into the conduit and at their outer ends into the interior of the hollow body to be ventilated.

2. In a ventilating system, the combination with a hollow body to be ventilated, of an air conduit having an inlet and discharge outside of said body and having a free and uninterrupted interior passage from the inlet to the outlet, of induction and eduction passages, extending angularly from and externally to the said conduit, and opening at their inner ends into the conduit and at their outer ends into the interior of the hollow body to be ventilated and means for inducing a current of air through said conduit.

3. In a ventilating system, the combination with a hollow body to be ventilated, of an air conduit having an inlet and discharge outside of said body and having a free and uninterrupted interior passage from the inlet to the outlet, of induction and eduction passages extending angularly from and externally to the said conduit, and opening at their inner ends into the conduit and at their

outer ends into the interior of the hollow body to be ventilated, and an air forcing device connected with said conduit adjacent to its discharge end.

5 4. In a ventilating system, the combination with an air inlet conduit, and an air outlet conduit, of a branch pipe connecting said conduits, and having an uninterrupted interior passage therethrough, said branch
10 pipe being provided with an inclined and exteriorly projecting induction port, and an oppositely inclined exteriorly projecting
15 eduction port, both of said ports being in communication at their inner ends with the branch pipe and at their outer ends with
the space to be ventilated.

5 5. In a ventilating system, the combination with an air inlet conduit, and an air outlet conduit, of a branch pipe connecting
20 said conduits, and having an uninterrupted interior passage therethrough, said branch pipe being provided with an inclined and exteriorly projecting induction port, and an
25 oppositely inclined exteriorly projecting eduction port, both of said ports being in communication at their inner ends with the branch pipe and at their outer ends with the
space to be ventilated, and an air forcing device connected with the outlet conduit.

30 6. In a ventilating system, the combination with an air inlet conduit, and an air outlet conduit, of a branch pipe connecting

said conduits, and having an uninterrupted interior passage therethrough, said branch
35 pipe being provided with an inclined and exteriorly projecting induction port, and an oppositely inclined exteriorly projecting
40 eduction port, both of said ports being in communication at their inner ends with the branch pipe and at their outer ends with the space to be ventilated, and independent
valves for regulating the said induction and eduction ports without interfering with the
passage of air through the said conduit.

7. In a ventilating system, the combina- 45
tion with an air inlet conduit, and an air outlet conduit, of a branch pipe connecting
said conduits, and having an uninterrupted interior passage therethrough, said branch
50 pipe being provided with an inclined and exteriorly projecting induction port, and an oppositely inclined exteriorly projecting
55 eduction port, both of said ports being in communication at their inner ends with the branch pipe and at their outer ends with the space to be ventilated, and an independent
controlling valve for each of said induction and eduction ports.

In testimony whereof I affix my signature in the presence of two witnesses.

DAVID HILL.

Witnesses:

A. D. MacLEAN,
W. T. SMITH.