(No Model.) 3 Sheets—Sheet 1.

L. H. NASH.

METHOD OF COMMINGLING FLOWING FLUIDS IN DEFINITE PROPORTIONS.

No. 353,704. Patented Dec. 7, 1886.

Fig. 2.

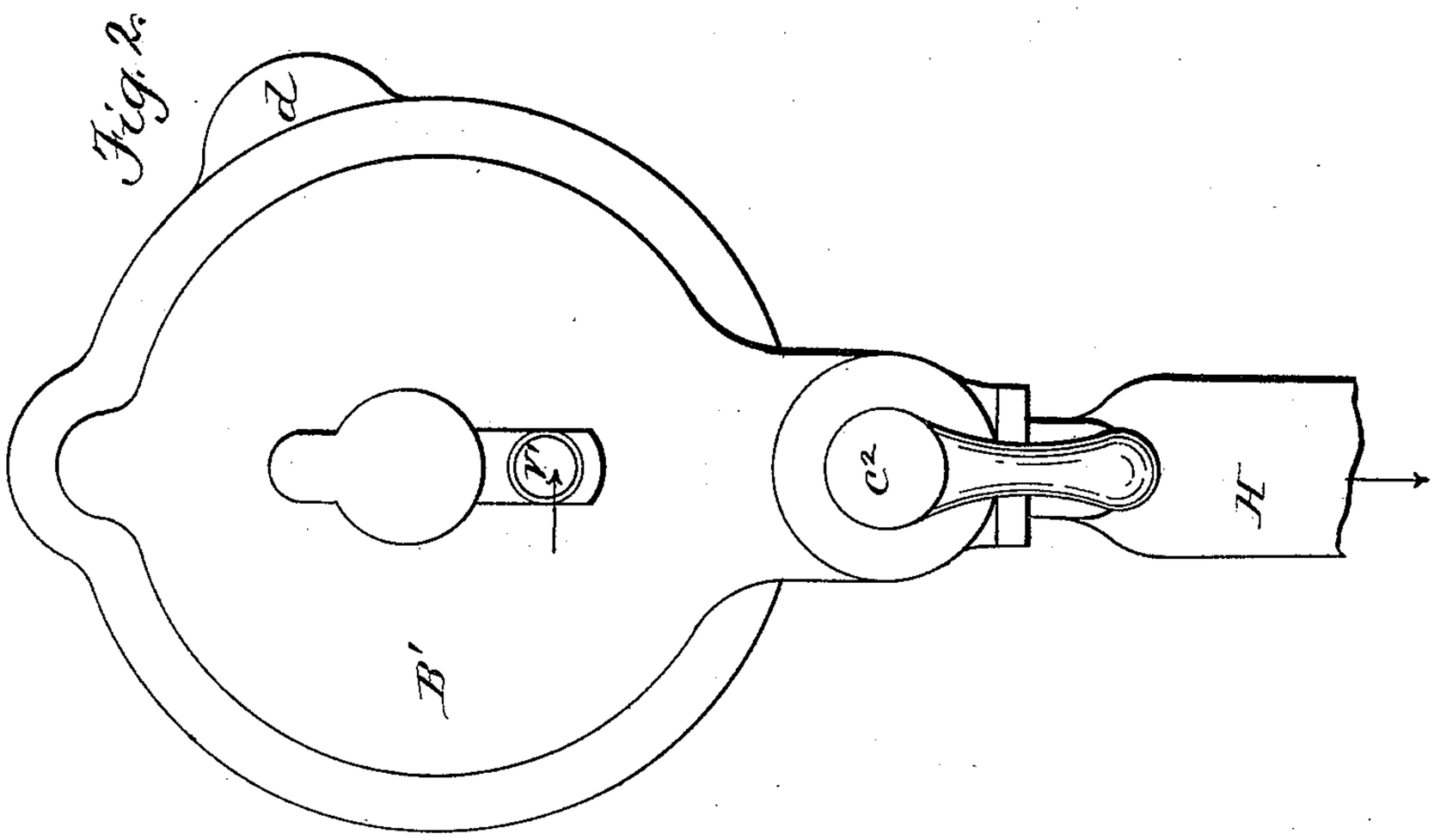
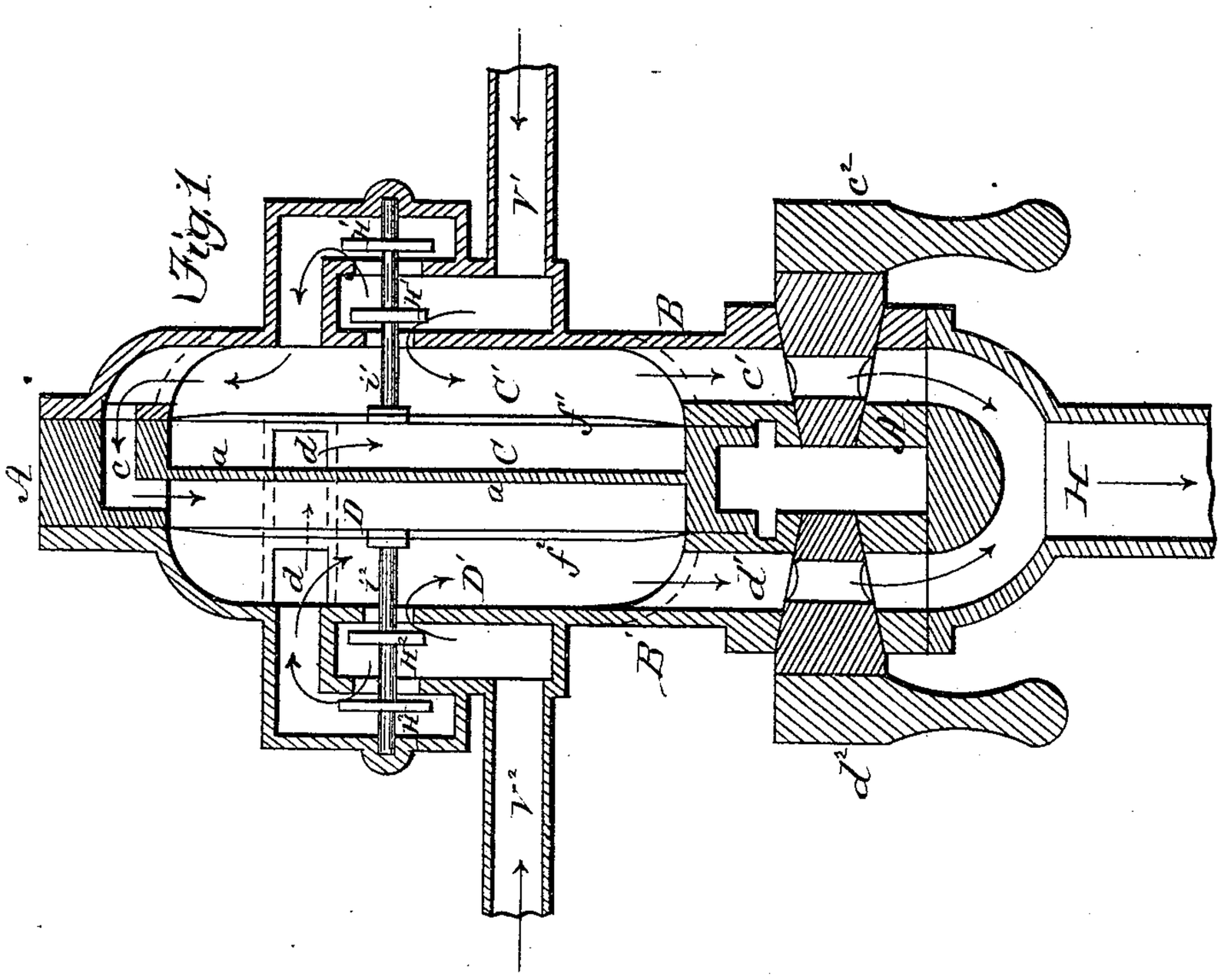


Fig. 1.



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(No Model.) 3 Sheets—Sheet 2.

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Fig. 4.

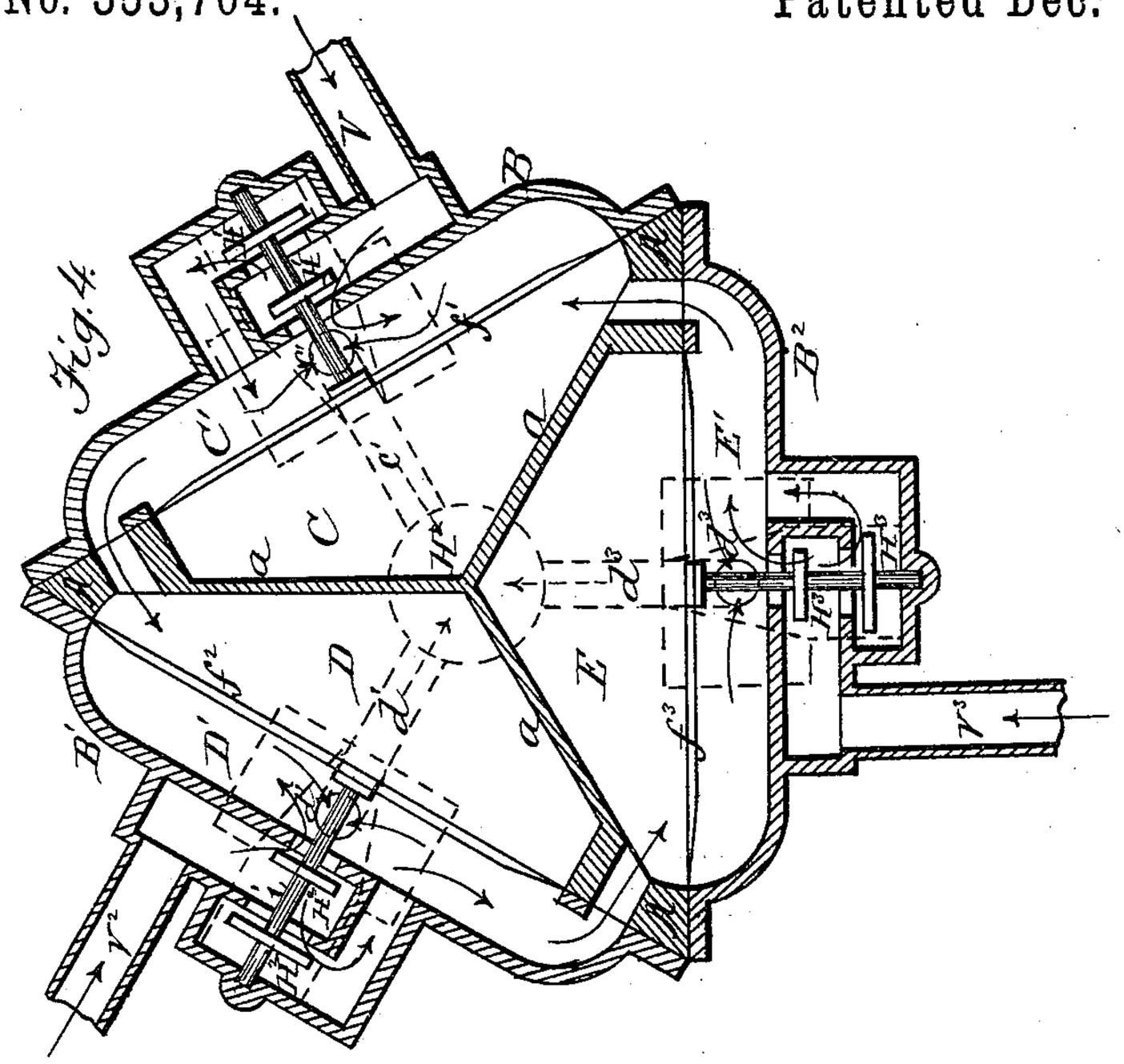

Fig. 3.

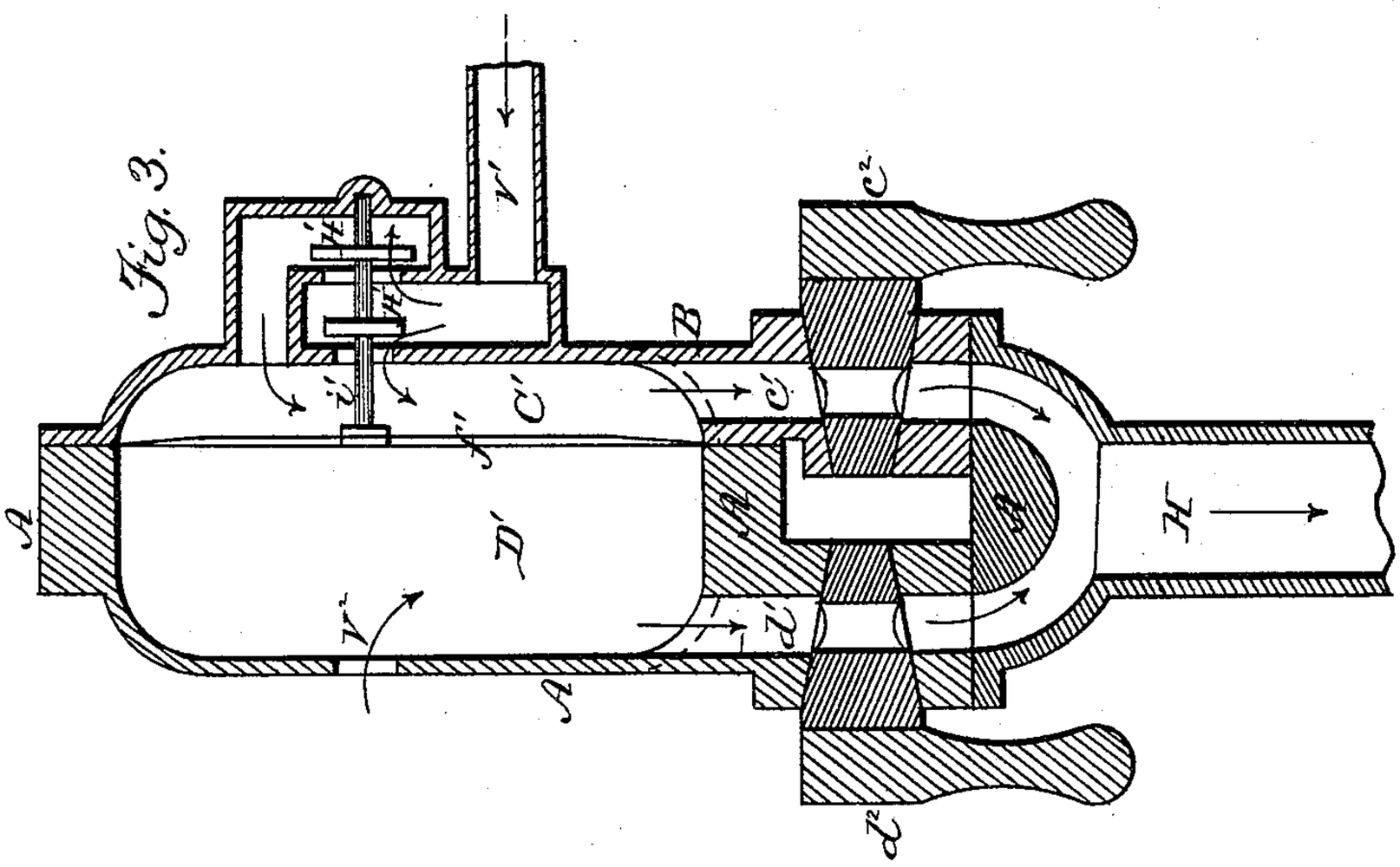

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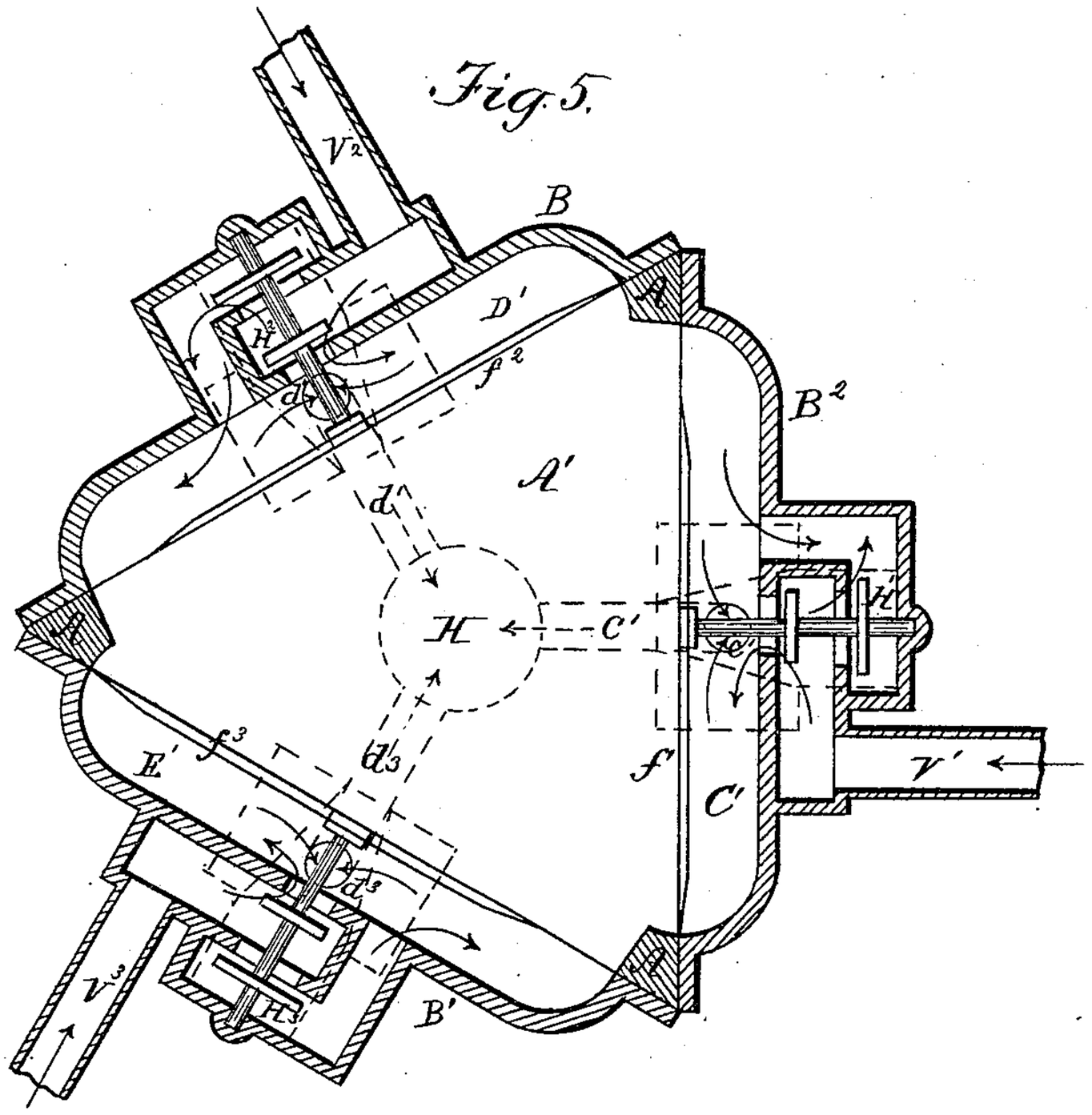
Fig. 5.



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UNITED STATES PATENT OFFICE.

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METHOD OF COMMINGLING FLOWING FLUIDS IN DEFINITE PROPORTIONS.

SPECIFICATION forming part of Letters Patent No. 353,704, dated December 7, 1886.

Application filed September 23, 1885. Renewed October 7, 1886. Serial No. 215,622. (No model.)

To all whom it may concern:

Be it known that I, LEWIS HALLOCK NASH, a citizen of the United States, residing at Brooklyn, in the county of Kings and State of New York, have invented new and useful Improvements in Methods of Commingling Flowing Fluids in Definite Proportions, of which the following is a specification.

The object of my invention is to mix flowing fluids in definite proportions for use in the arts.

My invention is designed to mix or intermingle different liquids or different gases or liquids with gases—such, for instance, as gas with air—to form a combustible mixture for operating gas-engines; but it is capable of varied applications in the arts. In its use the device forms the medium of carrying out my method of receiving, mixing in definite proportions, and discharging the several constituents in intermingled condition.

The device, of which I have shown several forms, for carrying out this method is a closure of one or more chambers, each having at least one yielding wall, each having separate inlets, and each communicating with an outlet common to all, each chamber having an inlet-valve controlled by its yielding wall.

The accompanying drawings show modified constructions, in which Figure 1 represents a vertical section of the device for mixing two fluids, each flow having a controlling-valve; Fig. 2, an elevation of the same. Fig. 3 shows the device as constructed with one flow-controlling valve, and Fig. 4 shows the device as constructed for mixing three several and distinct fluids, each flow having a controlling-valve. Fig. 5 represents a modification of the construction shown in Fig. 4.

The device consists of a closure or case, A, having one or more chambers, each having at least one yielding wall separating the flows, and when more than one chamber is used the device is divided by immovable partitions into separate chambers, each having a movable wall.

Referring to Figs. 1 and 2, the case is divided by an immovable partition, *a*, into two compartments, the heads whereof form the covers B B′, which make joints upon the case. Each compartment is divided into two chambers by partitions, which form a movable wall for each, which I prefer to make of flexible diaphragms f' f^2, secured in the joining of the case-covers. The outer chamber, C′, of one compartment connects with the inner chamber, D, of the other compartment by a passage, *c*, placed, preferably, at the circumference, so as to equalize the pressures therein, while the outer chamber, D′, of the other compartment connects with the chamber C by the case-ports, *d*, for the same purpose. The outer chambers, C′ D′, form the receiving-chambers, and communicate by the passages c' d' with an outlet-passage, H, common to all the chambers. These outlet-passages c' d' have controlling-cocks c^2 d^2, for regulating the proportional quantity of the discharge of the separate flows. The movable walls of the chambers are connected with valves H′ H^2 by stems i i^2, for controlling the supply to the chambers, and I prefer to use the double-beat valves shown, placed in the inlet-passages V′ V^2, which are formed in the case-covers.

Referring to Fig. 3, the device is shown as having a single compartment divided by a movable partition-wall having an inlet-controlling valve for one of the flows only, the flow into the other chamber being uninterrupted, as shown at V^2.

Referring to Fig. 4, the device is shown as constructed for mixing three constituents, and therefore as having three separate compartments, each having its own movable chamber, forming partition-wall and inlet-controlling valve, and each chamber of each compartment communicating with a chamber of one of the other compartments and the receiving-chamber of each compartment communicating with a discharge common to all the chambers.

It will be understood that the influent-controlling valves and the effluent-controlling cocks are the same in the several modifications shown, and the provision for equalizing the pressure in the several communicating chambers is identical. I have described the movable walls as being formed of flexible diaphragms; but I may use sliding or swinging joint-forming pistons for controlling the influent valves.

The operation of the device in commingling flowing fluids in definite proportions is as follows, viz: The principle of operation being the same whether two or more fluids are commingled, I will describe the operation of the commingling of three constituents, as illustrated in Fig. 4. The flow being in all the chambers by their supply-pipes V′ V² V³, if the pressure in any one of the receiving-chambers, as C′ and D, which is in communication with it, should become greater than in the other chambers, the movable wall f' will be pressed farther into chamber C, and thus close to some extent the controlling-valve H′, tending to lessen the pressure in C′. At the same time this pressure in chamber D will move the movable wall f^2 into the chamber D′, and thus open the valve H², thereby allowing a freer inlet to chamber D′, increasing the pressure therein, and in its communicating-chamber E. This increase of pressure in chamber E will move the partition-wall f^3 into chamber E′, opening the valve H³, thus giving a freer inlet into chamber E′ and increasing the pressure therein and into its communicating chamber C, which completes the communication of all. This operation continues until the pressure in all the chambers is equalized. Should this condition be interrupted by reason of any variation in the rate of flow of the separate streams, or in the total delivery of the combined streams, then the same equalizing operation will at once take place, in accordance with the changed condition. The pressure in all the chambers being the same, the quantity of the constituent which will flow from each chamber through the passage connecting it with the discharge common to all will be exactly proportional to the capacity of its discharge-passage. By varying the capacity of the several discharge-passages, any desired proportional relation between the capacities of these passages can be effected, and thereby the relative proportions of the flowing constituents regulated.

In the application of the device for supplying a gas-engine the pipe H is connected with the supply-pipe of the engine, so that the air is drawn through the pipe-chamber and gas through the pipe of another chamber, and are commingled in the delivering-pipe. No particular grouping of the compartments is essential, so long as they are conveniently arranged for co-operative action in carrying out the method which I have described.

Instead of the receiving-chambers being connected alternately on each side of the dividing-walls, I may dispense with the immovable partitions shown in Fig. 4, in which case the receiving-chambers will be separated from a middle chamber, A′, common to all the movable walls, and wherein the pressure would be equal to that of the receiving-chambers.

The device in its organization and combination is not claimed herein, as it forms the subject of a separate application for a patent filed by me of even date herewith.

In Figs. 4 and 5 the outlet-passages c' d' d^3, in the chambers C′ D′ E′, lead to the outlet-passage H, common to all said chambers, and these passages H are provided with regulating-cocks.

I claim—

1. The method, substantially herein described, of commingling two or more flowing fluids, which consists in conducting each separate constituent into a separate chamber, equalizing the pressures in all the chambers by controlling the inflow therein, and discharging each constituent through a separate passage of determined capacity into a conduit common to all the chambers.

2. The method of commingling two or more fluids, which consists in conducting each fluid into separate chambers, each having a dividing-wall capable of being moved by variations in the pressure of the fluid on opposite sides of said wall, controlling the inflow of each fluid into its chamber by means of the movements of said division-walls, and discharging each fluid through passages of determined capacity into a discharge-conduit common to all the chambers, substantially as described.

3. The method of commingling two or more flowing fluids, which consists in conducting each fluid into a separate receiving-chamber, equalizing the pressures in each chamber by means of variations in the relative pressures in the several receiving-chambers, and discharging each fluid under the same conditions of pressure through passages of determined capacity into a conduit common to all said chambers, substantially as described.

In testimony whereof I have hereunto set my hand in the presence of two subscribing witnesses.

LEWIS HALLOCK NASH.

Witnesses:

A. E. H. JOHNSON,

J. W. HAMILTON JOHNSON.