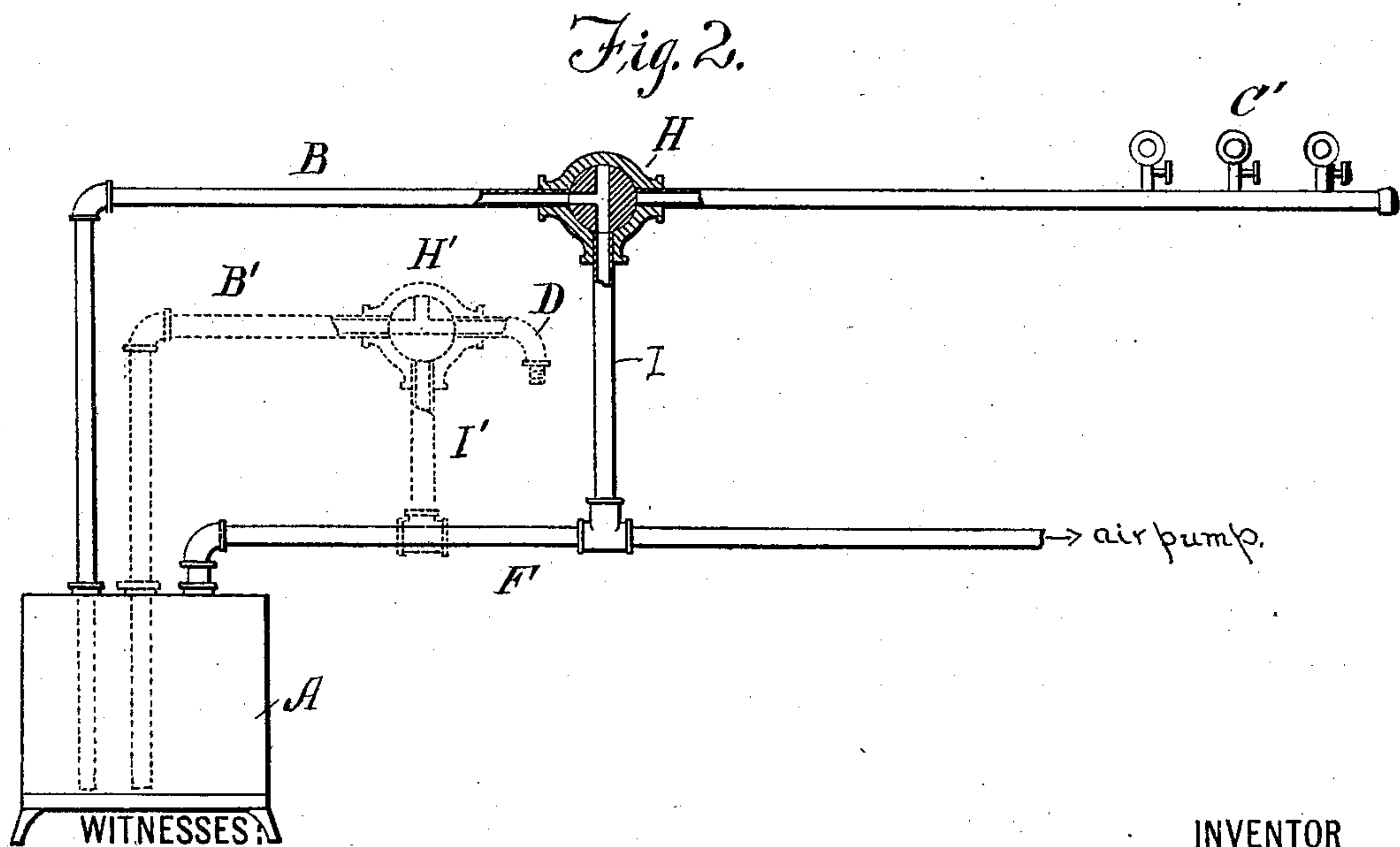
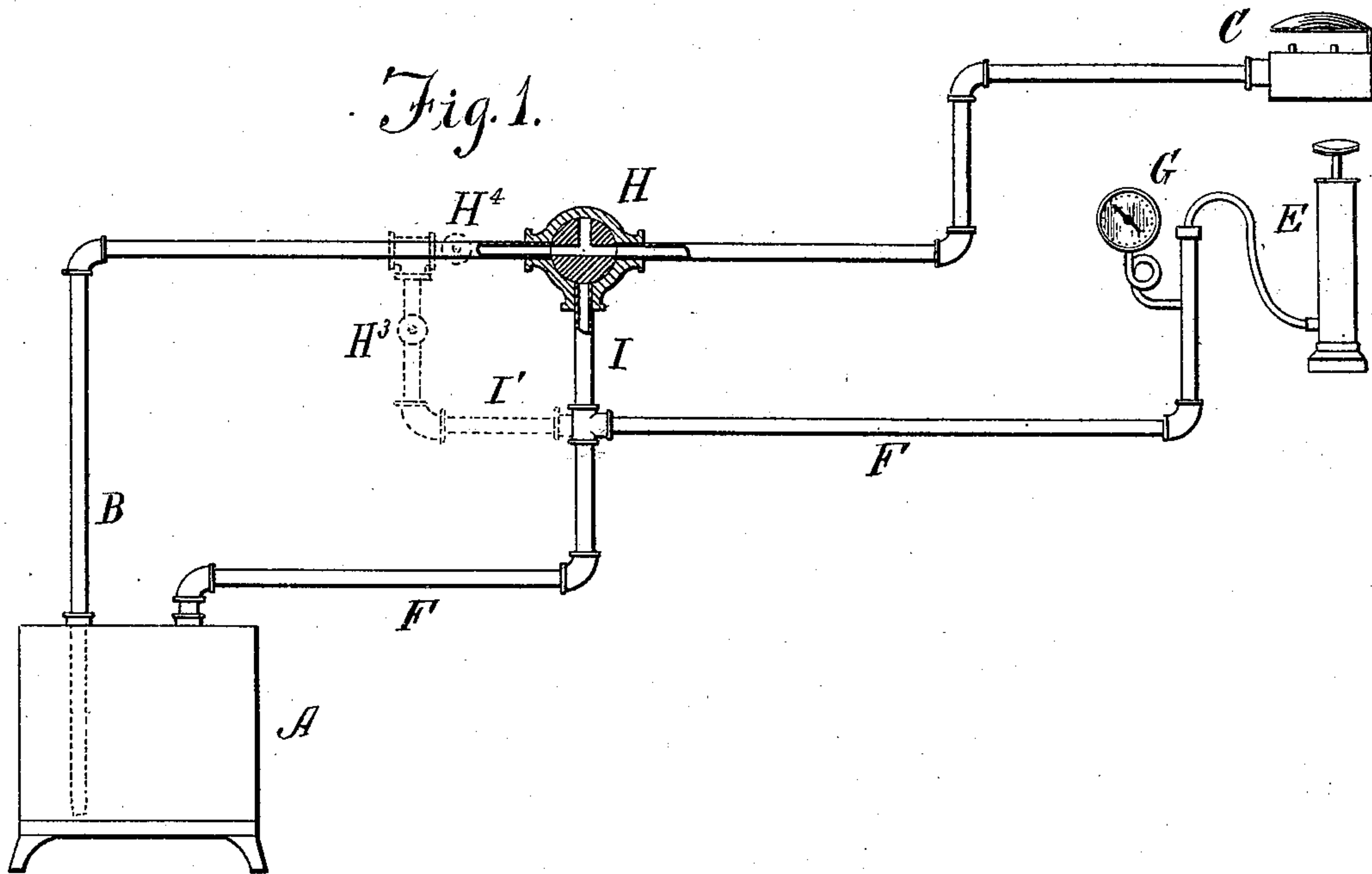


(No Model.)

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PNEUMATIC DISTRIBUTING SYSTEM FOR LIQUIDS.

No. 599,702.

Patented Mar. 1, 1898.



WITNESSES

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## PNEUMATIC DISTRIBUTING SYSTEM FOR LIQUIDS.

SPECIFICATION forming part of Letters Patent No. 599,702, dated March 1, 1898.

Application filed March 5, 1897. Serial No. 626,015. (No model.)

*To all whom it may concern:*

Be it known that I, FLORENCE M. GRISWOLD, a citizen of the United States, and a resident of Brooklyn, in the county of Kings and State of New York, have invented a certain new and useful Pneumatic Distributing System for Liquids, of which the following is a specification.

This invention relates to an improvement in means and methods of elevating or distributing liquids by the use of a fluid under pressure—such, for instance, as compressed air.

The objects of the invention are to provide for the safe and convenient storage of any liquid that is to be distributed by fluid-pressure, to provide for maintaining the fluid-pressure, to provide for equalizing or opposing the pressures, as hereinafter described, so that on cutting off the flow of liquid from a pipe the liquid in the pipe may return to the tank, and to secure other results. The attainment of these objects is rendered essential, particularly in the handling and consumption of inflammable liquids, such as turpentine, naphtha, gasoline, and kerosene. Tanks containing these substances should be placed underground or in such places that it would be utterly impossible for fire to get to them or for their contents, in the event of the rupture of a tank, to get to a fire. The tanks having been thus safely located, the most satisfactory means for getting their contents to the source of consumption or distribution is fluid-pressure. The most accessible and convenient fluid for this purpose is air.

In the distribution of inflammable liquids, particularly in buildings, it is essential to safety that when the flow of the liquid is cut off the contents of the pipes may be returned to the tank in order that there may be no chance for leakage to occur from the pipe-joints. It is also a great saving in time and trouble to be able to make this return to the tank without letting off the fluid-pressure from the tank.

My invention consists, substantially, in a novel method and apparatus for elevating and distributing liquids by fluid-pressure employing a storage-tank, a discharge-pipe containing a suitable cock, means for elevating the liquid by fluid-pressure, and means controlled by the cock for automatically putting upon

the liquid in the discharge-pipe a pressure such that when the cock stands in closed position between the tank and discharge-outlet the liquid in the discharge-pipe will be caused to return to the tank.

My invention consists also in maintaining the elevating pressure for raising the liquid in the tank when the cock is closed and applying an equal or substantially equal opposing pressure on the liquid in the discharge-pipe by any desired means.

The invention further consists in the construction, combination, and arrangement of parts hereinafter described, and set forth in the claims.

In the accompanying drawings, which form a part of this specification, Figure 1 is a diagrammatic representation of an apparatus or system, illustrating one way of carrying out the invention. Fig. 2 is a similar representation showing some modifications in detail.

Though the invention has several different applications, it will be described as applied to the distribution of liquid fuel by compressed air.

In this application the oil is preferably placed in a suitable tank in the basement of a building or under the sidewalk, or it may be placed in an outbuilding or located under the ground in any convenient place or otherwise protected against fire. In the drawings such tank is indicated at A, and may be of any suitable material and construction. From it a discharge-pipe, as B, extends, starting from a point near the bottom of the tank, as indicated. This pipe may be extended to any part of the building and may feed a burner, as indicated at C, or a series of burners, as indicated at C', or it may terminate in a discharge-nozzle, from which the oil may be drawn into any receptacle or to which a hose may be attached, as desired, such nozzle being indicated in dotted lines at D in Fig. 2.

The fluid-pressure supplied to the tank A may be supplied from any suitable source. In Fig. 1 an ordinary hand air-pump is indicated at E, which is connected by pipe F to the top of tank A. To this pipe at any convenient place, preferably near the pump, is located a gage G to show the degree of compression to which the air has been subjected. By the operation of the pump E any suitable



pressure may be applied to the surface of the oil in the tank. This pressure will cause the oil to be distributed through the pipe B, as desired. For checking and allowing this flow  
 5 a cock is located in the pipe B, one form of which is indicated at H. From the pipe F a branch pipe or by-pass, as I, extends to the pipe B and makes connection therewith, preferably at the cock H. The connection is made  
 10 at this point, because by properly constructing this cock it may be made to serve the double purpose of controlling the liquid and the air. The cock is preferably made on the three-way plan, as indicated. When the cock  
 15 is turned as shown in Fig. 1, the oil is allowed to flow to the burner under fluid-pressure applied to the surface of the liquid in the tank. When the cock is turned as shown in Fig. 2, the flow of oil is cut off, but at the same  
 20 time air is admitted to the pipe B. The effect of this is obviously to put upon the liquid in the discharge-pipe a pressure opposing that which may be at the same time upon the surface of the liquid in the tank while the  
 25 cock stands in closed position to the burner or discharge-outlet, and hence the liquid will automatically return to the tank through the mere act of cutting off the discharge substantially by the effect of gravity when the  
 30 opposing pressures are substantially equal (as in the particular arrangement shown) or by the superior effects of the pressure admitted to the pipe B, assisted by gravity, the action in any case depending upon the rela-  
 35 tive levels of the pipe B and the tank and the relative fluid-pressures existing or caused to exist when the outlet-cock is closed upon the surface of the liquid in the tank and upon the column of liquid in pipe B.  
 40 The arrangements of pipes and cocks and the pressures and sources of pressure may obviously be varied without departing from my invention, a principal feature of which is using a fluid-pressure to cause the liquid to  
 45 be discharged and automatically, upon the closing of the outlet-cock and while the same is closed, establishing or permitting a fluid-pressure to exist upon the liquid in pipe B, which balances or opposes that which at the  
 50 same time is permitted to exist upon the surface of the liquid in the tank, so that the liquid will return to the same.

In the particular way of carrying out my invention herein illustrated the pressure permitted upon the surface of the liquid in the  
 55 tank is that which is sufficient to discharge it if unopposed; but I do not wish to be understood as limiting myself to any degree of pressure upon the surface of the liquid at the  
 60 time the pressure is applied to the liquid in the discharge-pipe by the act of turning the cock nor as to any particular source of pressure, although for convenience the same source which raises the liquid is here shown  
 65 as utilized to supply the pressure tending or serving to return the liquid to the tank, and the pressure permitted to exist upon the sur-

face of the liquid in the tank while the cock stands closed is the pressure which would raise it if unopposed.

Any number of distributing-pipes may be connected to the tank A, as illustrated in Fig. 2, by the additional distributing-pipe B', as there shown in dotted lines. This pipe may be connected by branch pipe I' to the air-  
 75 pipe F. In this figure the source of compressed air is omitted to indicate that the air or other elevating fluid may be derived from any desired source.

As indicated in Fig. 2, the cock II' may be  
 80 the only cock in the distributing-pipe and serve as the distributing-cock and as the equalizing-cock. This is also true of the cock shown in Fig. 1, though in connection with the burner C a needle-valve may be used, if  
 85 desired. At C' such valve is indicated in connection with each burner.

The operation of the device is as follows: The tank A having been filled in any suitable manner, the necessary pressure for dis-  
 90 tributing the oil therefrom is supplied to the tank, with the cock II in the position shown in Fig. 2 or Fig. 1. Then when it is desired to distribute the oil either to the burners C' or in any other manner, as through the nozzle D, the cock is turned, as indicated at H'.  
 95 Then when it is desired to cut the oil off the cock is turned, as at H, and the pressure in the pipe and tank equalized, thereby returning the oil in pipe B to the tank. Oil from  
 100 the tank A may be distributed simultaneously through the several pipes leading therefrom or may be distributed through any one or more of them, as the case may require, the opening and closing of the cock in any one of  
 105 the pipes not affecting the flow of the oil through the others, and yet the oil in any discharge-pipe will be returned to the tank as soon as the flow of the oil in that pipe is cut off. From the above description it is clear  
 110 that no oil can stand in the pipes B between the cock H and the tank after the flow thereof is cut off. The cock H may be placed at any suitable distance from the discharge end of the pipe B.

Many changes may be made in the construction and arrangement of pipes aside from those above mentioned without departing from the spirit of the invention, one such change being indicated in dotted lines in Fig.  
 120 1. Though the three-way cock H or some equivalent therefor is preferred, because by it the oil cannot be cut off from the burner or discharge-nozzle without admitting the air to pipe B and returning the oil therein to the  
 125 tank, yet a cock in each of the pipes B and I may be employed, as indicated at H<sup>3</sup> and H<sup>4</sup>. In this case the cock H and the branch I would be omitted and the by-pass I' substituted. In operating the system as thus modified the cock H<sup>3</sup> being closed the cock H<sup>4</sup>  
 130 would control the discharge of oil through pipe B. Then upon cutting off this discharge and opening the cock H<sup>3</sup> the oil left in B



would be returned to the tank; but the pressure of the elevating fluid is substantially maintained without material loss. This manner of control might be preferable in a system used for dispensing liquid where frequent drafts were to be made, as by it the liquid in pipe B may or may not be returned to the tank when the discharge is stopped; but where inflammable liquid is to be served to burners otherwise the three-way cock or its equivalent for cutting off and equalizing by one act is indispensable.

What I claim as my invention is—

1. The improvement in handling liquids by fluid-pressure, consisting in maintaining the necessary distributing-pressure upon the liquid continuously, and upon stopping the flow of liquid putting a pressure upon the liquid in the tributaries opposed to the maintained pressure and sufficient to return to the tank the liquid in said tributaries for the purpose set forth.

2. The combination with a tank containing a liquid under fluid-pressure, of a discharge-pipe having a cock for controlling the flow of the liquid, and means controlled by the cock for equalizing the fluid-pressure in the discharge-pipe and tank when the cock is closed so as to allow the liquid in the pipe to return to the tank.

3. The combination with a tank for liquids, of a fluid-pressure apparatus connected therewith for maintaining a pressure within the tank, a discharge-pipe as B, for the tank, a branch pipe as I, connecting the fluid-pressure supply with the discharge-pipe, and a cock as H, in the discharge-pipe at its junction with said branch pipe whereby on cutting off the discharge of liquid the fluid-pressure is permitted to enter the discharge-pipe and force the liquid therein back into the tank.

4. The combination of a tank containing a liquid under fluid-pressure, of a discharge-pipe having a cock for controlling the flow of

the liquid, a branch or by-pass from the source of fluid-pressure to the discharge-pipe for making the fluid-pressure in the discharge-pipe oppose that in the tank while the cock is closed so as to allow the liquid in the discharge-pipe to return to the tank.

5. As a means of storing and supplying inflammable liquids, the combination, substantially as described, of a storage-tank protected against fire, a source of fluid-pressure connected to said tank for elevating the liquid when it is to be burned or otherwise utilized, and means whereby, when the flow of the liquid is cut off, a fluid-pressure in the discharge-pipe may be made to oppose that which elevates the liquid and to an amount sufficient to cause the liquid between the point of cut-off and the tank to return to the latter.

6. As a means of elevating and controlling the flow of liquid from a tank, the combination of means for putting pressure upon the stored liquid, a discharge-pipe, a stop-cock therein, and means for equalizing the pressure upon the liquid in the pipe and upon the surface of the liquid in the tank while the stop-cock stands in closed position to the burner or discharge-outlet, whereby the liquid in said pipe will be returned to the tank by gravity.

7. The combination with the storage-tank, discharge-pipe and cock therein, of means for elevating the liquid by fluid-pressure, and means controlled by the cock for putting upon the liquid in the discharge-pipe a pressure which, while the cock stands in closed position to the burner or other discharge-outlet, will cause or permit the liquid to return to the tank.

Signed at New York, in the county of New York and State of New York, this 3d day of March, A. D. 1897.

FLORENCE M. GRISWOLD.

Witnesses:

WM. H. CAPEL,  
D. H. DECKER.