

J. A. BOUCHAYER.

AUTOMATIC APPARATUS FOR STOPPING THE SUPPLY IN CASE OF A SUDDEN EMPTYING.

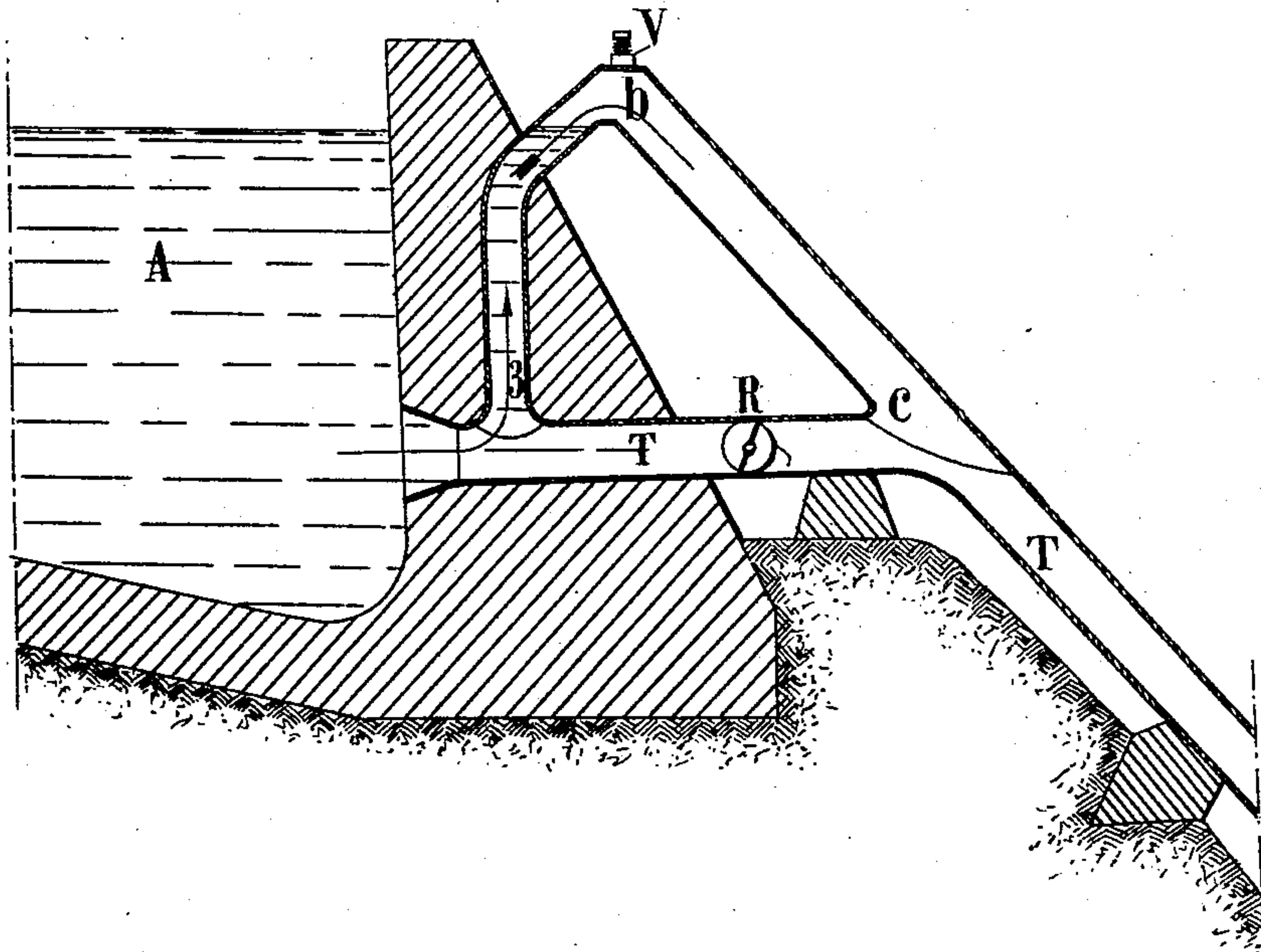
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969,516.

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3 SHEETS—SHEET 1.

Fig. 1.



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3 SHEETS—SHEET 2.

Fig. 2

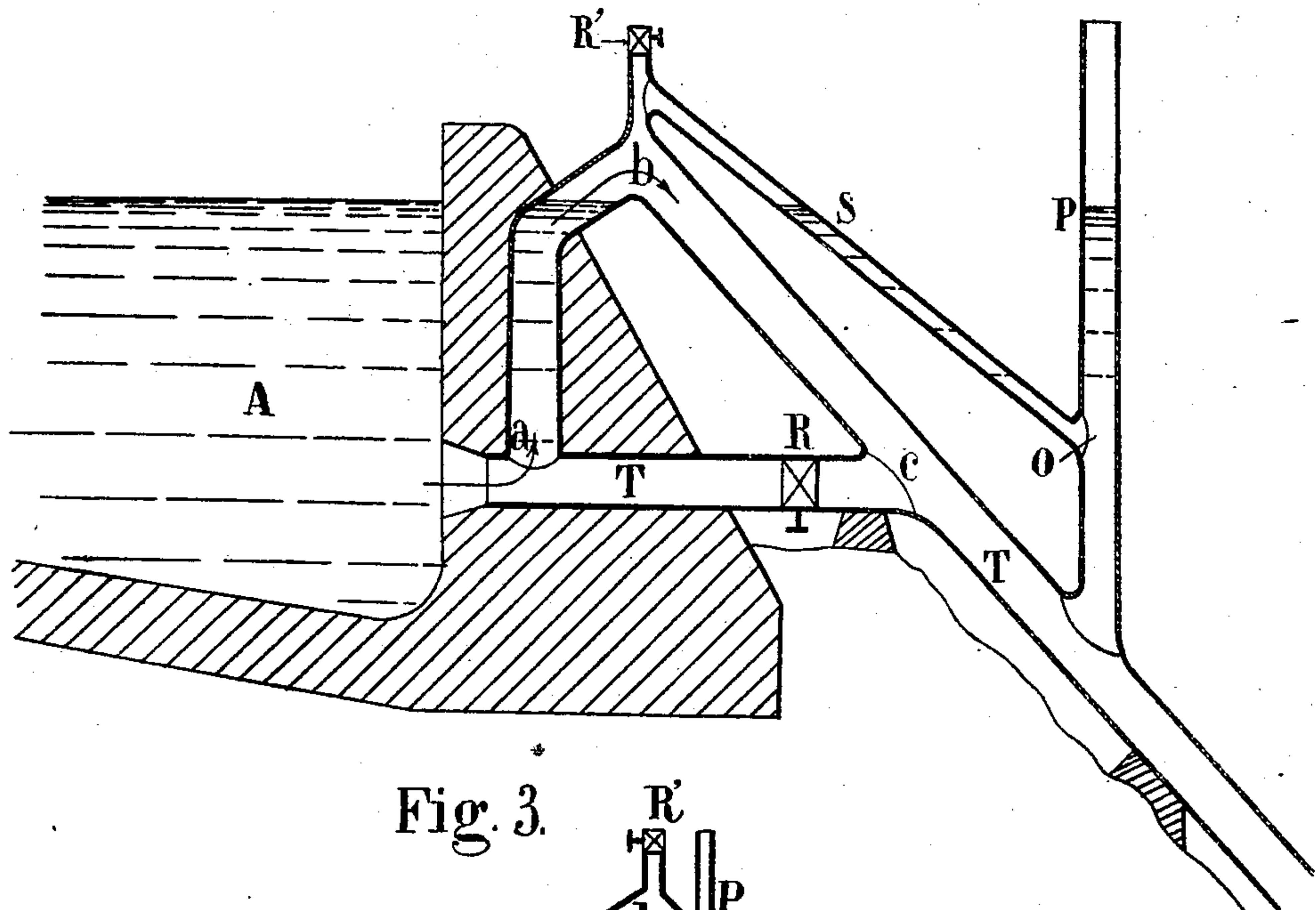
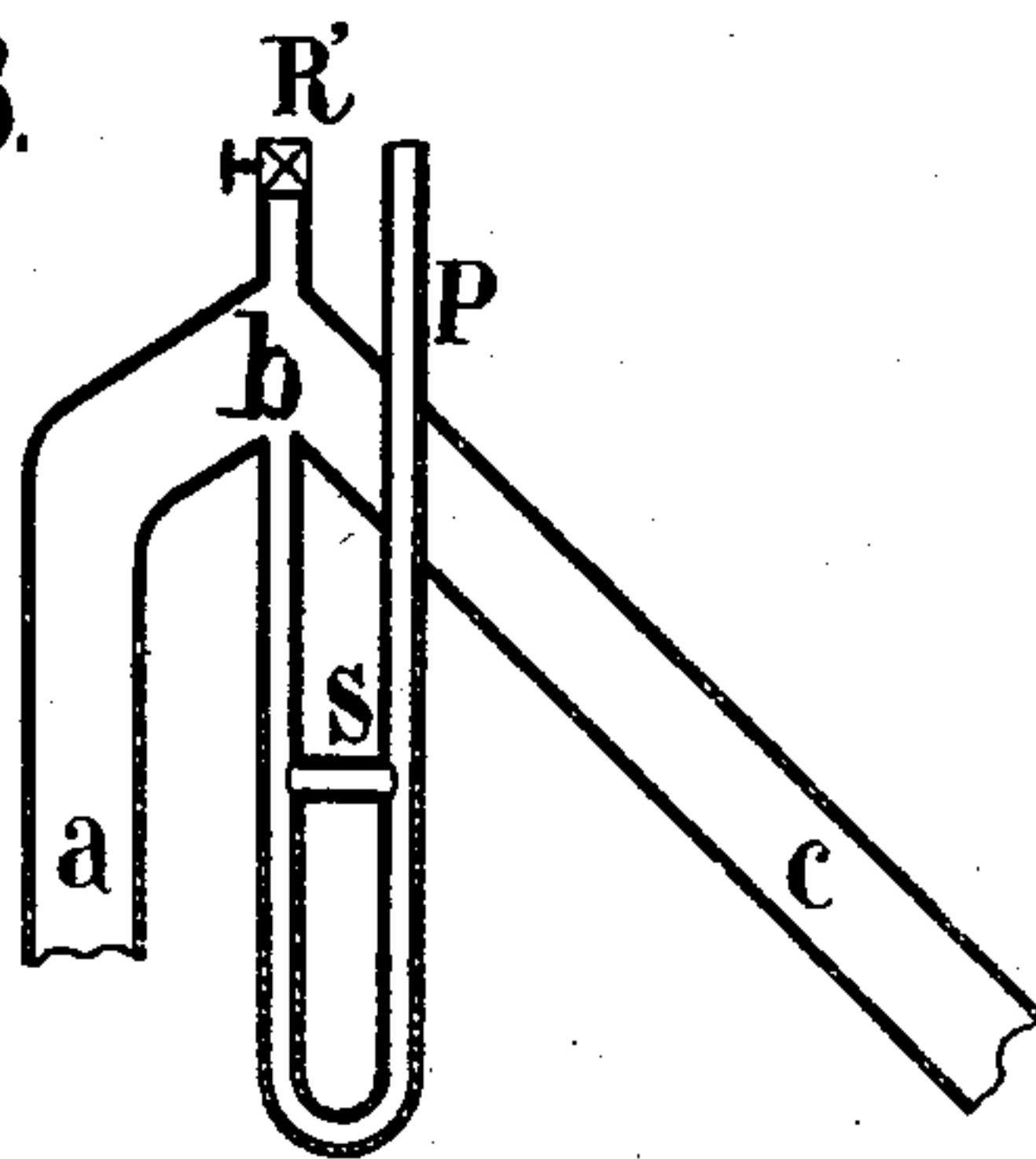


Fig. 3



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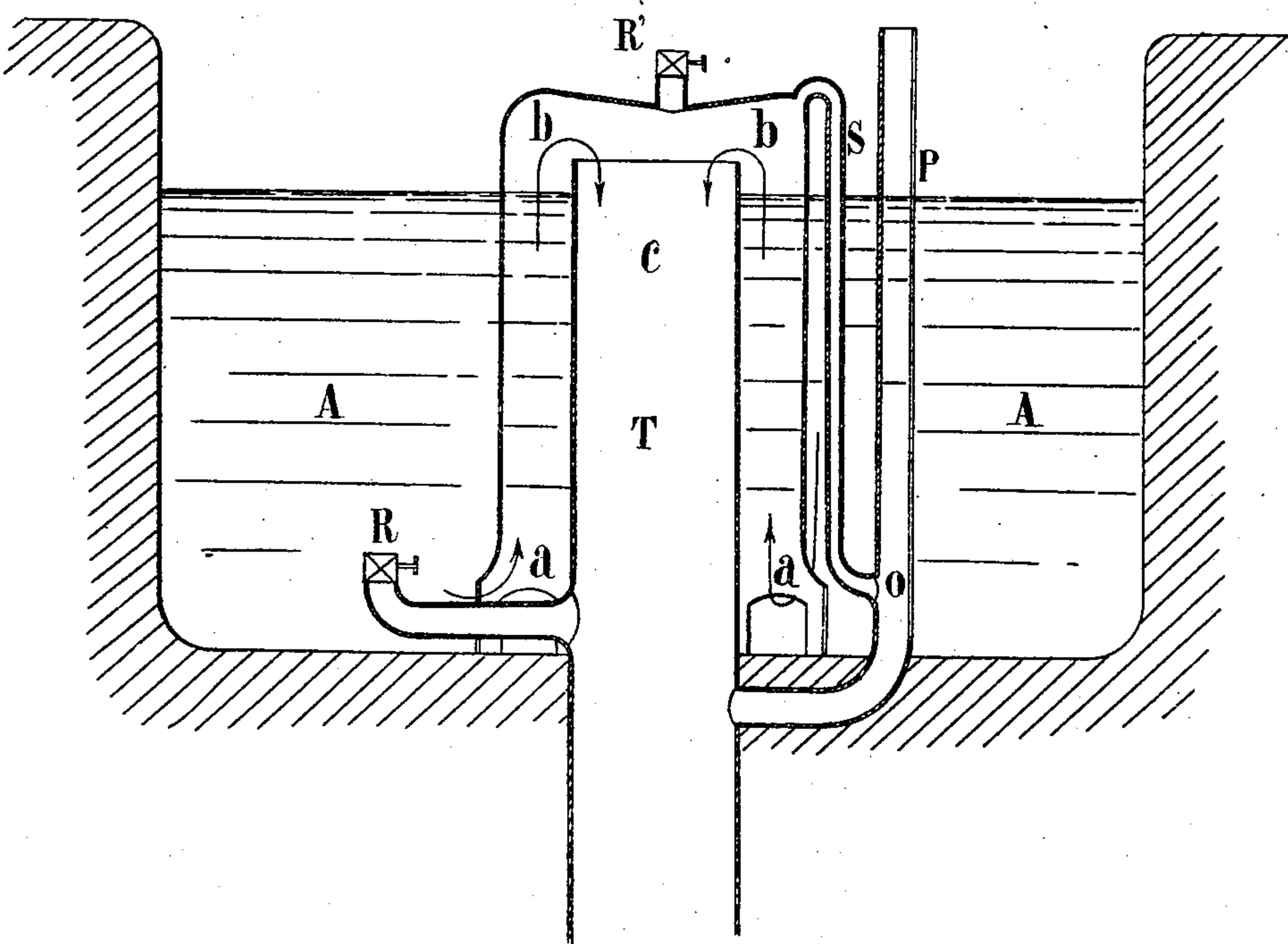
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Fig. 4.



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AUTOMATIC APPARATUS FOR STOPPING THE SUPPLY IN CASE OF A SUDDEN EMPTYING.

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To all whom it may concern:

Be it known that I, JOSEPH AUGUSTE BOUCHAYER, a citizen of the Republic of France, and resident of Grenoble, France, have invented new and useful Improvements in Automatic Apparatus for Stopping the Supply in Case of a Sudden Emptying, which improvements are fully set forth in the following specification.

Pressure conduits of hydraulic installations are generally preceded by a "derivation" canal or tank containing large quantities of water. When a breakage takes place accidentally in the conduits, it is necessary to see that the discharge or leakage should be limited to the water contained in the pressure conduit proper. In order to arrive at that result, various systems of closing, sluice valves, gates, floats, etc., have been used the object of which is to close the end of the pipe as soon as an accident takes place. These apparatus based on mechanical or electrical arrangements, are not reliable, and the safest method of getting a good result, is to have a man at the entrance of the pipe, who, at the moment of the accident, brings into action the apparatus in question.

This invention has for its object to render the manipulation in question absolutely automatic, owing to the utilization of a simple principle, giving an almost perfect security. For arriving at the result in question, the principle of siphon has been applied.

The working of the apparatus forming the subject of the invention will be readily understood with reference to the accompanying drawing given by way of example and showing all its elements.

Figure 1 is a diagrammatic view in vertical section, Fig. 2 is a vertical section of the improved apparatus arranged in the shape of an ordinary siphon; Fig. 3 is a partial elevation of a modified construction; and Fig. 4 is a vertical section of the apparatus arranged in the shape of a bell.

In Fig. 1, A is the tank or canal for charging the conduit, and T the pressure conduit proper supplying water to the hydraulic works. The said conduit is provided with a closing device R and is surmounted by a siphon *a b c* provided at the top with an air outlet valve V. This siphon is arranged in such manner that its upper

point is above the level of water in the chamber A.

The working of the apparatus is as follows:—The tank A being full, the cock R is opened, and the conduit filled, the bottom closing orifices at the works being closed. This having been done, the cock R is closed, and the system is ready to work. In fact, when the closing orifices are opened for use and the conduit supplies water, the vacuum will be produced at the top in the siphon *a b c*, the latter will be started, and the suction in the tank will take place along the path *a b c* T indicated by the arrows. The conduit will then work in a normal manner. If an accident takes place and results in the conduit breaking at any point of the latter, the volume of water then supplied will depend on the slope of the conduit, and there will necessarily take place a separation of the liquid vein at *b*. This will result in the formation of a vacuum at the top of the siphon the air valve V will open, and air will come in, which will result in the siphon being rendered inoperative, and the water of the tank A will not be able to flow into the conduit, and thus the result desired will be obtained.

Figs. 2, 3, and 4 show an automatic apparatus for stopping the supply in case of a sudden emptying, in which the valve has been replaced by a column of water, which by its eventual descent, uncovers the orifice of the air inlet conduit and thus renders the siphon inoperative. This result is obtained by the use of a piezometric tube or stand pipe.

Fig. 2 shows the improved apparatus arranged in the shape of an ordinary siphon.

Fig. 4 shows the apparatus in the shape of a bell.

Whatever be the form of the apparatus, the characteristic features remain the same, and the principle of working is identical in both cases.

On the descending branch *b c* is placed a piezometric tube P called the "sniffing" tube, connected to the top of the siphon by means of an air inlet pipe S. Fig. 3 shows that the sniffing tube can be also arranged at the very top of the siphon.

On examining the accompanying drawings, it will be readily understood that the sniffing pipe replaces the air valve V of

the device shown in Fig. 1, by a column of water which descends as the speed increases in the siphon, that is to say, in the main conduit. This column of water which is descending, uncovers the orifice *o* of the air inlet pipe. The orifice in question having been uncovered, the top of the siphon *b* is in communication with the atmosphere, the siphon is rendered inoperative, and the flow is automatically stopped.

The improved apparatus such as shown in Figs. 2-4 enables in practice the following results to be obtained:

1. It insures the filling of the conduits in a given time, it being sufficient to provide a suitable orifice at the cock R.

2. If it is desired to stop the flow from the canal during the normal working, this can be done by manipulating the cock R' which admits air and stops the supply or flow. The cock R' is arranged, as shown in the drawings, at the highest point of the apparatus. The control can be effected at a distance by means of a special pipe.

3. The arrangement described enables the siphon to be automatically rendered inoperative for a given speed of water in the conduit, according to the relative position of the snifting pipe and of the air inlet pipe.

Claims:

1. The combination with a conduit and means for supplying liquid thereto, of means for automatically cutting off the supply of liquid to the conduit in case of the sudden emptying of the latter, said means including a siphon connecting the supplying means and conduit, and mechanism governed by the flow of liquid through the conduit for automatically admitting air to the siphon to break the same.

2. The combination with a conduit and means for supplying liquid thereto, of means for automatically cutting off the supply of liquid to the conduit in case of the sudden emptying of the latter, said means including a siphon connecting the supplying means and conduit, mechanism governed by the

flow of liquid through the conduit for automatically admitting air to the siphon to break the same, and controllable means for admitting liquid to the conduit from the supply means independent of the siphon.

3. The combination with a conduit, of means for supplying liquid thereto, a direct connection between the supplying means and the conduit, a controlling valve in the connection, a siphon connection between the supplying means and conduit that bridges the controlling valve, and means governed by the flow of liquid from the conduit to automatically admit air to the siphon to break the same.

4. The combination with a conduit and means for supplying liquid thereto, of means for automatically cutting off the supply of liquid to the conduit in case of the sudden emptying of the latter, said means including a siphon connecting the supplying means and conduit, a stand pipe connected to the conduit below the siphon, and an air inlet pipe connecting the stand pipe and siphon and having a connection with the former below the normal liquid level in the stand pipe.

5. The combination with a conduit, of a reservoir, a direct connection between the reservoir and conduit, a valve for controlling said connection, a siphon connection between the reservoir and conduit that bridges the valve, said siphon having an air inlet at its upper end, a valve for closing said air inlet, a stand pipe connected to the conduit below the siphon, and an air admitting pipe connecting the stand pipe below the normal liquid level, with the upper end of the siphon.

In testimony whereof I have signed this specification in the presence of two subscribing witnesses.

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Witnesses:

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