

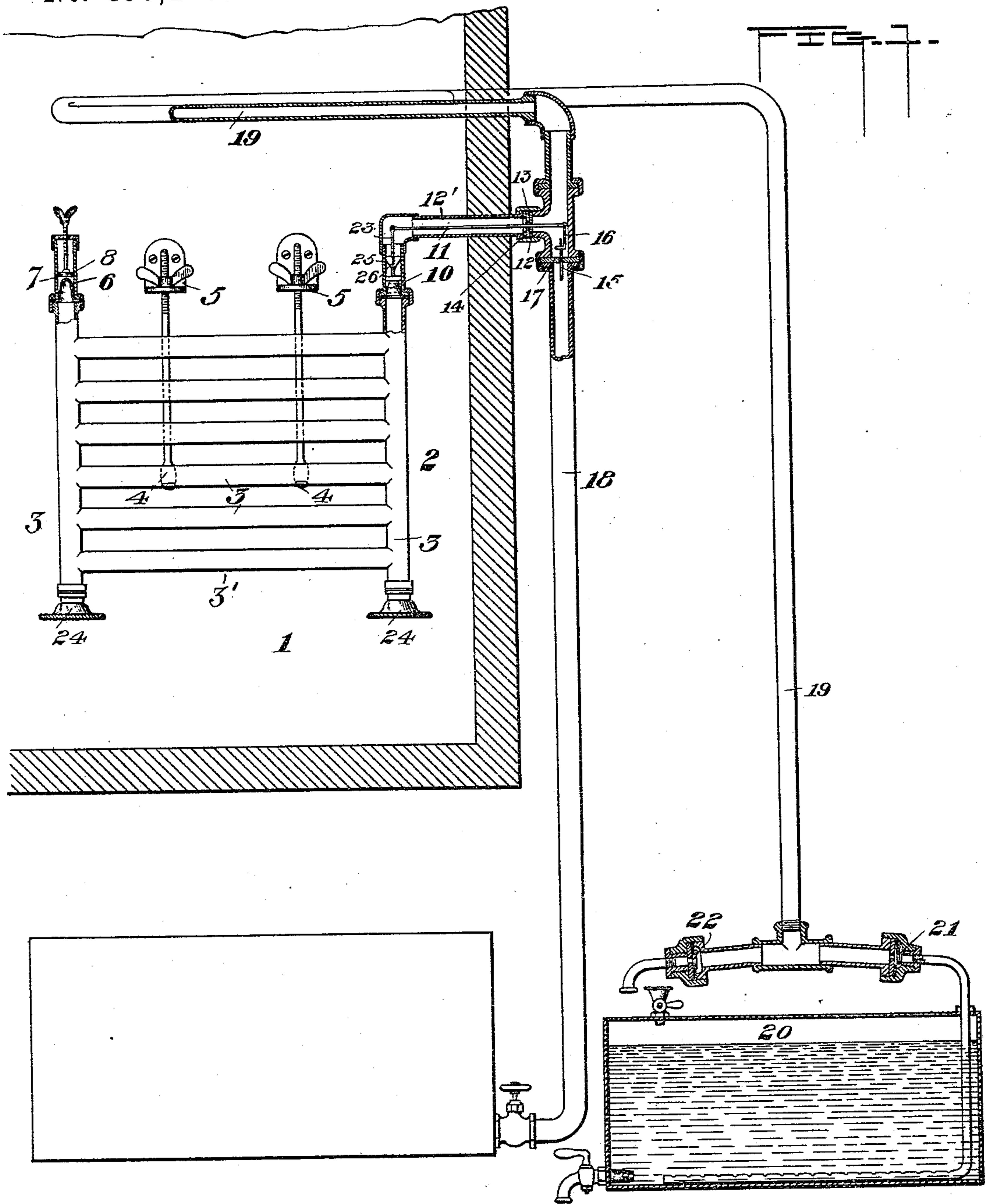
(No Model.)

2 Sheets—Sheet 1.

L. N. CHARLES.
AUTOMATICALLY GOVERNED VALVE.

No. 458,247.

Patented Aug. 25, 1891.



WITNESSES

L. A. Connor Jr.
Geo. F. Rozel

INVENTOR

L. N. Charles.

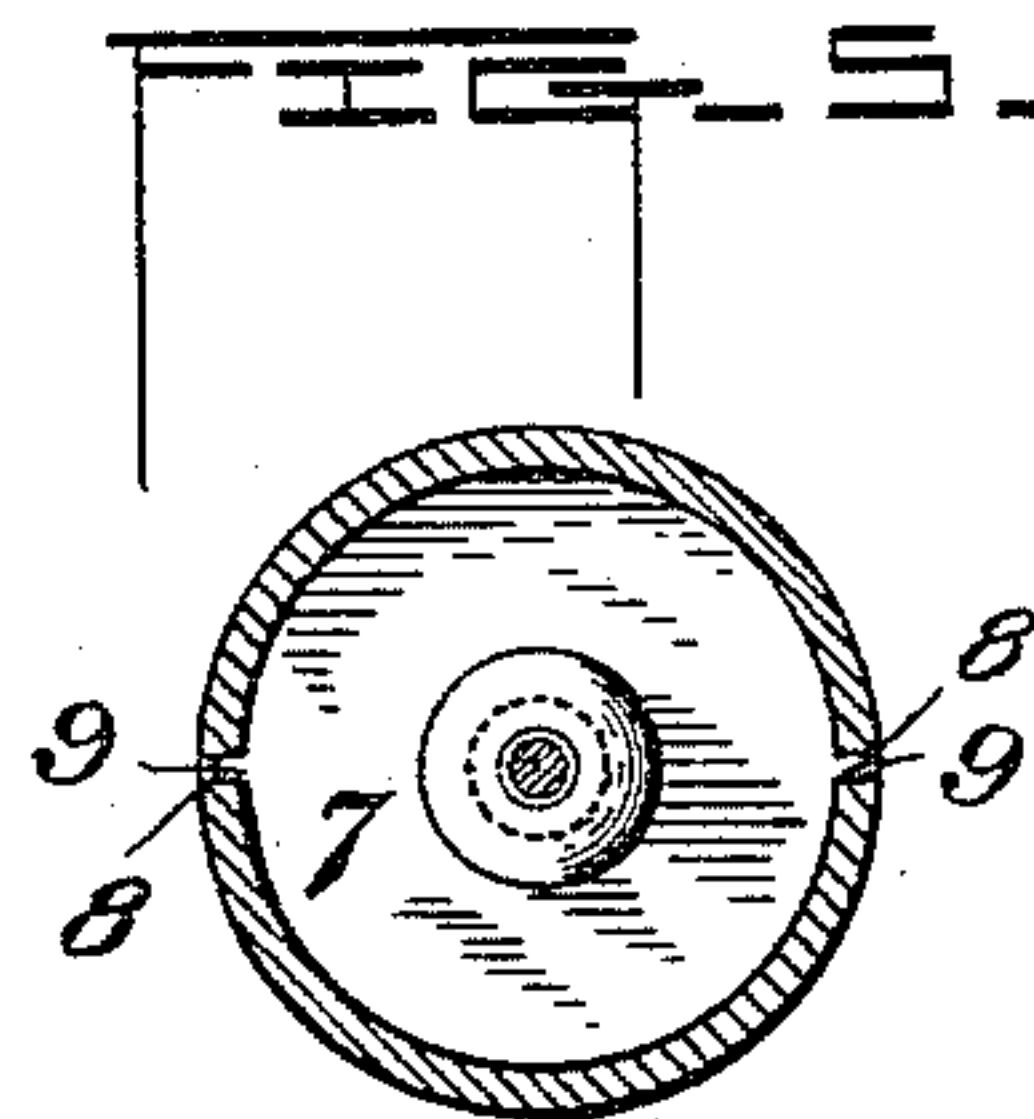
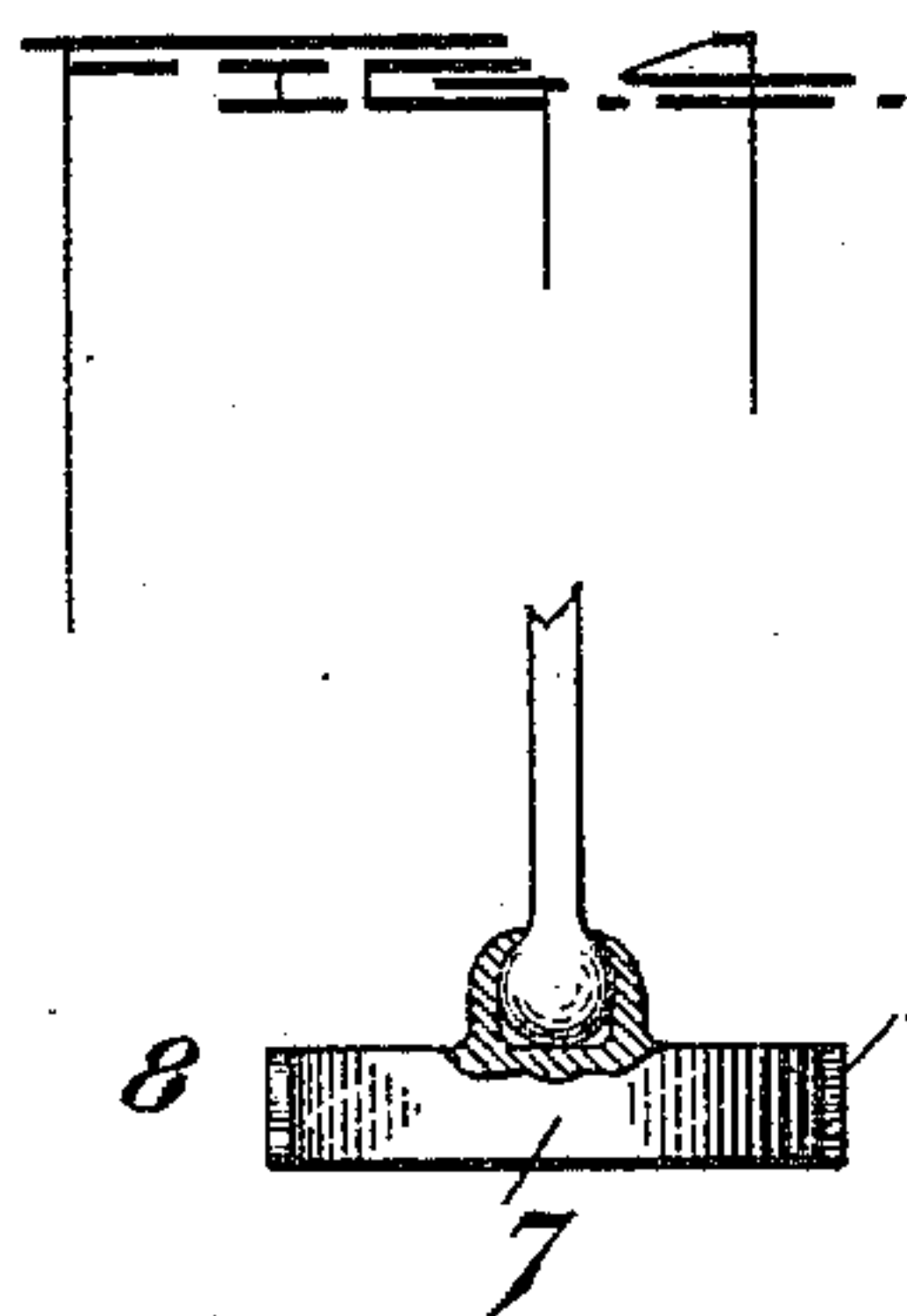
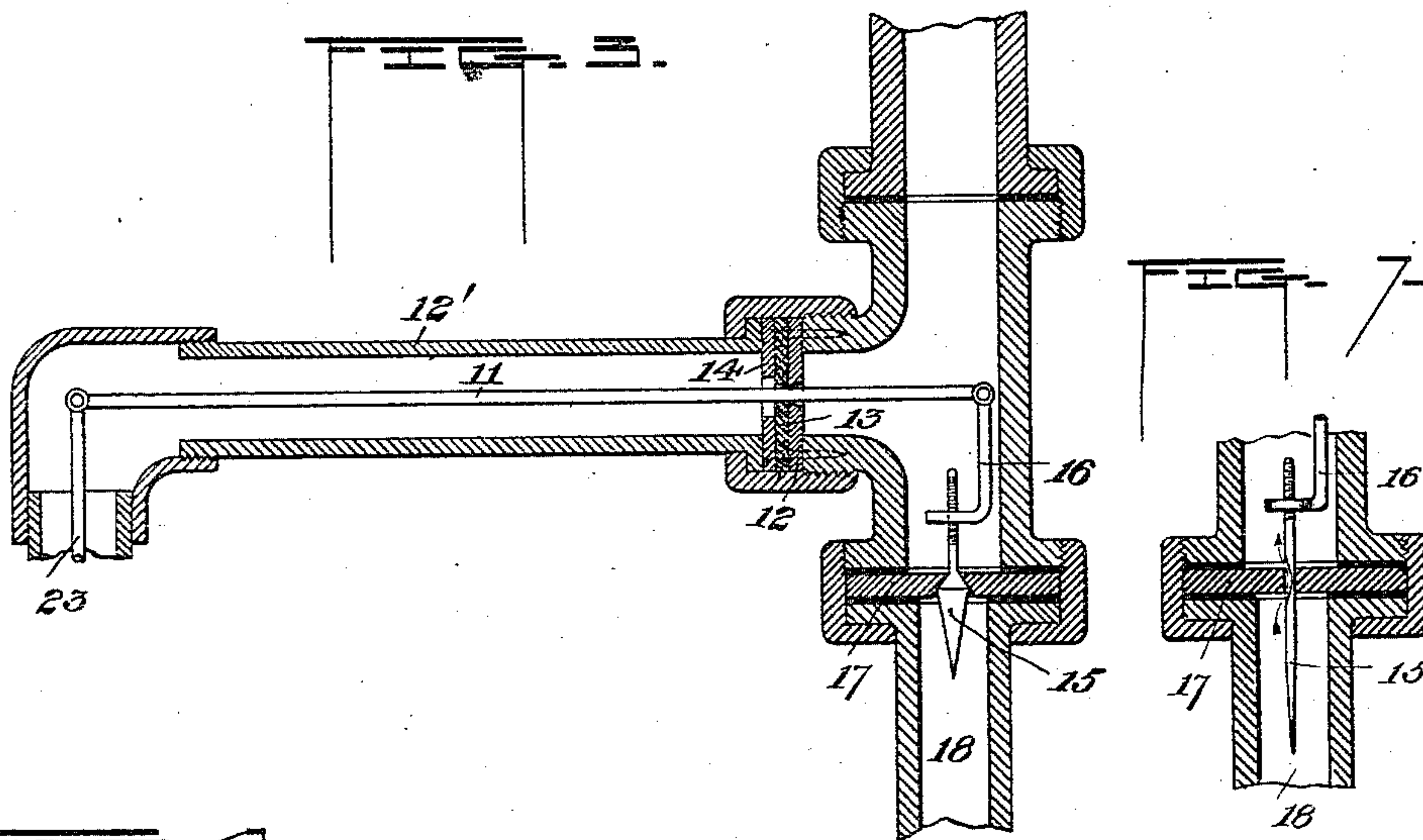
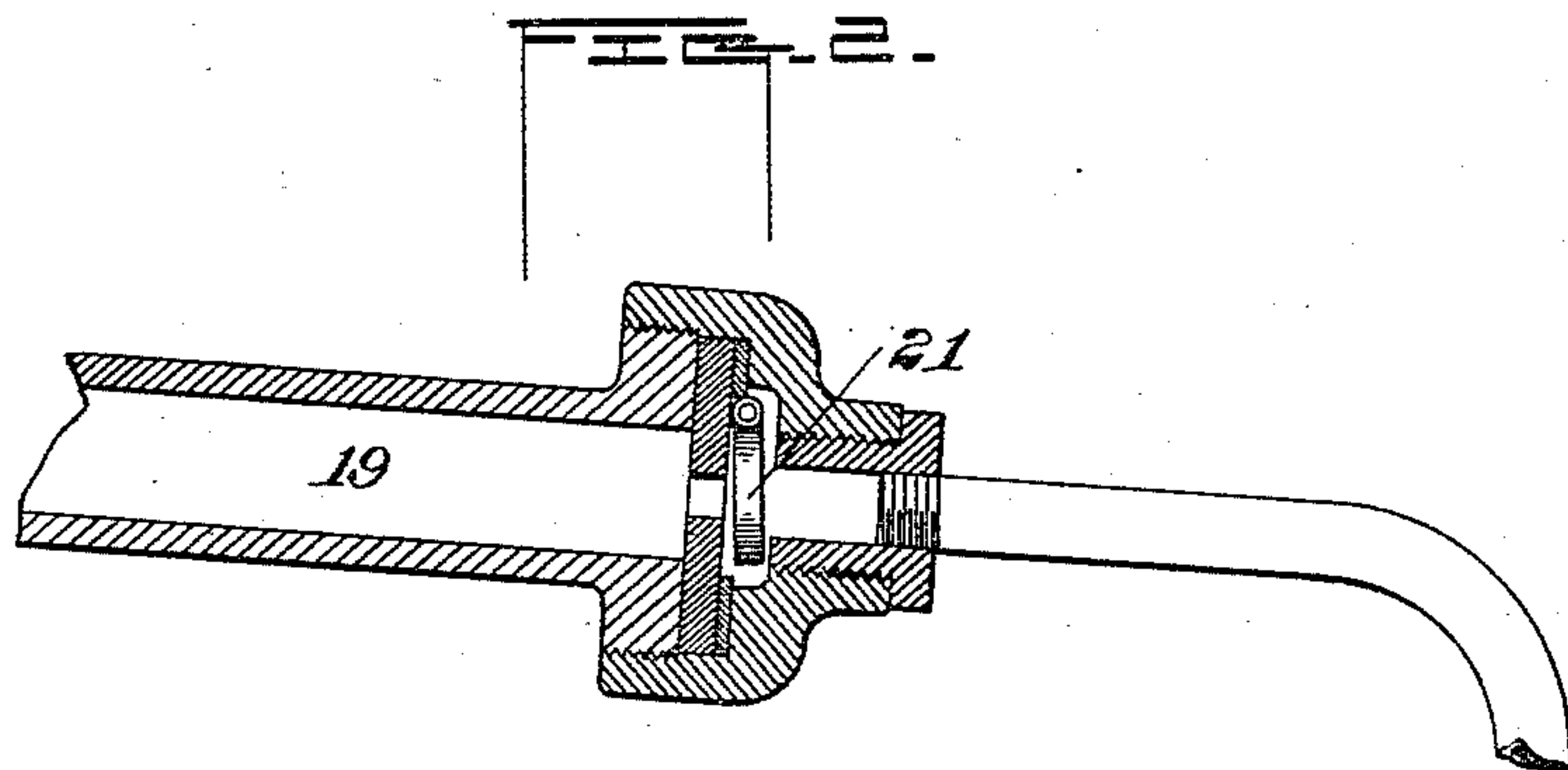
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2 Sheets—Sheet 2.

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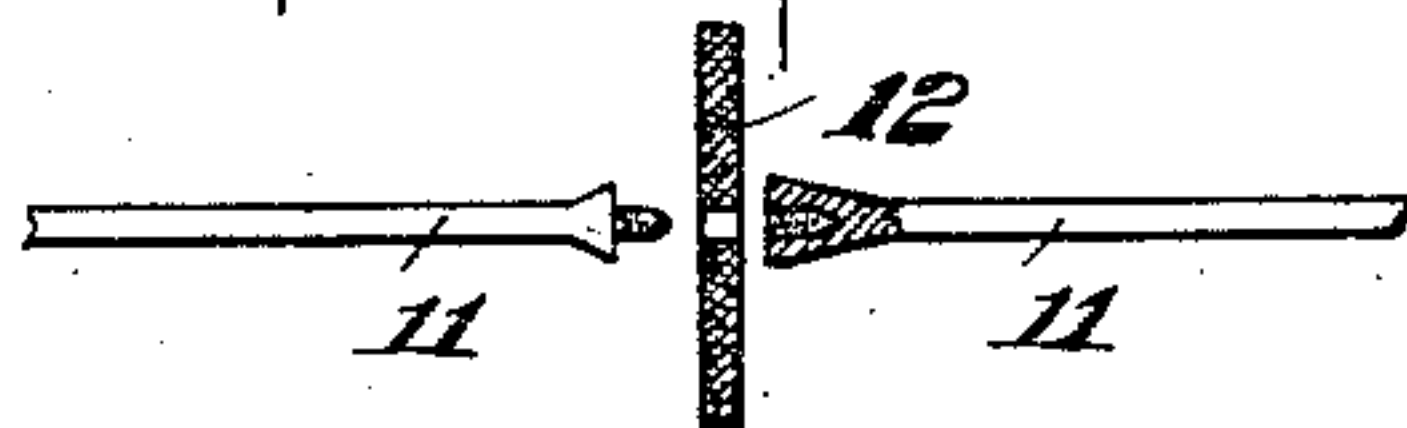


WITNESSES

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UNITED STATES PATENT OFFICE.

LEWIS N. CHARLES, OF WASHINGTON, DISTRICT OF COLUMBIA.

AUTOMATICALLY-GOVERNED VALVE.

SPECIFICATION forming part of Letters Patent No. 458,247, dated August 25, 1891.

Application filed May 26, 1890. Serial No. 353,255. (No model.)

To all whom it may concern:

Be it known that I, LEWIS N. CHARLES, a citizen of the United States, residing at Washington, in the District of Columbia, have invented certain new and useful Improvements in Automatically-Governed Valves; 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.

The object of the invention is to provide an efficient means for controlling the flow or escape of a fluid under pressure from one conduit or receptacle to another; and in an application of such device to a refrigerating apparatus wherein ammonia is employed; and it consists in the devices and combinations hereinafter described and pointed out.

In the drawings, Figure 1 is an elevation of the improvement applied to a refrigerator. Fig. 2 is a partial section of a pipe leading to a water-vessel, showing the valve therein. Fig. 3 is a similar view of pipes, valve, and valve-lever. Figs. 4 and 5 are details showing parts of an adjusting device for an alcohol-receptacle. Fig. 6 is a modified detail, and Fig. 7 is a modified form of valve.

Numeral 1 denotes a refrigerator of any desired pattern or size.

2 indicates a receptacle for a fluid, like alcohol, having a large coefficient of expansion and congealable only at very low temperature. It consists in the present instance of communicating pipes 3, connected by transverse pipes, substantially as shown, so that each pipe is thoroughly exposed to the surrounding atmosphere, and the several pipes brace and strengthen the receptacle and obviate its expansion by the pressure of the contained fluid. It is supported or suspended in any convenient manner, as by hooks 4, adjustably connected with screw-threaded brackets 5, secured to the interior of the refrigerator. The alcohol-receiver can be raised or lowered by means of thumb-nuts on the screw-threaded ends of the suspending-hooks which engage the brackets.

At some convenient point—as, for example, at the top of one of the upright members of the alcohol-receptacle—is arranged a flexible diaphragm 6, which may be conveniently secured in place by a pipe-coupling. Above

this diaphragm is arranged a piston or follower 7, having a sliding connection with the pipe, and whereby the diaphragm can be moved downward so as to lower the alcohol immediately below and correspondingly raise it in a similar member or pipe, shown in the present instance at the other side of the receiver. The follower has a ball-and-socket connection with a threaded stem that can be screwed up or down in a cap on the pipe to raise or lower the follower.

8 indicates guides on the follower, and 9, grooves in the pipe to receive them, whereby turning of the follower and distortion and rupture of the diaphragm are prevented.

At 10 is another flexible diaphragm secured in the pipe and arranged with reference to the valve-operating lever 11, the arrangement being such that the expansion of the alcohol will raise the diaphragm and the power-arm of the lever connected by a rod 23, having a hinge connection therewith. This lever has a fulcrum in the metal diaphragm 12.

A rubber disk is denoted by 13, and a metal washer or disk by 14, the rubber being held between the two metal disks, as shown, and the lever passed therethrough, all the connections of the rubber being gas-tight. The lever 11, located in a branch pipe 12' in the present instance, is connected to a valve 15 by an arm 16, hinged thereto and adjustably secured to the valve-stem. The expansion of alcohol in the receiver will operate the lever 11 and open the valve 15, which has a seat in a diaphragm 17, as shown. The valve is preferably made with a quick-opening bearing-surface and a needle-pointed extension directed toward the inlet for compressed fluid. Another convenient form is shown in Fig. 7.

18 is a pipe located outside of the refrigerator, by preference, which communicates with a reservoir of a fluid, such as ammonia, under pressure.

19 is an expansion-coil in the refrigerator communicating with the ammonia-pipe 18 by means of the valved passage in the diaphragm 17. The expansion-coil communicates freely with a water-reservoir 20, except as herein after explained.

It will be understood that valve 15 is opened and closed by the expansion and contraction of alcohol in the pipes 3, acting through the

medium of lever 11, and that said valve 15 will be opened when the temperature in the refrigerator, or about the alcohol-receiver, is such as to expand the alcohol therein sufficiently to raise the lever and depress the valve, and that the automatic opening or closing of the valve to correspond to any desired temperature can be regulated by the follower 7, the adjustable hooks 4, and the adjustable valve 15, one or more of these means of adjustment being used, as found desirable.

Refrigeration is caused by the expansion of the compressed ammonia within the expansion-coil, which expanded ammonia is subsequently absorbed by the water in the closed reservoir 20, with which the expansion-coil is normally in free communication.

21 indicates a check-valve located in the pipe or a branch thereof between the expansion-coil and the reservoir, having preferably a ground seat and arranged to hang or stand open under ordinary circumstances, as indicated. If, however, a vacuum more or less perfect is by any chance produced in the expansion-coil by absorption of ammonia after the supply of fresh ammonia has been arrested, this check-valve will be closed and prevent the inconvenient flow of water toward the coil. A valve 22 is arranged to hang or stand normally closed in a branch pipe communicating with the open air. Any tendency to a vacuum in the coil will open this valve and admit air. By these valves all danger either of the ascent of the water or of collapse of any part of the apparatus is avoided.

The devices just described are not claimed herein, but in an application filed August 1, 1891, and serially numbered 401,366.

It will be understood that the water-reservoir is provided with suitable means for supplying and removing water. The ammonia-pipe is provided with a cock, and the ammonia-receptacle with a suitable inlet for compressed ammonia. The alcohol-receiver is also made vapor-tight, and can be conveniently filled by removing the diaphragm above described and pouring alcohol into one of the tubes, air escaping from the other. If the lever 11 simply be pushed through a small puncture in the rubber diaphragm 13, it will be sufficiently tight to prevent the escape of ammonia on the low-pressure side of valve 15.

In Fig. 6 is indicated another method suitable for connecting a lever to a rubber diaphragm. According to this method two parts of the rod have screw-threaded ends adapted to be screwed together and compress the diaphragm between them, forming an absolutely tight connection.

The details of the construction can be varied by mechanical skill, provided substan-

tially the same means are employed to utilize like principles of operation.

Referring to diaphragm 13, it may be noted that it can be made of any suitable flexible material. If the material used is liable to be injuriously affected by the fluid employed, the conical opening for the passage of the lever having its apex toward diaphragm 13 protects it from contact therewith, so far as practicable, and this form of opening furnishes a suitable fulcrum for the lever 11.

It should be noted that the alcohol-reservoir may be conveniently filled by removing the screw-plugs or feet 24 and pouring into one of the pipes 3, air escaping at the other. Preferably a sliding connection is provided at 25 to permit the adjustment of the alcohol-receptacle without disturbing the pipe 12' or the lever 11, or the connected parts.

26 indicates a spider or guide of any suitable form for the connecting-rod 23.

It will be understood that it is not in all cases necessary to extend the lever 11 through the wall of a refrigerator, as pipe 18 (and 19 also) may be inclosed in the chamber or space to be refrigerated.

Having thus described my invention, what I desire to secure by Letters Patent is—

1. A receiver for containing an expansible fluid, consisting of end pipes connected by transversely-arranged communicating pipes, in combination with a distinct pipe or conduit, a valve in said pipe, and devices for transmitting motion from the fluid in the receiver to the valve in the pipe, substantially as set forth.

2. A receiver containing an expansible fluid and consisting of transversely-arranged pipes, one of the pipes being provided with a flexible diaphragm, a conduit for compressed fluid, a valve therein, a lever connecting the valve and diaphragm, and a second diaphragm and devices for adjusting it in its tube to move the contents of the receiver, substantially as set forth.

3. A receiver containing an expansible fluid, in combination with a conduit for a distinct fluid under pressure, a valve in said conduit, and a lever located in the conduit on the low-pressure side of the valve for transmitting the effect of expansion and contraction of the contents of the receiver to the valve, said lever passing through a closed flexible diaphragm in the side of the conduit, substantially as set forth.

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

LEWIS N. CHARLES.

Witnesses:

BENJ. R. CATLIN,
ARCH. M. CATLIN.