

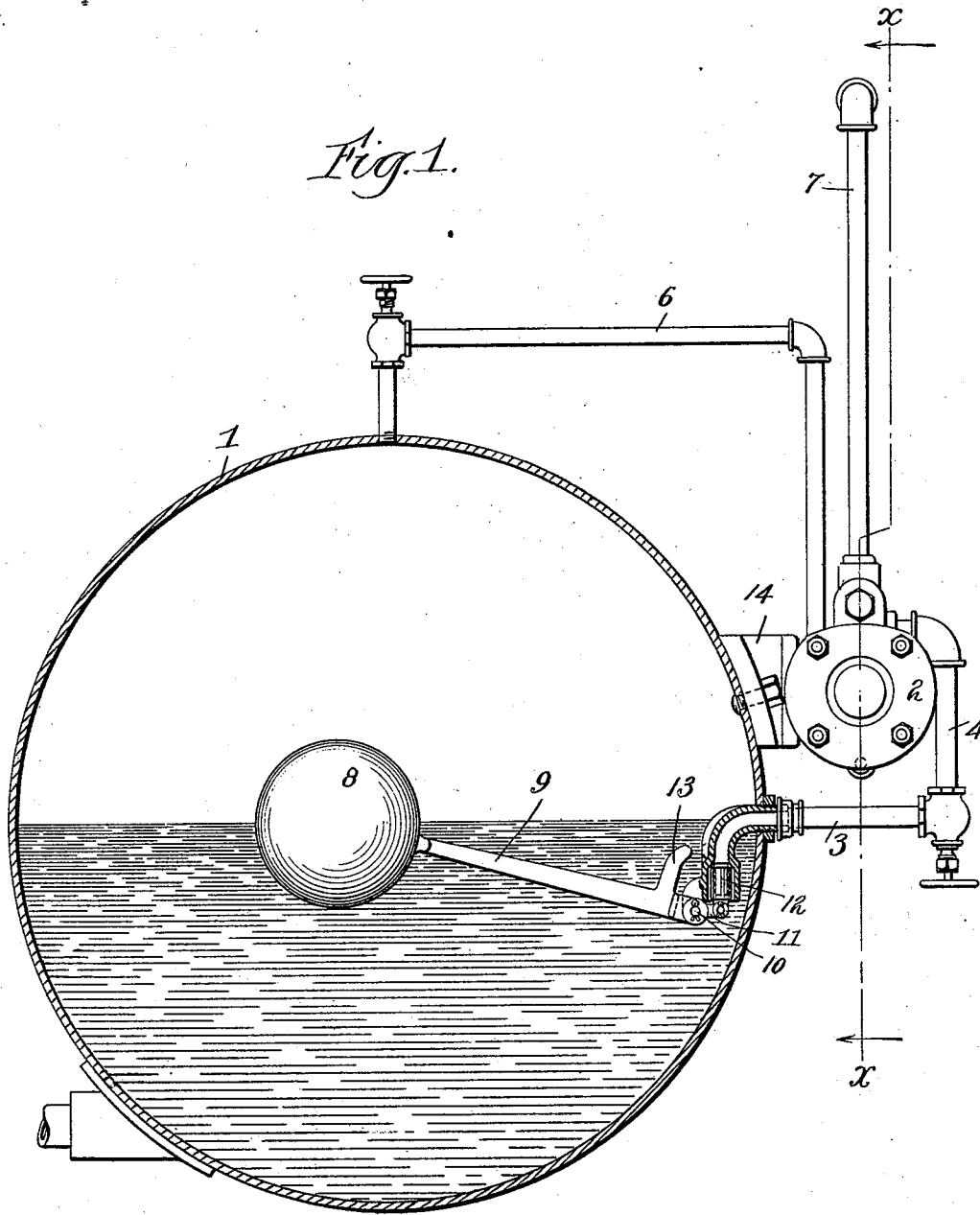
(No Model.)

2 Sheets—Sheet 1.

G. T. FRANCIS.
COMPRESSION TANK.

No. 527,678.

Patented Oct. 16, 1894.



Witnesses
Wm. F. Fleming
J. M. Rhein:

George T. Francis
Inventor
by Brown and Darby
Attys.

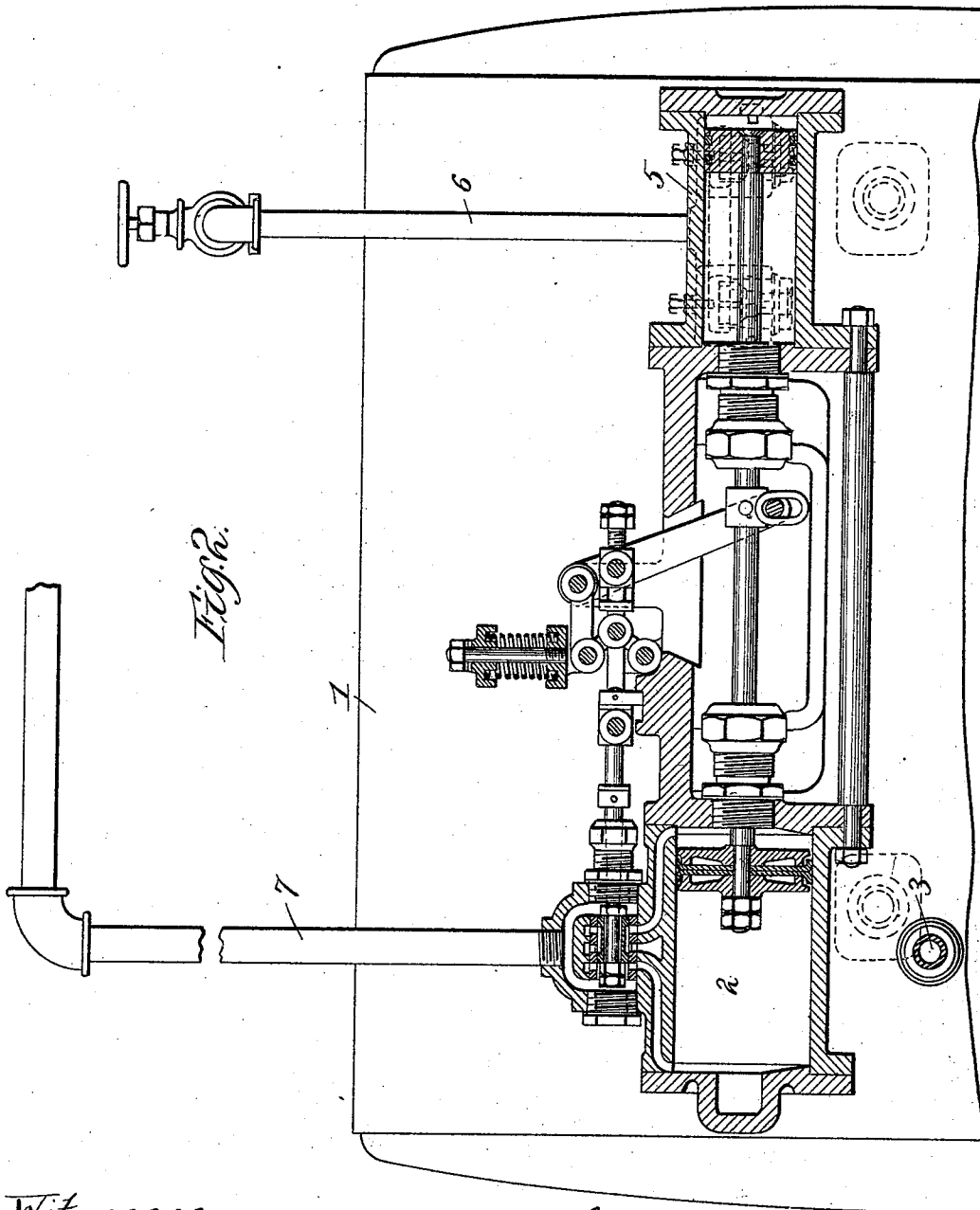
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2 Sheets—Sheet 2.

G. T. FRANCIS.
COMPRESSION TANK.

No. 527,678.

Patented Oct. 16, 1894.



Witnesses
Wm. F. Huming
Jas. M. Shum.

George T. Francis
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UNITED STATES PATENT OFFICE.

GEORGE T. FRANCIS, OF CHICAGO, ILLINOIS.

COMPRESSION-TANK.

SPECIFICATION forming part of Letters Patent No. 527,678, dated October 16, 1894.

Application filed April 19, 1894. Serial No. 508,134. (No model.)

To all whom it may concern:

Be it known that I, GEORGE T. FRANCIS, a citizen of the United States, residing at Chicago, in the county of Cook and State of Illinois, have invented a new and useful Improvement in Compression-Tanks, of which the following is a specification.

This invention relates to automatic means for regulating the supply of air to a compression tank.

The invention consists in the construction, combinations, arrangements and relative location of parts all as will be more fully hereinafter set forth, as shown in the accompanying drawings, and finally specifically pointed out in the appended claims.

Referring to the accompanying drawings forming a part hereof Figure 1, is a vertical transverse sectional view, parts being in elevation, of an apparatus embodying my invention. Fig. 2, is a longitudinal sectional view taken on the line *x, x*, Fig. 1, and looking in the direction of the arrows.

The same reference signs are used to designate the same parts wherever they occur.

The numeral 1, designates a compression tank adapted to receive the operating liquid of any suitable motor, and also a supply of air. A suitable motor 2, operated by liquid form said tank through pipe connections 3, and 4, serves to operate an air pump 5, by which air is supplied to compression tank 1, through air delivery pipe 6. The liquid after performing its work in the cylinder of motor 2, exhausts through pipe 7, which may lead to the tank from which tank 1, is supplied.

Pipe connection 3, for supplying liquid to motor 2, from the compression tank 1, is led into said tank and is provided with an enlarged mouth. A float 8, of suitable construction is placed inside of the tank and is adapted to float upon the surface of the liquid contained therein. Attached to float 8, is a suitable connection for operating a valve 12, arranged in the enlarged mouth of pipe connection 3. In the form shown this connection consists of a handle or lever 9, which may be pivoted as at 10, to a suitable support adjacent to said enlarged mouth. A short extension 11, of said arm or lever, projecting beyond its pivotal point or support is loosely

pivoted to plug valve 12. By this construction the mouth of said pipe connection is adapted to be opened or closed as the plug is withdrawn or inserted, the end of the plug being received and seated against the conical contraction of said pipe at the base of the enlargement therein, as clearly shown in Fig. 1. A finger or projection 13, is provided to prevent the arm 9, from being tilted vertically too far. This projection also prevents the plug valve from being entirely withdrawn from the mouth of connection 3. The motor 2, and air pump 5, may be located at any desirable point, that shown being a convenient one, where they are supported by a bracket 14, bolted to the side of the compression tank. The pump, motor, and motor valve operating mechanism may be of any desirable and suitable construction and as the specific construction thereof forms no part of my present invention I have not deemed it necessary to describe the same specifically, as many different forms of mechanism may be employed in carrying out the principles of my invention.

The main motor operating liquid is stored in compression tank 1, and said tank is also supplied with air which is compressed in the tank by the liquid forced therein by the usual force pump. Through the expansive force of this compressed air the liquid contained in said tank is forced into the main motor for operating the same. In order to secure uniformity of action of the main motor it is exceedingly important that the supply of liquid as well as the supply of air, and hence the amount of compression imparted to the air, should remain as nearly uniform in the compression tank as possible, so that when the liquid is drawn off from, or is supplied to the tank there will be no decrease or increase of the air pressure, and hence no variation in the action of the motor. In order to secure this uniformity of compression in the compression tank I make use of the fact that the liquid level should be maintained at a uniform height. There is a certain point or height to which the liquid may be brought where the best results may be secured, and if the level of the liquid falls below that level or rises above it, the efficiency of the motor

decreases by reason of the undue expansion of the air in the compression tank, in the one case, or by reason of the fact that the air occupies a smaller space and when the liquid is drawn off for use it expands too rapidly in the other case. This point at which it is desirable to maintain the level of the liquid in order to secure the best results may be easily determined by experiment, and the float may be so pivoted as to retain the liquid at that level.

It has been the usual practice to supply the liquid to the tank by one pump, and the air by another pump, operated by independent means. It is obvious that in the use of such apparatus the liquid level cannot be kept at a uniform level, nor can the air pressure be maintained uniformly, without the greatest care and attention. When both pumps are in operation at the same time the greatest care must be exercised in order to prevent an over supply of air or of liquid, and when the liquid is constantly being withdrawn to operate the motor, there is a tendency toward an undue expansion of the air, and if the air pump is started up there is danger through the carelessness or negligence of the engineer of forgetting it and hence the tank is supplied with air far beyond its point of efficiency, as well as far beyond the point of safety of the tank in case the ordinary air pump is not supplied with an automatic governor, or should the ordinary safety valve commonly used in devices of this kind, fail to operate properly, thus endangering the entire plant as well as causing irregular action of the main motor. By providing an auxiliary motor for operating the air pump, which auxiliary motor is operated by the liquid contained in the compression tank, and automatic means for cutting off the supply of liquid to said motor when a certain level of the liquid has been reached in the tank, operated by the amount of liquid contained in the tank the amount of air under compression can be readily, easily, efficiently and automatically maintained at a uniform point.

It will be seen in the operation of my invention that when the liquid level rises above the given point which has been determined as the point of maximum efficiency, the float is elevated and consequently the plug valve 12, is withdrawn thus permitting the liquid to escape through the connections 3, 4, into the motor cylinder 2, where said auxiliary motor is operated, thus effecting a delivery of air to the tank through pump 5, and delivery pipe 6, until the exhaustion of the liquid from the tank and the increased supply of air thereto bring the level of the liquid to the required point, when the further supply of liquid to motor, 2, and hence the action of the pump is automatically arrested, thus avoiding the danger of unduly increasing the air pressure in the compression tank, and requiring no further care or attention than

to keep the parts of the pump and motor properly lubricated. It will also be observed that any loss of air through leakage is thus automatically supplied.

It will be seen that many forms of apparatus may be employed in carrying out the principles of my invention and therefore I desire it to be distinctly understood that I do not confine myself to the exact details shown and described; but,

Having now fully described the principles of my invention and its mode of operation, what I claim as new, and desire to secure by Letters Patent of the United States, is—

1. The combination of a compression tank adapted to receive air and a liquid, a pump for supplying air to said tank, and means for operating said pump controlled by the amount of liquid contained in said tank, as and for the purpose set forth.

2. The combination of a tank adapted to receive air and a liquid, a pump for supplying air to said tank, a motor for operating said pump, and automatic means for controlling the action of said motor operated by the amount of liquid contained in said tank, as and for the purpose set forth.

3. In an apparatus of the class described a compression tank, an air pump, a motor for operating the same, connections between said tank and motor for supplying liquid thereto for operating the same, and a valve, operated by the amount of liquid contained in said tank for controlling the admission of liquid to said motor, as and for the purpose set forth.

4. In an apparatus of the class described, a tank, an air pump, connections between said pump and tank, a liquid motor for operating said pump, connections between said tank and motor for supplying liquid to the latter, a valve arranged in said connections, a float carried on the surface of the liquid contained in said tank, and connections between said float and valve whereby the latter is automatically operated by the amount of liquid contained in said tank, as and for the purpose specified.

5. In an apparatus of the class described a tank, adapted to contain air and a liquid, a pump for delivering air to said tank, a motor, operated by liquid from said tank for operating said pump, a float adapted to be carried on the surface of the liquid contained in said tank and having an arm pivoted intermediate its ends, and pivotally connected at the end opposite the end carrying the float to a valve for controlling the admission of liquid to said motor, as and for the purpose set forth.

6. In an apparatus of the class described, a tank, adapted to contain air and a liquid, a pump for delivering air to said tank, a motor operated by liquid from said tank for operating said pump, a float adapted to be carried on the surface of the liquid contained in said tank and having an arm pivoted intermediate its ends, and pivotally connected at one end

to a valve for controlling the admission of liquid to said motor, and a projection for preventing said arm from being tilted too far and for preventing said valve from being withdrawn from its chamber, as and for the purpose set forth.

In testimony whereof I have hereunto set

my hand, this the 14th day of April, 1894, in the presence of two subscribing witnesses.

GEORGE T. FRANCIS.

Witnesses:

JOHN R. DORMAN,
HUGO W. FORSLUND.