(No Model.)

F. B. PERKINS.
ELECTRIC ELEVATOR.

No. 509,821. Patented Nov. 28, 1893.

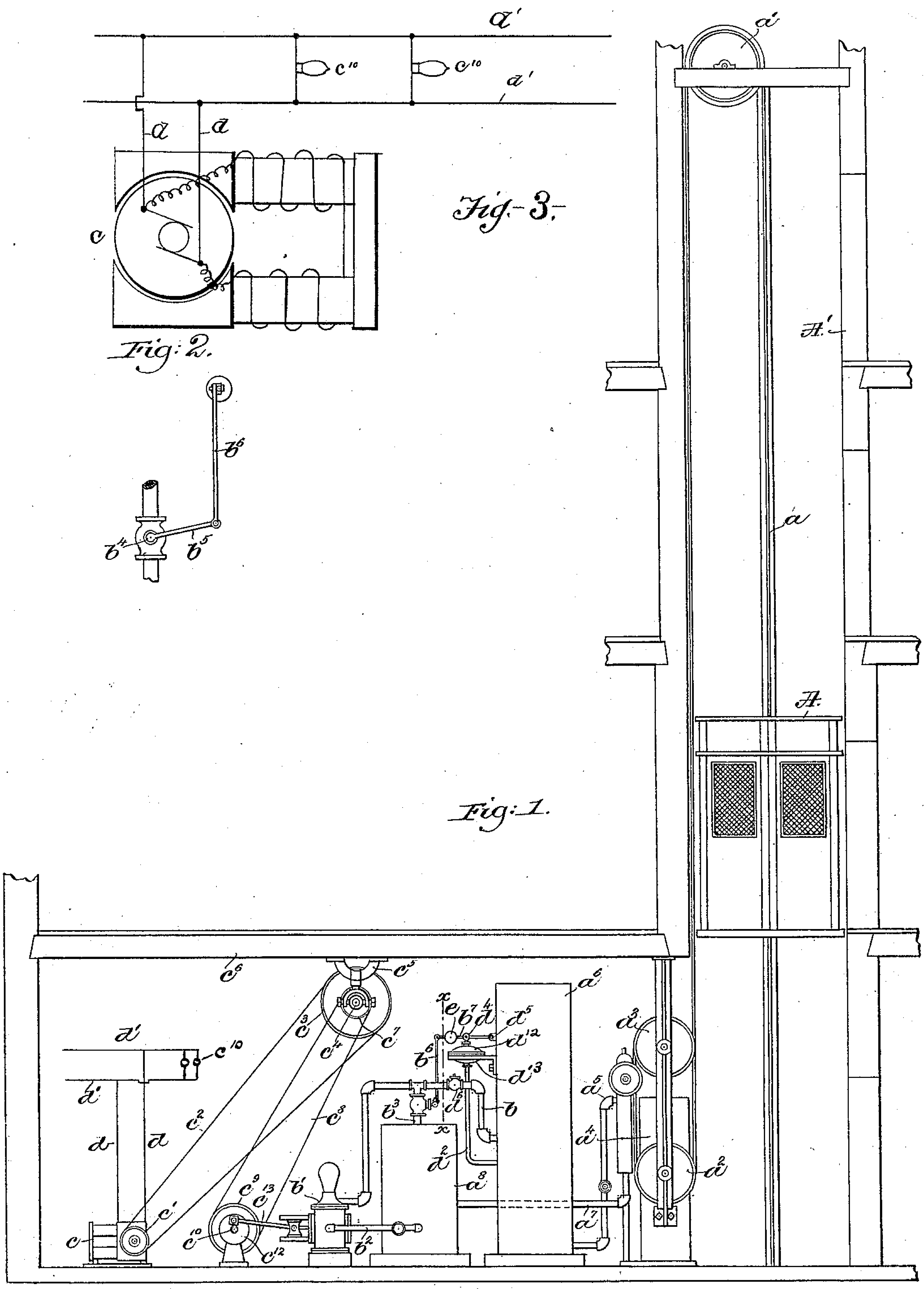

Fig: 3.

Fig: 2.

Fig: 1.

Witnesses.
Fred S. Greenleaf
Frederick L. Emery

Inventor.
Francis B. Perkins,
by Crosby & Gregory
Attys

THE NATIONAL LITHOGRAPHING COMPANY,
WASHINGTON, D. C.

UNITED STATES PATENT OFFICE.

FRANCIS B. PERKINS, OF BOSTON, MASSACHUSETTS.

ELECTRIC ELEVATOR.

SPECIFICATION forming part of Letters Patent No. 509,821, dated November 28, 1893.

Application filed March 16, 1889. Serial No. 303,565. (No model.)

To all whom it may concern:

Be it known that I, FRANCIS B. PERKINS, of Boston, county of Suffolk, State of Massachusetts, have invented an Improvement in Elevators, of which the following description, in connection with the accompanying drawings, is a specification, like letters on the drawings representing like parts.

This invention relates to hydraulic elevator systems wherein the fluid to actuate the elevator is stored in a tank, under pressure, by means of a pump operated by an electric motor.

Prior to this invention, it has been customary to stop the motor and pump, whenever the pressure in the pressure tank has reached a certain predetermined point, the motor and the pump being started when the pressure has been reduced by operation of the elevator, to restore the pressure to the required point.

In United States Patent, No. 399,716, dated March 19, 1891, a device is represented, for automatically starting and stopping the motor and pump as required; to maintain the proper pressure in the pressure tank; but it has been found in practice, has an injurious effect upon the line or circuit in which the motor is placed, and which usually contains one or more electric lights or other translating devices, the effect upon the line or circuit being particularly noticeable when incandescent lamps are included in the circuit.

This invention has for its object to provide an apparatus which shall overcome the objections referred to, and which may be employed or operated in connection with any circuit, containing any number of translating devices, without danger of injuring the effect of the latter.

In this invention, the motor which is a self-regulating one and pump are not stopped whenever the pressure in the pressure tank shall have reached the predetermined point; but are permitted to run continuously, thereby obviating the injurious effect caused by starting and stopping the motor at frequent intervals.

In accordance with this invention, suitable means are provided, controlled by the pressure in the pressure tank, whereby the delivery of the pump, to the pressure tank, may be controlled in such a manner as to maintain the pressure at the required point without stopping the pump.

One part of this invention in hydraulic elevator systems, therefore, consists in the combination of the following instrumentalities, viz:—an electric circuit containing translating devices, a continuously running self-regulating motor, placed in circuit therewith, a pressure tank to contain fluid to actuate the elevator; a pump operated by said continuously running motor, and delivering into said pressure tank, and a valve actuated by pressure in the pressure tank to regulate the amount of delivery from the pump to the pressure tank, substantially as will be described.

Other features of this invention will be hereinafter described and pointed out in the claims at the end of this specification.

Figure 1 in elevation represents a sufficient portion of a building provided with a hydraulic elevator operated in accordance with my invention, to enable the latter to be understood, and Fig. 2 a detail to be referred to, it being a section on the line x—x Fig. 1 looking toward the left, and Fig. 3, a diagram showing the motor included in the circuit containing translating devices.

The elevator car A suspended in the elevator well or shaft A′ by the rope a passed about the sheave a', and having its other end passed about a fixed sheave a^2 and connected to a movable sheave a^3, may be such as now commonly used on hydraulic elevators, especially of that class known as the "Hinckle" system. The movable sheave a^3 is moved away from the fixed sheave a^2 by an engine a^4, having its inlet pipe a^5 connected to the bottom of a tank a^6 and having its outlet pipe a^7 connected to a second tank a^8. The tank a^6 will preferably be a closed tank having its inlet pipe b connected to a pump b', and forming the outlet pipe for the same, the inlet pipe b^2 for the said pump being connected to the tank a^8 near its bottom.

The pump b' is driven, in accordance with my invention, by an electric motor c, which may be of any usual or well known self regulating type, having mounted upon its armature shaft the pulley c', connected by a belt c^2 to a preferably larger pulley c^3 on a shaft

c^4 having bearings, as herein shown, in hangers c^5 suspended from the ceiling c^6. The shaft c^4 is provided with a second smaller pulley c^7 which is connected by a belt c^8 to a pulley c^9 on a shaft c^{10}, having mounted upon it a crank disk c^{12} to which the connecting rod c^{13} of the pump is joined.

The electric motor c, herein represented as a shunt wound motor, see Fig. 3, derives its current of electricity by means of wires d, from the main line or circuit d', the latter containing, as represented in the drawings, one or more translating devices herein represented as incandescent electric lamps c^{10}.

While I prefer to employ a shunt wound motor, as shown, for the reason that such a motor presents the simplest form of self regulating motor, that is, a motor which will maintain a substantially constant speed irrespective of the load thrown upon it, still I desire it to be understood, that any other self regulating motor may be employed, or any other self regulating device applied to a motor whereby the latter is caused to maintain a constant speed irrespective of the load.

The rotation of the armature shaft of the electric motor through the system of belts referred to, drives the pump and forces the water through the inlet pipe b into the tank a^6, where it is stored under pressure to be used for raising the elevator.

In practice it is desired that the pressure in the tank a^6 should not exceed a predetermined or desired amount, as for instance, seventy pounds, and in order that the pressure may not exceed the desired amount, I have provided a regulator herein shown as the well known "Clark" diaphragm regulator by which the supply of water to the tank a^6 is automatically cut off when the pressure has reached the desired amount. The regulator consists of a diaphragm located between an upper chamber d and a lower chamber d', the lower chamber being connected by a pipe d^2 with the tank a^6. The upper chamber d is provided with an opening through which is extended a pin or stem d^4 on a lever b^7 pivoted, as herein shown at d^5 to the pressure tank, and having its other end connected by link b^6, see Fig. 2, to a rod b^5 fastened to the valve stem b^4 of a valve located in a pipe b^3 connected to the inlet pipe b. The inlet pipe b between the branch pipe b^3 and the pressure tank is provided, as herein shown, preferably with a check valve d^6 of any usual or well known construction.

In operation the electric motor is run continuously by a current fed from the main wires, and continuously drives the pump b', thus forcing water into the tank a^6 until the desired pressure has been attained in the said tank. When the pressure in the tank has reached a predetermined amount, the diaphragm of the regulator is raised by the said pressure and the lever b^7 lifted, thus turning the valve stem b^4 through the link b^6 and rod b^5 and opening the valve in the branch pipe b^3, permitting the water forced by the pump to flow through the said branch pipe. As the valve in the branch pipe is opened the pressure upon the front side of the check valve d^6 is reduced and the said check valve is closed by the back pressure from the tank a^6. As herein shown, the branch pipe b^3 discharges into the waste-water tank a^8, from which it is again drawn by the pump b'. It will thus be seen that a continuous circulation of water through the pump and waste tank a^8 is maintained, when the pressure in the pressure tank a^6 has reached a normal or desired amount.

The amount of pressure in the tank a^6 may be varied, as shown, by a weight or ball e adjustable on the lever b^7. As soon as the pressure in the tank a^6 has been reduced, as by the starting of the elevator, the pressure upon the diaphragm of the regulator is reduced in the same proportion, and the valve in the branch pipe b^3 is closed, so that the water withdrawn from the waste tank a^8 is again pumped into the pressure tank a^6 to once more restore the pressure therein to the normal or desired amount.

I prefer to employ the check valve, but the same might be dispensed with and the valve in the branch pipe be so constructed, as for instance it might be made smaller, so that when opened by the regulator, a sufficient amount of water will be discharged through the said valve to keep the pressure in the tank a^6 substantially constant, after the pressure in the said tank has reached a predetermined or certain point.

I claim—

1. In a hydraulic elevator system, the combination of the following instrumentalities, viz:—an electric circuit containing translating devices; a continuously running self-regulating motor placed in circuit therewith; a pressure tank to contain fluid to actuate the elevator; a pump operated by said continuously running motor and delivering into said pressure tank; and a valve actuated by pressure in the pressure tank to regulate the amount of delivery from the pump to the pressure tank, substantially as described.

2. In a hydraulic elevator system, the combination of the following instrumentalities, viz:—an elevator mechanism; a pressure tank to contain fluid to actuate the same; a discharge tank to receive the discharge from said elevator mechanism; an electric circuit containing translating devices; a continuously running self-regulating motor placed in circuit therewith; a pump operated by said continuously running motor and taking its supply from said discharge tank and delivering into said pressure tank, and a valve actuated by pressure in the pressure tank to regulate the amount of the delivery from the pump to the pressure tank, substantially as described.

3. In a hydraulic elevator system, the combination of the following instrumentalities,

viz:—an elevator mechanism; a pressure tank to contain fluid under pressure to actuate the same; a discharge tank to receive the discharge from the said elevator mechanism; an electric circuit containing translating devices; a continuously running self-regulating motor placed in circuit therewith; a pump operated by said continuously running motor, and taking its supply from said discharge tank; a connection between said pump and pressure tank; a branch leading therefrom to said discharge tank, and a valve actuated by the pressure in the pressure tank to open said branch to divert the delivery of the pump from the pressure tank into the discharge tank, substantially as described.

4. In a hydraulic elevator system, the combination of the following instrumentalities, viz:—an electric circuit, a continuously running motor placed therein, a tank to contain fluid to actuate the elevator, a pump operated by said continuously running motor, and having its delivery pipe connected with said tank, a valve actuated by pressure in the said tank to regulate the amount of delivery from the pump to the pressure tank, and a check valve in said delivery pipe between said valve and tank, to operate, substantially as described.

5. In a hydraulic elevator system, a tank to contain fluid to actuate the elevator, a continuously operated pump delivering into said tank, an electric motor to operate said pump, and a valve actuated by the pressure of the fluid used to actuate the elevator, to control the amount of delivery from the pump to the said tank, substantially as described.

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

FRANCIS B. PERKINS.

Witnesses:

JAS. H. CHURCHILL,

B. DEWAR.