(No Model.) 3 Sheets—Sheet 1.

# J. P. BARRETT.

## ELECTRICALLY OPERATED WATER SUPPLY SYSTEM.

No. 571,328. Patented Nov. 17, 1896.

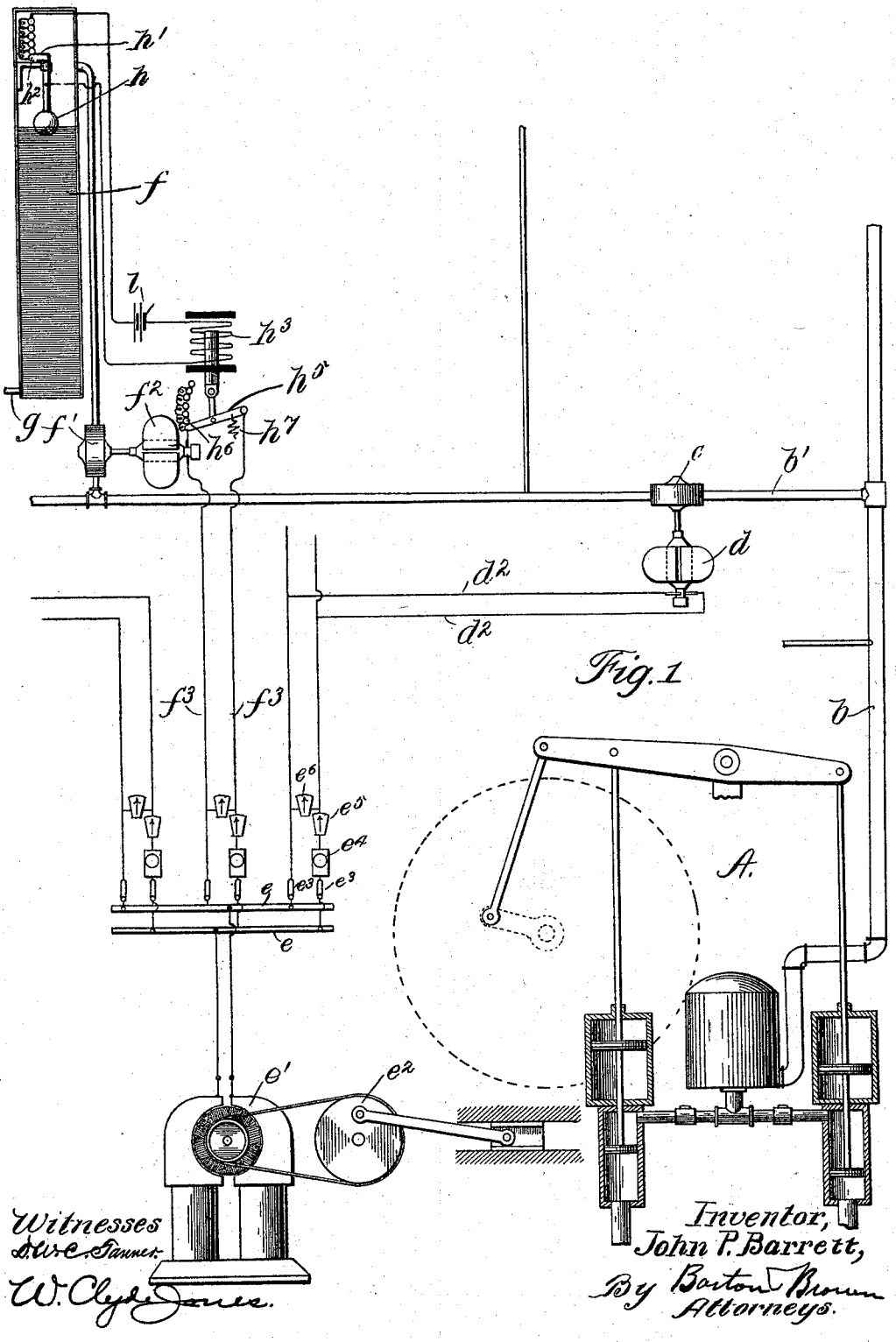


Fig. 1

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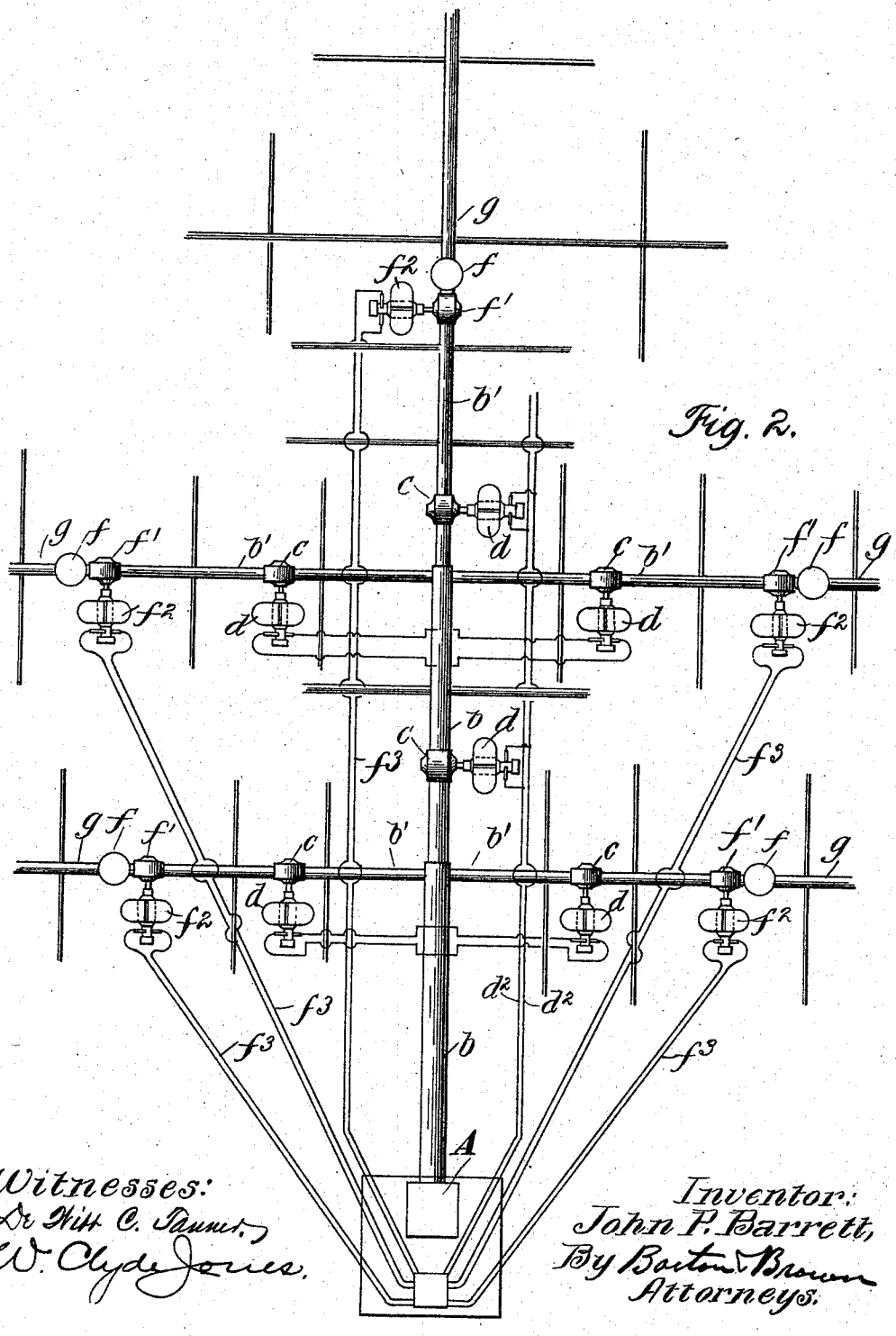


Fig. 2.

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(No Model.) 3 Sheets—Sheet 3.

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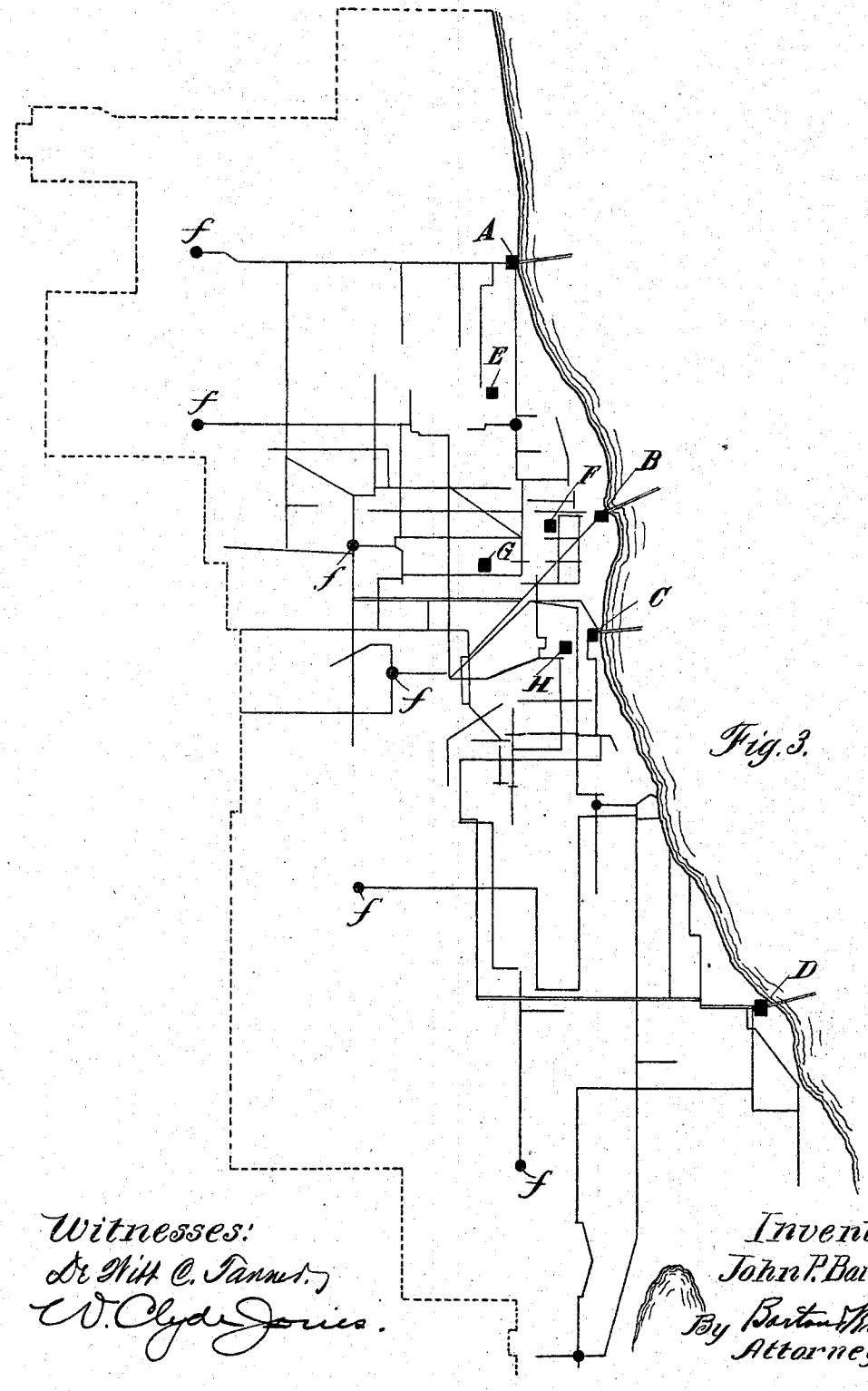


Fig. 3.

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# UNITED STATES PATENT OFFICE.

JOHN P. BARRETT, OF CHICAGO, ILLINOIS.

## ELECTRICALLY-OPERATED WATER-SUPPLY SYSTEM.

SPECIFICATION forming part of Letters Patent No. 571,328, dated November 17, 1896.

Application filed August 31, 1895. Serial No. 561,089. (No model.)

*To all whom it may concern:*

Be it known that I, JOHN P. BARRETT, a citizen of the United States, residing at Chicago, in the county of Cook and State of Illinois, have invented a certain new and useful Improvement in Electrically-Operated Water-Supply Systems, (Case No. 2,) of which the following is a full, clear, concise, and exact description, reference being had to the accompanying drawings, forming a part of this specification.

My invention relates to an electrically-operated water-supply system, the object being to relieve the central pumping-station, whereby the pressure required at the central pumping-station may be reduced, and, furthermore, to produce a more uniform pressure throughout the supplied districts.

In water-supply systems as in general use a central pumping-station is provided which forces the water through the mains to the districts to be supplied. As considerable resistance is met by the passage of the water through the mains and pipes the pressure decreases as the distance from the central pumping-station increases, so that in outlying districts and at points remote from the central pumping-station it often happens that the pressure is hardly sufficient to raise the water to the upper stories of the buildings, and the water-supply system becomes unavailable for high-pressure fire-service.

It is the object of the present invention to relieve the central pumping-station by providing at points along the mains auxiliary pumps, the pumps being connected with electric motors supplied by current from a central power-station. The electrically-operated pumps thus employed assist the pumping apparatus at the central station in overcoming the resistance made by the water in flowing through the mains and serve to maintain a uniform pressure along the mains. By the employment of auxiliary pumps the pressure at points remote from the central pumping-station may be maintained as high as the pressure at points near the pumping-station.

At centers of distribution in the outlying districts tanks or stand-pipes are provided, an electrically-operated lifting-pump being provided in connection with each stand-pipe adapted to force the water from the mains into the tank. The water for supplying the district is drawn from the tank, and the pressure is secured by the head of water in the tank, the electrically-operated pump serving to force the water into the tank and not to maintain the pressure throughout the district by direct action. The electrically-operated pump belonging to each tank or stand-pipe is preferably automatically controlled by means of a float within the tank, which serves to increase or decrease the speed of the motor, according as the water-level falls or rises, the controller being constructed so that the motor may be thrown out of circuit when the level of the water reaches the predetermined maximum level. During the day the motor will be run at varying speeds, in accordance with the rate of withdrawal of the water from the tank, while at night, when little or no water is being used, the motor may be brought to rest. Should a fire occur in the district, the electrically-operated pump will be run at an increased speed to supply the increased amount of water demanded by the fire-service.

By thus providing electrically-operated pumps for assisting the pump at the central pumping-station and for lifting the water into the tanks at the outlying districts the water and lighting departments of the municipality may be run with a considerable saving in power, since the greatest demand is made upon the water-supply system during the day, at which time the electrical apparatus of the lighting-station is available, while at night, when the demand upon the water-supply system is small, the electrical apparatus of the lighting-plant may be employed for its usual purpose of supplying current for lighting purposes.

I will describe my invention in connection with the accompanying drawings, in which—

Figure 1 is a view illustrating an electrically-controlled water-supply system equipped after the manner of my invention. Fig. 2 is a diagrammatic view illustrating the manner in which a central pumping-station and a central electrical power-station may be employed for securing uniformity of water-supply. Fig. 3 is a diagram illustrating the water-supply system of a municipality, in which several central pumping-stations are provided, and, further, illustrating the manner in which the power for running the elec-

trically-operated pumps may be derived from the electric-lighting stations of the municipality.

Like letters refer to like parts in the several figures.

A pump is provided at the central pumping-station A for forcing the water through the main *b*. At various points along the mains are provided auxiliary pumps, one of said pumps *c* being illustrated as interposed in the main *b'*. The pump may be of any of the usual forms, reciprocating, rotary, or of the screw type, as may be found desirable. In the drawings the pump *c* is illustrated as of the rotary type, the rotating element being mounted upon the armature-shaft of the motor *d*. The electric motor is connected by feeding-mains $d^2$ $d^2$ with the bus-bars *e e* at the central power-station and supplied with current from a dynamo or generator *e'*, operated by a steam-engine $e^2$. Upon the switchboard at the central station are provided the usual switches $e^3$ $e^3$, rheostat $e^4$, and meters $e^5$ $e^6$, whereby the motor *d* may be controlled by the attendant at the central station. A number of motors for operating the pumps may be connected with a single pair of mains, or the motors may be individually connected with the central station. At the centers of distribution of outlying districts are provided tanks or stand-pipes *f*, a pump *f'* being provided in connection with each stand-pipe for forcing the water from the main into the stand-pipe. The pump is illustrated as a rotary pump, the rotating element of which is mounted upon the armature-shaft of the motor $f^2$, the motor being supplied by current from the central power-station over the feeding-conductors $f^3$ $f^3$. The water-main *g*, supplying the district, is connected with the stand-pipe *f*, and the pressure throughout the district thus depends upon the head of the water within the tank. The motor $f^2$ may be controlled by the attendant at the central power-station, and thus operated at will to maintain the water within the tank at the desired level.

It is preferable to provide means for automatically controlling the speed and operation of the motor $f^2$, and in Fig. 1 is illustrated a specific form of controller which may be employed for this purpose. Within the tank is provided a float *h*, carrying a contact-arm *h'*, adapted to move over a series of terminals $h^2$, connected with a series of resistance-coils. The contact-arm *h'* and the resistance-coils are connected in circuit with a source of electricity *l* and the winding of a solenoid or electromagnet $h^3$. The core $h^4$ of the solenoid is connected with a contact-arm $h^5$, adapted to be moved over a series of contacts $h^6$, which are connected with the resistance-coils of a rheostat. As the level of the water within the tank falls the float *h* is lowered and moves the contact-arm *h* to cut resistance into the local circuit containing the source of electricity $h^2$. The attractive effect of the solenoid $h^3$ is thus decreased and permits the movement of the contact-arm $h^5$, by means of a spring $h^7$, to cut resistance out of the motor-circuit, and thus increase the speed of the motor, and consequently the volume of water pumped into the stand-pipe by means of the pump *f'*. As the level of the water in the tank rises the contact-arm *h'* is moved over the terminals to cut resistance from the circuit of the source *l*, thus increasing the attractive power of the solenoid $h^3$ and moving the arm $h^5$ in a direction to cut resistance into the motor-circuit, thus decreasing the speed of the motor. When the water reaches a predetermined level, the contact-arm *h'* is moved to cut all of the resistance out of the local circuit containing the source *l'*, and the solenoid $h^3$ is energized to move the contact-arm $h^5$ into a position to open the circuit through the motor, thus bringing the motor to rest. It is evident that other forms of controllers may be employed without departing from the spirit of my invention.

In Fig. 2 submains *b' b'* are illustrated as extending from the main *b* to tanks *f f*, located at the centers of distribution of outlying districts, a series of pumps *f' f'* being provided, one in connection with each of the tanks, for forcing water from the mains into the tanks, the pumps being operated by the electric motors $f^2$ $f^2$, connected with the central station by mains $f^3$ $f^3$. Distributing-pipes *g g* extend from the tanks *f* throughout the districts to be supplied. At points along the mains *b b'* auxiliary pumps *c c* are provided, the pumps being operated by electric motors *d d*, connected with the mains $d^2$ $d^2$, extending to the central power-station.

In Fig. 3 are illustrated the water-supply mains of a municipality, a number of central pumping-stations A B C D being provided, while at outlying points are situated tanks *f f*, adapted to supply water to the districts in which they are located. The electrical energy for operating the auxiliary pumps, which are situated at intervals along the mains, and for operating the pumps provided in connection with the several tanks or stand-pipes is supplied from central power-stations E F G H. By thus providing auxiliary pumps at intervals along the mains and tanks at outlying points the pressure at the central stations may be greatly decreased, while a practically uniform pressure may be maintained at all points throughout the supplied districts. Furthermore, the water-supply system and the electric-lighting system coact, thus cheapening the cost of furnishing water and electrical energy to the city, since the electrical apparatus of the power-stations may be utilized for operating the auxiliary pumps during the day, while they are not in demand for furnishing lighting-currents.

Having described my invention, what I claim as new, and desire to secure by Letters Patent, is—

1. In a water-supply system, the combination with the main-station pumping appa-

ratus, of water-mains extending therefrom to the districts to be supplied, a series of electrically-operated auxiliary pumps situated at intervals along said mains for assisting the main pumping apparatus in forcing the water through the mains, a series of tanks or stand-pipes situated at the centers of distribution of outlying districts, an electrically-operated pump provided in connection with each of said stand-pipes for forcing water from the mains into said stand-pipe, supply-pipes connected with said stand-pipes, a generator or other source of electricity located at a central station and connected in circuit with said electrically-operated pumps to supply current thereto and controlling apparatus at said central station for controlling the current supplied to said electrically-operated pumps, whereby the electrically-operated pumps may be thrown into operation when desired to assist the main pumping apparatus, substantially as described.

2. In a water-supply system, the combination with the main-station pumping apparatus, of water-mains extending therefrom to the districts to be supplied, a series of tanks or stand-pipes situated at the centers of distribution of outlying districts, an electrically-operated pump provided in connection with each of said stand-pipes for forcing water from the mains into the stand-pipes, supply-pipes connected with said stand-pipes, a generator or other source of electricity located at a central station and supplying current to said electrically-operated pumps, and controlling apparatus at the said central station for controlling the current supplied to said electrically-operated pumps, substantially as described.

3. In a water-supply system, the combination with the main-station pumping apparatus, of water-mains extending therefrom to the districts to be supplied, a series of tanks or stand-pipes situated at the centers of distribution of outlying districts, an electrically-operated pump provided in connection with each of said stand-pipes for forcing water from the mains into the stand-pipes, supply-pipes connected with said stand-pipes, a generator or other source of electricity located at a central station and supplying current to said electrically-operated pumps, controlling apparatus at the said central station for controlling the current supplied to said electrically-operated pumps, and means independent of the central station and controlled by the rise and fall of the water-level in said stand-pipes for varying the speed of the electrically-operated pumps, substantially as described.

In witness whereof I hereunto subscribe my name this 28th day of August, A. D. 1895.

JOHN P. BARRETT.

Witnesses:

JOHN W. SINCLAIR,

W. CLYDE JONES.