(No Model.) 2 Sheets—Sheet 1.

E. NEFF.

PUMP FOR WATER SYSTEMS.

No. 512,737. Patented Jan. 16, 1894.

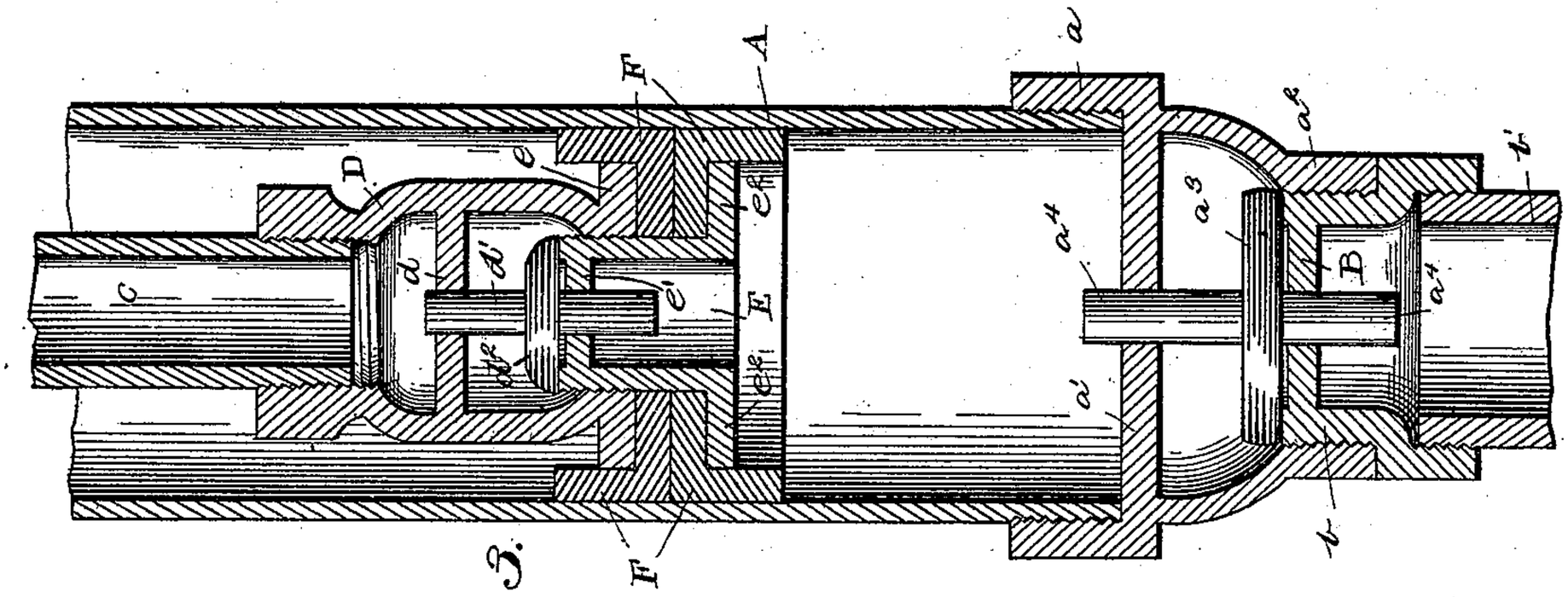


Fig. 3.

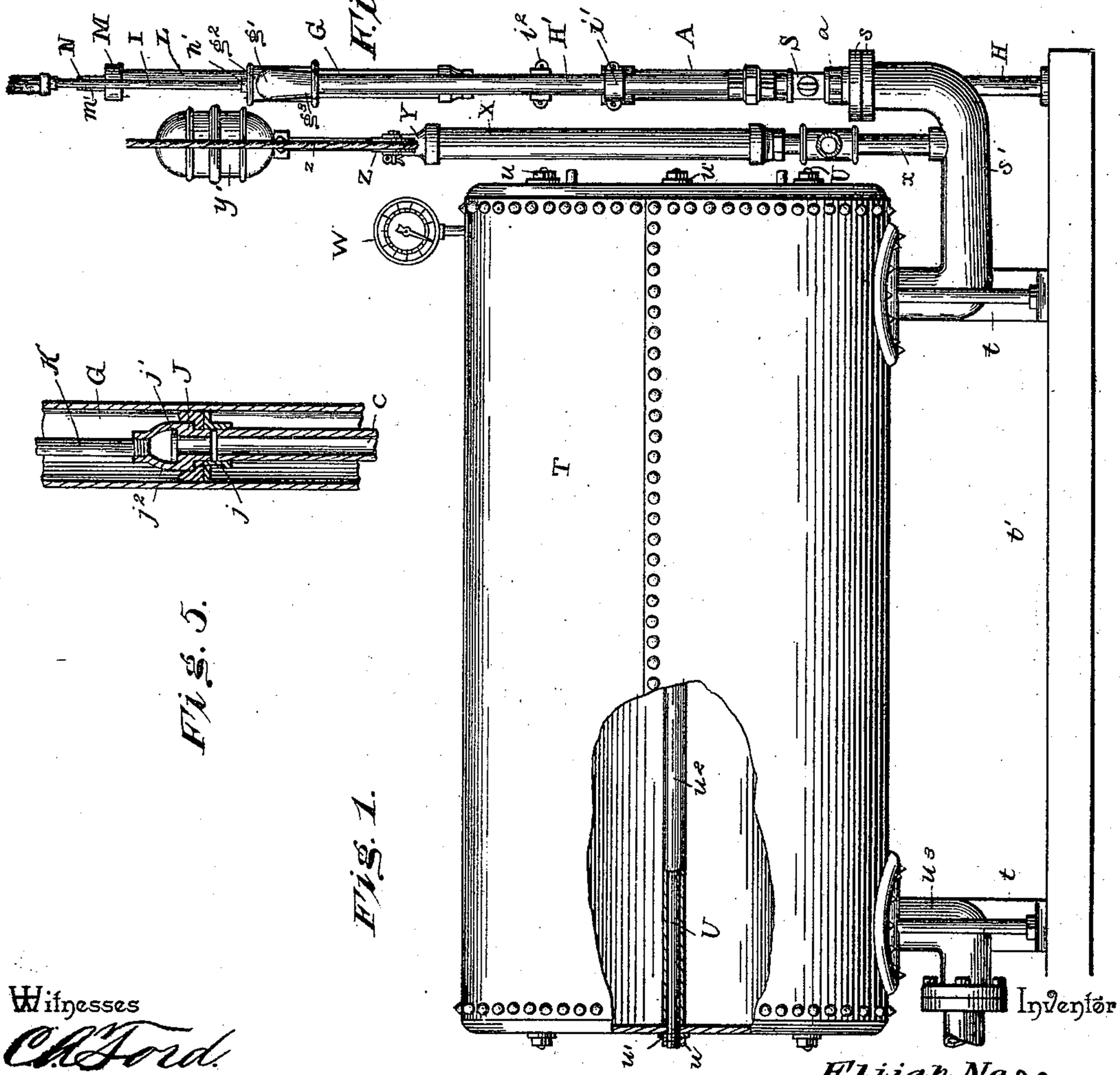


Fig. 1.

Fig. 5.

Witnesses
C. H. Ford.
D. B. Hochmuth.

Inventor
Elijah Neff.
By his Attorneys,
C. A. Snow & Co.

THE NATIONAL LITHOGRAPHING COMPANY,
WASHINGTON, D. C.

(No Model.)

2 Sheets—Sheet 2.

E. NEFF.

PUMP FOR WATER SYSTEMS.

No. 512,737. Patented Jan. 16, 1894.

Fig. 2

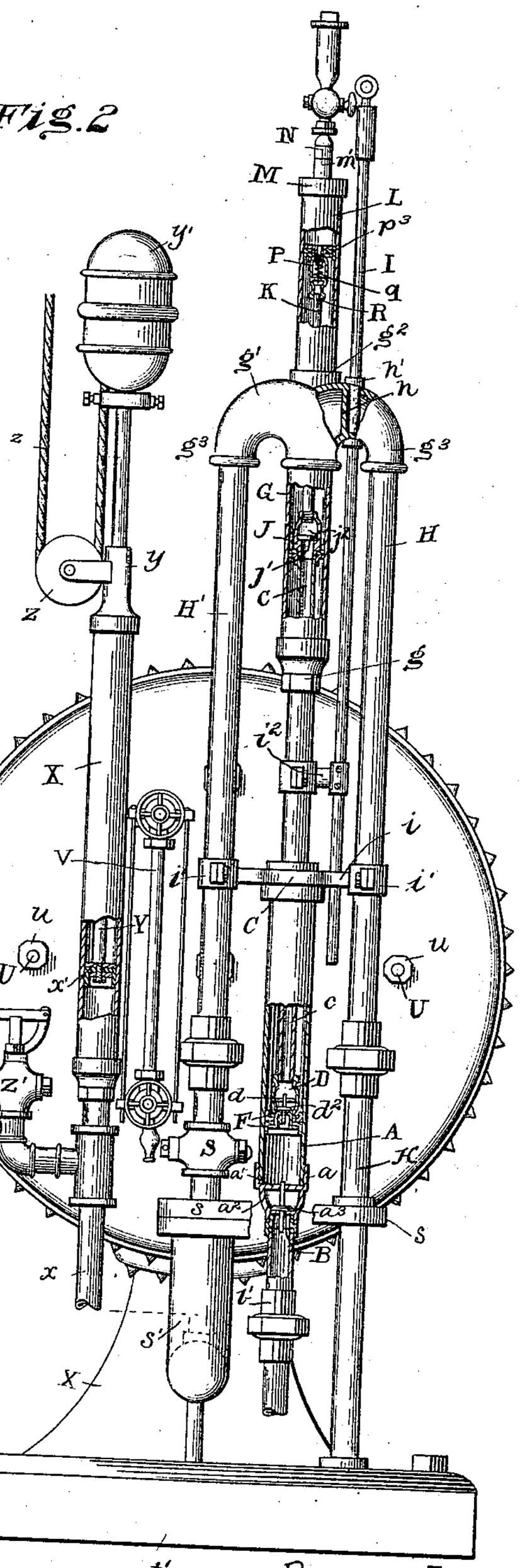
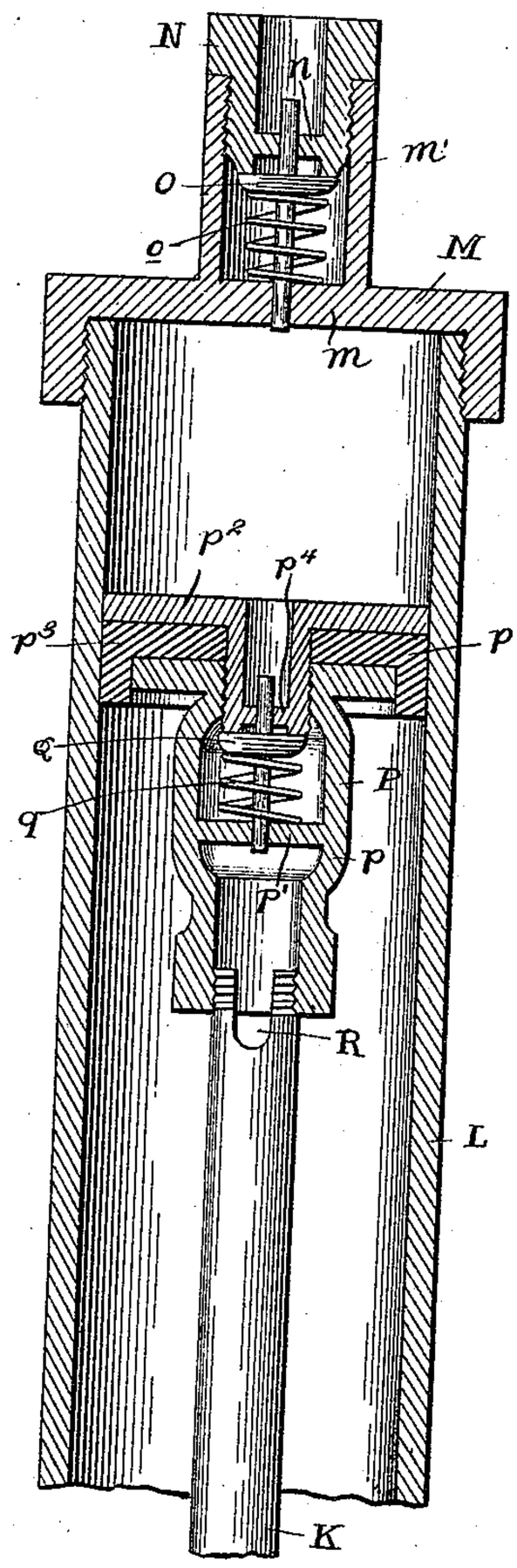


Fig. 4



Witnesses

C. A. Ford.

D. P. Wolhaupter.

Inventor

Elijah Neff,

By his Attorneys,

C. A. Snow & Co.

THE NATIONAL LITHOGRAPHING COMPANY,
WASHINGTON, D. C.

UNITED STATES PATENT OFFICE.

ELIJAH NEFF, OF MILFORD, INDIANA.

PUMP FOR WATER SYSTEMS.

SPECIFICATION forming part of Letters Patent No. 512,737, dated January 16, 1894.

Application filed March 30, 1893. Serial No. 468,315. (No model.)

To all whom it may concern:

Be it known that I, ELIJAH NEFF, a citizen of the United States, residing at Milford, in the county of Kosciusko and State of Indiana, have invented a new and useful Pump for Water Systems, of which the following is a specification.

This invention relates to pumps for water systems; and it has for its object to provide certain improvements in pumps of that character which are employed in connection with storage and pressure regulating devices, whereby means shall be provided for collecting and storing quantities of water and air, so that the former can be distributed to the point of use under air pressure.

With these and many other objects in view which will readily appear as the nature of the invention is better understood the same consists in the novel construction, combination and arrangement of parts hereinafter more fully described, illustrated and claimed.

In the accompanying drawings:—Figure 1 is a side elevation showing the various parts of my improved system in operative position. Fig. 2 is an enlarged end view of the same construction showing several portions of the pump in section, the pressure regulating device being shown as separated from and at one side of its connection to the tank supply pipe. Fig. 3 is an enlarged vertical sectional view of the main water cylinder foot-valve devices, and the valved plunger moving therein. Fig. 4 is a similar view of the upper end of the air cylinder and the plunger moving therein. Fig. 5 is an enlarged detail sectional view of the discharge or delivery plunger head.

Referring to the accompanying drawings, A represents the main water or pumping cylinder supported in a suitable position in a vault room or beneath the ground, and the main pumping cylinder A, is exteriorly threaded at its lower end to receive the lower cylinder head a. The lower cylinder head a, thus removably connected to the main pumping cylinder, is provided with a transverse valve guide a', and an interiorly threaded valve chamber or neck a^2, extended therebelow and accommodating a foot valve a^3. The foot valve a^3, is provided with upper and lower stems a^4, the upper of which moves in the guide a', and the lower of which moves through the transverse guide B, of the exteriorly and interiorly threaded valve seat b. The valve seat b, removably engages the interiorly threaded valve chamber or neck, and has coupled thereto the suction or supply pipe b', which leads into the well or other source of water supply.

The main water or pumping cylinder A, is inclosed at its upper end by the stuffing box head C, through which is designed to reciprocate the elongated plunger tube c, the lower end of which, inside of the cylinder A, is exteriorly threaded to removably receive the upper threaded end of the plunger valve casing or chamber D. The plunger valve casing or chamber D, of the plunger which moves in the cylinder A, is entirely closed, and is provided with an interior transverse valve guide d, which guides the upper stem d', of the plunger valve d^2, arranged to work inside of the valve casing or chamber D. The plunger valve d^2, is arranged to work onto the valve seat at the upper inner end of the cylindrical plunger head E. The cylindrical plunger head E, is removably threaded into the lower flanged end e, of the valve casing or chamber D, and is provided at its upper valve-seat end with the interior valve guide e', to receive the lower valve stem of the plunger valve, and is exteriorly flanged as at e^2, to clamp therebetween and the lower flanged end e, of the casing or chamber D, the flanged or cup packing disks F, which work tightly against the inner sides of the main pumping cylinder.

The elongated plunger tube c, is extended above the upper head of the main cylinder A, sufficiently far so as to work into the intermediate discharge or delivery cylinder G, arranged a distance above the main pumping cylinder and adapted to form a chamber to collect the water and air which are to be discharged at one and the same time. The intermediate discharge or delivery cylinder is inclosed at its lower end by the stuffing box g, to form a packing around the reciprocating tube c, and is coupled to and supported in

position by the approximately T-shaped coupling head g'. The coupling head g', is provided, in a line directly above the coupling of the cylinder G thereto, with the interiorly threaded coupling neck g^2, and the end coupling necks g^3, into one of which is threaded the upper end of the vertical supporting rod or pipe H, which is extended to a solid bed so as to provide for a firm support of the entire pumping devices in a steady position. Into the other end coupling neck g^3, is threaded the upper end of the pump discharge pipe H', which will be more particularly referred to as receiving both the discharge from the discharge or delivery cylinder G, and the air devices to be hereinafter described. The said coupling head g', is also provided at one side of its center with a partition or diaphragm h, which directs the discharge from the pump entirely through the pipe H', and adjacent to said partition or diaphragm with the guide h', through which reciprocates the pump rod I.

The pump rod I, is connected to a wind mill or other suitable source of power and has its lower end move in the intermediate guide bar i, extended laterally from the stuffing box head C, and provided at its ends with the clamps i', which embrace the support H, and the discharge pipe H', respectively, thus spacing and holding the opposite portions of the apparatus in their proper position. A clamp i^2, is attached to the pump rod I, and to the plunger tube c, intermediate of its ends so as to provide for the suitable reciprocation of the plunger tube when the wind mill or other power is in operation.

The upper end of the plunger tube c, which works inside of the intermediate discharge or delivery cylinder G, is removably attached to the valved discharge or delivery plunger or piston head J. The discharge or delivery piston or plunger head J, carries the intermediate packing disks j, and the valve j', working in the casing j^2, which opens into the cylinder G, and has removably attached to the upper end thereof the plunger rod K, which extends through and above the coupling head g', and works inside of the vertical air cylinder L. The valve j', closes on the up stroke of the pump and serves to eject or discharge the water and air therefrom in the manner to be presently described.

The air cylinder L, is threaded at its lower end into the coupling neck g^2, at the top of the coupling head g', and has attached to the upper end thereof the head M. The head M, is provided with the central guide m, and the upwardly extended interiorly threaded valve neck or chamber m', which removably receives the flanged inlet plug N. The inlet plug N, is centrally perforated and is provided with the guide n, which receives the upper stem of the inlet valve O, which is normally held onto the plug N, which forms a seat therefor, by means of a spring o, arranged in the neck or chamber m', under said valve, the lower stem of the valve working in the central guide m, of the head M.

Removably coupled to the upper end of the plunger rod K, is the air cylinder plunger P. The air cylinder plunger P, comprises a closed valve casing or chamber p, having an interior guide p', and removably receiving at its upper end the plunger clamping disk or head p^2. The plunger clamping disk or head p^2, clamps between the same and the upper flanged end of the valve casing or chamber p, the packing disk p^3, and is provided with a perforated guide p^4, which receives the upper stem of the plunger valve Q. The plunger valve Q, works inside of the valve casing or chamber p, and is held closed onto the inner end of the head p^2, which forms a seat therefor, by means of the valve closing spring q, arranged under the valve on the guide p', which accommodates the lower stem of the valve. At the lower end of the plunger valve casing or chamber p, and in the upper end of the plunger rod K, is formed the air discharge opening R, which directs the air into the air cylinder L, under the plunger moving therein, so that it, the air, can be forced together with the water out of the coupling head g' into the discharge pipe H'.

Now from the foregoing it is thought that the construction and operation of the pumping devices will be readily apparent to those skilled in the art. As the pump rod reciprocates, motion is necessarily communicated to the plunger tube c, which draws the water through the supply pipe b', and the foot valve at the lower end of the main pumping or water cylinder, into such cylinder. As the pumping continues, the water passes through the valved plunger at the lower end of the plunger tube, and up said plunger tube and out of the valved discharge or delivery plunger J, into the intermediate discharge or delivery cylinder G. At the same time air is drawn into the air cylinder, and is collected, under the same pressure as the water, beneath the plunger moving in the air cylinder so that both the water and air will be discharged and forced under the same pressure through the discharge pipe H', thus providing an efficient combination pump for simultaneously collecting and discharging water and air. The discharge pipe H', is provided near its lower end with the stop cock S, the function of which will presently appear, and is coupled at such end by means of the horizontal coupling flange s, onto the outer flanged end of the off-standing tank supply pipe s', said coupling flange s, being extended laterally to embrace the upper end of the supply pipe b', as well as the supporting rod H, so as to additionally strengthen the apparatus. The tank supply pipe s', leads into the bottom and one end of the cylindrical storage tank T. The cylindrical storage tank T, is supported on the end supporting legs t, arising from a suitable base t', and has the

opposite heads thereof connected by a series of longitudinally arranged strengthening bolts U. The longitudinally arranged strengthening bolts U, extend through the interior of the tank and are threaded at each end to receive the clamping nuts u, working against the copper washers u', which fit against the opposite heads of such tank at points in from the edges of the heads which are riveted at their edges to the body of the tank. The longitudinally arranged strengthening bolts U, also accommodate the spacing sleeves u^2, the opposite ends of which bear against the inner sides of the opposite heads of the cylindrical tank, so that a construction is completed which prevents the opposite heads of the tank from either contracting or expanding, as the pressure may be relieved therefrom or increased therein, as will be readily apparent. The water and air is pumped into the storage tank when the windmill or other power is in operation, so that the air which is displaced into the top portion of the tank by the heavier water, will always be under sufficient compression in such tank, so as to force the water out through the distributing pipe u^3, to the point of use, such distribution being regulated by suitable valves and line of piping. The level or height of the water in the storage tank may be observed on the water glass or gage V, at one end of the tank, and the pressure in such tank indicated by means of the indicator W, attached to the top of the tank. When the power is not in operation the stop cock S, may be turned so as to hold the water in the tank without loss of pressure.

In order to control the power operating the pumping devices, I employ a suitable power regulating device which I shall now proceed to describe. A vertical pressure cylinder X, is coupled by means of the valved coupling pipe x, to the tank supply pipe s', at a point intermediate of its connection with the tank T, and the discharge pipe H'. The cylinder accommodates the sliding piston head x', attached to the lower inner end of the piston rod Y. The piston rod Y, works through the upper closed end or head y, of the pressure cylinder, and has adjustably attached to its upper end the weight y', which normally tends to force the piston head x', to the bottom of the cylinder X. An off-standing guide pulley Z, is attached to the upper head y, of the cylinder X, and forms a guide for the power regulating rope or wire z, passing therearound and attached at one end to the weight y', and at its other end to the windmill or other power so as to throw the same in and out of gear in any suitable manner. Now it will be apparent to those skilled in the art, that, as the pressure in the storage tank T, increases beyond the point at which it is advisable to sustain the pressure, the piston in the pressure cylinder will be forced upward, thereby lifting the weight y', and pulling down on the cord or wire z, so as to stop the power. On the other hand, as the pressure in the tank decreases, the weight at the upper end of the piston rod will lower the piston in the pressure cylinder, and relieve the rope or wire, so as to allow the power to start again, so that pumping will commence. A safety valve Z', is attached to the connection x, so as to relieve the tank of sudden increase in pressure.

From the foregoing it is thought that the construction, operation and many advantages of the herein-described apparatus will be readily apparent to those skilled in the art, and I will have it understood, that changes in the form, proportion and the minor details of construction as embraced within the scope of the appended claims, may be resorted to without departing from the principle or sacrificing any of the advantages of this invention.

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

1. In an apparatus of the class described, the combination with a storage tank having a lower off-standing supply pipe provided with a laterally extended horizontal flange at its outer upper end; of a suitably arranged hollow coupling head, a lower valved pumping cylinder arranged below said coupling head at one side of the tank supply pipe, separate aligned top air and intermediate discharge cylinders threaded respectively into the top and bottom of said hollow coupling head, valved plungers in each of the cylinders, intermediate connections between the several plungers, a single pumping rod guided to move through the coupling head and connected with one of the plunger connections, and an oppositely arranged single discharge pipe and a supporting rod connected at their upper ends to opposite ends of the hollow coupling head, respectively, the lower end of the discharge pipe being coupled to the flange of the tank supply pipe, and said supporting rod being embraced by the lateral extension of said flange, substantially as set forth.

2. In an apparatus of the class described, a valved pumping cylinder having a guide bar extended laterally from its upper end, an approximately T-shaped coupling head, having a diaphragm or partition at one side of its center and a guide near such diaphragm, an air cylinder threaded into the top of the coupling head, an intermediate discharging or delivery cylinder threaded into the bottom of the coupling head in a direct line with the air cylinder and above the pumping cylinder, a supporting rod threaded into one end of the coupling head, a single discharge pipe threaded into opposite end of the coupling head, valved plungers in each of the cylinders, a tube connecting the plungers in the pumping and discharging cylinders, a rod connecting the plungers in the latter cylinder and the air cylinder, a reciprocating pump

rod moving in the guide of the coupling head and the guide bar, a clamp attached to the pump rod and to the plunger tube intermediate of the pumping and discharging cylinders, and the storage tank, substantially as set forth.

In testimony that I claim the foregoing as my own I have hereto affixed my signature in the presence of two witnesses.

ELIJAH NEFF.

Witnesses:
ELMER HOLLOWAY,
J. C. MCLAUGHLIN.