(No Model.) 3 Sheets—Sheet 1.

H. R. WINKELMANN.

STEAM VACUUM WATER ELEVATOR.

No. 489,064. Patented Jan. 3, 1893.

FIG. 1.

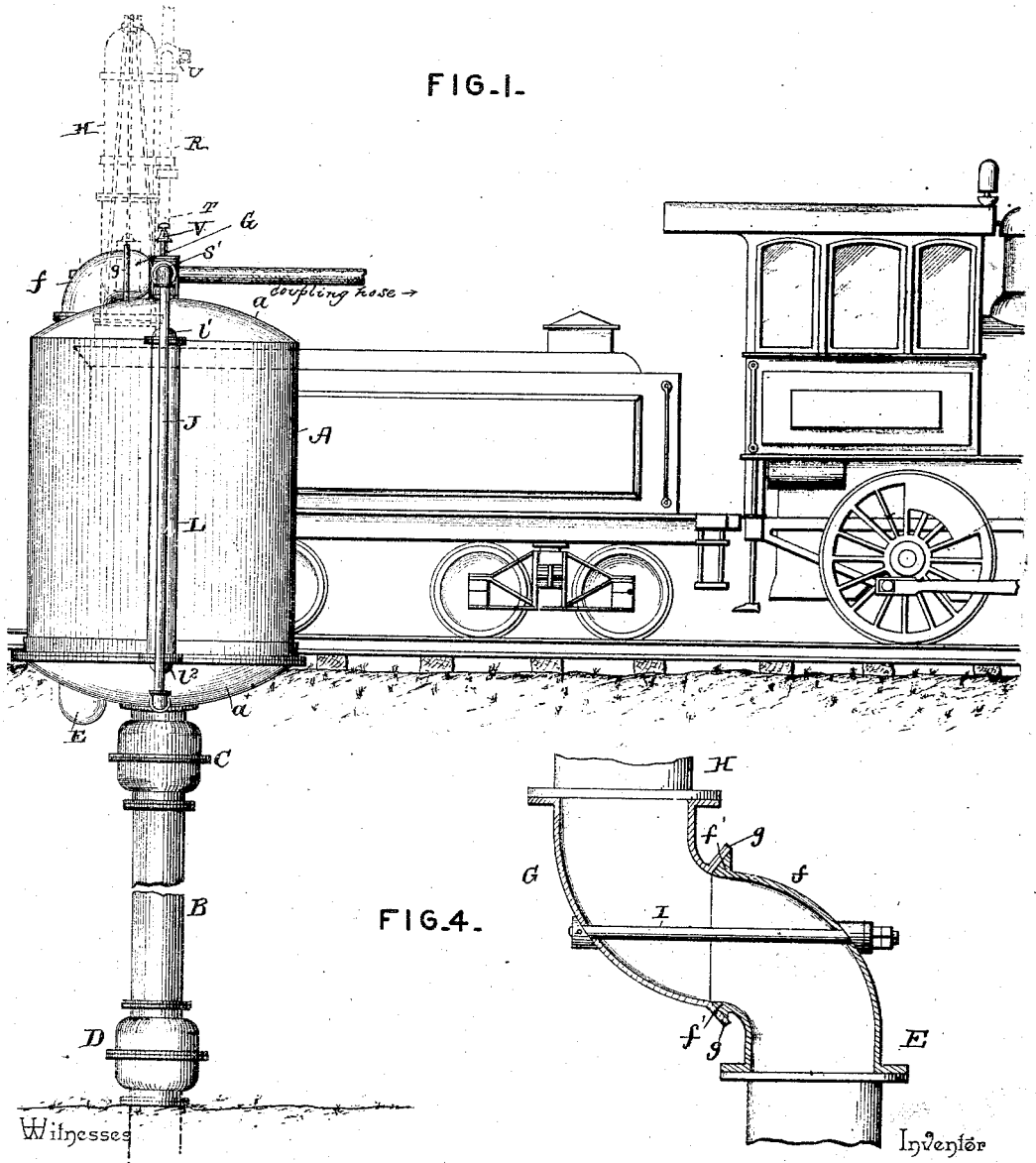

FIG. 4.

Witnesses

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D. P. Wolhaupter.

Inventor

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(No Model.) 3 Sheets—Sheet 2.

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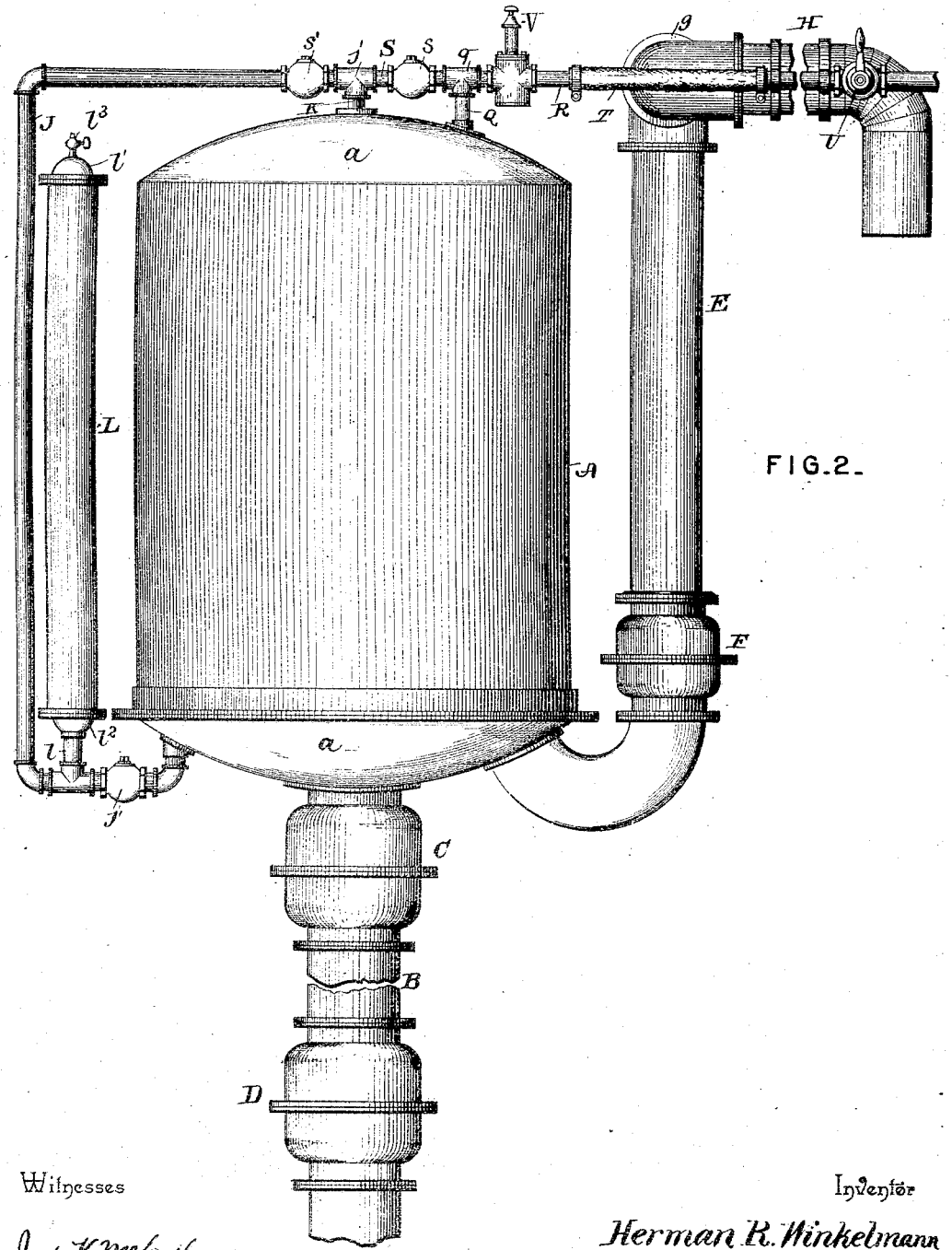

FIG. 2.

Witnesses

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(No Model.) 3 Sheets—Sheet 3.

H. R. WINKELMANN.

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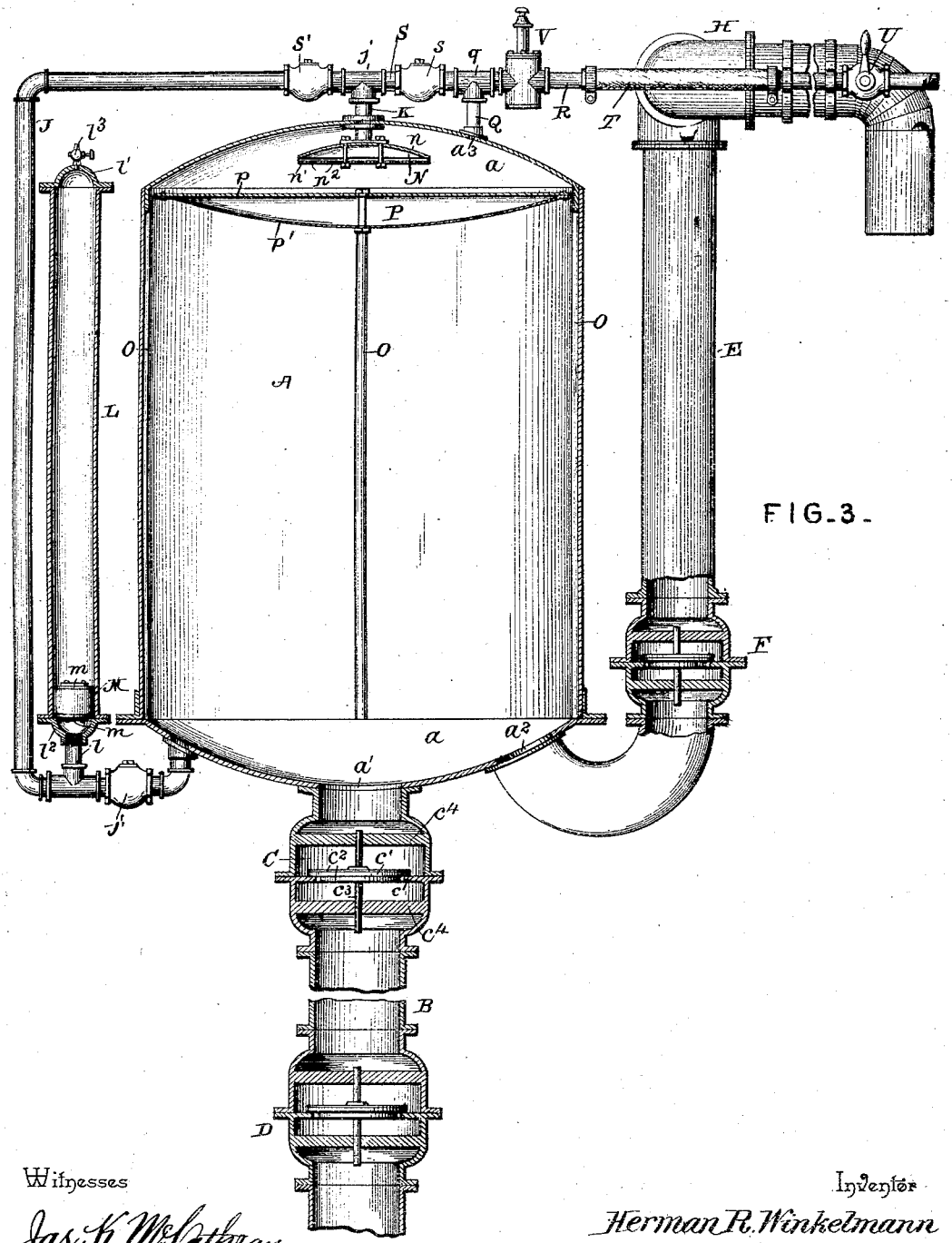

FIG. 3.

Witnesses

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UNITED STATES PATENT OFFICE.

HERMAN R. WINKELMANN, OF JACKSONVILLE, FLORIDA, ASSIGNOR, BY DIRECT AND MESNE ASSIGNMENTS, TO THE AUTOMATIC WATER TANK COMPANY, OF PHILADELPHIA, PENNSYLVANIA.

STEAM-VACUUM WATER-ELEVATOR.

SPECIFICATION forming part of Letters Patent No. 489,064, dated January 3, 1893.

Application filed December 7, 1891. Serial No. 414,331. (No model.)

To all whom it may concern:

Be it known that I, HERMAN R. WINKELMANN, a citizen of the United States, residing at Jacksonville, in the county of Duval and State of Florida, have invented a new and useful Steam-Vacuum Water-Elevator, of which the following is a specification.

This invention relates to steam vacuum tank feeders; and it has for its object to provide a steam vacuum railroad tank that shall hold a sufficient amount of water to supply the largest locomotive, and one which shall be constructed in such a manner as to be able to discharge the water to any reasonable height above the tank according to the pressure furnished at a velocity in equal ratio with the pressure, and also will lift the water from a distance below the tank, and one which after the discharge of the water therefrom will immediately and automatically refill itself for the next locomotive.

To attain these ends one of the principal objects of the invention is to so construct the same that the steam used for discharging the filled tank will not come in direct contact with the surface of the water therein, which will effectually prevent rapid condensation of the steam, thereby fully utilizing the pressure of the steam to elevate the water, the steam pressure being otherwise materially reduced by the loss from condensation as is usual in devices of this character.

With these and many other objects in view, which will readily appear as the nature of the invention is fully 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 of a locomotive and tender located upon a track adjacent to a tank feeder connected therewith and constructed in accordance with my invention. Fig. 2 is a side elevation of a tank feeder constructed in accordance with my invention. Fig. 3 is a vertical longitudinal section of the same. Fig. 4 is a detail sectional view of the discharge pipe and goose neck pipe-joint.

Referring to the accompanying drawings;—A represents an inclosed tank cylinder that is designed to accommodate the quantity of water to be fed to an adjacent locomotive tender and said cylinder is provided with the convexed top and bottom a which more effectively resists the pressure of steam and water which is powerfully exerted therein and which would tend to strain or bulge a flat top and bottom. The said cylinder is provided with a bottom receiving opening a' secured over and communicating with which is the depending suction receiving pipe B provided near its upper end directly beneath the opening in said cylinder with the suction valve chamber C having the inwardly extending flange c forming a seat for the circular valve c' clamped between the plates c^2 carrying the valve stems c^3 working in the opposite crossbars c^4 in said chamber. The said suction pipe B is further provided near its lower end which is inserted or connected with the source from which the water is supplied with a suction foot valve chamber and valve D similar in construction to the upper valve C and adapted to check the water below the upper suction valve just described. Upon one side of the receiving opening a' in the bottom of said cylinder, the same is provided with a bottom discharge opening a^2, over which is secured and placed the discharge pipe E arising from beneath the said cylinder above the top of the same to any height desired according to the elevation to which the water is to be raised and the height of the tank cylinder A. The said discharge pipe E is provided at a point adjacent to the bottom of the tank with the check valve F constructed identical with that of the valves C and D and opening upwardly so as to allow the water a free egress from the tank when the same is discharged therefrom under pressure and which allows the same to close and prevent the water above the valve from running back into the tank. The extreme upper end of the discharge pipe E is provided with an elbow f having a beveled or conical flange f' at its outer end that is adapted to fit within the flanged tapering seat g at the outer end of the elbow G secured to the inner end of the goose neck pipe H, and said conical flange and its opposing receiving conical seat form a swivel joint which allows the said goose neck

pipe when not in use to be held in a vertical position above the tank as illustrated in dotted lines, by means of the ordinary overbalancing weight and which can be readily drawn down when in use to a horizontal position and inserted into the tender water receiving opening in the usual manner. A securing and pivot bolt I passes through and is secured to the opposing elbows *f* and G, and securely holds the same together and keeps the swiveled joint water tight, to effectually prevent leakage.

The spray conducting pipe J is connected to the bottom of the tank cylinder A upon one side of the bottom receiving tank and extending above the top of the same is connected by means of the T-coupling *j* with the spray inlet pipe K secured in the top of said cylinder and projecting slightly above and within the same. At a point adjacent to its bottom connection with said cylinder, the said spray conductor J is provided with the outwardly opening check valve *j'* of the ordinary construction, which allows the water from the tank to be forced up through said pipe J and back into the top of the cylinder for the purposes to be described, while at the same time it prevents the water being forced back into said tank from the compression cylinder L located adjacent to the same and connected with said spray conductor J by means of the pipe connection *l* securing said compression cylinder to and above the spray conductor in front of the check valve *j'*. The said compression cylinder L is provided with the upper and lower heads *l'* and *l²*, respectively, having inner shoulders and is further provided with the cock *l³* in the upper head *l'* in order to leave the compression cylinder opened when it is desired to run the apparatus without the compressed air, otherwise as is the ordinary operation of the apparatus, the said cock is kept closed.

A float M works within the air cylinder L and is provided upon the top and bottom thereof with the rubber disk valves *m* securely clamped thereon and adapted to bear upon the shoulders of the upper and lower heads respectively according as the said float may either be at the extreme upper or lower limit of its travel. It can be readily seen that when water is forced into the tank the same will pass up within the air chamber and raise the float therein, and thus greatly compress the air above said float and the surface of the water, while at the same time when the pressure is relieved from within said tank cylinder, that the pressure of air will immediately force the water from within the compression cylinder up through the spray conductor J and through the spray inlet K in the top of the cylinder. When the water is exhausted from the compression cylinder, the lower valve of the float M seats itself upon the lower head *l²* and forms a seal which prevents the escape of the air from within said cylinder or compression chamber.

A spray condenser and distributer N is secured to the inner end of the spray inlet pipe K in the top of the tank cylinder and the same comprises an upper concavo-convex plate *n* and a lower circular flat plate *n'* provided with a series of perforations *n²*, said plate being located directly under the upper curved disk or plate and is bolted thereto so that the edges of the same remain a slight distance apart, so as to allow the spray water to be forced from between said edges in a fine fan-shape jet, while the water also escapes through the perforations in the flat plate *n'* and thus distributes the spray over the entire inner area of the cylinder, when the same has been discharged of its water and is filled with steam and thus causes a complete and rapid condensation of the steam which thus forms a vacuum and sucks the water through the pipe B and immediately fills.

The tank cylinder A is provided with a series of rounded fender and guide bars O secured vertically around the inner sides of the same in order to steady the up and down movement of the floating piston P contacting with the same and located within the cylinder and rising and falling with the water therein, said bars also preventing the floating piston from scraping the sides of the tank and becoming caught or wedged at any point. The said floating piston comprises the upper flat circular plate *p* of a diameter slightly less than that of the tank and the lower concavo-convex plate *p'* secured thereto and forming an air space between the same and the top flat plate *p* which also allows the said piston to be forced under the pressure of steam far down within the concaved bottom of the tank. The top of the tank A is also provided with a steam inlet opening *a³* to which is secured the inlet steam pipe Q which by means of the T-coupling *q* is connected with the main steam pipe R and the connecting pipe S connected with said T-coupling *q* and the T-coupling *j* of the spray inlet pipe K, and said connecting pipe S is provided with a check valve *s* corresponding with a similar check valve *s'* located in the spray conductor J upon the opposite side of the T-coupling *j*, the purpose of said check valves on either side of the T-coupling *j* being, first, when the steam is on to allow the same to pass through the check valve *s* and close the valve *s'* thus preventing the water from being forced through the spray conductor into the cylinder, inasmuch as the pressure of the steam upon the valve *s'* would be sufficient to overcome the pressure of the water in the spray conductor J, while on the other hand when the steam is shut off the valve *s'* opens and allows the water to pass into the spray condenser and the valve *s* closes and prevents said water from passing into the steam pipe. A section of the steam pipe R is securely fastened to the swinging goose neck pipe H and is carried thereby, said section being connected with the section of the pipe upon the tank by means of the flexible connecting pipe

T which allows the goose neck pipe to be raised and lowered, and said steam pipe is provided with a cut-off valve U which is turned on when the steam connection with the boiler is made and when shut off prevents the air from entering the tank when sucking water. The said steam pipe R is also provided at a point adjacent to the T-coupling *q* with a pressure reducing valve V, which allows for a lower pressure of steam being used in the tank than in the boiler.

The construction of the steam vacuum railroad tank being now fully described, the operation of the same is thought to be readily apparent. In the first place steam connection is made by any suitable coupling or hose to the locomotive or other boiler, and having been turned on or admitted onto the steam pipe R through the cut-off valve U, the same passes through the reducing valve V, thereby being reduced to any desired pressure, and from thence through the steam inlet pipe Q, the check valve *s*, and the spray inlet pipe K into the tank. The steam being now turned off, a vacuum is formed which causes water to rise up the suction pipe and completely fill the tank, the rising water of course carrying the floating pistou to the top of the tank. Steam is again turned on thereby forcing the water within the filled tank down by the action of the steam exerted in pressure upon the top flat surface of the floating piston P, and thus forces the water out through the discharge pipe E and to the locomotive tender or point of discharge, while at the same time, the water is forced through the check valve *j'* of the spray conductor pipe J and up into the air compression chamber L, thereby carrying the float M up within said chamber and compressing the air therein, the water within the spray conductor pipe J being prevented from passing into the top of the tank on account of the check valve *s'* being closed under the pressure of steam which is now on. As much water having been forced out of the tank as is needed, steam is shut off by the valve U. The pressure upon the check valve *s'* having been now relieved, the compressed air in the air compression cylinder L exerts its pressure upon the float M therein, which forces the water through the pipe J and through the check valve *s'* into and through the spray condenser, the check valve *s* being of course closed under the pressure of said water, and the water being distributed throughout the tank cylinder by said spray condenser as herein described, a most rapid condensation of the remaining steam in the tank is effected, thereby causing another vacuum which sucks more water into the tank and fills the same, again ready for another discharge. It is readily seen that as the water is forced from the tank in the manner described, the same when the steam pressure is relieved therefrom will immediately refill.

The connection of the herein described tank with a locomotive is apparent, while at the same time it may be readily noted that the construction of the apparatus adapts it for elevating and lifting water for other purposes.

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

1. In a steam vacuum water elevator, the combination with an inclosed tank cylinder having valved receiving and discharge pipes connected with the bottom thereof, a spray conductor pipe connected with the bottom of said cylinder and projecting within the top thereof, a spray condenser secured to said conductor in the top of said cylinder, steam connections at the top of the tank, and an air compression cylinder connected with said conductor pipe to force the water through said spray conductor and condenser when steam is shut off, substantially as set forth.

2. In a steam vacuum water elevator, the combination of an inclosed tank cylinder having a concaved bottom and top and valved receiving and discharge pipes connected with the bottom thereof, a valved spray conductor pipe connceted with the bottom of said tank and projecting within the top of the same, a spray condenser located in the top of the tank and connected with said conductor pipes, a floating piston working within the tank and having a flat top plate and convexed bottom plate conforming to the curvature of the bottom of said tank, steam connections at the top of the tank, and means for forcing the water through said spray conductor and condenser when the steam is shut off, substantially as set forth.

3. In a steam vacuum water elevator, the combination of an inclosed tank having valved receiving and discharge pipes connected to the bottom thereof, a spray conductor connected with the bottom and top of said tank continuously, a spray condenser secured to the inner end of said conductor within the top of the tank and comprising an upper concaved disk and a lower perforated flat disk secured to said curved plate below the same so that the edges thereof do not meet, steam connections at the top of the tank, and means for forcing the water through said spray conductor and condenser when the steam is shut off, substantially as set forth.

4. In a steam vacuum water elevator, the combination with an inclosed tank cylinder having valved receiving and discharge pipes connected with the bottom thereof, a valved spray conductor pipe connected with the bottom of said tank and projecting within the top of the same, a spray condenser and distributer located in the top of the tank and connected with said conductor pipe, an inclosed air compression cylinder connected with said spray conductor pipe, a float working within said compression cylinder, and steam connections at the top of the tank cylinder, substantially as set forth.

5. In a steam vacuum water elevator, the combination with an inclosed tank cylinder

having valved receiving and discharge pipes connected with the bottom thereof, a valved spray conductor pipe connected with the bottom and top of said tank, a spray condenser and distributer located in the top of the tank and connected with said conductor pipe, an inclosed air compression cylinder connected with said spray conductor pipe, a valved float working within said compression cylinder to compress the air within and force the water out of the same, a floating piston within said tank cylinder, and valved steam pipes connected with the top of said tank cylinder and said spray conductor pipe, 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.

HERMAN R. WINKELMANN.

Witnesses:
MALCOLM D. JAMES,
BENJ. B. WHITE.