(No Model.) 2 Sheets—Sheet 1.

P. SATTELKAU & H. R. WINKELMANN.

STEAM VACUUM WATER ELEVATOR.

No. 521,441. Patented June 12, 1894.

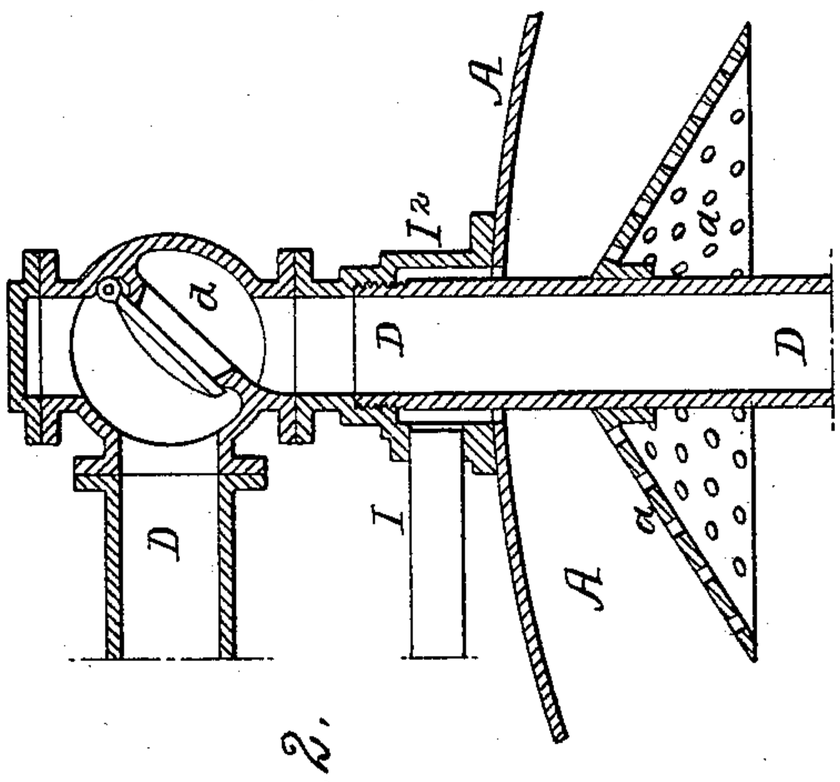

FIG. 2.

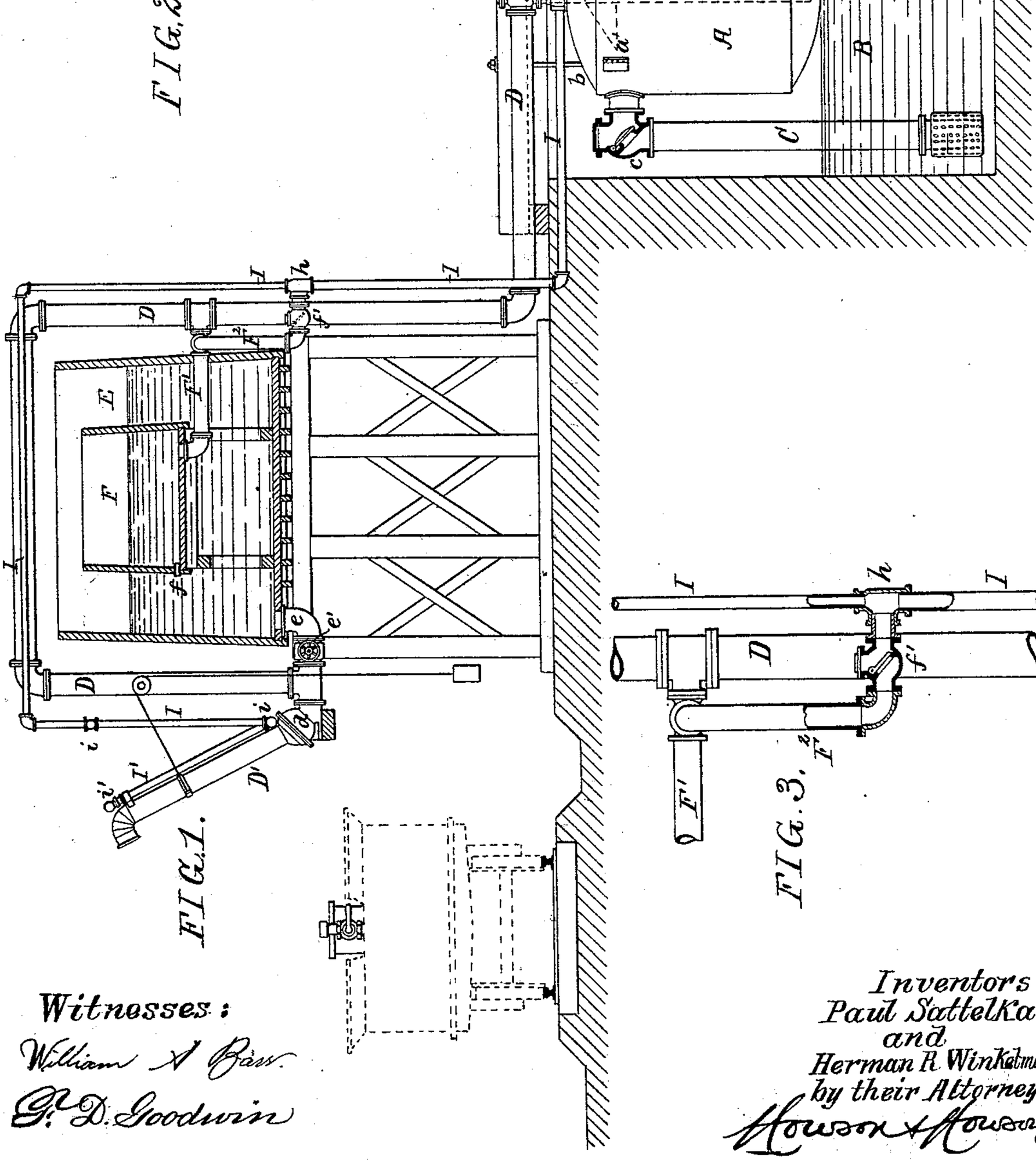

FIG. 1.

FIG. 3.

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(No Model.) 2 Sheets—Sheet 2.

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FIG. 5.

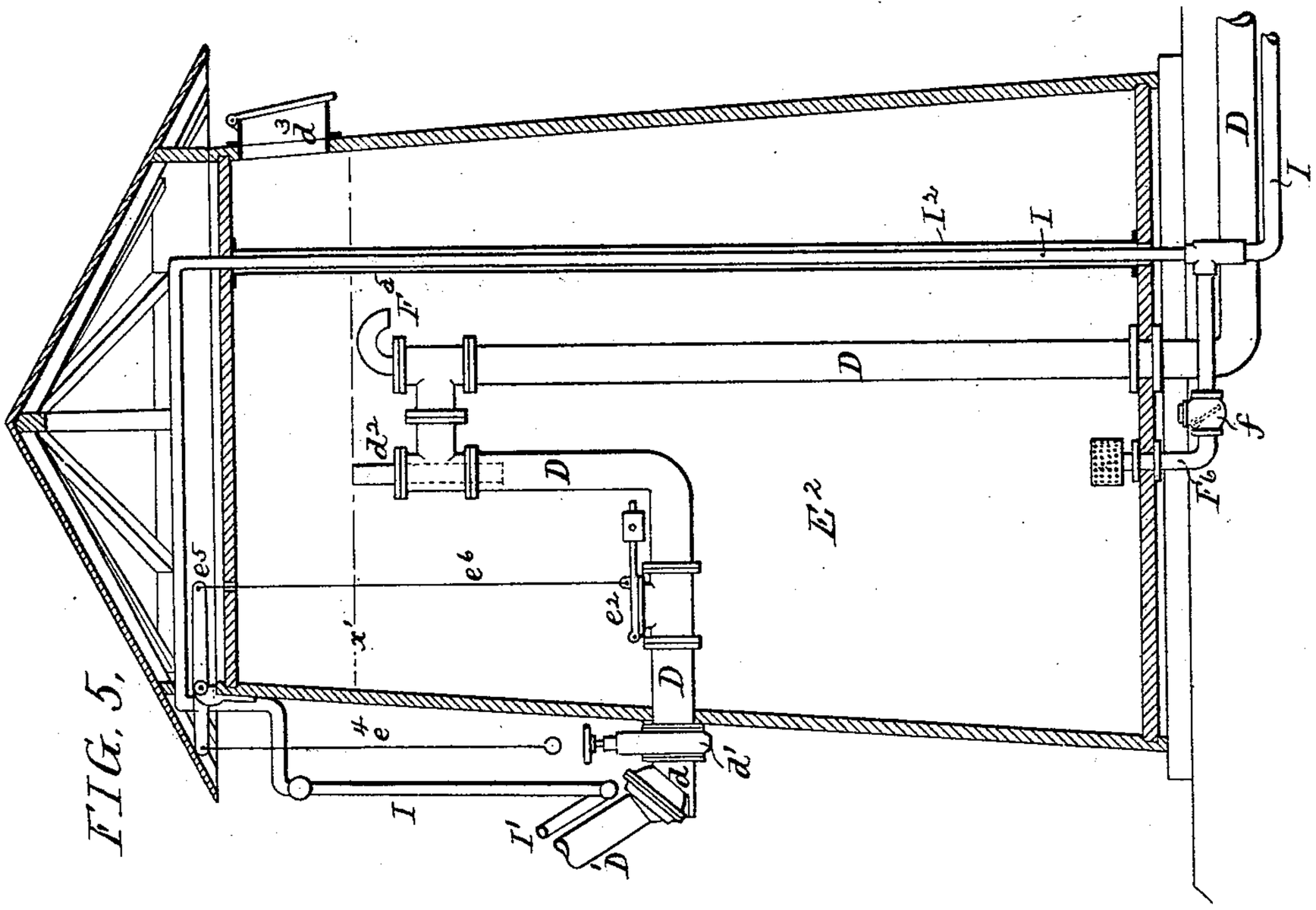
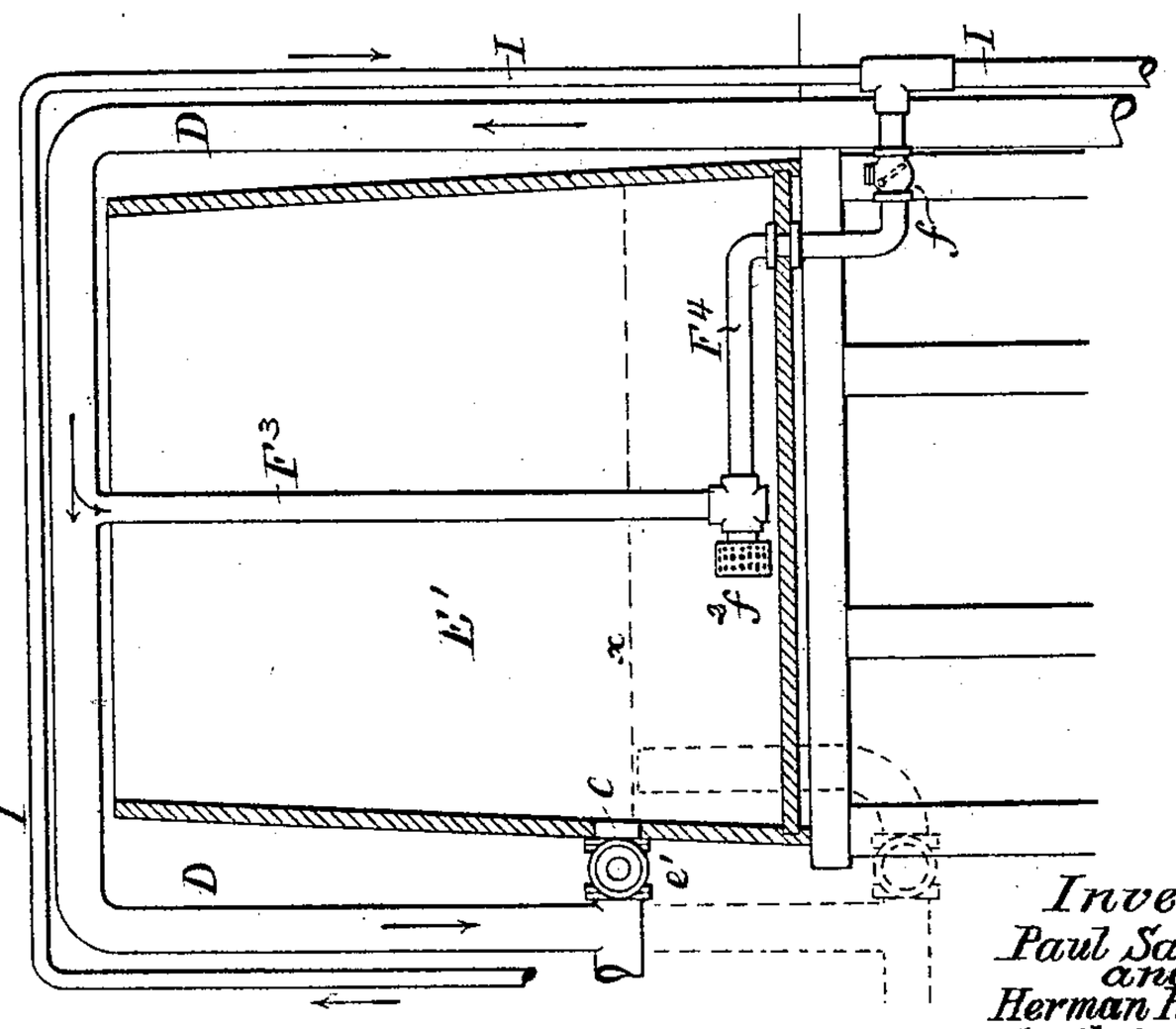


FIG. 4.



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UNITED STATES PATENT OFFICE.

PAUL SATTELKAU AND HERMAN R. WINKELMANN, OF PHILADELPHIA, PENNSYLVANIA, ASSIGNORS TO THE AUTOMATIC WATER TANK COMPANY, OF CAMDEN, NEW JERSEY.

STEAM VACUUM WATER-ELEVATOR.

SPECIFICATION forming part of Letters Patent No. 521,441, dated June 12, 1894.

Application filed October 20, 1893. Serial No. 488,687. (No model.)

To all whom it may concern:

Be it known that we, PAUL SATTELKAU and HERMAN R. WINKELMANN, both citizens of the United States, and residents of Philadelphia, Pennsylvania, have invented certain Improvements in Steam Vacuum Water-Elevators, of which the following is a specification.

The object of our invention is to simplify the construction of vacuum water elevators and to reduce the number of check valves necessary for the proper operation of the device. This object we attain in the following manner, reference being had to the accompanying drawings, in which—

Figure 1, is a view in elevation of the vacuum tank and reservoir, the said reservoir being in section. Fig. 2, is an enlarged sectional view showing the discharge valve. Fig. 3, is an enlarged view showing the pipes leading from the storage reservoir to the vacuum tank. Fig. 4, is a view showing the storage reservoir used also as a spray reservoir; and Fig. 5, is a view showing an enlarged reservoir with a discharge pipe from the vacuum tank contained therein.

Referring in the first instance to Figs. 1, 2 and 3, A is the vacuum tank suspended within the well B in the present instance.

C is the suction pipe to the tank extending into the well below the water line and communicating with the upper portion of the tank as clearly shown in Fig. 1. In this suction pipe is a check valve *c* which is preferably situated at the point where the suction pipe is connected to the tank. By this arrangement the lower portion of the tank is closed, so that water in the tank cannot possibly escape, through a defective valve structure, for instance, as in tanks where the suction pipe communicates with the bottom of the tank.

D is the discharge pipe entering the tank at the top, and extending to a point near the bottom of said tank, so that the discharge will empty, or very nearly empty the tank; the pipe is preferably arranged inside the tank, so as to avoid joints below the water level. The pipe D extends up and over the storage tank E and is coupled by a ball joint *d* to the goose neck D′ which extends over the railway track. When the tank is not used for railway purposes, the pipe D may extend to a suitable reservoir or to another point of discharge.

In the pipe D, directly above the tank A in the present instance, is a check valve *d′* which closes against atmospheric pressure.

Within the storage reservoir E is a spray reservoir F, Fig. 1, in which accumulates the water to be sprayed into the vacuum tank so as to quickly condense the steam therein. A pipe F′ extends from the pipe D to the spray reservoir F entering the bottom of the reservoir, as shown in Fig. 1. A small leakage port *f* in the reservoir F affords communication between it and the storage tank E, so that the water will not pass rapidly from the spray reservoir into the storage reservoir.

I is the steam pipe preferably running parallel with the discharge pipe D, and having ball joints *i*, *i* at its inlet end, and a coupling *i′* at its extreme end so that it may be coupled to a steam pipe on the tender of the locomotive. The section I′ of the pipe I is attached to the goose neck D′ and the ball joints allow it to move with the pipe. The outlet end of the steam pipe is connected to a cap I^2 on the vacuum tank A; this cap surrounds the discharge pipe D so that the steam passes through the cap and enters the vacuum tank at the top.

The steam pipe I is coupled to an extension F^2 of the water pipe F′ at *h*, and from this point to the cap I^2 the steam pipe is preferably enlarged, as it acts also as a conduit for the spray water when the steam is cut off.

A check valve *f′* in the pipe F^2 prevents the steam entering the spray reservoir.

Mounted on the discharge pipe D within the vacuum tank A is a perforated disk *a* upon which the spray water flows when entering the tank so that it will quickly condense the steam within the tank.

It will be noticed that we dispense with a check valve in the steam pipe, as we find that there will always remain in said pipe a certain amount of water after the vacuum tank is once filled, as the spray reservoir is of sufficient size to not only supply the spray water

but also to fill the vacuum tank if the suction will not fill the tank.

The storage reservoir has an outlet *e* communicating with the pipe D, and this outlet pipe *e* has a gate valve *e'* which can be opened by the fireman when water is required from the storage reservoir without coupling to the steam pipe of the vacuum tank.

The vacuum tank in the present instance, is suspended in the well from beams B' and suspension rods *b* pass through lugs *a'* on the tank.

It will be seen by the above description that the construction of the water elevator is simplified and the number of valves reduced to three.

The operation of the apparatus is as follows:—If, for instance, the vacuum tank is charged with water, and a locomotive is on the track at the side of the apparatus to take water, the fireman draws down the goose neck until the opening is directly above the inlet opening of the tender; he then couples the steam pipe on the tender with the steam pipe on the goose neck, turns a steam valve so that steam will flow through the steam pipe to the vacuum tank forcing the water in the pipe I ahead of it and forcing the water from the vacuum tank through the discharge pipe D and goose neck into the tank of the tender, a certain amount of water being also forced into the spray reservoir through the pipe F' from the discharge pipe. When the steam is cut off after the vacuum tank is discharged the water from the spray reservoir immediately flows through the steam pipe, and is sprayed into the vacuum tank, quickly condensing the steam therein, forming a partial vacuum, which draws the water through the suction pipe, recharging the tank with water, and if the charge does not completely fill the tank, then the water from the spray reservoir, gradually flows into the tank, completely filling it and forming a water seal in the steam pipe preventing the access of air to the tank, the water also finding its level in the discharge pipe above the valve *d*. By this means all air is expelled from the tank at each charge of water, as the tank is completely filled at each charge, and not partially filled. The several check valves of the apparatus are thereby water sealed by the water from the spray reservoir.

In Fig. 4, we have shown the storage reservoir and spray reservoir combined and in order to prevent the emptying of the said reservoir through the outlet *e* we make the outlet some distance above the tank so that the water level can be only reduced to the dotted line *x*, the said outlet may be made directly in the side or may be made in the bottom and a stand pipe may extend from the bottom to the water line *x*, as shown by dotted lines in Fig. 4. A pipe F^3 is coupled to the discharge pipe D as shown in Fig. 4, the said pipe F^3 being somewhat smaller than the discharge pipe so that the main body of water will flow to the goose neck, the percentage of water passing through the pipe F^3 will not only be sufficient to supply the spray for the vacuum tank but will also increase the height of water in the storage reservoir. The pipe F^3 is attached to a T-joint and secured to this T-joint is a strainer f^2 so that the water as it enters the reservoir will be strained. The pipe F^4 is connected to the other arm of the T-joint and this pipe extends to the pipe I and is provided with the check valve *f*.

In Fig. 5, we have shown a high tank in which the ordinary trestle work is dispensed with, this enables us to reserve a large body of water in the reservoir, thus preventing freezing to a great extent. In this instance the discharge pipe D from the vacuum tank passes into the reservoir at the bottom and has a discharge opening F^5 at its upper end in the form of a neck and then extends down to a point about midway of the tank, passing out of the tank and connected to the goose neck in the ordinary manner. The pipe D is provided with a valve e^2 which is weighted as shown and this valve can be opened to allow water to flow into the pipe D by gravity from the reservoir E^2 by pulling the rod e^4 which is connected to the valve through the lever e^5 and rod or chain e^6. In the upper portion of the pipe D is inserted an overflow pipe d^2 for the reservoir so that in the event of the water reaching the level *x'* it will not be wasted but will flow through the pipe and goose neck into the tender. We preferably arrange the overflow pipe d^2 so that the water level will be above the inlet neck F^5. The pipe F^6 extends from the bottom of the reservoir E^2 to the steam pipe I and has the check valve *f* so as to prevent steam entering the reservoir. The steam pipe I is preferably arranged so as to pass through the tank, as shown in Fig. 5, and surrounding this pipe within the reservoir is a tube I^2 so that air may circulate between the pipe and the water in the reservoir.

d^3 is an overflow opening in the tank so as to carry off the overflow water that would not be carried off by the overflow pipe d^2, in the present instance this overflow d^3 has a hinged cap so as to prevent cold air gaining access to the interior of the tank as the tank in this instance is closed at the top. The opening d^3 is made sufficiently large to allow a man to enter the tank when in need of repairs.

The reservoir is also provided with a suitable roof and it will be understood that the reservoirs shown in Figs. 1 and 4 may also be provided with roofs.

We do not claim in this application the details shown in Figs. 4 and 5, as they form the subject matter of a separate application filed on the 9th day of March, 1894, Serial No. 502,950.

We claim as our invention—

1. The combination in a steam vacuum water elevator, of the steam pipe on the tender, and a valveless pipe for conveying steam

from the tender pipe to the vacuum tank, said valveless conveying pipe having means for checking the flow of air but allowing the free flow of steam to the vacuum tank.

2. The combination in an automatic water elevator, of the vacuum tank, the inlet and outlet therefor, a reservoir above the tank, a pipe connecting the reservoir and the tank so that after the tank has been partially filled by water drawn through the inlet pipe it will be completely filled by water flowing from the reservoir by gravity, substantially as described.

3. The combination in an automatic water elevator, of the reservoir, a vacuum tank, an inlet for said tank, and an outlet therefor also communicating with the reservoir, and a steam pipe communicating with the tank and with the reservoir, substantially as described.

4. The combination in an automatic water elevator, of the reservoir, the vacuum tank, an inlet therefor, a valve in said inlet pipe, an outlet pipe for the tank communicating also with the reservoir, a valve in said pipe and a steam pipe communicating with the tank and with the reservoir, and a valve between the said pipe and reservoir, the whole so constructed that when the vacuum tank is partially filled by the water entering the inlet pipe it will be completely filled and the valves water sealed by water from the reservoir, substantially as described.

5. The combination in an automatic vacuum water elevator, of the vacuum tank, suction pipe therefor and discharge pipe, a spray reservoir mounted above the tank, a steam pipe connected to the vacuum tank, said spray reservoir being connected to the discharge pipe, and to the vacuum tank, substantially as described.

6. The combination of a vacuum tank, suction pipe therefor, the discharge pipe, the steam pipe connected to the tank, an elevated spray reservoir, the pipe connecting said spray reservoir with the discharge pipe of the vacuum tank, and a pipe connecting the spray reservoir with the steam pipe, substantially as described.

7. The combination of the steam vacuum water tank, a discharge pipe entering the tank at the top, and extending to a point near the bottom of the tank, a collar around the discharge pipe at the top of the vacuum tank forming a steam space communicating with the tank and a steam pipe connected to said collar, substantially as described.

8. The combination of the vacuum water tank, the discharge pipe entering the tank at the top, a collar around said discharge pipe, situated at the top of the tank, a spray device mounted on the discharge pipe below the collar, and a pipe communicating with the steam supply and the spray reservoir so that the steam and spray water will enter the tank through the collar, substantially as described.

9. The combination in a vacuum water tank, of the suction pipe, its valve, the discharge pipe, its valve, the steam inlet pipe, with an elevated spray water reservoir, connected to the discharge pipe, and also connected to the steam pipe, the check valve to prevent the steam from entering the spray reservoir but which will allow the flow of water from the spray reservoir to the tank, substantially as described.

10. The combination in a vacuum tank, of the suction pipe and discharge pipe therefor, with a steam pipe, a spray water reservoir connected to said steam pipe and to the discharge pipe, said steam pipe being enlarged from the point where it connects with the spray reservoir to the vacuum tank, substantially as described.

11. The combination of the vacuum tank, the suction pipe, the discharge pipe, steam inlet pipe, the storage tank mounted above the vacuum tank, a spray water reservoir coupled to the discharge pipe and the steam pipe, and communicating with the storage tank, substantially as described.

12. The combination in a vacuum tank, of the suction pipe therefor, discharge pipe, a storage tank, said discharge pipe extending above said storage tank, a steam pipe also extending above the storage tank and connected to the vacuum tank, a spray reservoir connected to the discharge pipe and to the steam pipe and communicating with the storage tank, substantially as described.

13. The combination of the vacuum tank, its suction pipe, the discharge pipe therefor, and the steam pipe, a storage tank, a spray water reservoir mounted within the storage tank and communicating therewith, connecting pipe connecting the spray water reservoir with the discharge pipe of the vacuum tank and with the steam pipe, substantially as described.

14. The combination of the suspended vacuum tank, its discharge pipe, and suction pipe, a storage tank, spray reservoir mounted within the storage tank and connected to the discharge pipe and with the storage tank, said discharge pipe extending above the storage tank, and terminating below said tank, in the form of a goose neck, a valved outlet for the storage tank, communicating with the said discharge pipe, a steam inlet pipe communicating with the vacuum tank, and connected to the spray water reservoir, substantially as described.

In testimony whereof we have signed our names to this specification in the presence of two subscribing witnesses.

PAUL SATTELKAU.
HERMAN R. WINKELMANN.

Witnesses:
WILLIAM A. BARR,
JOSEPH H. KLEIN.