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G. SPEARMAN.

COMBINED TRACTION WHEEL AND WATER TANK.

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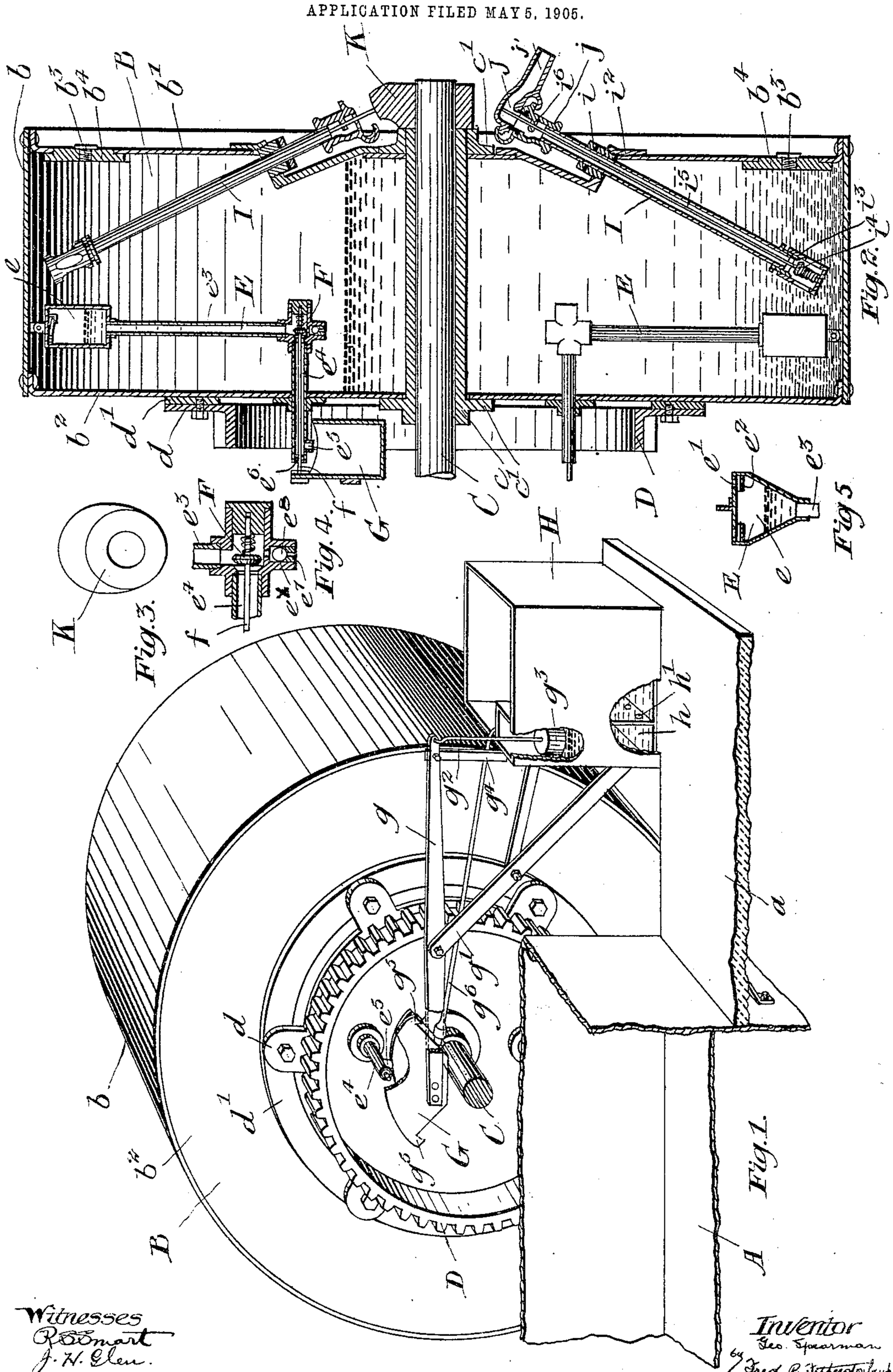


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# UNITED STATES PATENT OFFICE.

GEORGE SPEARMAN, OF WINNIPEG, CANADA.

## COMBINED TRACTION-WHEEL AND WATER-TANK.

No. 801,276. Specification of Letters Patent. Patented Oct. 10, 1905.

Application filed May 5, 1905. Serial No. 259,062.

*To all whom it may concern:*

Be it known that I, GEORGE SPEARMAN, farmer, of the city of Winnipeg, in the county of Selkirk, Province of Manitoba, Dominion of Canada, have invented new and useful Improvements in Combined Traction-Wheels and Water-Tanks, of which the following is a specification.

My invention relates to improvements in traction-engines; and the objects of my invention are to provide a combined traction-wheel and water-tank whereby the water necessary for use in the operation of the boiler may be conveniently carried without materially increasing the load to be propelled by the engine, further objects being to cause the rotation of the traction-wheel to automatically pump the required amount of water and to provide means to regulate the amount of water pumped; and it consists, essentially, of a hollow traction-wheel adapted to contain water, a plurality of gravity-pumps located therein and having discharge-orifices external to the wheel, normally closed valves for said discharge-orifices, means controlled by the movement of the wheel for intermittently operating said valves, a supply-tank for the boiler and means operated by a predetermined accumulation of the water in said tank to automatically cause the operation of said pumps to cease, the various parts of the device being constructed and arranged in detail, as hereinafter more particularly described.

Figure 1 shows a perspective view of my combined traction-wheel and water-tank on the side nearest the boiler, parts of the device being shown in section to more clearly show the construction. Fig. 2 is a sectional view through the center of my combined traction-wheel and water-tank. Fig. 3 is an end view of the cam K shown in Fig. 2. Fig. 4 is an enlarged sectional detail of the valve F shown in Fig. 2. Fig. 5 is a detail showing a longitudinal section through the pump-chamber *e* shown in Fig. 2.

In the drawings like letters of reference indicate corresponding parts in each figure.

A represents a portion of the engine-boiler provided with the usual rear end platform *a*.

B is a traction-wheel which in accordance with my invention is made in the form of a hollow cylindrical tank comprising a suitable rim *b* and side plates $b'$ $b^2$, suitably secured together with water-tight joints. A plurality of plugs $b^3$ are secured into plates $b^4$, which are secured with water-tight joints to one or both sides of the wheel. When the plugs $b^3$ are removed, water may be conveniently introduced through the aperture then provided in the plate $b^4$.

C is the axle of the traction-wheel, which is rigidly secured to suitable bearings on the boiler A, which bearings, forming no part of my invention, need not be here described. The connection between the axle and the traction-wheel may be of any suitable water-tight character, that I prefer to use being a sleeve-like bearing-hub *c*, having flanges $c'$ rigidly secured to the side plates of the wheel with water-tight joints. The driving mechanism of the traction-wheel forming no part of my invention need not be here described, D representing the annular gear, preferably provided with a plurality of lugs *d*, which are bolted to a plate $d'$, which is suitably secured to the side plates.

A plurality of gravity-operated discharge-pumps E are provided in the interior of the wheel, comprising pump-chambers *e*, provided with a plurality of inlet-passages $e'$, adapted to be opened or closed at the proper time by gravity-operated check-valves $e^2$, of the flapper type, and subtantially radial tubes $e^3$, which afford communication between the outer chamber *e* and a discharge-tube $e^4$, provided with a discharge-orifice $e^5$. A spring-operated valve F, normally remaining closed, is provided in the discharge-tube $e^4$, the valve-stem *f* thereof extending through a plug $e^6$ in the end of the discharge-pipe $e^4$. It will be understood that while preferring the above form I do not limit myself to the exact construction, as there are many other forms of pumps which would work in my device.

Directly below the discharge-orifice $e^5$ a catch-box or hopper G is secured to the free end of a lever *g*, which is pivoted intermediate of its length to a frame $g'$ or other suitable support. The inner end of the lever is connected by suitable means, such as a rod $g^2$, to a float $g^3$, which floats in the vertical compartment *h* of the water-tank H. The sides of the compartment *h* are provided, near the bottom thereof, with a plurality of openings $h'$, which afford communication for the water between the compartment and the rest of the tank. This compartment affords a vertical guide for the float $g^3$. An arm or dog $g^4$ is pivotally

secured near the end of the lever *g* and is normally gravity-held in an inoperative position, but is adapted to be engaged with the edge of the tank H for the purpose which will presently appear. A segmental cam $g^5$ is made integral with or secured to the top of the hopper G, the valve-stem *f* of the valve F normally coming in contact with the said cam-plate during its rotation and being forced inwardly thereby, thus opening the valve F and permitting any water which may be in the pump-chamber *e* to flow out through the discharge-orifices $e^5$ into the hopper G. A suitable tube $g^6$ leads through the bottom of the hopper into the tank H. At the juncture of the tubes $e^3$ and $e^4$ a hollow head $e^\times$ inwardly extends, in which is secured a perforated plug $e^7$, the perforation of which is adapted to be closed by a check-valve $e^8$ in the form of a ball.

To allow for the withdrawal of water from the traction-wheel when not in motion, I provide a plurality of tubes I, which preferably extend through stuffing-boxes *i*, secured in plates $i^2$, secured to the outside of the wheel. To the inside ends of the tubes I, which are near the periphery of the wheel, are secured suitable valve-housings $i^3$, in which are spring-seated valves $i^4$, normally closing the inner ends of the said tubes. A valve-stem $i^5$ is secured to the valve and extends through the tube I and guide-lug $i^6$, provided therein, and protudes beyond the surface of the outside plate $b'$.

To the ends of the tube I, which extend external to the plate $b'$, are secured the sections *j* of a two-part coupling J, the sections $j''$ of which are detachable and applicable in working position by a pivoted movement. There are many forms of water-tight couplings which might be used for this purpose, all of which are well known to those familiar with the art and so need not be here described.

K is a cam rigidly secured to the outer end of the axle C and adapted to be engaged by the valve-stem $i^5$ in its movement, whereby when the valve is in its uppermost position the valve-stem will have been forced inwardly by the cam, and so will open the valve.

Having now described the various parts of my mechanism I will briefly indicate the method of operation of the same. The traction-wheel will be filled with water through the openings in the plates $b^4$ to any desired level. Under the rotation of the wheel as the pump-chamber *e* is turned downward it will be submerged in the water contained within the wheel and flapper-valve $e^2$, thereby opening under pressure of the water which will run into the chamber and tube $e^3$ and fill the same. When under the continued rotation of the wheel the pump-chamber *e* and tube $e^3$ are thrown into a substantially vertical position, the end of the valve-stem *f* protruding beyond the tube $e^4$ will come in contact with the cam-plate $g^5$, which, we will assume for illustration, stands in its operative position, as shown in the drawings. This cam pressing on the valve-stem forces the valve F open and permits the water to run by gravity from the pump-chamber *e*, through the tube $e^3$, through the tube $e^4$, and out through the orifice $e^5$ into the hopper G, from whence it will run through the tube $g^6$ into the water-tank H. The chamber *e* being in a vertical position, the gravity-valves $e^2$ will be open, as shown, thus permitting the air to flow into the pump-chamber to displace the water discharged. At the same time as this operation has taken place with regard to the pump E one of the inlet-tubes I has also been brought into a vertical position and the valve-stem $i^5$ of the valve contained therein having come in contact with the cam K will have opened the valve $i^4$, thus permitting air to enter through the tube I into the interior of the wheel to displace the water which has been pumped out therefrom by means of the pump E. Automatic means are thus provided for admitting air to the interior of the wheel as the water is discharged therefrom. When the pump-chamber *e* is turned downwardly and submerged in the water, the ball check-valve $e^8$ will open up, thus permitting the air to flow out of the chamber *e* as it is displaced by the water flowing in. When it is desired to withdraw water from the wheel when in a stationary position, the detachable coupling is used connected to the inlet-tube I, as shown in working position in the lower part of Fig. 2. When thus applied, the detachable head $j'$ of the coupling will press the valve-stem $i^5$ inwardly, thus opening the valve $i^4$. When, however, the traction-wheel is in motion, the part $j'$ of the coupling will be removed, so that the valve $i^4$ will normally remain closed except in its upright position. When the coupling J is applied, a hose may be attached thereto and the water withdrawn from the interior of the wheel by the usual engine-actuated pump. Whenever by the rotation of the wheel water is accumulated in the tank H above a predetermined point, the float $g^3$ will be raised, thus lowering the hopper G, carrying the cam-plate $g^5$ below the circular line of movement of the outer ends of the valve-stem *f*, thus temporarily stopping the action of the gravity-pump by permitting the valve F to remain closed under action of the spring operating it. Whenever the water in the tank H again lowers, the weight of the float $g^3$, acting through the lever *g*, will again move the hopper upward and carry the cam $g^5$ back into its operative position, where it will act upon the valve-stem *f* to intermittently open the valve F, as already described.

Should it for any reason be desirable to have the pumping of the water entirely cease, the lever *g* may be raised until the gravity-held arm or dog $g^4$ thereof engages the edge of the tank. The apparatus is so arranged that when in this position the cam $g^5$ will be

altogether out of the circular line of movement of the valve-stem *f*, and so the pump will cease to operate.

It will thus be seen that I have devised a convenient and efficient way of carrying the water for use in the boiler of a traction-engine. Means are also provided for pumping the water automatically as required and for admitting air to the inside of the wheel as the water is withdrawn therefrom.

It will be understood that in carrying out the construction of my device certain changes may be made in the details thereof without departing from the spirit of my invention.

Although I have described my invention with reference to the carrying of water for a traction-engine, it will be readily understood that with very little change it could be used to carry any other form of liquid which might serve as a fuel for the engine, such as oil, gasolene, or the like. I therefore do not limit myself to the application of my invention to a traction-engine, but claim the right to use the combined liquid-tank and vehicle-wheel in any form in which it may be possi- to use it.

What I claim as my invention is—

1. In a device of the class described the combination with a hollow wheel adapted to contain a liquid, of means for pumping the water therefrom, while the wheel is in motion as and for the purpose specified.

2. In a device of the class described the combination with a hollow wheel adapted to contain a liquid, of means automatically operated by the rotation of the wheel for pumping water therefrom as and for the purpose specified.

3. In a device of the class described the combination with a vehicle-wheel adapted to contain a liquid, of a plurality of gravity-pumps located within the wheel and having discharge-orifices external to the wheel, normally closed valves for said discharge-orifices and means controlled by the movement of the wheel for intermittently operating the same as and for the purpose specified.

4. In a device of the class described the combination with a hollow vehicle-wheel adapted to contain a liquid of a plurality of gravity-pumps located within the wheel and having discharge-orifices external to the wheel, a plurality of normally closed valves for said discharge-orifices, valve-stems secured to said valves and protruding beyond the side plate of the wheel and a cam-plate supported independently of the wheel and adapted to coact with said valve-stem to intermittently operate the valves as and for the purpose specified.

5. In a device of the class described the combination with a hollow vehicle-wheel adapted to contain a liquid, of a plurality of gravity-pumps carried by said wheel and adapted to normally operate during a certain portion of the rotation of the wheel, a tank means for conveying the liquid-discharge of said pumps to said tanks and means operated by a predetermined accumulation of liquid in the tank to temporarily throw the pumps out of action as and for the purpose specified.

6. In a device of the class described the combination with a hollow wheel adapted to contain a liquid, a plurality of gravity-pumps carried by said wheel and adapted normally to discharge during a certain portion of the rotation of the wheel, a plurality of normally closed valves for said pumps, a plurality of valve-stems therefor extending externally beyond the side plate, a cam-plate adapted to coact with said valve-stem to intermittently operate said valves, a tank, means for conveying the liquid discharged by said pump to said tank, and means operated by a predetermined accumulation of the liquid in the tank to temporarily withdraw said cam-plate from its operative position in relation to said valve-stem as and for the purpose specified.

7. In a device of the class described the combination with a hollow vehicle-wheel adapted to contain a liquid, of a plurality of gravity-pumps carried by said wheel, a plurality of normally closed valves therefor, a plurality of valve-stems for the same extending externally to the side plate of the wheel, a cam-plate adapted to coact with said valve-stems to intermittently operate the valves, a tank, means for conveying the liquid discharged by said pumps to said tank, a lever pivoted intermediate of its length and supporting the cam-plate at one end thereof, a float in said disk, means for connecting said float to the end of said lever as and for the purpose specified.

8. In a device of the class described the combination with a hollow vehicle-wheel adapted to contain a liquid, a plurality of gravity-pumps carried by said wheel and provided with discharge-orifices external to the wheel, normally closed valves therefor, a plurality of valve-stems for said valves extending externally to the side plate, a cam-plate adapted to coact with said valve-stems to intermittently operate said valves, a hopper integral with said cam-plate, adapted to receive the discharge from said pumps, a tank, suitable connections conveying the liquid from said hopper to said tank, and means operated by a predetermined accumulation of liquid in said tank to temporarily withdraw said cam-plate from in contact with said valve-stems as and for the purpose specified.

9. In a device of the class described the combination with a hollow vehicle-wheel adapted to contain liquid, of a plurality of gravity-pumps located within the wheel and comprising liquid-chambers near the periphery of the wheel provided with gravity-operated valves, ball check air-admitting valves adapted to cooperate with said gravity-operated valves to admit and discharge the liquid to and from said pumps as and for the purpose specified.

10. In a device of the class described the combination with a hollow vehicle-wheel adapted to contain liquid, a plurality of gravity-pumps contained in the interior thereof comprising liquid-chambers near the periphery of the wheel provided with gravity-operated valves, ball check air-admitting valves adapted to coöperate with said gravity-operated valves to admit and discharge the water, to and from said pumps, discharge-tubes for said pumps extending external of the wheel, valves for said discharge-tubes, normally closed valves, and means controlled by the rotation of the wheel for intermittently operating said valves as and for the purpose specified.

11. In a device of the class described the combination with the hollow vehicle-wheel adapted to contain liquid, of a plurality of normally closed air-admitting tubes and intermittent automatic means for opening the same as and for the purpose specified.

12. In a device of the class described the combination with a hollow wheel adapted to contain liquid, a plurality of air-admitting tubes, normally closed valves therefor, valve-stems secured to said valves and extending external of the said wheel, a non-rotatably-supported cam adapted to coact with said valve-stems to operate said valves by the rotation of the wheel as and for the purpose specified.

13. In a device of the class described the combination with a hollow vehicle-wheel adapted to contain liquid, of a plurality of normally closed tubes extending to the interior of the wheel through the side thereof, and adapted when open to admit air to the interior of the wheel or to permit the discharge of the liquid therefrom, detachable couplings for said tubes and means whereby the detaching of said coupling closes the tubes as and for the purpose specified.

14. In a device of the class described the combination with a hollow vehicle-wheel adapted to contain a liquid, of means operated by the rotation of the wheel to pump the liquid from the interior thereof and means for automatically intermittently admitting air to replace the liquid discharged as and for the purpose specified.

Signed at the city of Ottawa, in the Province of Ontario, this 2d day of May, 1905.

GEORGE SPEARMAN.

Witnesses:
RUSSEL S. SMART,
MAY LYON.