(No Model.)

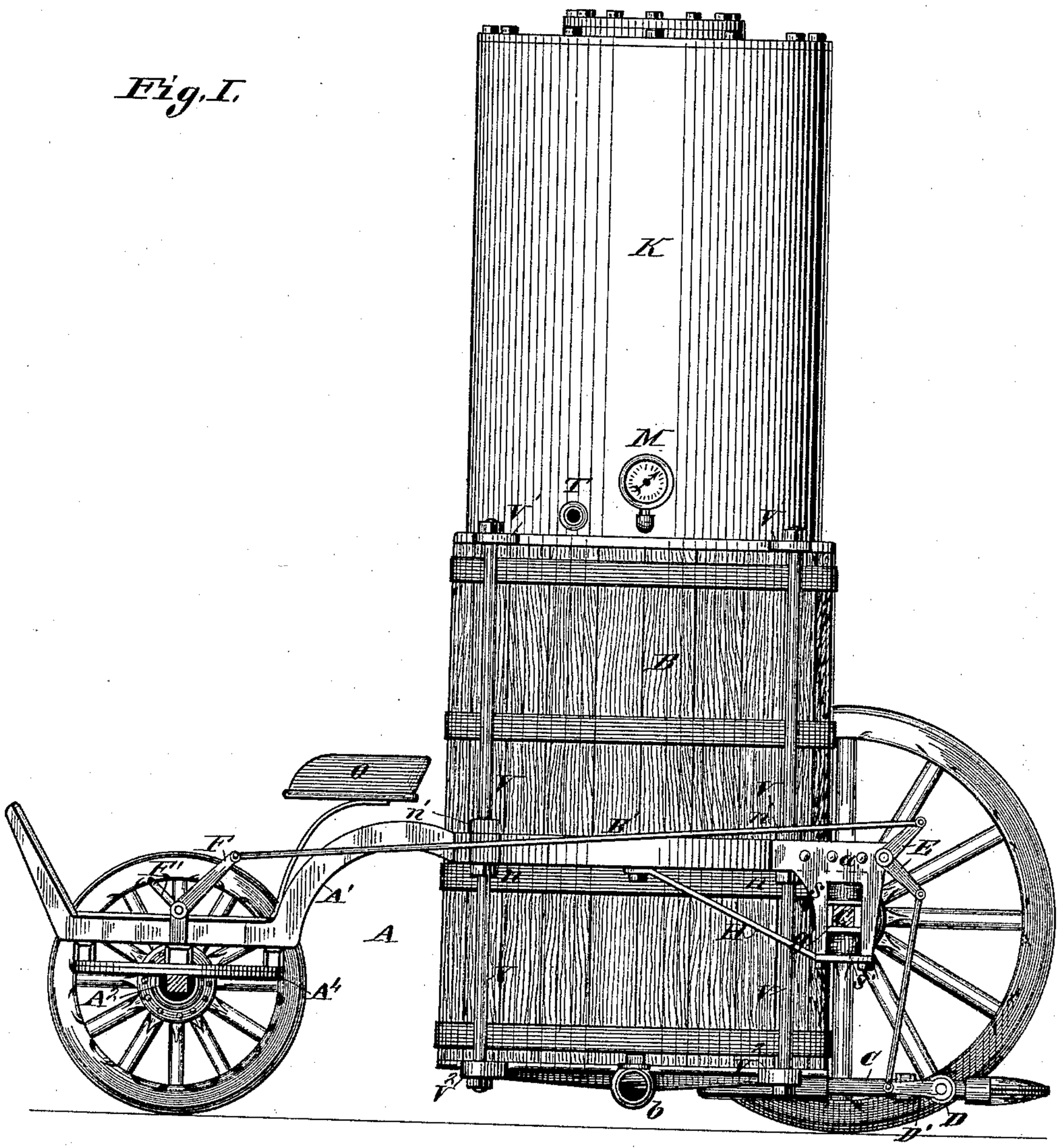
3 Sheets—Sheet 1.

W. M. ECCLES.

WATER SPRINKLER.

No. 436,406. Patented Sept. 16, 1890.

Fig. 1.



Attest;
Charles Pickles
Bowling Lewis

Inventor;
Wm M Eccles.

(No Model.) 3 Sheets—Sheet 2.

W. M. ECCLES.

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Fig. II

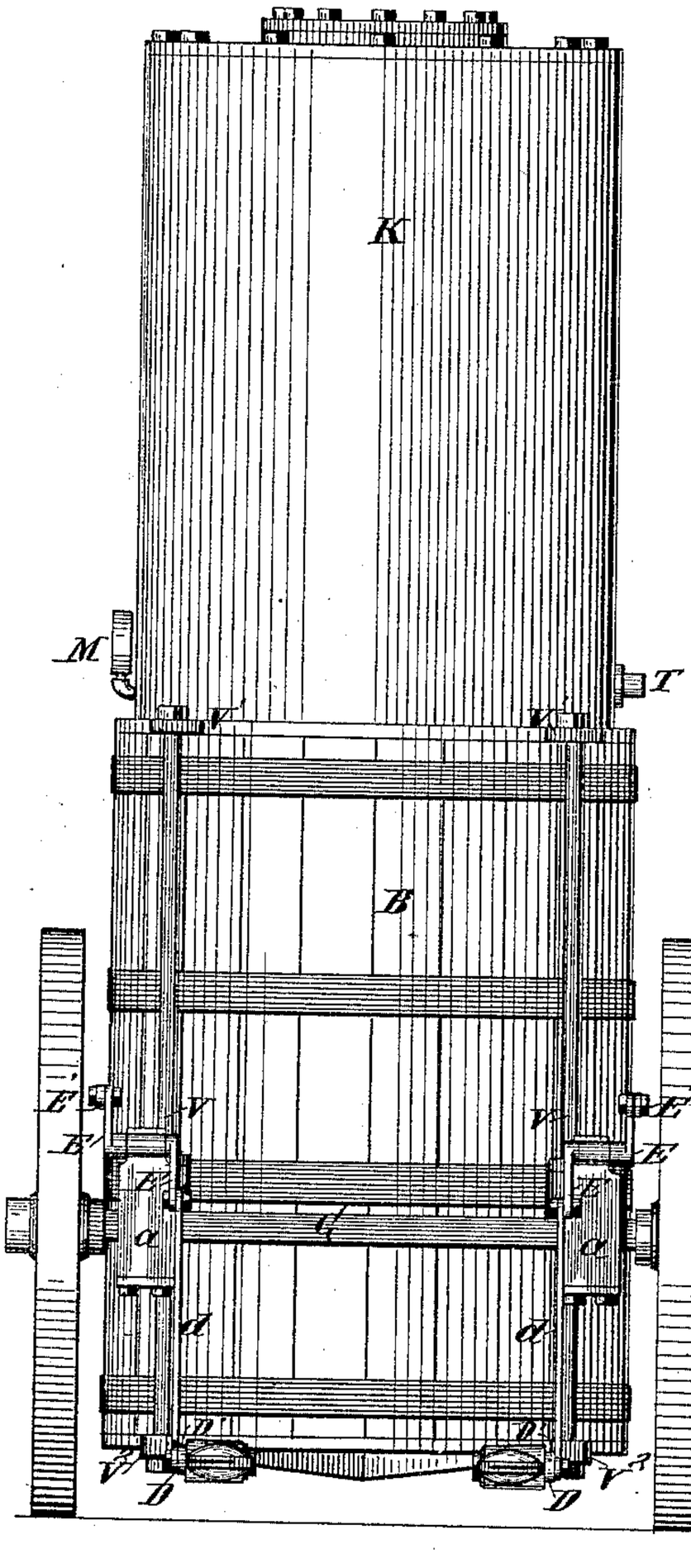
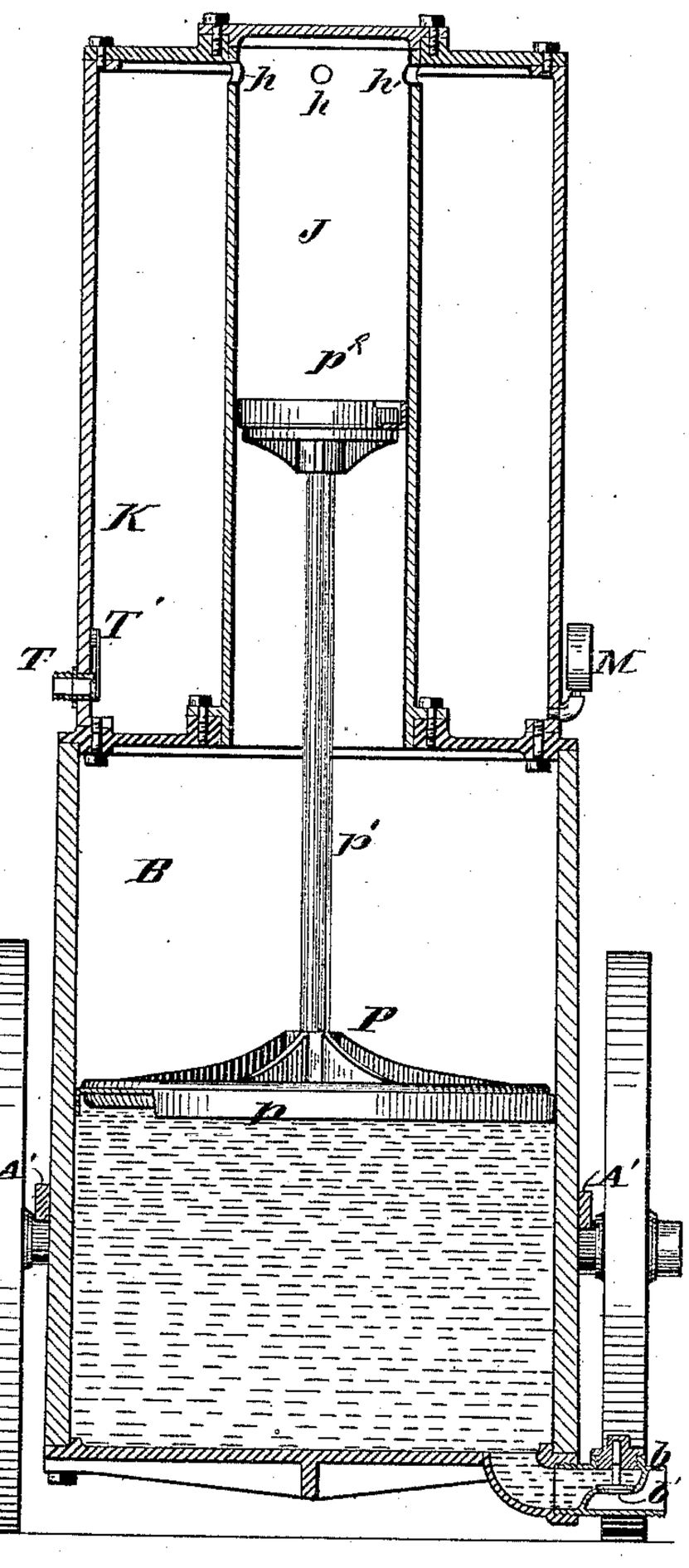


Fig. III



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Inventor:
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(No Model.)

3 Sheets—Sheet 3.

W. M. ECCLES.

WATER SPRINKLER.

No. 436,406. Patented Sept. 16, 1890.

Fig. 4.

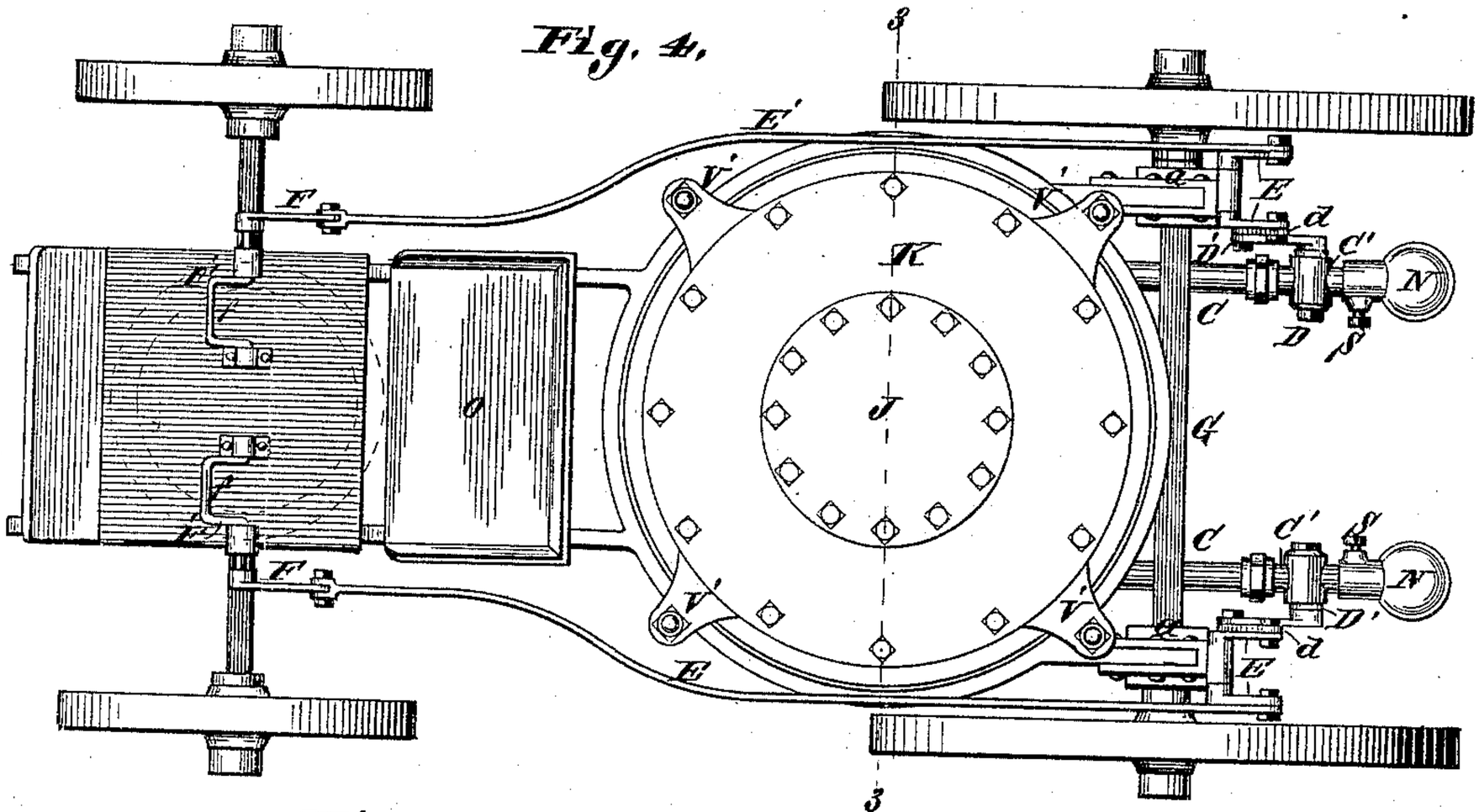
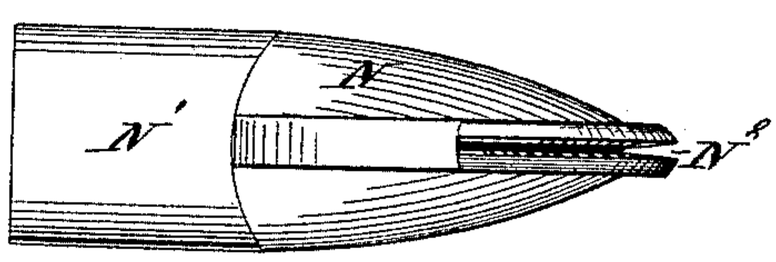


Fig. 5.

Fig. 6.



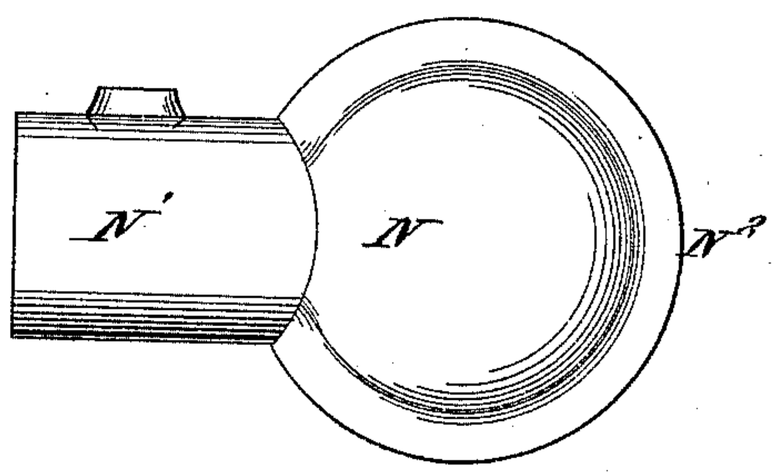


Fig. 7.

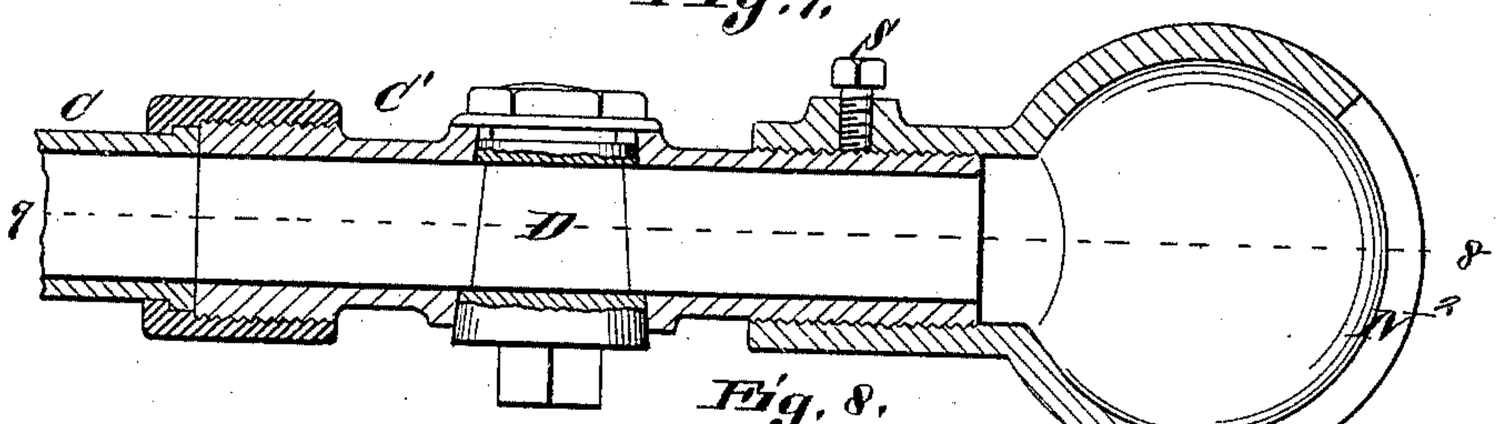
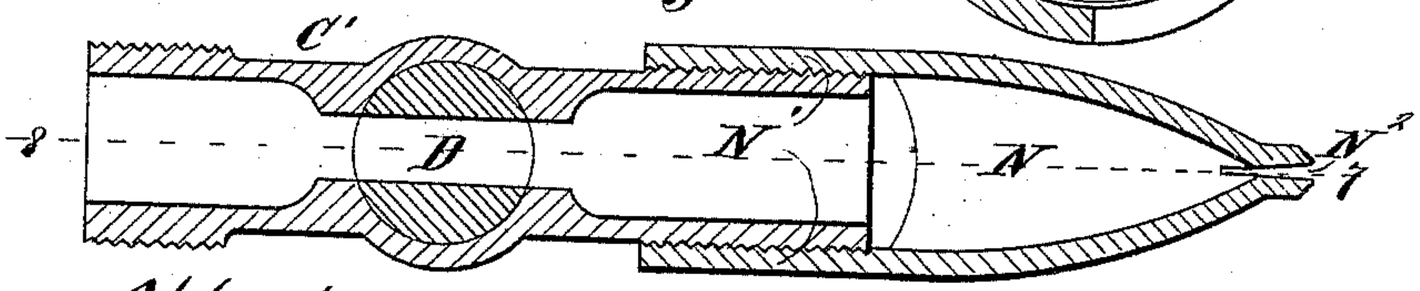


Fig. 8.



Attest;
Charles Pickles
Borling & Laus

Inventor;
Wm M Eccles.

UNITED STATES PATENT OFFICE.

WILLIAM M. ECCLES, OF ST. LOUIS, MISSOURI.

WATER-SPRINKLER.

SPECIFICATION forming part of Letters Patent No. 436,406, dated September 16, 1890.

Application filed April 7, 1890. Serial No. 346,962. (No model.)

To all whom it may concern:

Be it known that I, WILLIAM M. ECCLES, a citizen of the United States, residing at the city of St. Louis, in the State of Missouri, have invented a new and useful Improvement in Water-Sprinklers, of which the following is a specification.

My invention relates to water-sprinklers; and it consists, first, in means for utilizing a fixed and continuous quantity of compressed air or other yielding substance confined in an air-tight reservoir to force water from a water-reservoir; second, it consists in means for utilizing the water-pressure in water-mains to force the water from portable water-reservoirs for sprinkling and other purposes; third, it further consists in means for securing approximately uniform pressure on the water in the portable water-reservoir during its entire discharge from the same; fourth, it also consists in means for forcing water by approximately equable pressure from a portable water-reservoir onto a street or the ground a greater distance than could be done by force of its own gravity without extra draft on the team, and, fifth, it further consists in the construction and combination of parts hereinafter described and claimed.

The objects of my invention are, first, to secure uniform pressure on the water in a portable water-reservoir during the entire discharge of the water therefrom; second, to utilize the pressure of water which it has in street-mains to expel it from a portable water-reservoir onto a street or the ground; third, to expel water from a water-reservoir by means of a fixed and continuing quantity of compressed air confined in an air-chamber; fourth, to expel the water from a portable water-reservoir over the street with approximately the same pressure which it has in the water-mains and by which it is forced into the reservoir, and, fifth, to expel water from a portable water-reservoir into the street, without increasing the draft of the truck carrying the same, with sufficient force to throw the water a greater distance than it could be thrown by its own gravity. I attain these objects by the mechanism shown in the accompanying drawings, in which—

Figure I is a side elevation of my sprinkler. Fig. II is an end elevation of the same. Fig. III is a vertical section of the sprinkler drawn on line 3 3, Fig. IV. Fig. IV is a plan view of the sprinkler. Fig. V is a side elevation of one of the sprinkling-nozzles detached from the sprinkler. Fig. VI is a plan view of the same. Fig. VII is a longitudinal section of the nozzle, its connecting-pipe and valve, drawn on line VII VII in Fig. VIII. Fig. VIII is a longitudinal section drawn on line VIII VIII in Fig. VII.

A is the running-gear of a four-wheeled truck, consisting of frame, arched side sills A′, front and hind axles A^2 G, and fifth-wheel A^4, all mounted on wheels and adapted to carry a water-reservoir and air-reservoir and mechanism connected therewith.

B is a water-reservoir made of uniform diameter on the inside. It is securely fastened, preferably in an upright position, to the running-gear A in any suitable manner and is placed near the ground, in order that the weight may be near the ground, and in order that the sprinkling-nozzles may also be near the ground, so as to throw the water beneath passing vehicles, and not onto them. This water-reservoir is provided with an inlet *b*, communicating with the interior of the water-reservoir and situated near the bottom of the same and adapted to be connected with a street water-main of ordinary water-works by an ordinary connecting-hose, whereby the water from street-mains can flow into the water-reservoir B.

b′ is an ordinary check-valve situated in the body of the inlet *b*, operating to prevent the water from flowing out of the reservoir through the inlet *b*, but which will permit it to flow in through the same. The water-reservoir is also provided with two outlet-pipes C C, which connect the sprinkling-nozzles with the water-reservoir and make an open connection between the interiors of the nozzles and the interior of the reservoir, so as to permit the flow of water from the reservoir into and through the sprinkling-nozzles. The whole bottom of the water-reservoir B is preferably made of one piece of cast-iron, having the neck of the inlet cast integral therewith, as shown. These outlet-pipes C C are each connected interiorly with the reservoir B near the bottom, and to each of these outlets at their outer ends is fastened a connecting-pipe

C′, which connects the sprinkling-nozzle to the outlet-pipe. These connecting-pipes are each provided with a common plug-valve D, situated transversely through the body of the connecting-pipe. Each plug-valve has its stem provided with a crank D′, to the free end of which is pivotally connected a crank-rod *d* at one of its ends, and which has the other end connected pivotally to one arm of a double-crank lever E, which double-crank lever E is fulcrumed on the rear end of the running-gear A. To the other arm of this double-crank lever E is pivotally connected a crank-rod E′ at one end and at the other end the crank-rod is connected to the free end of the crank-lever F, which is secured to the end of a treadle-rod F′, journaled in the front part of the running-gear A. This treadle-rod is bent out, so as to form a treadle *f* for the driver to operate the valves with by pressure of the foot on the foot-treadle.

N is a sprinkling-nozzle having a neck N′ and a mouth N². The neck is adapted to screw over the end of the connecting-pipe C′, and is provided with a set-screw S, which serves to hold the nozzle N in any fixed position on the connecting-pipe C′. The mouth of this nozzle is made by extending the walls of the neck into disk-shaped walls having the lips slightly separated at their rear and side portions when attached to the connecting-pipes C′ in place on the sprinkler, operating to throw the water out under pressure in a thin and approximately horizontal sheet. This nozzle is rendered adjustable by the set-screw S, and may be turned at pleasure on the connecting-pipe C′, so as to direct the sheet of water low or high, as desired, or deflect it from a horizontal course. This rotatable adjustment of the nozzle enables the operator to direct that part of the sheet of water which passes out at the side of the nozzle and which is directed toward the curb of the street either high or low, to suit the pressure on the water and direct the sheet of water just to the curb and no further. By driving in the middle of the street and by thus adjusting the nozzles to suit the pressure which may happen to be in the street-mains where the machine is being used he will be enabled to sprinkle from curb to curb and not throw the water on the sidewalk, which is very desirable in a sprinkler.

The rear portion of the frame of the running-gear has a jaw-shaped attachment *a*, adapted to encompass a movable box *g*, which moves up and down between the jaws and through which the hind axle G passes. Inserted between this box and the base of the jaw-shaped attachment *a* is a rubber spring *s* to relieve the axle from jar. Inserted between the lower part of this block and the brace-bar H is another rubber spring *s*′, which prevents the rebound.

The interior of the water-reservoir B is provided with a piston or pressure head P, fitting the interior of the water-reservoir and packed with a hydraulic packing *p*, which renders the pressure-head water-tight as it moves up and down in the interior of the water-reservoir. This hydraulic packing *p* consists of a strip of leather, which surrounds the head and has its lower edge pressed out against the side of the water-reservoir by the pressure of the water against its inside surface, so as to prevent the water from passing up between the side of the reservoir and the outside of the leather. The lower edge of the periphery of the piston-head is rounded off, so as to facilitate the outward pressure of the water against the packing. This piston or pressure head is provided with a piston-rod P′ securely connecting it with another smaller piston-head P². This smaller piston-head is also provided with an air-tight packing *p*′, which packing is preferably made of leather and in construction like the packing *p*. This piston-head is adapted to move up and down in its air-tight cylinder J in unison with the piston-head P. This cylinder J is made of metal with a smooth bore, and is preferably incased within the air-reservoir K which surrounds it. Its interior communicates with the interior of the reservoir K by open connections or holes *h*, near the top of the same, sufficiently large and numerous to allow a free passage of compressed air or other fluid from the interior of the reservoir into the cylinder J as the piston-head *p*² descends, and a free passage of the same compressed air back from the cylinder P² to the interior of the air-reservoir K as the piston-head *p*² ascends. This air-reservoir is supplied with an inlet-pipe T, provided with appropriate means for attaching a hose on its outer end, and with a common leather check-valve T′ on its inner end, and serves to make an open communication between an ordinary air-pump and the interior of the air-reservoir and allow compressed air to pass into the reservoir and retain it there. It is also provided with an ordinary pressure-gage M, which communicates with the interior of the air-reservoir and serves to register the pressure of air in said air-reservoir. This air-reservoir is held securely to the top of the water-reservoir by tie-rods V V, which pass through projections or lugs on the top plate of the air-reservoir K, and down the outside of the reservoir, through the side pieces A′ of the running-gear A, and through similar lugs or projections V² V² on the bottom plate of the water-reservoir B. These rods not only serve to hold the two reservoirs together, but by means of nuts *n* and collars *n*′, the one below and the other above the side piece A′ on the rods V V, serve to hold the two reservoirs in place on the running-gear.

O is seat for the driver.

When the operator desires to sprinkle, he presses his foot on the pedal *f* and opens the valve D, through the medium of the system

of cranks and rods before explained, and when he desires to stop sprinkling he closes the valve by a reverse movement of the pedal.

The superficial area of the pressure-head P^2 is proportionately as much smaller than the pressure-head P as the pressure of air per square inch on it is desired to be greater than the resistance of the water per square inch is on the pressure-head P; but any variation in the diameter or superficial areas of the respective pressure-heads may be made without departing from the spirit of my invention. The object of making the piston-heads of different diameters is to secure, as near as possible, a uniform pressure on the water of the water-reservoir as the piston-head P descends without being compelled to make the air-reservoirs K and J too large and cumbersome. It is obvious that the greater the difference between the capacity of the air-reservoir K to hold compressed air and the capacity of the cylinder J for the same purpose the less will be the difference between the pressure on the water when the piston is at the top and when it is at the bottom of the water-reservoir. The compressed air then displaced by the throw of the piston-head P^2 must be relatively small in proportion to the whole body of air used to secure the least possible variance between the pressure with the piston at the top and that with the piston at the bottom of the water-reservoir, or when it is full and almost empty. For this reason the air-reservoir K is made of much larger dimensions than the cylinder or small air-reservoir J. I prefer to make the larger one about six feet long and about four feet in diameter and the smaller one about six feet long and eighteen inches in diameter, and use these relative sizes with a water-reservoir about six feet long and four feet in diameter. When the air-reservoirs are constructed of about the above relative dimensions and they are charged with a body of compressed air, the compressed air will exercise, through the medium of the piston-heads, a pressure on the water of approximately the same number of pounds to the square inch when the water-reservoir is about empty as when it is full.

The relative dimensions of the reservoirs, as above stated, will cause a near enough uniform pressure on the water for all practical purposes; but the uniformity may be increased by making the air-reservoir K relatively larger than the cylinder J. It is obvious, therefore, that the piston-head P^2 can be increased in diameter to the full size of the piston-head P, if the air-reservoir is correspondingly increased in its capacity, without departing from the spirit of my invention. It is also obvious that the piston-head P^2 can be connected with the piston P by gear mechanism or lever attachment, and the two reservoirs set side by side, whereby the piston-head P^2 will only move a portion of the distance along the cylinder J during the time the piston-head P moves the whole distance down the water-reservoir without departing from the spirit of my invention.

Now to use my sprinkler, first fill the air-reservoir with compressed air to a pressure of air that will give a pressure on the piston-head P a little less than the pressure in the street water-mains from which you desire to take the water. Then from the connection with the street water-main and the inlet-pipe *b*, turn the water into the water-reservoir B, and the pressure of the water in the water-main being greater than the resistance of the air-pressure on the piston-head P, the piston-head P will rise until the water-reservoir is filled with water and the piston-head P has risen to the top of the water-reservoir. The water then is shut off and the connection between the street water-main and the inlet-pipe is severed, and the sprinkler is ready to go on the street. When the operator opens the valve D with his foot, the water rushes out through the sprinkling-nozzle with a pressure slightly less than the pressure in the street water-main from which it was taken, and will continue to so flow with approximately uniform pressure until the piston-head P has reached the bottom and the water has been all expelled from the water-reservoir without any loss of compressed air. The process can again be repeated with the same effect as before. All the operator has to do is to see to it that the pressure of air in the air-reservoir will offer a less resistance per square inch on the piston-head P than the pressure per square inch in the street water-main from which he desires to take the water, and of sufficient pressure to expel the water from the center of the street to the curb. Thus it is evident that the pressure in the water-main is readily and successfully utilized in expelling the water from the water-reservoir onto the street or ground, without any extra draft or work for the team, by using a confined yielding cushion of compressed air or other elastic fluid within which to store the pressure in the street water-mains by adapting it to cause the compressed air to yield as the water is forced into a water-reservoir.

By this device I have a light and cheap and durable compressed-air spring which takes up the pressure in the street water-mains as the water is forced into the water-reservoir and causes the same pressure to act upon the water to force it out of the reservoir with approximately the same force with which it entered, and by this device, also, is secured the approximately uniform pressure on the water during its entire flow from the water-reservoir, both of which are very essential in a sprinkler.

Now what I claim, and for which I ask Letters Patent of the United States to be granted to me, is—

1. A water-sprinkler consisting of a water-reservoir provided with a sprinkling nozzle or nozzles for the egress of water, a piston-head

adapted to move to and fro within said water-reservoir, an air-reservoir containing a confined body of compressed air or other yielding substance, a piston-head adapted to move to and fro within said air-reservoir, and suitable mechanism connecting said two piston-heads, whereby they are caused to move in unison with each other and operate to force the water out of the water reservoir through the sprinkling-nozzle with approximately the same force with which it was forced into the water-reservoir, for the purposes set forth.

2. In a water-sprinkler, the combination, with a water-reservoir having nozzles which communicate with the interior of said reservoir, of an air-reservoir adapted to receive and confine a body of air or other elastic substance, a piston-head for said water-reservoir, and a connection between the air-reservoir and the said piston-head, whereby the piston-head is normally forced against the volume of water within the said water-reservoir, for the purpose shown and described.

3. In a water-sprinkler, two air-tight reservoirs adapted to hold a confined body of compressed air or other elastic substance, one being smaller than the other, and having their interiors communicating with each other by an open passage-way, the smaller one being provided with a piston-head adapted to move within it, in combination with another reservoir adapted to hold water under pressure and provided with a piston-head movably arranged therein and connected to the first-mentioned piston-head by a piston-rod, and with a water-nozzle having its interior communicating with the interior of the water-reservoir, all combined and operating to discharge water out of the water-reservoir through the nozzle with approximately the same force when the reservoir is about empty as when it is full.

4. In a water-sprinkler, the combination of a water-reservoir mounted upon a running-gear and adapted to hold water, a water-nozzle communicating interiorly with said water-reservoir, an inlet-opening communicating interiorly with said water-reservoir and adapted to admit water from the water-mains in streets into the water-reservoir under pressure, a movable head situated within said reservoir and adapted to recede therein with the advance of the incoming water into the reservoir, and means for resisting said receding movement of the head, whereby the water is expelled out of said reservoir through the nozzle with approximately the same force with which the entrance of the water into said reservoir was resisted, for the purposes set forth.

5. In a street-sprinkler, the combination of an air-tight reservoir in which is stored a fixed quantity of air or other analogous elastic fluid, a water-reservoir having a movable head, a connection between the head and air-reservoir, an inlet-opening in the water-reservoir beneath the said head for receiving water under pressure to force the said head against the said air-pressure, and outlet-nozzles communicating with the interior of the reservoir below the said movable head, substantially as described.

WILLIAM M. ECCLES.

Attest:
FRANCIS VALLÉ,
F. A. SIEFERT.