

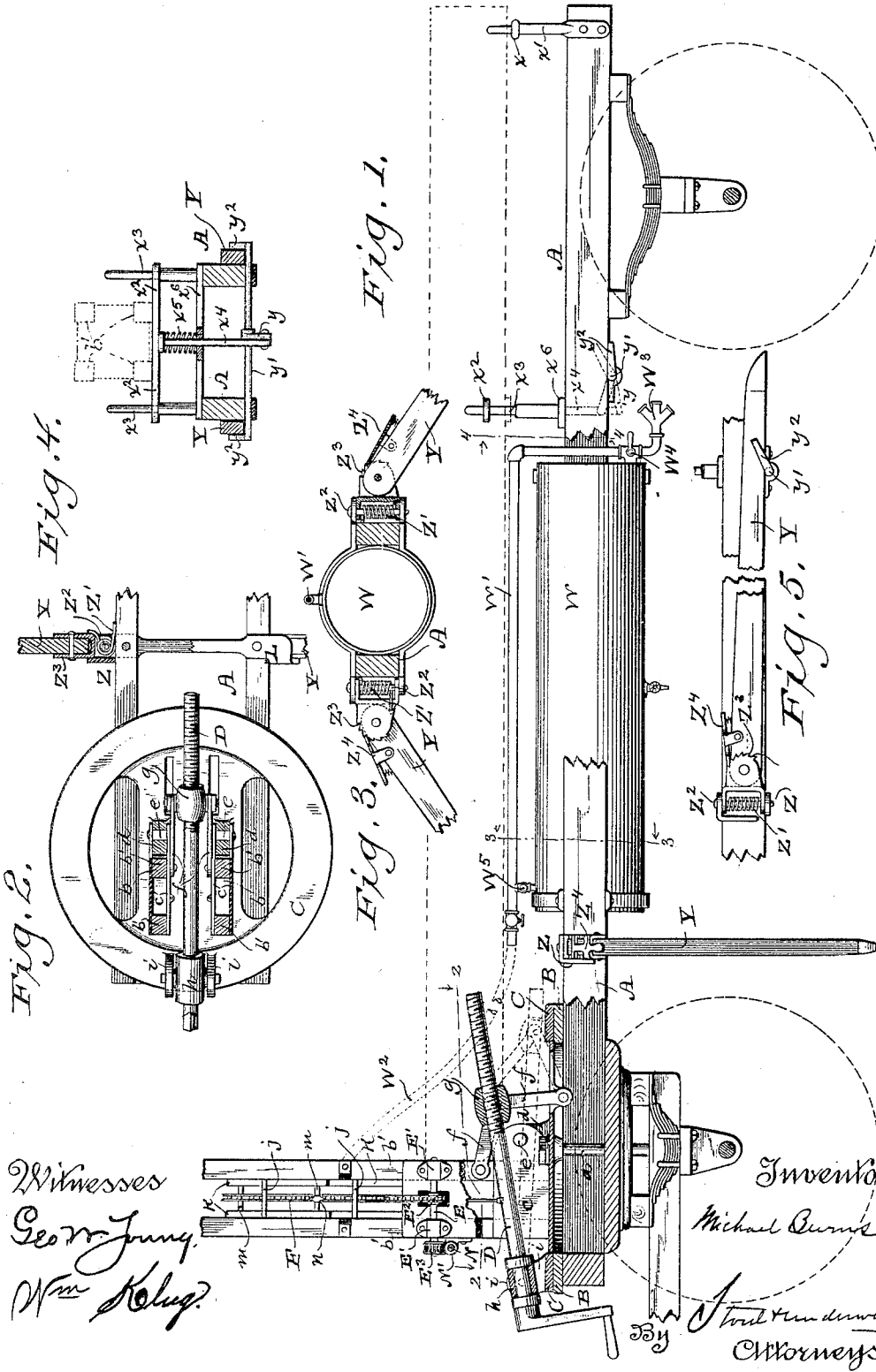
(No Model.)

4 Sheets—Sheet 1.

M. BURNS.
WATER TOWER.

No. 439,383.

Patented Oct. 28, 1890.



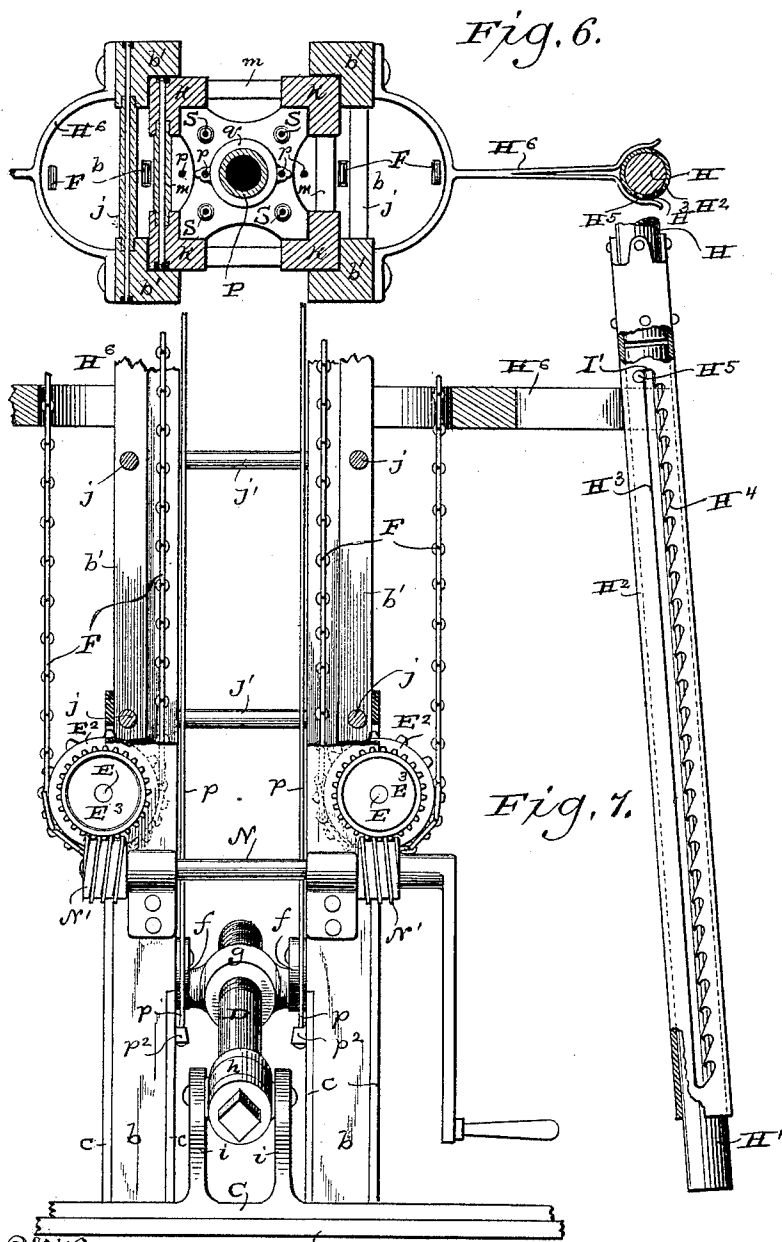
(No Model.)

4 Sheets—Sheet 2.

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Witnesses
Geo. M. Young.
Wm. Kellogg.

Inventor
Michael Burns
By *Stul & Lindwood*
Attorneys

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Fig. 12.

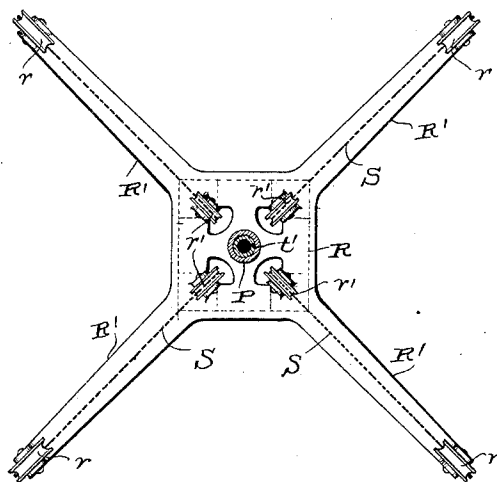


Fig. 15.

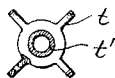


Fig. 14.

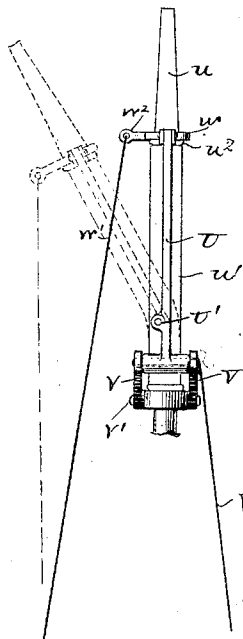
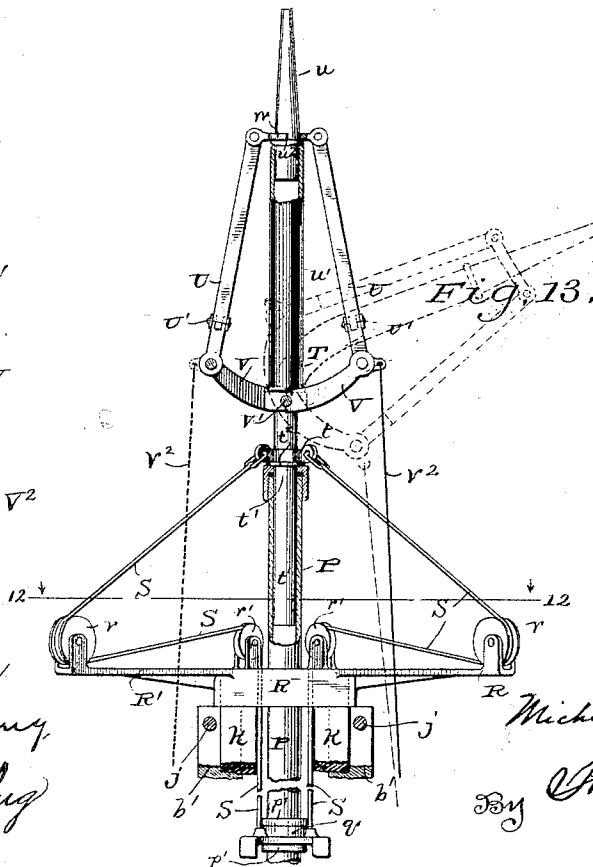


Fig. 13.



Witnesses
Geo. M. Young
Wm. Kellogg

Inventor
Michael Burns
By *Frank H. L. L. L.*
Attorneys

UNITED STATES PATENT OFFICE.

MICHAEL BURNS, OF MILWAUKEE, WISCONSIN.

WATER-TOWER.

SPECIFICATION forming part of Letters Patent No. 439,383, dated October 28, 1890.

Application filed October 31, 1888. Serial No. 289,622. (No model.)

To all whom it may concern:

Be it known that I, MICHAEL BURNS, of Milwaukee, in the county of Milwaukee, and in the State of Wisconsin, have invented certain new and useful Improvements in Water-Towers; and I do hereby declare that the following is a full, clear, and exact description thereof.

My invention relates to that class of portable fire apparatus which is designed to enable one or more streams of water to be thrown from an elevated position, and the superstructure of which is of an extensible and collapsible nature, so as to be readily elevated for use and depressed upon its supporting-vehicle for transportation to and from the place of conflagration.

My invention consists in certain peculiar and novel features of construction and arrangement, as hereinafter described, and pointed out in the appended claims.

In order that my invention may be fully understood, I will proceed to describe it with reference to the accompanying drawings, in which—

Figure 1 is a view partly in side elevation, partly in vertical longitudinal section, and partly broken away of a water-tower truck constructed in accordance with my invention. Fig. 2 is a horizontal section of the lower portion of the water-tower on the line 2 2 of Fig. 1. Fig. 3 is a transverse vertical section of the truck or vehicle on the line 3 3 of Fig. 1. Fig. 4 is a similar view on the line 4 4 of Fig. 1. Fig. 5 is a detached view in side elevation of one of the stays for the truck or vehicle. Fig. 6 is a horizontal section of the upper telescopic tower-section on the line 6 6 of Fig. 9. Fig. 7 is a front elevation of the lower part of the lower tower-section, showing a portion of one of the telescopic tower-stays. Fig. 8 is a horizontal section of the upper telescopic tower-section on the line 8 8 of Fig. 9. Fig. 9 is a central transverse vertical section of the upper tower-section. Fig. 10 is a horizontal section on the line 10 10 of Fig. 9. Fig. 11 is a transverse vertical section of the upper part of the lower tower-section. Fig. 12 is a plan view of the top of the upper tower-section and also a horizontal section of the water-pipe on the line 12 12 of Fig. 13. Fig. 13 is a front elevation of the

upper part of the rigid water-pipe with its nozzle and operative connections. Fig. 14 is a side elevation of the same. Fig. 15 is a horizontal sectional detail on the line 15 15 of Fig. 13. Fig. 16 is a front elevation of the apparatus, the tower being extended to its full height.

The objects of my invention are, first, to produce a portable water-tower which shall combine lightness, compactness, and strength, so that it can be readily and rapidly transported and at the same time be capable of erection to a great height; secondly, to render the tower capable of very rapid erection and collapse, and to enable it and its truck or vehicle to be instantly braced against capsizing while in use; thirdly, to enable the erected tower to be quickly turned axially from the ground, and to enable the nozzle to be properly depressed and elevated either from the ground or from any point upon the tower, and, finally, to further insure the stability of the erected structure by a water-ballast taken from the current of water entering the tower. These results I attain by virtue of the construction which I will now proceed to describe.

Referring to the drawings, A, Fig. 1, designates the truck-frame, which is of the usual elongated form and supported at its front and rear ends by carrying-wheels in the usual manner. Upon the front end of this frame is mounted a base-plate B, preferably of circular form for the sake of lightness, and upon this base-plate rests a turn-table C of corresponding form to the base-plate.

The turn-table C is centered upon the upper end of the king-bolt *a* of the truck, and the lower section of the telescopic tower rests upon the said turn-table. This lower tower-section is of rectangular form in cross-section, it being composed of two oppositely-disposed pairs of uprights *b*, one pair at each side of the truck-frame A when the tower is in its normal position. The uprights of each pair are connected by horizontal rungs *j*, while the two pairs of said uprights are connected by rungs *j'*, so that a ladder is provided at each of the four sides of the tower-section. Upon opposite points from the king-bolt *a* the turn-table C carries two vertical lugs *d*, to each of which is pivoted by a pin *e* one end of a

strap-plate *c*. The lower ends of each pair of uprights *b* are firmly secured to one of these plates *c*, and thus the lower tower-section, as well as the entire tower, is capable of being tilted over rearwardly upon the truck in hinge fashion. The mechanism for thus tilting the tower is as follows: *h* designates a hub, which is trunnioned horizontally between two lugs *i*, which extend upward from the front part of the turn-table C, and through this hub extends a rod D, the front end of which carries a crank-arm or equivalent appliance for imparting axial rotation to the rod, suitable shoulders confining the hub in position upon the rod. The opposite end portion of this rod is externally screw-threaded to receive a nut *g*, which is preferably of greater thickness at its middle than at its ends, and to the opposite sides of this nut are pivoted the adjacent ends of two pairs of toggle-arms *f f*. The upper ends of the upper toggle-arms *f* are pivotally connected to the opposite rear uprights *b*, while the lower ends of the lower toggle-arms are pivotally connected to opposite points on the turn-table C. Thus it will be seen that by revolving the screw-rod D in one direction the nut *g* will be drawn toward the hub *h* and through the pairs of toggle-arms will raise the tower, while by revolving the rod D in the opposite direction the nut *g* will move toward the outer end of the rod, and thus depress the tower horizontally upon the truck. When thus depressed, the lower tower-section rests upon a rigid cross-bar *x*, which is supported horizontally by two vertical standards *x'* at opposite sides of the truck-frame. In its descent into this horizontal position the lower tower-section comes into contact with a vertically-movable horizontal cross-head *x²*, the ends of which loosely embrace two vertical standards *x³*, located at opposite sides of the truck-frame a considerable distance in front of the standards *x'*, above described. Midway of the length of this cross-head is a pendent rod *x⁴*, and a spiral spring *x⁵*, which surrounds the upper part of this rod, is interposed between the upper side of the truck-frame and the under side of the cross-head, thus serving to retain the cross-head in raised position. The lower end of the rod *x⁴* is pivoted to a crank-arm *y* upon a horizontal rock-shaft *y'*, which extends transversely of the truck-frame and has its bearings beneath the same. At its outer end the rock-shaft *y'* is provided with rock-arms *y²* for a purpose to be presently described. Near the front end of the truck-frame, and at opposite sides thereof, are pivoted two stay arms or braces Y. The attached ends of each of these braces are horizontally pivoted to a casting, through the arms of which is passed a vertical pivot-pin Z², that passes also through brackets attached to the side of the truck-frame. A spiral spring Z' surrounds this pin Z², and its ends are so attached to the adjacent parts of the hinge as to throw the brace outward automatically, as presently de-

scribed. The outer end of the casting to which the brace is horizontally pivoted is formed with a segmental ratchet-section Z³, which is engaged by a spring-pawl Z⁴, pivoted upon an adjacent part of the brace. Now, when the tower is resting upon the cross-head *x²* it holds the same in normal position and the latter holds the rock-arms *y²* in their raised position, as shown in Figs. 1 and 4, and the free ends of the stays Y lie horizontally within said rock-arms. When, however, the tower is raised, the spring *x⁵* turns the rock-shaft *y'*, so as to depress the rock-arms *y²*. The springs Z' instantly throw the braces Y outward and the free ends of said braces drop upon the ground, where they are retained rigidly by the pawls Z⁴ and ratchet-segments Z³, thus effectually steadying the truck-frame against strains from the tall extended tower.

In order to add to the stability of the truck, an elongated horizontal water-ballasting tank or reservoir W is mounted centrally upon the truck-frame A, and a water-pipe W' extends above and downward along the rear end of this tank. The lower end of this downward extension of pipe W' is provided with a delta-coupling W³ and just above this coupling with a branch coupling connected to the end of the tank, a three-way cock W⁴ being located at this latter point. The upper forward end of this tank is connected by a valved branch W⁵ with the water-pipe W'. One or more engines or plugs are connected to the coupling W³, and ordinarily the valves W⁴ W⁵ are so turned that the water shall flow directly through the pipe W' to the water-tower, (a flexible pipe W² being connected to the front end of the pipe W' for this purpose,) and the stays Y being usually effective for steadying the truck. During the prevalence of high winds, however, the tank should be filled, and this can be readily accomplished without interrupting the action of the engines or plugs by turning the three-way valve W⁴ and opening valve W⁵, so that the flow to the tower is not affected.

The water-tower is composed of the lower section, before described, and an upper section, which is arranged to move telescopically within the lower section. The uprights *b* of the lower section are formed on their inner sides with V-grooves to receive the uprights *k* of the upper section, and these latter uprights are connected together and in pairs by rungs *m* in similar manner to the uprights of the lower section. Near the bottom of the lower tower-section is journaled a horizontal crank-shaft N, which at its ends carries worms *n*, and these worms rotate worm-wheels E³ upon two shafts E, which are journaled upon opposite sides of the lower tower-section and at right angles to shaft N. The shafts E carry sprocket-wheels E², beneath which pass endless sprocket-chains F. Near the upper end of the lower tower-section are journaled shafts G', which carry sheaves G, over which the said sprocket-chains F pass. The inner

strands of these chains are connected at n to the lower part of the upper tower-section, and it will be seen that by turning the crank-shaft in one direction or the other the upper tower-section can be raised or lowered telescopically within the lower section by corresponding movements of the inner strands of the sprocket-chains.

Within the upper tower-section are secured a suitable number of cross spider-plates O , each of which is formed with a central hub or opening O' , through which works a section of rigid pipe P . The lower portion of this pipe-section is embraced by a ring q , which is confined between collars $q' q'$ on the pipe, and to which are secured the ends of ropes, chains, or other flexible connections p . These flexible connections run over sheaves q^2 , which are carried by the uppermost spider-plate O , and said connections extend thence downward to the truck-frame, where they are suitably stopped in eyes p^3 . It will thus be seen that when the upper tower-section is elevated by the crank-shaft N it will automatically draw the pipe-section P upward, so that said pipe-section shall extend well above the upper tower-section, as shown in Fig. 16. The upper end of the flexible pipe W^2 , before referred to, is connected to the lower end of this pipe-section P . Upon the upper end of the upper tower-section is mounted a cap R , which also has a central hub or opening, and upon the upper side of which are mounted four sheaves r' . The cap R is also provided with four horizontally-extending arms R' , upon the outer ends of each of which is mounted a sheave r . The pipe-section P extends upward through the opening in the cap-plate R , and the shank t' of a flexible nozzle u' is tightly inserted into the upper end of the pipe P , and at this point said shank is surrounded by a loose collar t . To this collar are connected four ropes, chains, or other flexible connections S , which extend thence beneath the sheaves r and over the sheaves r' , their lower ends being stopped in the ring q , before referred to. Thus it will be seen that as the pipe-section is raised by the upper tower-section the flexible connections S , while permitting the pipe to rise, act as steadiers for the upper end of the pipe, and also brace it against the strains produced by the hereinafter-described deflection of the nozzle u' .

To the shank t' of the nozzle u' are pivoted at V' two oppositely-extending rocking arms V , to the outer ends of which are connected a pair of upwardly-extending arms U . These arms are each provided with a joint U' near its lower end, and the upper ends of these arms are pivotally connected to a collar w , which surrounds the tip or nipple u of the nozzle. A cord, chain, or other flexible connection leads from the outer end of each rocking arm V to the ground, so that by drawing upon one or the other of these cords the nozzle can be deflected downward toward one

or the other of said rocking arms, as shown in Fig. 13. An arm w^2 extends from the collar w intermediate of the points of attachment of the arms U , and a cord or other flexible connection w' leads from this arm w^2 to the ground, and it will be seen that by hauling upon the said cord w' the nozzle u' can be deflected intermediately of its deflection by the cords v^2 . These deflections, together with the rotation of the tower by its turn-table, give a complete circular horizontal range to the nozzle.

By reference to Fig. 16 it will be seen that by virtue of the construction above described the tower when fully extended in erect position rises to a great height proportionate to the transverse area of its supporting-truck, and that unless stayed from a point well upward on the tower the latter would be liable to capsize, particularly during the prevalence of strong winds. In order to accomplish this result, I provide long brace-bars H , the upper ends of which are pivoted on opposite sides of the lower tower-section close to its top, and the lower ends of these bars are inserted into the upper ends of long hollow cylindrical sockets H^2 . These sockets are provided with long longitudinal slots H^3 , one edge H^4 of each of which is serrated, the teeth thus formed inclining downward. An extension brace-bar H' extends at its upper portion within each of these sockets H^2 , and cross pins or studs at the upper ends of these extension-bars enter the slots H^3 and when the braces are not in use rest in offsets in the upper ends of the slots. When the braces are to be used, the extension-bars H' slide downward within the sockets H^2 , and their pins H^3 engage within certain of the serrations H^4 . It will thus be seen that the long cylindrical sockets H^2 afford an extensive and continuous bearing for the extension-bars H' , so that an effective and rigid connection is formed between the extension-bars and the brace-bars H , notwithstanding the great length of the latter.

From this description it will be seen that the structure as a whole is light, durable, and compact, readily manipulated, and capable of erection to a great height proportionate to the area of its supporting-truck, and yet perfectly secure and stable against capsizing.

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

1. In a water-tower, the combination, with a vehicle or truck frame, of stays pivoted upon opposite sides of said frame, springs attached to the pivots of the stays and serving to move the latter outward from the truck-frame, and a pawl-and-ratchet connection adjacent to the pivot of each stay serving to prevent upward movement of the latter, substantially as set forth.

2. The combination, with a water-tower truck or vehicle, of a vertically-movable cross-head mounted upon the truck-frame and arranged to receive the folded tower, a spring

operating to retain the cross-head in elevated position, a rock-shaft operatively connected to the cross-head and extending transversely of the truck-frame, and rock-arms located at the ends of said shaft and serving to retain and release staying-braces for the truck, substantially as set forth.

3. The combination, with a water-tower truck or vehicle, of a water-ballasting tank or reservoir located upon the truck and of elongated cylindrical form, a direct-service pipe connected to the opposite ends of said reservoir, a three-way valve at the rear end connection of said pipe, and a valve at the front end connection thereof, substantially as set forth.

4. In a water-tower, the combination, with a lower tower-section, of lateral braces therefor, consisting each of an upper bar pivoted near the top of said lower section, an elongated tubular socket secured to the lower end of said bar and having a long serrated longitudinal slot, and an extension-bar working telescopically within said socket and having at its upper end a cross-pin to engage the serrations of said slot, substantially as set forth.

5. In a water-tower, the combination, with a lower and an upper telescopic tower-section, each of rectangular transverse area, and endless-chain mechanism, substantially as described, for raising and lowering the upper section, of a rigid pipe-section and flexible connections for raising and lowering said pipe by corresponding movements of the upper section, one end of each of said connections being attached to the lower part of the pipe and the opposite end being connected to the lower tower-section, and said connections running over sheaves on the upper tower-section, substantially as set forth.

6. In a water-tower, the combination, with an upper tower-section having a cap-plate pro-

vided with outwardly-extending arms and pulleys carried by said cap and its arms, of a rigid pipe-section working telescopically within the said tower-section, and flexible connections secured each at one end to the pipe-nozzle and at its opposite end to a lower part of said pipe and passing under and over said pulleys, substantially as set forth.

7. The combination, with a water-tower, of a rigid water-pipe supported therein, a flexible nozzle connected to said pipe, a rocking arm pivoted to the shank of the nozzle, links connecting the ends of the arm to the nozzle, and ropes connected to the ends of the arm and extending downward therefrom, substantially as set forth.

8. The combination, with a truck or carriage and an extensible tower mounted thereon, of a ballasting-reservoir, a pipe external to said reservoir, adapted to convey water to the tower and connected to the reservoir so as to supply water to the same, and a three-way valve located at the point of connection of said pipe with the reservoir, substantially as and for the purpose set forth.

9. The combination, with a water-tower, of a rigid pipe supported therein, a flexible nozzle connected to said pipe, a pair of rocking arms pivoted to the shank of the nozzle, jointed links connecting the arms with the upper part of the nozzle, and a line connected to the upper end of the nozzle intermediate of the points of connection of the links, substantially as set forth.

In testimony that I claim the foregoing I have hereunto set my hand, at Milwaukee, in the county of Milwaukee and State of Wisconsin, in the presence of two witnesses.

MICHAEL BURNS.

Witnesses:

S. S. STOUT,
WILLIAM KLUG.