(No Model.) 2 Sheets—Sheet 1.

D. D. HAYES.

PORTABLE WATER TOWER.

No. 562,895. Patented June 30, 1896.

FIG. 1.

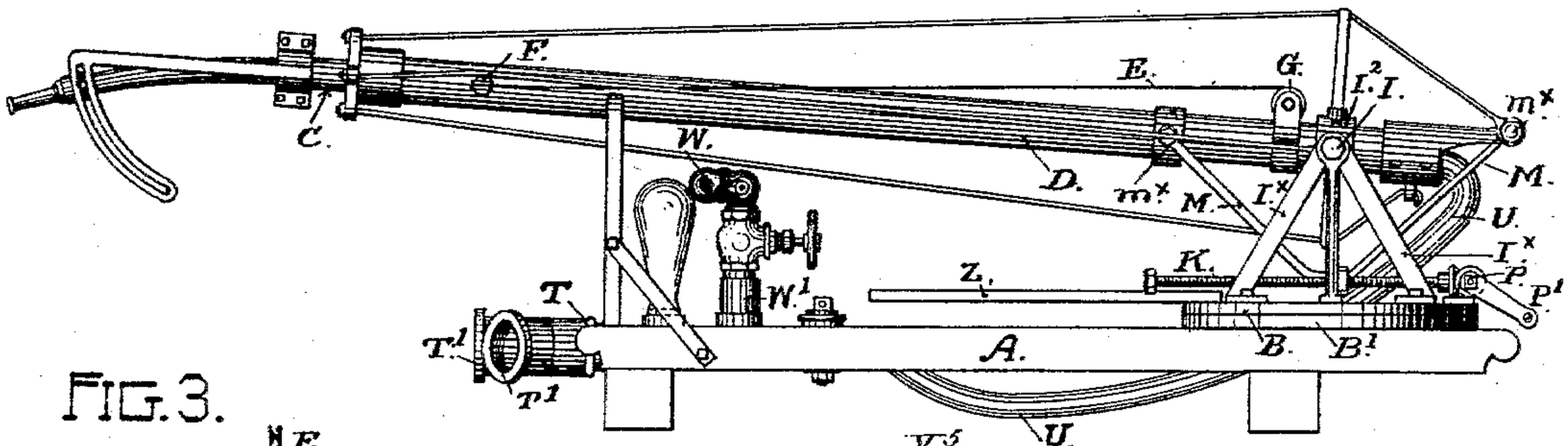


FIG. 3.

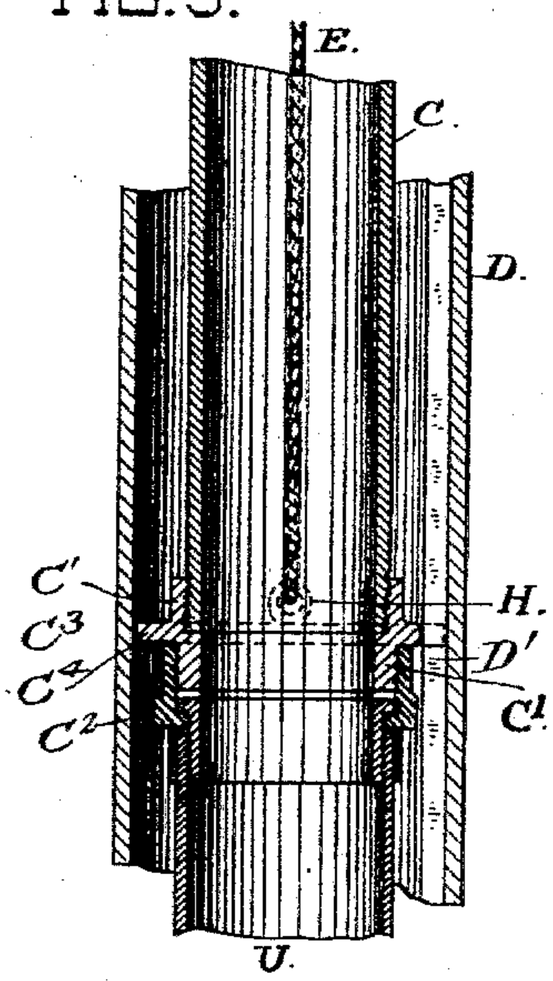


FIG. 2.

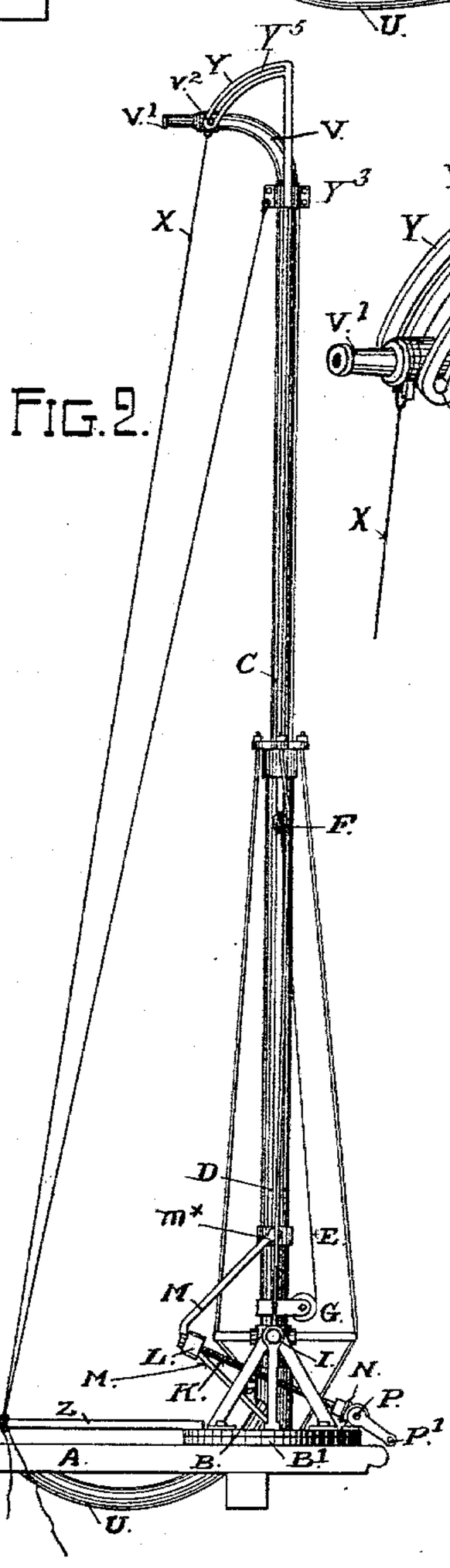
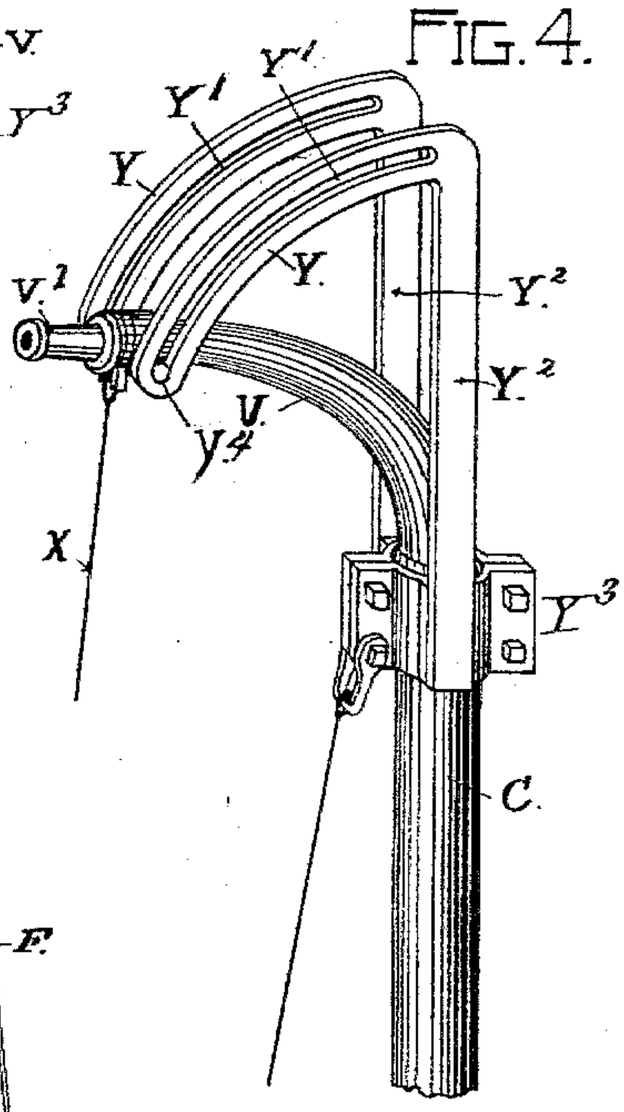


FIG. 4.



WITNESSES

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(No Model.) 2 Sheets—Sheet 2.

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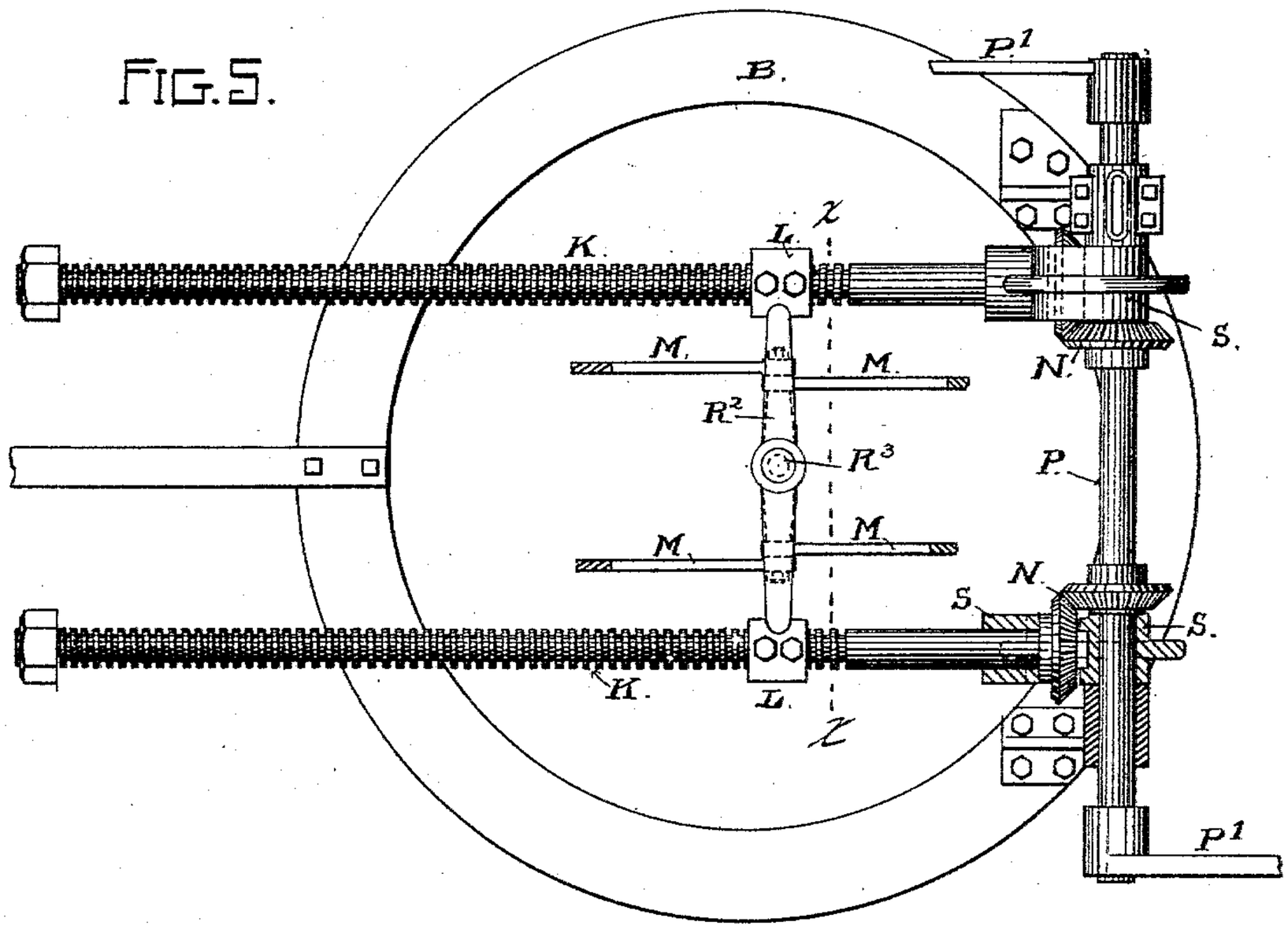
FIG. 5.



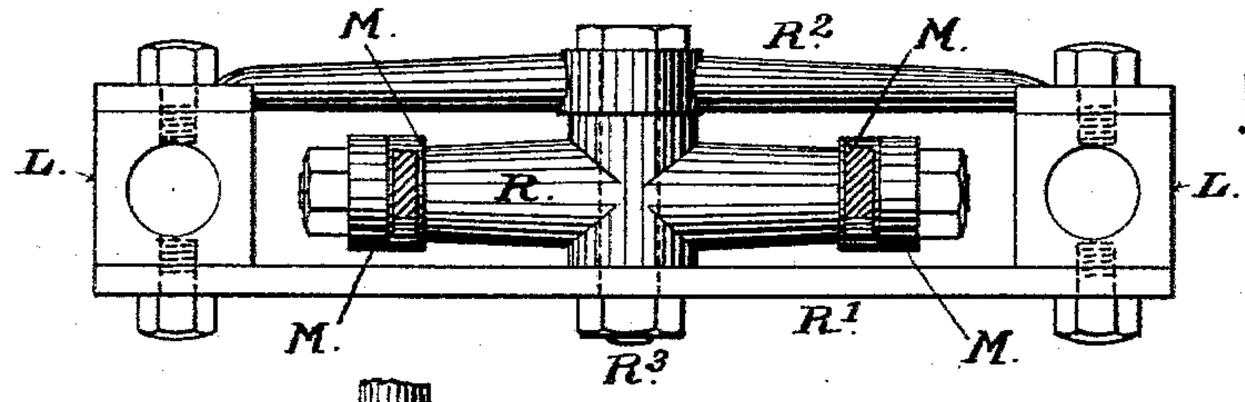


FIG. 6.

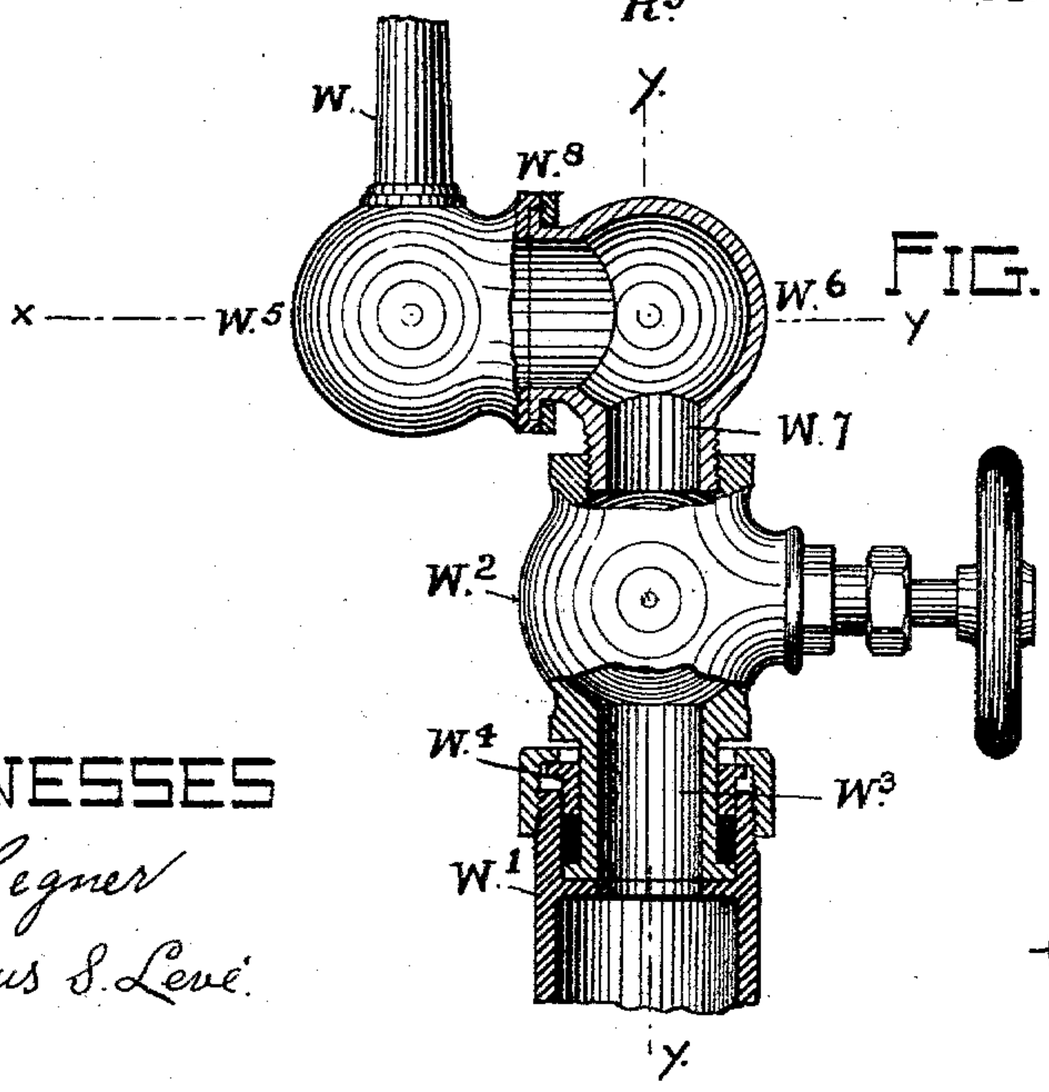


FIG. 7

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UNITED STATES PATENT OFFICE.

DANIEL D. HAYES, OF OAKLAND, CALIFORNIA.

PORTABLE WATER-TOWER.

SPECIFICATION forming part of Letters Patent No. 562,895, dated June 30, 1896.

Application filed December 12, 1895. Serial No. 571,906. (No model.)

To all whom it may concern:

Be it known that I, DANIEL D. HAYES, a citizen of the United States, residing in the city of Oakland, county of Alameda, and State of Cailfornia, have invented certain new and useful Improvements in Portable Water-Towers, of which the following is a specification.

My invention relates to improvements made in portable water-towers for uniting the streams from several fire-engines into a single stream of great volume and force and discharging it through a single nozzle at a greater elevation than it is possible to raise a stream with a single engine.

The objects sought to be attained in and by these improvements are to simplify the construction of the whole apparatus, whereby it is more readily and easily adjusted and handled; to dispense with the heavy and often cumbersome tower-frame; to give ready access to the parts in adjusting or making repairs, and to render the delivery pipe or nozzle readily adjustable for changing the direction and the angle of elevation of the stream.

To such ends and objects my said invention consists in the described construction and combination of parts producing an improved water-tower or apparatus of the kind mentioned, reference being had in the following description to the accompanying drawings, forming part of this specification.

In the said drawings, Figure 1 represents in side elevation the truck-frame and the parts of the tower mounted on it, the running-gear of the truck being omitted. Fig. 2 is a side elevation showing the tower raised to the perpendicular position and extended to its full height. Fig. 3 represents, on an enlarged scale, a longitudinal section taken through the two pipes that form the tower. Fig. 4 is a perspective view, on an enlarged scale, of the adjustable nozzle and its controlling means on the top of the extensible section. Fig. 5 is a plan or top view of the turn-table and the tower-elevating mechanism which is mounted on it. Fig. 6 is a cross-section, on a larger scale, taken through the line *x x*, Fig. 5, showing the nuts and the equalizing-bar of the elevating mechanism. Fig. 7 is an elevation, on an enlarged scale and partly in section, showing the construction of the universal adjustable nozzle mounted on the rear end of the truck for throwing what is sometimes called a "gallery-stream" from the rear of the truck.

A A indicate the frame of the truck, and B B′ the movable top ring and the stationary bottom ring of the turn-table on the front end of the truck.

C is a pipe of wrought-iron about twenty-five feet long and three and one-half inches in diameter inside, fitted into a pipe D about twenty-eight feet long and of sufficiently greater diameter to allow the inside section to slide easily up and down, and to give room between the two pipes for operating ropes E E by which the inner section is raised and lowered in the outer section. These ropes being fastened to eyes H on the lower end of the section C are laid along the space between the two sections and brought to the outside through openings in the outer section near the upper end and thence down on the outside to a windlass G. Sheaves F F are fixed in these openings for the ropes to run on.

The outer one of the two pipes is mounted on trunnions I I on the movable ring of the turn-table, and on these points it is raised from a horizontal position on the truck into a perpendicular position for action. The trunnions are formed on a reinforce-ring I^2, near the lower end of the pipe, and are carried by braced standards $I^\times$ $I^\times$ at such height above the turn-table that the lower end of the pipe D will clear the ring of the turn-table when the pipe is being raised to an upright position. These supports are bolted to the top ring B directly over the horizontal side bars of the truck.

The mechanism for raising and holding the pipe D on the centers I is composed of a pair of screw-rods K K, a set of traveling nuts or screw-threaded blocks L L, one on each screw, to which the pipe D is connected by stiff arms or braces M M, and an operating-shaft P, provided with hand-cranks P′ P′ on the outer ends and so connected with the two rods K by gears N N that the two rods are rotated simultaneously and with equal movements by means of the cranks.

Instead of being directly connected to the nuts L the braces M are secured to the outer ends of a pivoted equalizing-bar R, to which the nuts are united by stiff cross-bars R′ R^2, secured to the nuts in such manner that the

equalizing-bar is free to swing between them. Such bar is connected to the two bars by a pivot-bolt R^3, passing through a boss in the middle of the said equalizer, and the braces M are secured to the outer ends of the bar by tap-bolts setting through eyes in the ends of such bars and into the ends of the bar. At points $m^\times$ $m^\times$, equidistant from the center line through the trunnions, the braces M are secured to the pipe D, and from those points they extend at an angle downward to the equalizing-bar, to the ends of which they are joined, as indicated in Figs. 2, 5, and 6.

The ends of the screws K at the shaft P are carried by the bearing-blocks S S, set on the shaft to swing or move around it as a center, in order to allow the screws to assume different angular positions under the movement of the section D on its trunnions, and miter-gears fixed on the shaft engage similar gears on the ends of the screws K.

The change in the angle of the screws as the section D is raised from the horizontal to the upright position is illustrated in Figs. 1 and 2.

T is a coupling-pipe mounted between the side bars of the frame on the rear end of the truck and provided on its outer ends with two or more branches T′, having threaded couplings for connecting several engines to the pipe T. The inner end of the same pipe is connected with the lower end of the extensible section C by a section of hose or flexible pipe U of proper length to allow the movement and extension of that pipe upward in the surrounding carrier D. The hose U is joined to the pipe C by a threaded coupling, the construction of which is shown in Fig. 3 of the drawings. The part C′ is fixed on the end of the pipe by a screw-joint, and is formed with an external screw-thread to receive the threaded ring C^2 or that part of the coupling which is secured on the end of the hose U. These parts are constructed like an ordinary hose coupling or union, so that a tight joint is produced when the coupling is screwed up.

To the member C′ of the coupling there is added a wide flange C^3 about equal in diameter to the internal diameter of the outer pipe, but fitted to slide smoothly in that pipe and having on one side a rectangular slot C^4 of suitable size to play smoothly up and down on the spline or rib D′ on the inner wall of the stationary outer pipe, so that the inner pipe in its movements is kept in the center of the outer pipe and is prevented also from turning in it by the said flange. The hoisting-ropes E are attached to this flange on opposite sides of the inner pipe at the eyes H, which are fixed to the flange for that purpose. By this construction a strong and stiff joint is secured at the point of connection between the pipe and the hose, because the wide flange on the joint serves to hold the pipe stiffly in the center of the surrounding pipe when at rest, while at the same time the inner pipe is capable of sliding in the outer pipe when it is desired to raise or lower the inner pipe. The hose is readily detached also in case of accident resulting from the great pressure which the hose or flexible connection is called upon to bear, and a new hose is quickly connected with but little interruption in the working of the apparatus.

On the pipe T at a point behind the branches T′ is a short upright branch pipe W′ to carry an adjustable nozzle W, by which a gallery-stream of large volume can be thrown directly from the rear end of the truck in different directions without turning the truck and at different degrees of elevation or depression. The construction of this nozzle will be understood from Fig. 7 of the drawings.

The upright section W^2 has a globe-valve with a neck w^3 on the lower end fitting into the end of the upright stationary pipe W′ to turn around in it, this joint being rendered water-tight by suitable packing and gland W^4.

To the upper end of the valve-section W^2 is connected a nozzle formed of the two globe-shape sections W^5 W^6, the one having a short cylindrical neck W^7 to join the valve-section W^2 and the other having a contracted outlet formed of a short tapering pipe W. Such two sections W^5 W^6 are united by a flange-joint W^8, that allows one section to turn around on the other, but the part W^6 is united rigidly to the part W^2 by a screw-joint W^4. Thus the discharge-pipe W is adjustable at all angles in a vertical direction around the horizontal axis $x\,y$, while the joint W′ allows adjustment of the section W^2 about the vertical axis $y\,y$.

Universal adjustment of the nozzle to direct the stream in any direction and at various angles, both above and below the horizontal, is afforded by this construction, while the form and the manner of joining the sections above described gives a passage of full area without abrupt angles and turns to reduce the force of the stream.

The nozzle on the end of the pipe C is constructed of flexible section V, having a metal tip V′ on the discharge end and joined at the opposite end directly to the end of the pipe C.

The flexible body of the nozzle tapers from the butt-end to the tip, and it has proper flexibility to bend in a curve when the outer end is drawn down. The body V is made of rubber for this purpose, and is provided with screw-couplings on the ends, so that a new nozzle may be readily attached at any time when needed. As such a flexible nozzle is subject to the excessive backward pressure or reaction of the stream there is always a strong tendency in the nozzle to buckle or break at the bend or part of greatest curvature when the tip of the nozzle is brought down into horizontal position to throw the stream at right angles to the pipe while standing upright; and it is desirable and necessary to the effective working of the apparatus that the body of the nozzle should be maintained at such times in a true curve and the passage through it kept of full

area, while the nozzle is movable readily in a vertical arc to change the direction of the stream as it becomes necessary.

The device which I secure to the upper end of the telescoping pipe to obviate the before-mentioned defects in operation is shown in Figs. 2 and 4 of the drawings. It is constructed of the two upright arms Y^2, provided on their lower ends with a flanged clamp Y^3, surrounding the end of the pipe and fastened together around it by bolts through the flanges; and the curved and slotted arms Y, that are joined to the top ends of the uprights and extend therefrom in the same plane and also parallel with each other outward and downward on the same side of the pipe. In these curved slots pins or studs Y^4 on the metal tip of the nozzle are fitted to play smoothly, and the length and curvature of the slots Y^5 are so calculated and determined by the length of the flexible body of the nozzle that when the nozzle is standing in upright position or in line with the pipe and the top is pointing directly upward the studs Y^4 are resting in the highest part of the curve and against the back of the slot, while, on the other hand, when the top of the nozzle is drawn down into horizontal position to direct the stream at right angles to the upright pipe the studs will rest in the bottom of the slots. In the last-described position the body of the nozzle is bent in a gradual and smooth curve, and is confined and held in that shape under the greatest pressure it is called upon to bear, and cannot break or buckle at the bend.

The angular distance from the butt or large end of the nozzle to the lower end of the curved guides or quadrants Y is somewhat less than the length of the flexible body of the nozzle, in consequence of which the flexible body bends in a smooth curve directly at and from the end of the upright pipe upward, and the internal passage is kept the full area at all points in its length.

Any degree of elevation between the vertical and the horizontal is given to the nozzle by means of a halyard X, carried from the tip of the nozzle down to the truck, at which point it is made fast to a projecting boom or outrigger Z, bolted to the movable ring B of the turn-table. To this same point of attachment is also made fast the lower end of a guy rope or cable Q, that is attached at Q′ to the top of the telescoping section C. The function of this rope is to steady the pipe against the recoil of the discharging stream. Additional guys may be carried from the top of the extensible section down to the truck to secure greater steadiness if found necessary.

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

1. The combination, with the truck having a turn-table, and a pipe or tubular part mounted on the turn-table on trunnions that are located above the center of the turn-table at a point between the ends of said tubular part and near one end thereof; of means for raising and lowering said tubular part on its trunnions, consisting of the screw-rods, the operating-shaft and gears connecting the screw-rods with said shaft, the traveling-nuts on said rods united by stiff connections, the equalizing-bar and the braces connected to the tubular part at points in front of and behind the trunnions thereof and to the ends of said equalizing-bar, substantially as described.

2. The combination, with the extensible pipe composed of the interior, telescoping section having a nozzle on its upper end and a flexible section coupled to its lower end, the exterior section mounted on trunnions on a turn-table to move in a vertical arc from horizontal to upright position, said trunnions being located over the center of said turn-table and at a point above the lower end of said exterior section, as described; of the screw-rods, the operating-shaft, a traveling nut on each screw-rod and bars rigidly connecting the said nuts together, the equalizing-bar pivoted between said connecting-bars, and the braces extending from the exterior section of the said extensible pipe on opposite sides of the line of its trunnions downward to the ends of the equalizing-bar.

3. The combination with the tubular section D mounted on a turn-table on trunnions which are located above the center of the turn-table and at a point above the lower end of the section, and said section being open at both ends and having a projecting rib on the inside; of the extensible pipe movable in said section, having the flexible section detachably connected to its lower end by a screw-coupling, a flange on said coupling fitting the base of the outer section and having a slot for the rib on the outer section, the hoisting-ropes attached to said flange and running through openings to the outside at the upper part of the outer section, a flexible section on the upper end of the extensible section, and means for raising the outer section on its trunnions, substantially as described.

In testimony that I claim the foregoing I have hereunto set my hand and seal.

DANIEL D. HAYES. [L. S.]

Witnesses:
CHAS. E. KELLY,
G. E. KELLY.