Sept. 25, 1923. 1,468,998

J. DOLAN

WATER TOWER AND THE LIKE

Filed Feb. 24, 1920 4 Sheets-Sheet 1

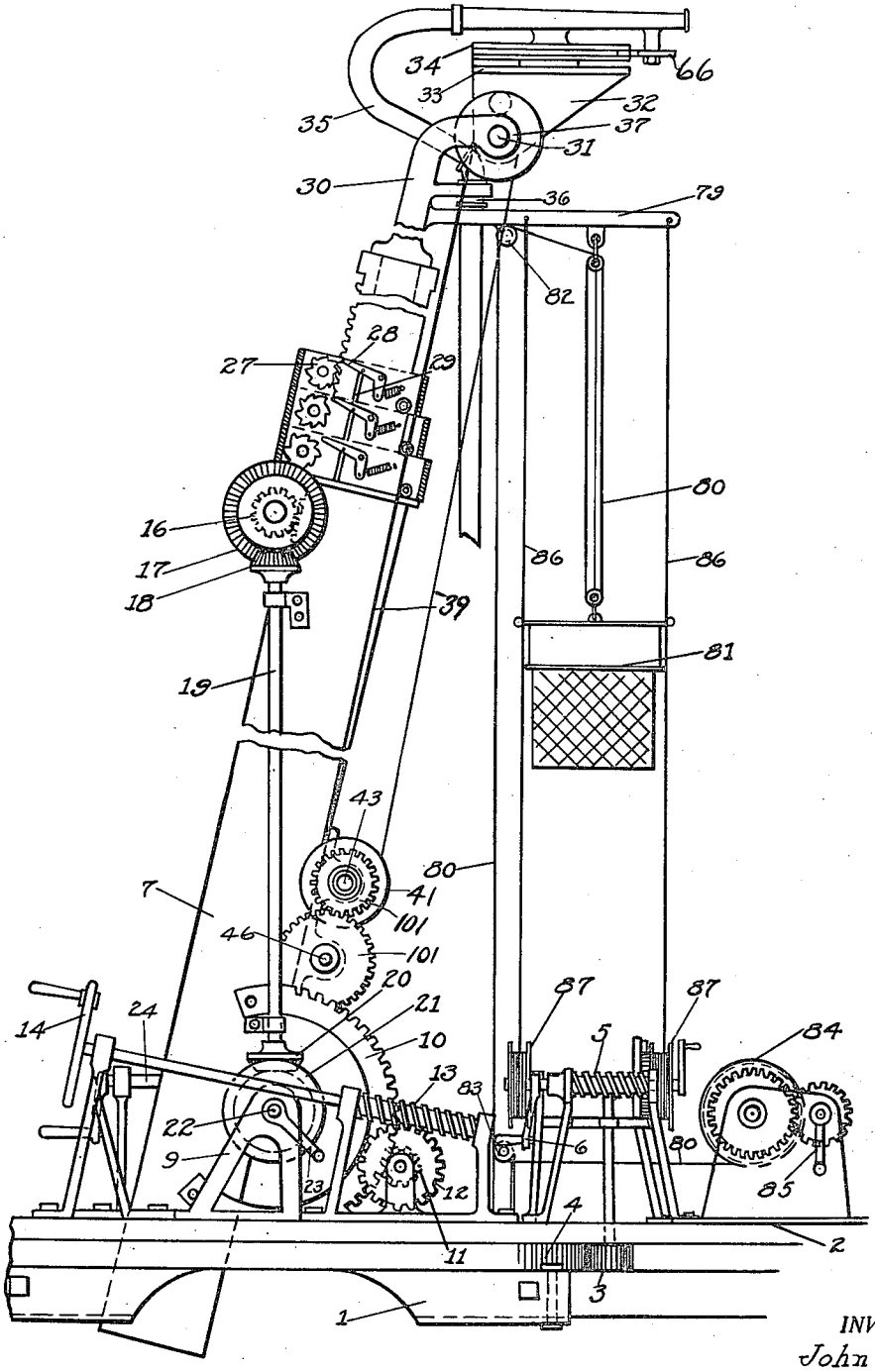


Fig. 1.

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WATER TOWER AND THE LIKE

Filed Feb. 24, 1920 4 Sheets-Sheet 2

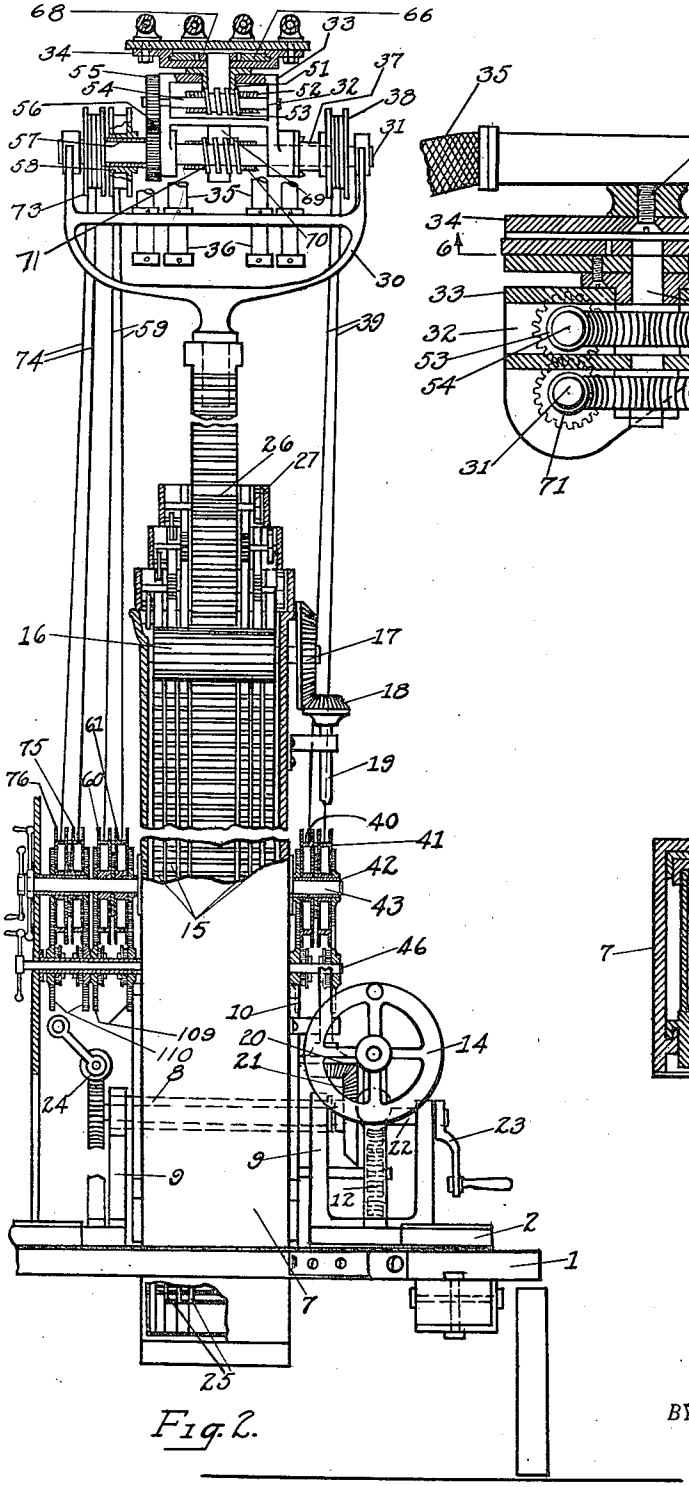


Fig. 2.

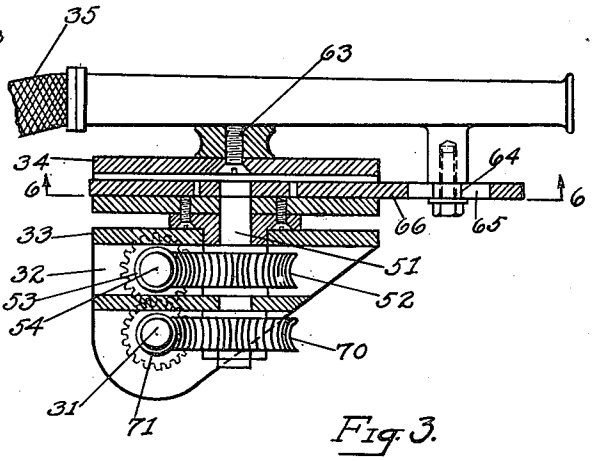


Fig. 3.

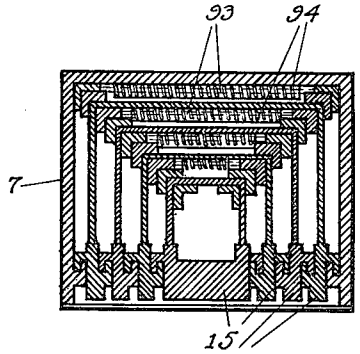


Fig. 4.

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WATER TOWER AND THE LIKE

Filed Feb. 24, 1920 4 Sheets-Sheet 3

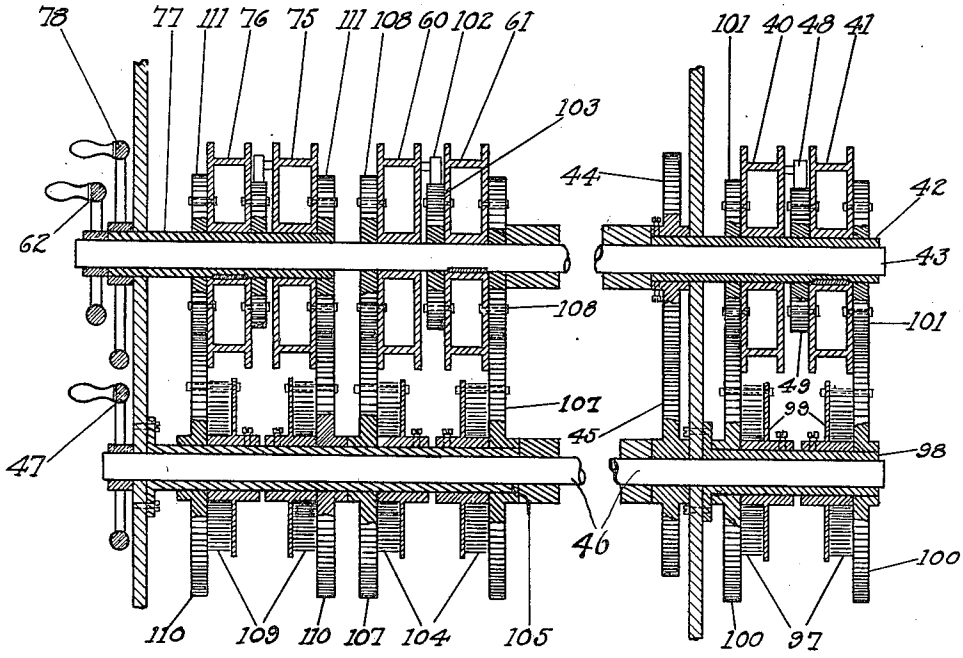


Fig. 5.

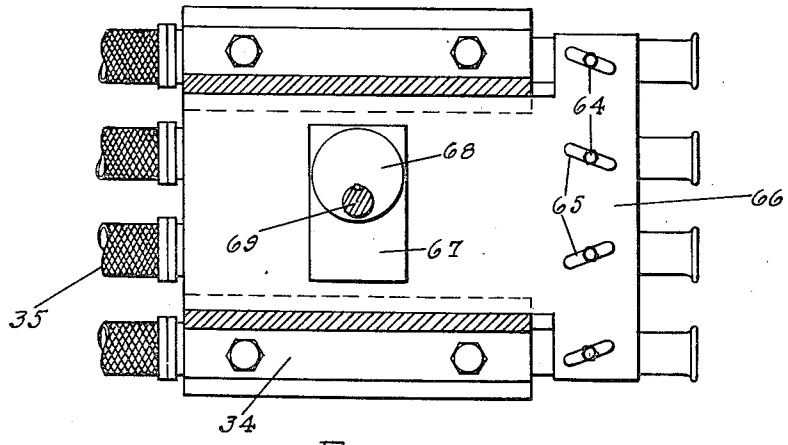


Fig. 6.

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Sept. 25, 1923. 1,468,998

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WATER TOWER AND THE LIKE

Filed Feb. 24, 1920 4 Sheets-Sheet 4

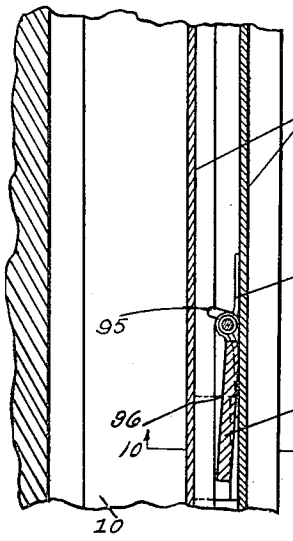


Fig. 7.

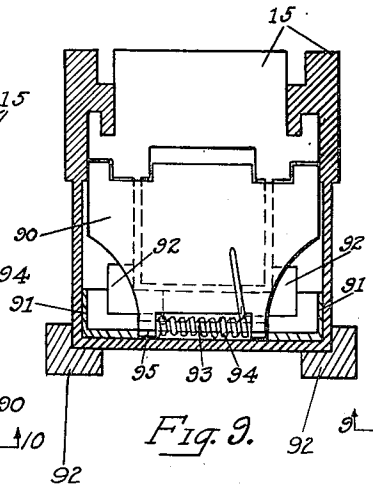


Fig. 9.

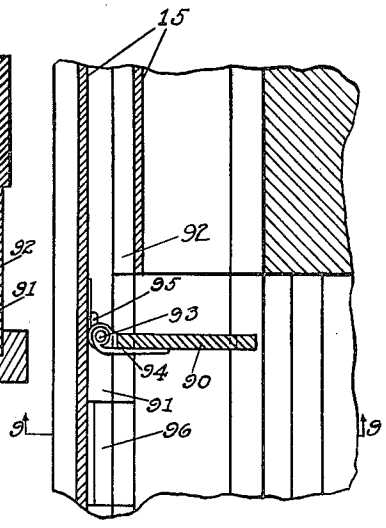


Fig. 8.

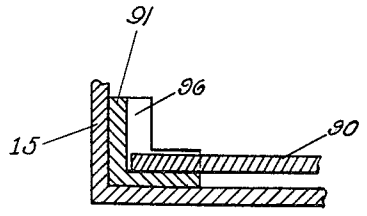


Fig. 10.

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John Dolan
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Patented Sept. 25, 1923. 1,468,998

UNITED STATES PATENT OFFICE.

JOHN DOLAN, OF DAYTON, OHIO.

WATER TOWER AND THE LIKE.

Application filed February 24, 1920. Serial No. 360,636.

To all whom it may concern:

Be it known that I, JOHN DOLAN, a citizen of the United States, residing at Dayton, in the county of Montgomery and State of Ohio, have invented certain new and useful Improvements in Water Towers and the like, of which the following is a specification, reference being had therein to the accompanying drawing.

This invention relates to water towers and the like, and the present application is a continuation in part of the application for patent on hoisting mechanism, filed by me November 11, 1918, Serial No. 261,968 (Patent No. 1,335,782 granted Apr. 6, 1920).

The object of the invention is to provide in connection with a suitable hoisting mechanism means for supporting thereon one or more hose nozzles, and to provide means whereby the nozzle or nozzles may be adjusted, from a point near the base of the hoisting mechanism, to control the direction, or directions, which the stream, or streams, of water take when discharged.

A further object of the invention is to provide in connection with such a mechanism a lifting device, or elevator, which may be utilized to elevate firemen, or as a fire escape.

Other objects of the invention will appear as the mechanism is described in detail.

In the accompanying drawings Fig. 1 is a side elevation, partly broken away, of a mechanism embodying my invention; Fig. 2 is a front elevation of a hoisting mechanism showing my invention applied thereto; Fig. 3 is a sectional view taken vertically through the nozzle supporting mechanism; Fig. 4 is a transverse section taken through the hoisting mechanism; Fig. 5 is a sectional detail view of the controlling drums; Fig. 6 is a horizontal section taken on the line 6—6 of Fig. 3 looking in the direction of the arrows; Fig. 7 is a vertical sectional view of portions of two of the extensible members showing the hinged brace in its collapsed position; Fig. 8 is a similar view showing the hinged brace in its operative position; Fig. 9 is a section taken on the line 9—9 of Fig. 8 looking in the direction of the arrows; and Fig. 10 is a sectional view taken through one corner of one of the extensible elements on the line 10—10 of Fig. 7.

In these drawings I have illustrated one embodiment of my invention and have shown the same as applied to the hoisting mechanism, shown and described in the above mentioned application, but it will be understood that this particular hoisting mechanism is shown for the purpose of illustration only, and that the invention may be utilized in connection with hoisting mechanisms of various kinds.

The hoisting mechanism, as here shown, is mounted upon a truck, a portion of the frame of which is shown at 1 in Figs. 1 and 2, and which has mounted thereon a turn table 2, which is rotated by means of a pinion 3 meshing with a fixed gear 4 and driven from a worm 5 by means of a crank 6. The hoisting mechanism is mounted upon this turn table and comprises a standard 7, which may be, if desired, mounted in a fixed upright position, but is preferably so mounted that it can be lowered into an approximately horizontal position when not in use, to facilitate transportation. I have therefore here shown the standard as mounted on a shaft 8 journaled in brackets 9 carried by the turn table, and as provided with a toothed segment 10 which meshes with a pinion 11, which in turn is connected with a worm wheel 12, which is driven by a worm 13 provided with a crank wheel 14. Mounted within the standard 7 are a plurality of extensible elements 15 which are nested one within the other and which are provided along their adjacent edges with teeth. Mounted near the upper end of the standard 7 is a pinion 16 which extends transversely of the teeth of the several extensible elements 15 and is adapted to mesh with the teeth on all of these elements. When the hoisting mechanism is in its contracted, or lowered position the pinion 16 will mesh with the teeth of the inner extensible element only and consequently the other elements will remain in their lowermost positions until the innermost element has been elevated. Movement is imparted to the pinion 16 by means of a beveled gear 17 meshing with a similar gear 18 on the upper end of a shaft 19, which is provided at its lower end with a beveled pinion 20 which meshes with a beveled gear 21 secured to a shaft 22 which is rotatably mounted in the shaft 8, the latter shaft being hol-

low. This shaft 22 may be rotated either by a crank 23 or through a worm drive 24. When the innermost, or first, extensible element has been moved to a point near the upper limit of its movement relatively to the next succeeding element a shoulder 25 at the lower end thereof will engage a corresponding shoulder at the upper end of the next succeeding element and the further movement of the first element will move the succeeding element far enough to bring the teeth thereof into mesh with the pinion 16 and the continued rotation of the pinion will cause both the first and the second elements to continue their upward movement. Suitable means are provided to lock the first element to the succeeding element to retain it in its extended position relatively thereto. As here shown the second element has mounted thereon a pinion 26 which meshes with the teeth of the first element and is provided with a ratchet wheel 27 arranged to be engaged by a pawl 28 and held against rotation, thereby preventing the downward movement of the first element relatively to the second element. When the succeeding element is in its lowermost position the pawl 28 is held out of engagement with the rachet wheel 27 by trip finger 29, but as soon as the succeeding element begins its upward movement the pawl is released and permitted to engage the ratchet wheel. The second element bears the same relation to the third element that the first element bears to the second element, and consequently the continued rotation of the pinion 16 will successively move the several elements into their extended positions.

I prefer to provide the extensible elements, except the first, with means for bracing the side walls thereof one against the other, when they are in their extended positions, thus strengthening the structure and giving it an added rigidity. The innermost extensible element is connected at its forward edges by the rack and therefore does not require bracing. There may be one or more of these braces mounted in each of the extensible elements, except the first, at suitable points between the ends thereof, and the braces are of such a character that they will fold downward out of the way to permit the inner element to move downwardly into its normal, or contracted, position with relation to the element which carries the brace, and will be automatically moved into its operative position as soon as the inner element has been extended far enough for its lower end to clear the brace. Preferably each brace comprises a plate 90 along the rear wall of the extensible element upon which it is mounted. In the present construction each of the succeeding extensible elements are provided on their inner corners with angle bars 91 in which slide other angle bars 92 carried by the preceding extensible element. The thickness of these angle bars causes a space to be left between the rear walls of the adjacent extensible elements and I have in the present instance shown the bracing plate as mounted on a shaft 93 which is journaled in the angle bars, or slideways, 91. A spring 94 acts on the brace plate to move the same upwardly and its upward movement is limited by suitable stops, 95, which in the present instance are formed integral with the bearing lugs of the plate. Consequently when the plate is free to move the spring will move the same into a substantially horizontal position, as shown in Fig. 8. When the inner element moves downwardly it will engage the plate 90 and move the same downward against the tension of the spring. In order to permit the plate to move out of the path of the downwardly moving element I have recessed the angle bars, or slideways, 91, as shown at 96, so that the plate can fold into these recesses. The forward edge of the plate is shaped to fit snugly in the forward portion of the extensible element, when it is in its extensible position, and to thus brace the side walls one against the other. It will be apparent that as the several extensible elements are elevated the brace plates 90 will automatically move into their operative positions as the preceding elements pass the same.

Mounted on the upper end of the innermost element, which, of course, is the uppermost element when the hoisting mechanism is extended, is a suitable bracket 30 which serves as a supporting structure for the nozzle or nozzles and their adjusting devices. As here shown, the bracket has journaled therein a shaft 31 upon which is mounted a frame 32 having a flat upper surface, or top plate, 33. Pivotally mounted on this top plate 33 is a nozzle supporting plate 34 on which are mounted the nozzles. As has been stated, there may be one or more nozzles, and in the present instance I have shown four, and these nozzles are shown arranged substantially parallel with the plate 34 and as connected by flexible hose sections 35 with coupling devices 36 mounted on the bracket and adapted to have connected therewith the several hose lines which lead to the source of water supply. In order that the nozzles may be adjusted about a horizontal axis to cause the streams to be directed upwardly or downwardly from the nozzles, I have loosely mounted the bracket 32 on the shaft and have connected the same by means of a sleeve 37 with a drum 38 which is also loosely mounted on the shaft and has wound thereon a cable 39, the end portions of which extend downwardly and are wound in opposite directions about two

drums 40 and 41 which are supported near the lower end of the hoisting mechanism. As here shown, these drums are mounted on a sleeve 42 which is rotatably mounted on a shaft 43 mounted in bearings on the rear wall of the standard 7. The drum 40 is loosely mounted on the sleeve and the drum 41 is rigidly secured thereto so as to rotate with the sleeve. The sleeve may be rotated in any suitable manner, but is here shown as provided with a gear 44 meshing with a gear 45 on a shaft 46 which is also journaled in suitable bearings on the standard and is provided with a crank 47 by means of which it may be rotated. The drum 40 has mounted thereon a pawl 48 which engages a ratchet wheel 49 rigidly secured to the drum 41. The pawl and ratchet are so arranged that when the hoisting mechanism is being elevated the two drums may rotate in opposite directions to permit the ends of the cable to be withdrawn therefrom but when the drum 41 is positively rotated in one direction the ratchet wheel will pick up the pawl 48 and cause the two drums to be rotated in unison, thereby causing the cable to be wound onto the one drum and unwound from the other and this movement of the cable will operate the drum 38 to cause the nozzle supporting frame 32 to move about the axis of the shaft 31.

The two drums are acted upon by springs which tend to rotate the drums in directions to wind the end portions of the cable thereon. The springs may be of any suitable character and may be connected with the drums in any suitable manner. In the present instance I have shown the springs at 97 as coiled about the shaft 46. In order that the springs may not be affected by the rotation of the shaft 46 I have mounted on the shaft a fixed sleeve 98 to which one each of the springs is connected by means of a hub 99, to which the spring is secured. The other end of each spring is connected with a gear 100 which meshes with the gear 101 secured to the drum. In this manner the springs are not affected by the rotation of the shaft 43 or the sleeve 42 which carry the drums 40 and 41, and further I am enabled to employ multiplying gearing between the springs and the drum and thus increase the efficiency of the springs. Inasmuch as the two parts of the cable are wound in opposite directions about the two drums, it will be apparent that the drums are rotated in opposite directions by the springs. Consequently when the drum 41 is rotated in a direction to unwind the cable therefrom, the spring will operate the drum 40 to wind the cable onto that drum. These springs also serve to automatically actuate the drums to pay out and take up the cable as the hoisting mechanism is elevated and lowered.

As has been stated, the nozzle supporting plate 34 is pivotally mounted on the bracket 32 and will thus permit the nozzles to be turned about a vertical axis to direct the streams laterally. As here shown, the plate 34 is secured to the upper end of a hollow shaft, or sleeve, 51 which is journaled in the bracket 32 and has secured to its lower end a worm wheel 52 which meshes with a worm 53 on a shaft 54 journaled in the bracket, or frame, 32. Secured to this shaft is a gear 55 which meshes with a gear 56 rotatably mounted on the shaft 31 and connected by a sleeve 57 with a drum 58 about which is wound a cable 59, the lower end portions of which are wound in opposite directions about drums 60 and 61. The drums 60 and 61 are mounted on the shaft 43 and are operated by a crank 62 on that shaft, the operation of which will move the nozzles in a horizontal plane. The drums 60 and 61 are connected one to the other by a pawl 102 and a ratchet wheel 103 in the same manner that the drums 40 and 41 are connected. These drums are also acted upon by springs 104 wound on a fixed sleeve 105 on the shaft 46 and connected by gears 107 and 108 with the respective drums, the arrangement and operation being the same as that described in connection with drums 40 and 41.

It is also desirable that means be provided for so controlling the nozzles as to cause the several streams to converge or diverge, as may be desired. To accomplish this I have pivotally mounted the several nozzles on the plate 34, as shown at 63, and I have connected with each nozzle, at a point forward of its axis, a pin 64 which extends downwardly through a slot 65 in a controlling plate 66 which is slidably mounted on the plate 34. The several slots 65 are so inclined relatively to the direction of movement of the plate 66 that the movement of the plate will cause the nozzles to move about their axes and the movement of the plate in one direction will cause the nozzles to converge and the movement of the plate in the opposite direction will cause the nozzles to diverge. Movement may be imparted to this plate in any suitable manner, but as here shown, I have arranged within an opening 67 in the plate 66 an eccentric disk, or cam, 68 which is rigidly secured to a shaft 69 mounted in the sleeve 51 and having secured thereto a worm wheel 70 which meshes with a worm 71 on the shaft 31. Secured to the outer end of the shaft 31 is a drum 73 about which is wound a cable 74. This cable extends downwardly and has its end portions wound about drums 75 and 76 which are mounted on a sleeve 77 on the shaft 43 and are controlled by a crank 78 on the sleeve in the same manner as the drums 40 and 41 are controlled. These drums are acted upon by springs 109 connected therewith by gears

110 and 111 in the same manner as has been described in connection with the drums 40 and 41.

It will be apparent therefore that the nozzles at the top of the hoisting mechanism can be controlled to direct the streams in any desired direction by means of the operating mechanism which is arranged near the base of the standard 7.

I have also provided the mechansim with an elevator car, or basket, by means of which firemen may be elevated to the top of the tower, or to any intermediate point, as to a point adjacent to a window in a building, or which may be used as a fire escape to remove persons from buildings. As here shown, I have provided the bracket 30 with an arm 79 from which is suspended, by means of a cable 80, a car 81. The cable is carried about suitable guide pulleys 82 and 83 and wound about a drum 84 which is actuated by means of crank 85 having geared connection therewith, to raise and lower the car. As here shown, the car is held against lateral movement by means of guide wires, or cables 86 secured at their upper ends to arm 79, passing through suitable guides at the sides of the car and wound about drums 87 on the supporting structure, the drums serving to maintain the cables taut and to take up and pay out the cables as the tower is lowered or raised.

The operation of the mechanism will be readily understood from the foregoing description of the several parts thereof, and it will be apparent that I have provided a water tower in which the nozzle or nozzles may be elevated to any desired height, within the scope of the hoisting mechanism, and when in their elevated positions may be adjusted to cause the stream, or streams, to be directed in any desired direction, this control being effected through mechanisms arranged near the base of the hoisting mechanism and therefore readily accessible to persons on the truck which carries the tower.

While I have shown and described one embodiment of my invention, I wish it to be understood that I do not desire to be limited to the details thereof as various modifications may occur to a person skilled in the art.

Having now fully described my invention, what I claim as new and desire to secure by Letters Patent is:

1. In a mechanism of the character described, the combination with a hoisting mechanism comprising an extensible element, and means for actuating the same, of a nozzle supporting structure pivotally mounted at the upper end of said extensible element, a nozzle mounted on said supporting structure, a flexible hose section connected with said nozzle mounted on a relatively fixed support and adapted to be connected with a hose line, a drum connected with said supporting structure, a cable wound about said drum, and controlling devices for said cable arranged near the base of said hoisting mechanism.

2. In an extensible water tower, a nozzle adjustably mounted at the upper end of said tower, actuating means for adjusting said nozzle comprising a drum operatively connected therewith, a cable wound about said drum, a pair of drums mounted near the base of said tower, the end portions of said cable being wound about said drums in opposite directions, and means for actuating said last mentioned drums either in the same direction or in opposite directions to control the adjustment of said nozzle.

3. In an extensible water tower, a nozzle adjustably mounted on the upper end of said tower, actuating means for adjusting said nozzle comprising a drum operatively connected therewith, a cable wound about said drum, a pair of drums mounted near the base of said tower, springs acting on said drums to rotate the same in opposite directions, pawl and ratchet mechanism to connect said drums one to the other, and means for positively actuating one of said drums.

4. In an extensible water tower, a nozzle adjustably mounted at the upper end of said tower, actuating means for adjusting said nozzle comprising a drum operatively connected therewith, a cable wound on said drum, a shaft mounted near the base of said tower, a drum rigidly secured to said shaft, a second drum rotatably mounted on said shaft, pawl and ratchet mechanism to connect said drums one to the other when the drum secured to said shaft is rotated in one direction, and springs to rotate said drums.

5. In a mechanism of the character described, the combination with a hoisting mechanism comprising an extensible element and means for actuating the same, of a supporting frame mounted on said extensible element for movement about a horizontal axis, a nozzle mounted on said frame for movement about an axis at an angle to the axis of said frame, a hose line leading to said nozzle independently of said frame, and separate means for adjusting said frame about its axis and for adjusting said nozzle relatively to said frame.

6. In a mechanism of the character described, the combination with a hoisting mechanism comprising an extensible element and means for actuating the same, of a frame pivotally mounted on said extensible element for adjustment about a horizontal axis, a nozzle supporting plate pivotally mounted on said frame, separate operating mechanism for said frame and said plate, each of said mechanisms comprising a drum, a cable wound about said drum and means arranged near the base of said

hoisting mechanism for actuating said cable.

7. In a mechanism of the character described, the combination with a hoisting mechanism comprising an extensible element and means for actuating the same, of a shaft mounted at the upper end of said extensible element, a supporting frame pivotally mounted on said shaft, operating mechanism connected with said frame for adjusting the same about its axis, a nozzle supporting member pivotally mounted on said frame, a shaft connected with said nozzle supporting member, a drum connected with said shaft, and means for actuating said drum.

8. In a mechanism of the character described, the combination with a hoisting mechanism comprising an extensible element and means for actuating the same, of a shaft mounted at the upper end of said extensible element, a frame mounted on said shaft for adjustment about the same, a second shaft carried by said frame and extending at an angle to the first mentioned shaft, a nozzle supporting member rigidly secured to said shaft, a worm wheel secured to said shaft, a worm meshing with said worm wheel, and means operable from a point near the base of said hoisting mechanism to actuate said worm.

9. In a mechanism of the character described, the combination with a hoisting mechanism comprising an extensible element and means for actuating the same, of a shaft mounted at the upper end of said extensible element, a supporting frame loosely mounted on said shaft, a drum loosely mounted on said shaft and connected with said frame, a cable wound about said drum, a shaft rotatably mounted on said frame, a nozzle supporting plate rigidly secured to the last mentioned shaft, a worm wheel rigidly secured to the last mentioned shaft, a worm meshing with said worm wheel, a drum connected with said worm, a cable wound about said drum, and separate means arranged near the base of said hoisting mechanism for controlling said cables.

10. In a mechanism of the character described, the combination with a hoisting mechanism comprising an extensible element and means for actuating the same, of a plurality of nozzles mounted at the upper end of said extensible element for movement relatively one to the other, and means for actuating said nozzles to cause them to converge or to diverge in the direction in which the streams are discharged.

11. In a mechanism of the character described, the combination with a hoisting mechanism comprising an extensible element and means for actuating the same, of a nozzle supporting member carried by said extensible element, a plurality of nozzles pivotally mounted on said member, an actuating device connected with said nozzles for adjusting them relatively one to the other, and means for operating said actuating device.

12. In a mechanism of the character described, the combination with a hoisting mechanism comprising an extensible element and means for actuating the same, of a nozzle supporting member mounted at the upper end of said extensible element, a plurality of nozzles each pivotally mounted on said nozzle supporting member, an actuating plate slidably mounted with relation to said nozzle supporting member and having inclined slots, pins connected with said nozzles and extending into said slots, and means for actuating said plate.

13. In a mechanism of the character described, the combination with a hoisting mechanism comprising an extensible element and means for actuating the same, of a nozzle supporting member mounted at the upper end of said extensible element, a plurality of nozzles each pivotally mounted on said nozzle supporting member, an actuating plate slidably mounted with relation to said nozzle supporting member and having inclined slots, pins connected with said nozzles and extending into said slots, said plate having an opening therein, a cam arranged within said opening, a shaft connected with said cam and means for actuating said shaft.

14. In a mechanism of the character described, the combination with a hoisting mechanism comprising an extensible element and means for actuating the same, of a nozzle supporting member mounted at the upper end of said extensible element, a plurality of nozzles each pivotally mounted on said nozzle supporting member, an actuating plate slidably mounted with relation to said nozzle supporting member and having inclined slots, pins connected with said nozzles and extending into said slots, said plate having an opening therein, a cam arranged within said opening, a shaft connected with said cam and means for actuating said shaft, said means comprising a drum, a cable wound about said drum, and means arranged near the base of said hoisting mechanism to actuate said cable.

15. In a mechanism of the character described, the combination with a hoisting mechanism comprising an extensible element and means for actuating the same, of a nozzle supporting structure mounted on said extensible element, a plurality of nozzles mounted on said supporting structure, means operable from a point near the base of said hoisting mechanism to adjust said

nozzles about either a horizontal or a vertical axis, and other means for adjusting said nozzles relatively one to the other to cause the streams discharged therefrom to converge or diverge.

16. In a mechanism of the character described, the combination with a hoisting mechanism comprising an extensible element, and means for actuating the same, of a nozzle supporting structure mounted on said extensible element for movement about a horizontal axis, a nozzle supporting plate mounted on said structure for movement about a vertical axis, a nozzle mounted on said plate, and separate means for adjusting said nozzle supporting structure about said horizontal axis and for adjusting said nozzle supporting plate about said vertical axis.

17. In a mechanism of the character described, the combination with a hoisting mechanism comprising an extensible element and means for actuating the same, of a shaft journaled on said extensible element, a nozzle supporting structure loosely mounted on said shaft, a drum connected with said structure, cables for controlling the movement of said drum and said structure, a shaft journaled in said supporting structure at an angle to the first mentioned shaft, a nozzle supporting plate secured to said shaft, a drum loosely mounted on the first mentioned shaft, and having geared connection with the last mentioned shaft, and cables for actuating said drum to control the position of said nozzle supporting plate.

18. In a mechanism of the character described, the combination with a hoisting mechanism comprising an extensible element and means for actuating the same, of a nozzle support pivotally mounted on said extensible element for movement about a horizontal axis, a nozzle supporting plate pivotally mounted on said structure for movement about a vertical axis, a plurality of nozzles each pivotally mounted on said nozzle supporting plate, an actuating member slidably mounted on said nozzle supporting plate and operatively connected with the respective nozzles, and separate means for moving said nozzle supporting structure as a whole about its axis, for moving said nozzle supporting plate about said vertical axis relatively to said structure, and for actuating said slidable plate.

19. In a mechanism of the character described, the combination with a hoisting mechanism comprising an extensible element and means for actuating the same, of a shaft journaled on said extensible element, a nozzle supporting structure loosely mounted on said shaft, a drum connected with said shaft, a cable wound about said drum to control the movements of said structure about said shaft, a hollow shaft journaled on said supporting structure, a nozzle supporting plate rigidly secured to said hollow shaft and having a guideway therein, a drum journaled on the first mentioned shaft and having geared connection with said hollow shaft, a cable wound about said drum for actuating the same, a plurality of nozzles each mounted on said nozzle supporting plate on a transverse axis, a plate slidably mounted in the guideway on said nozzle supporting plate and operatively connected with the several nozzles to move the same about their individual axes, a shaft journaled in said hollow shaft, and means for operatively connecting said last mentioned shaft with said slidable plate, a geared connection between said last mentioned shaft and the first mentioned shaft, a drum secured to said first mentioned shaft, and a cable wound about said drum to control the operation of said slidable plate.

In testimony whereof, I affix my signature hereto.

JOHN DOLAN.