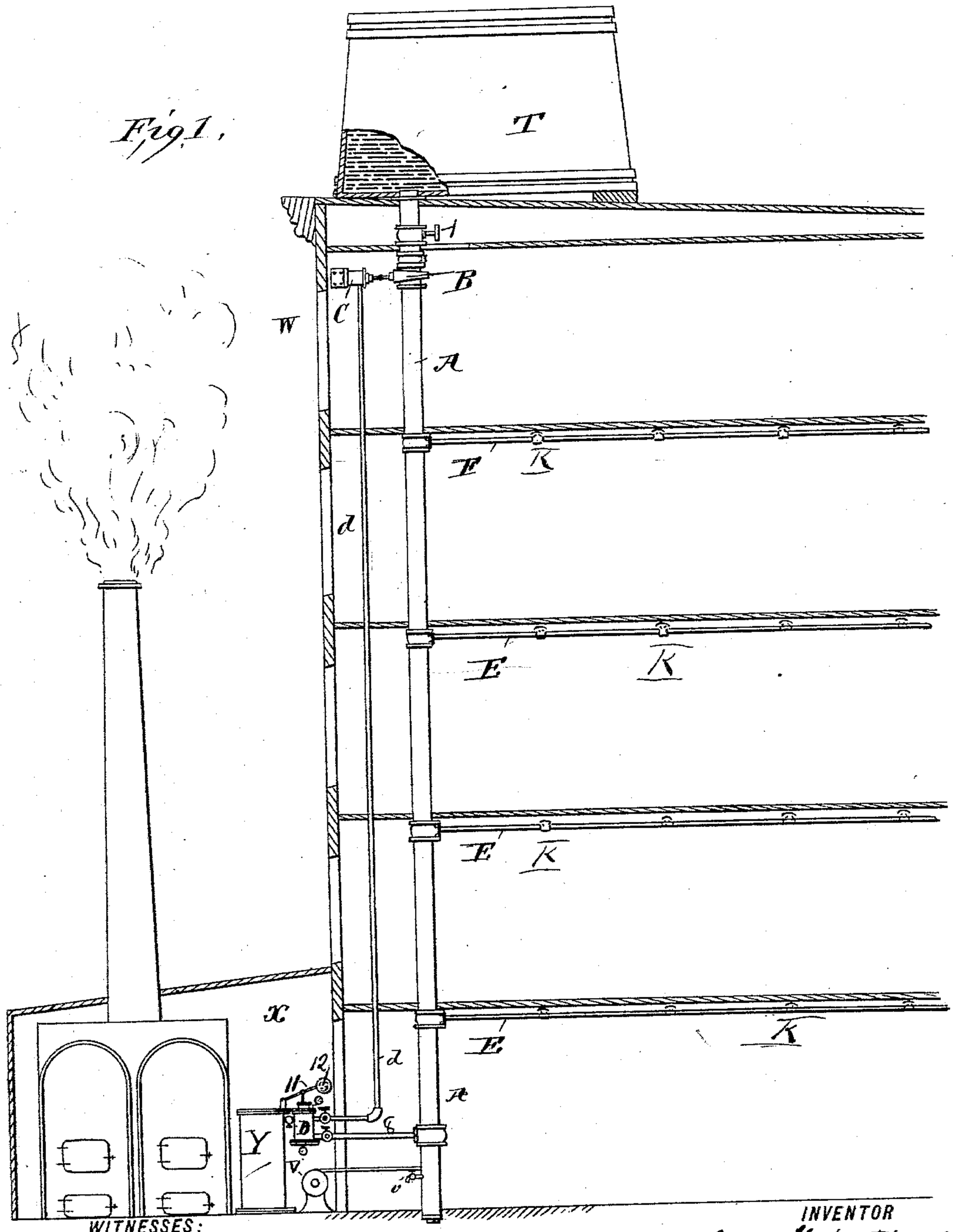
(No Model.) 3 Sheets—Sheet 1.

J. G. WESTBROOK.

AUTOMATIC SPRINKLER SYSTEM.

No. 556,947. Patented Mar. 24, 1896.

Fig. 1.



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(No Model.)

3 Sheets—Sheet 2.

J. G. WESTBROOK.

AUTOMATIC SPRINKLER SYSTEM.

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Fig. 3.

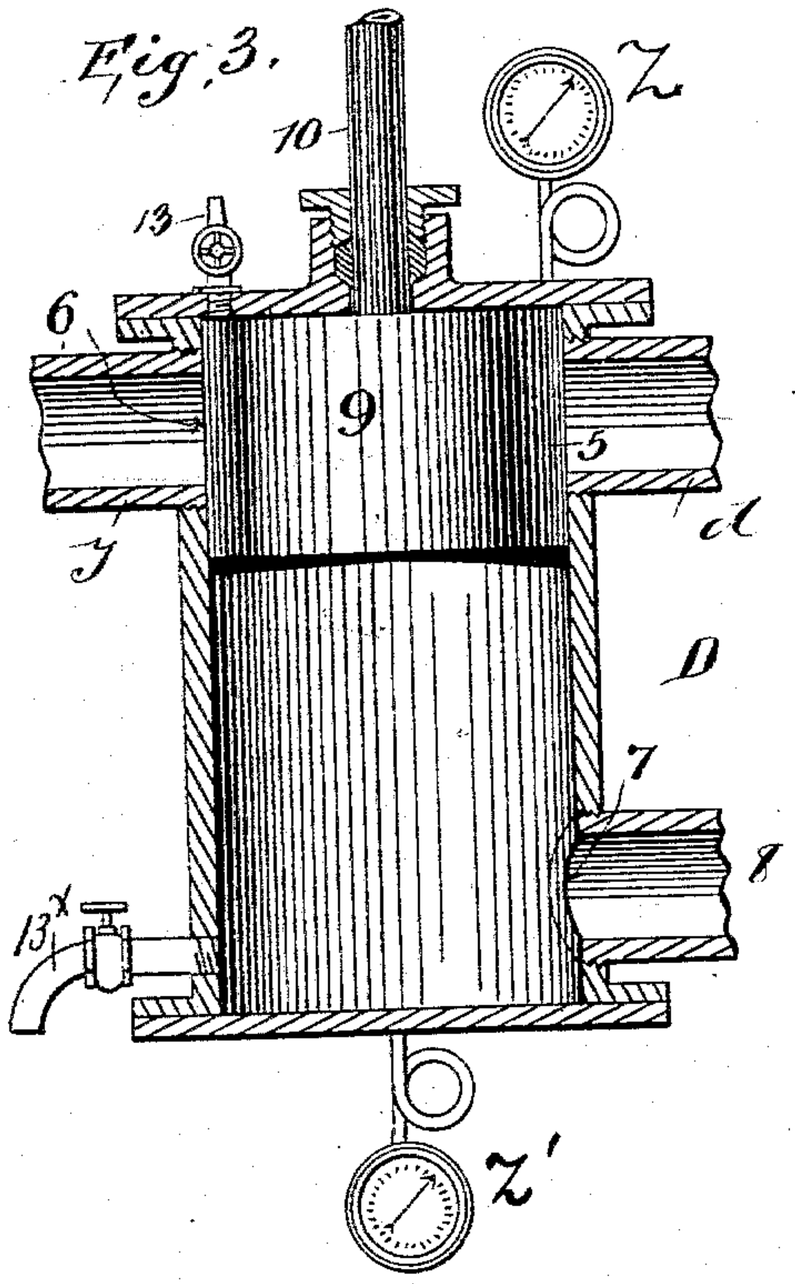
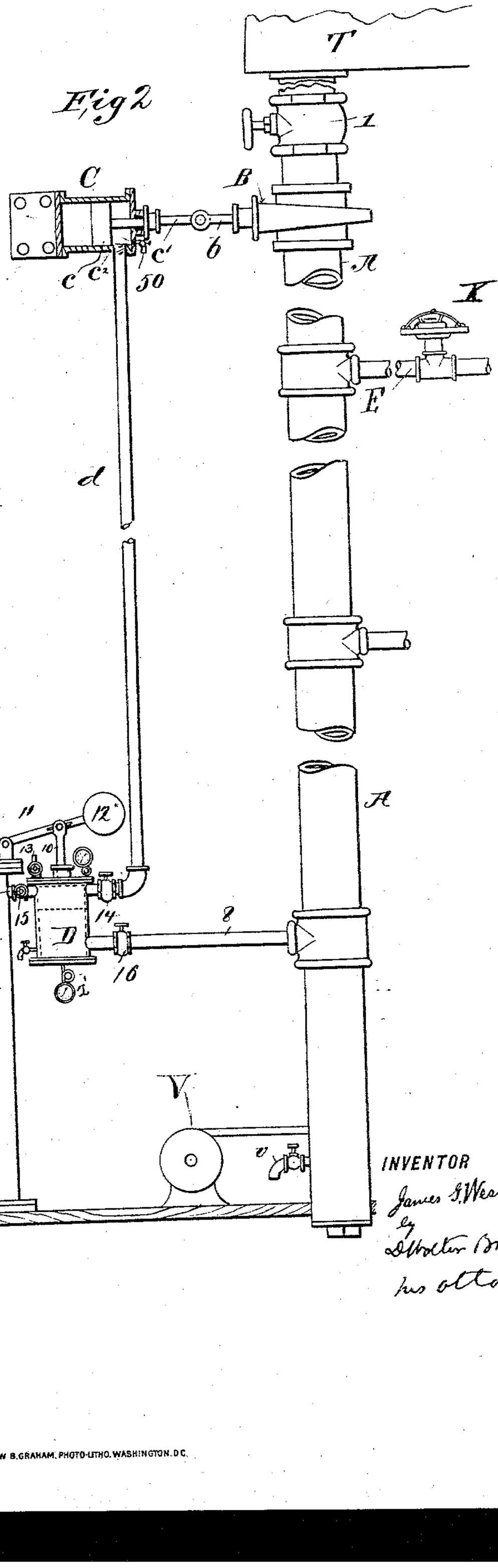


Fig 2



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(No Model.) 3 Sheets—Sheet 3.

J. G. WESTBROOK.

AUTOMATIC SPRINKLER SYSTEM.

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Fig. 6.

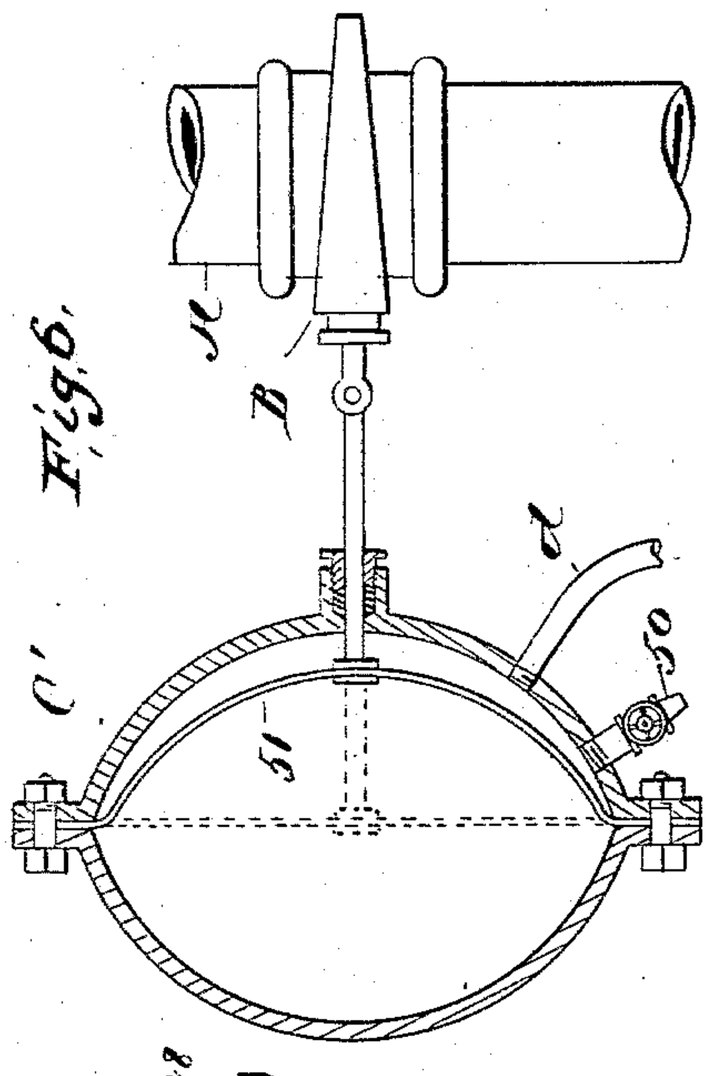


Fig. 7.

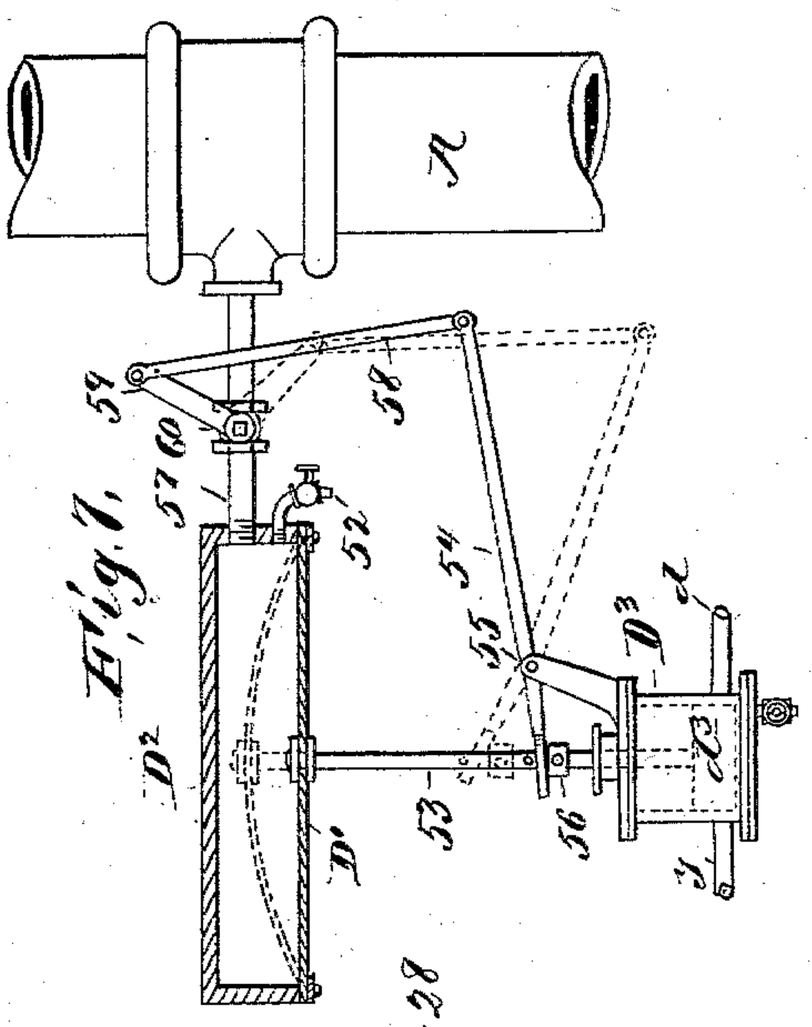


Fig. 4.

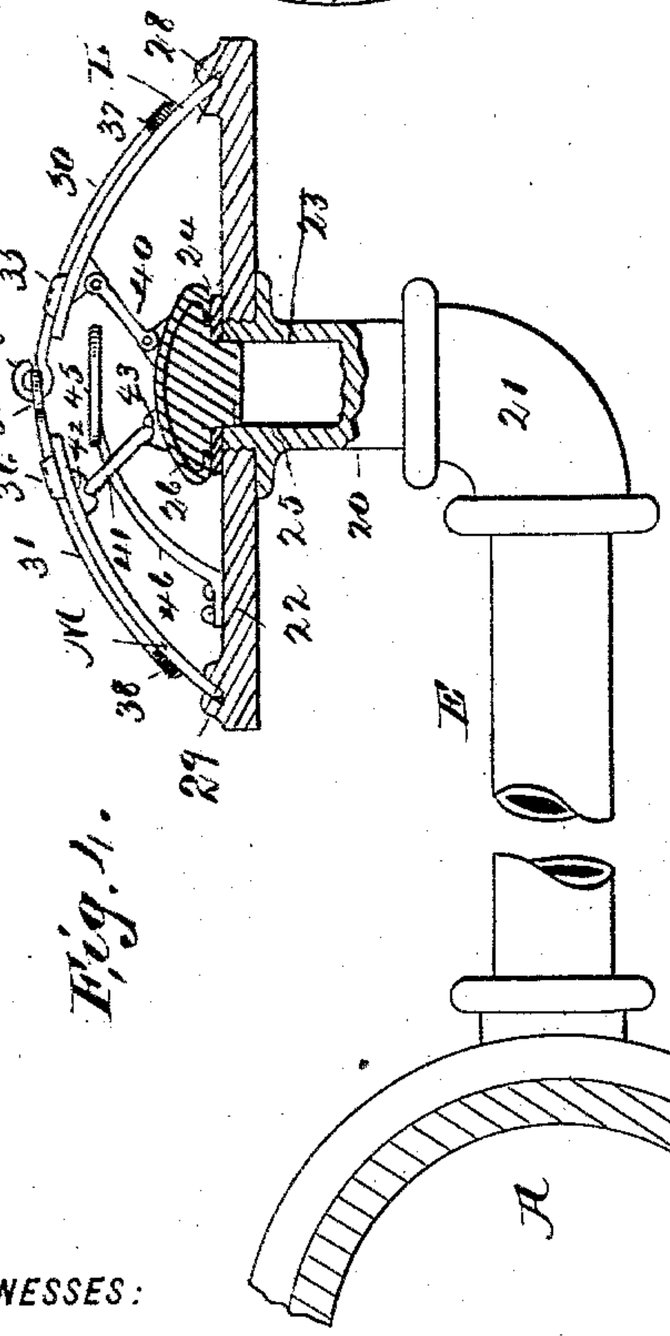
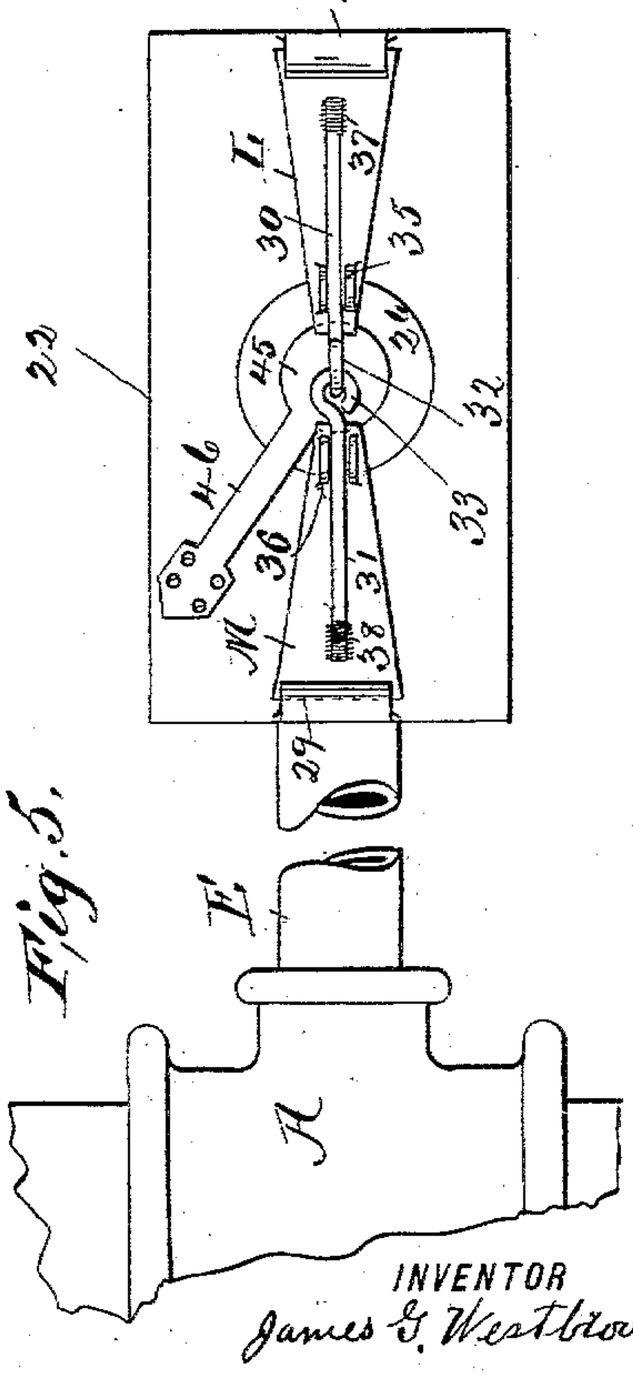


Fig. 5.



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UNITED STATES PATENT OFFICE.

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AUTOMATIC SPRINKLER SYSTEM.

SPECIFICATION forming part of Letters Patent No. 556,947, dated March 24, 1896.

Application filed April 1, 1895. Serial No. 544,118. (No model.)

To all whom it may concern:

Be it known that I, JAMES G. WESTBROOK, a citizen of the United States, and a resident of Ogdensburg, in the county of St. Lawrence, State of New York, have invented certain new and useful Improvements in Automatic Sprinkler Systems, of which the following is a specification.

My invention relates to improvements in automatic sprinkler systems of that class wherein water is admitted to the mains, which are called "dry pipes," only at the time a fire occurs. In such systems, therefore, the mains or dry pipes and the branches being normally without water are not liable to injury from freezing. In existing systems, however, the water is kept out of the dry pipes by check-valves which are held closed by air-pressure. At the time of a fire by the melting of appropriate devices a suitable valve or plug in the dry pipes is opened and the air-pressure relieved, by which it is calculated the check-valves shall be opened and the dry pipe filled with water, which will issue from sprinklers and put out the fire; but the action of the check-valves is not positive in such systems, and the sticking of the valves prevents the dry pipes from filling with water, and the result is heavy loss from fire.

It is the especial object of this invention to provide very positive means for opening the valve which controls the admission of water into the dry pipes, so as to always insure the opening of the valve at the time of need, the means consisting of a motor connected with the valve in the dry pipe actuated by compressed air, steam, or other fluid and controlled by an auxiliary valve, which is in its turn actuated automatically by the variation of pressure in the dry pipe. When a fire occurs, a plug or valve in the dry pipe or a branch is opened. This relieves the fluid-pressure in the dry pipe, and this reduction of pressure actuates the auxiliary valve, and this valve admits a high-pressure fluid to the motor, which thereupon with great power opens the valve in the dry pipe and admits water thereto.

The aforesaid combination, with the dry pipe and its valve, of a motor actuated by a fluid and an auxiliary valve controlling the fluid-pressure in the motor and itself automatically actuated by the variations in the pressures in dry pipe is the essence of my invention.

Referring to the drawings which accompany the specification to aid the description, Figure 1 is a sectional diagram of a building equipped with the system. Fig. 2 is a broken sectional elevation, on a larger scale, of a line of dry pipe and its equipment and showing relation of the motor and auxiliary valve to the dry pipe. Fig. 3 is a sectional elevation, on a still larger scale, of the preferred form of auxiliary valve. Fig. 4 is a sectional elevation, and Fig. 5 a plan, of the preferred device for opening the plug or valve in the dry pipe or its branch when a fire occurs. Fig. 6 is a sectional elevation of a modification in the motor for operating the main valve in the dry pipe. Fig. 7 is a sectional elevation of a modification of the auxiliary valve.

W is a building equipped with the system; T, a water-tank of the usual and suitable kind on the roof; X, the engine-room adjoining the main building.

A is the main line of dry pipe; B, the main valve therein; C, the motor for operating the valve; D, the auxiliary valve controlling the motor; E E, branches from the dry pipe A, preferably arranged near the ceilings of the several stories of the building and provided with sprinkling-nozzles.

V is an air-compressor connected with the dry pipe A and adapted to maintain a low pressure therein—say five pounds to the square inch.

The building shown in Fig. 1 is simply a diagrammatic representation of a factory, and of course the arrangement of the dry pipe and branches and the relative positions of various parts of the system will vary with different buildings.

The valve B, arranged near the tank T, is a straightway gate. A globe-valve 1 is placed on the dry pipe A above the valve B to facilitate testing and repairing the valve B and other parts of the system. The valve-rod *b* is connected with the piston-rod *c'* of the motor C, which motor is preferably a cylinder, adapted to sustain a high pressure and provided with a piston *c*, connected with the rod *c'*, and also provided with a port c^2, with which is connected the pipe *d*, leading to the

auxiliary valve D. The motor C will be sustained in any suitable manner from the walls or ceiling of the building. Said auxiliary valve D is preferably a cylinder with a port 5, with which is connected the pipe *d* near the top of the cylinder, a port 6 opposite the port 5, and connected with the pipe *y* from the high-pressure reservoir Y, and a port 7 a little above the lower end of the cylinder, and connected by a pipe 8 with the dry pipe A. A piston 9, having a periphery broad enough to more than close the ports 5 6, works in said cylinder, the piston-rod 10 working through the usual stuffing-box on the upper head and being connected with a lever 11, carrying a counterpoise 12. A relief-cock 13 is connected with the top of the cylinder, and a similar cock $13^{\times}$ may be connected with the bottom, if desired.

Z Z′ are pressure-gages, respectively connected with the top and bottom of the cylinder.

The proportions of the aforesaid parts of the auxiliary valve are such that when the piston 9 is raised it closes both the ports 5 6 and opens the port 7, and that when it is lowered it opens communication from the port 6 to the port 5 and closes the port 7, the piston then being about clear down to the bottom of the cylinder. Cocks 14, 15, and 16 on the pipes *d*, *y*, and 8, respectively, serve to isolate the auxiliary valve for testing or repairs when desired.

At frequent intervals on the branch pipes from the dry pipe are arranged sprinkler-heads K. I prefer to construct them in the following manner:

20 is a pipe pointing upward and connected with the branch pipe by an elbow 21.

22 is a brass plate fastened on top of the pipe 20 and having true-bored hole 23, which communicates with the pipe 20.

24 is a lead washer around the hole 23.

25 is a headed porcelain plug, making a water-tight fit on the hole in the washer 24 and provided with a metal cap 26.

The plate 22 is provided with sockets 28 29, arranged at opposite extremities of a diameter of the hole 23. The lower ends of stiff springs L M, respectively, are movably inserted in said sockets 28 29, then bent down, as shown, and held down by the interlocking of the upper ends of levers 30 31, the hook 32 on the end of lever 30 passing through the eye 33 on the end of lever 31. Said levers 30 31 rest very near their upper ends in sockets 35 36, respectively, formed on the springs L M, and the lower ends of said levers 30 31 are respectively soldered to the springs L M by the fusible amalgams 37 38. Evidently so long as the amalgams remain intact the springs L M will be held down by the interlocking levers 30 31; but the instant the amalgams are fused by the heat of a fire occurring in their vicinity the springs will fly powerfully upward. The long leverage from the sockets 35 or 36 to the corresponding amalgams diminishes the strain on the amalgams and prevents the springs L M from breaking away before a fire occurs.

40 is a link pivoted to the spring L and also to the cap 26 of the plug, so that the flying upward of said spring will pull out the plug.

41 is a prop resting in a socket 42 on the spring M and a socket 43 on the cap 26 and balancing the down-pressure on the cap.

45 is a deflector supported above the hole 23 by an arm 46, fastened to the plate 22.

The dry pipe A will be closed at the bottom, and a petcock *v* may be provided to drain it.

The operation is as follows: When a fire takes place, some one of the plugs 26 is released in the manner hereinbefore described, and the pressure in the dry pipe runs down; but this pressure has sustained the piston 9 of the auxiliary valve D in its upper position, so that the lowering of this pressure permits the counterpoise 12 to force the piston down, opening the ports 5 and 6 and closing the port 7, so that water from the dry pipe cannot enter the auxiliary valve. Now the high-pressure fluid, preferably air, at perhaps one hundred pounds pressure to the square inch, goes from the reservoir Y through the valve D by the pipe *d* to the motor C, forcing the piston *c* back and opening the gate B, whereby water is admitted to the dry pipe A, going thence to the branches and the sprinkler-head, which has been opened by the heat. When the fire is over, the valves 14 15 being closed and the relief 13 opened, the piston 9 can be raised to its upper position again, and after closing the globe-valve 1 and draining the dry pipe A, the relief 50 on the motor C being opened to permit the high-pressure air to escape, the gate B can be returned to its closed position and the system made ready for another operation.

In Fig. 6 the motor C′ is provided with a flexible diaphragm 51, with which the rod of the gate-valve B is connected. Evidently when the high-pressure air is admitted to act on the diaphragm it will open the gate-valve.

In Fig. 7, D′ is an elastic diaphragm, preferably of steel, secured on the case D^2. 57 is a pipe from the case to the dry pipe A. 52 is a petcock on the same. A rod 53 connects the diaphragm D′ with the piston d^3 of the auxiliary valve D^3. The pipe *y* leads to the pressure-reservoir, and the pipe *d* to the motor C, as hereinbefore described. A lever 54, pivoted at 55 and engaging between shoulders 56 on the rod 53, is pivoted to one end of a link 58, the other end of the link being pivoted to the handle 59 of the valve 60 in the pipe 57. Normally the diaphragm D′ curves inward, as indicated by the dotted lines, but the pressure of the air in the pipe A acting on the diaphragm (whose area is much larger than that of the cylinder D^3) forces the diaphragm to the position of the solid lines, and the piston d^3 then closes communication between the pipes *y* and *d*. In this position

also the valve 60 is open, allowing the pressure in the dry pipe A to act on the diaphragm D'. Now suppose a fire occurs and some one of the plugs opens, as hereinbefore described. The pressure in the dry pipe A diminishes, and the diaphragm D' springs back to the position of the dotted lines, thereby raising the piston d^3 and opening communication from the pipe y to the pipe d and thence to the motor C, so that the gate B is opened and water admitted to the dry pipe A, as hereinbefore described. At the same time the lever 54 and link 58 have closed the valve 60, so that no water can enter the case D^2.

Now, having described my improvements, I claim as my invention—

1. The combination with a dry pipe normally containing a low-pressure fluid, of a valve in the dry pipe, a motor for operating the valve, an independent high-pressure reservoir not connected with the dry pipe, an auxiliary valve, a channel from said reservoir to the auxiliary valve, and from the auxiliary valve to said motor, and a separate isolated channel from the auxiliary valve to the dry pipe, substantially as described.

2. The combination with a dry pipe normally containing a low-pressure fluid and a main valve controlling the admission of water to the dry pipe, of a motor for actuating the main valve, an independent high-pressure reservoir not connected with the dry pipe, an auxiliary valve, channels from the auxiliary valve to the high-pressure reservoir and to the motor, a piston in the auxiliary valve controlling said channels, and a separate channel isolated from the first-named channels by said piston and leading to the dry pipe, substantially as described.

3. A sprinkler-head provided with a movable plug, springs normally retaining said plug in position, levers interlocking at one end for holding the springs in position, and fusible amalgams normally fixing the other ends of said levers and adapted to hold said levers in their normal position until the temperature of the atmosphere has reached the melting-point of the amalgams, substantially as described.

In testimony that I claim the foregoing as my invention I have signed my name, in presence of two witnesses, this 13th day of March, 1895.

JAMES G. WESTBROOK.

Witnesses:
BERNARD J. BECKE,
DAVID W. BROWN.