(No Model.)

N. LOMBARD.

AUTOMATIC FIRE EXTINGUISHING APPARATUS.

No. 514,154. Patented Feb. 6, 1894.

Fig. 1.

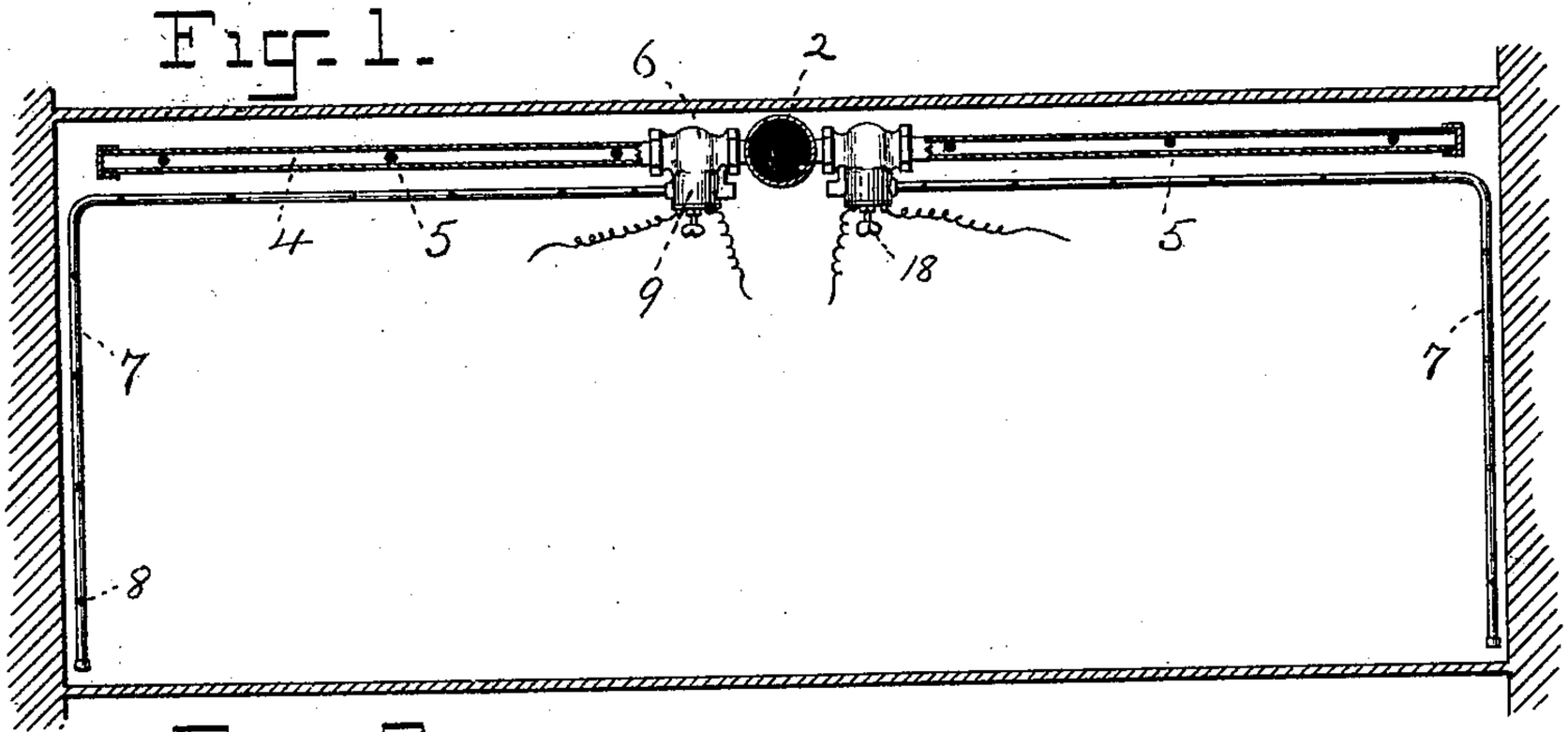


Fig. 2.

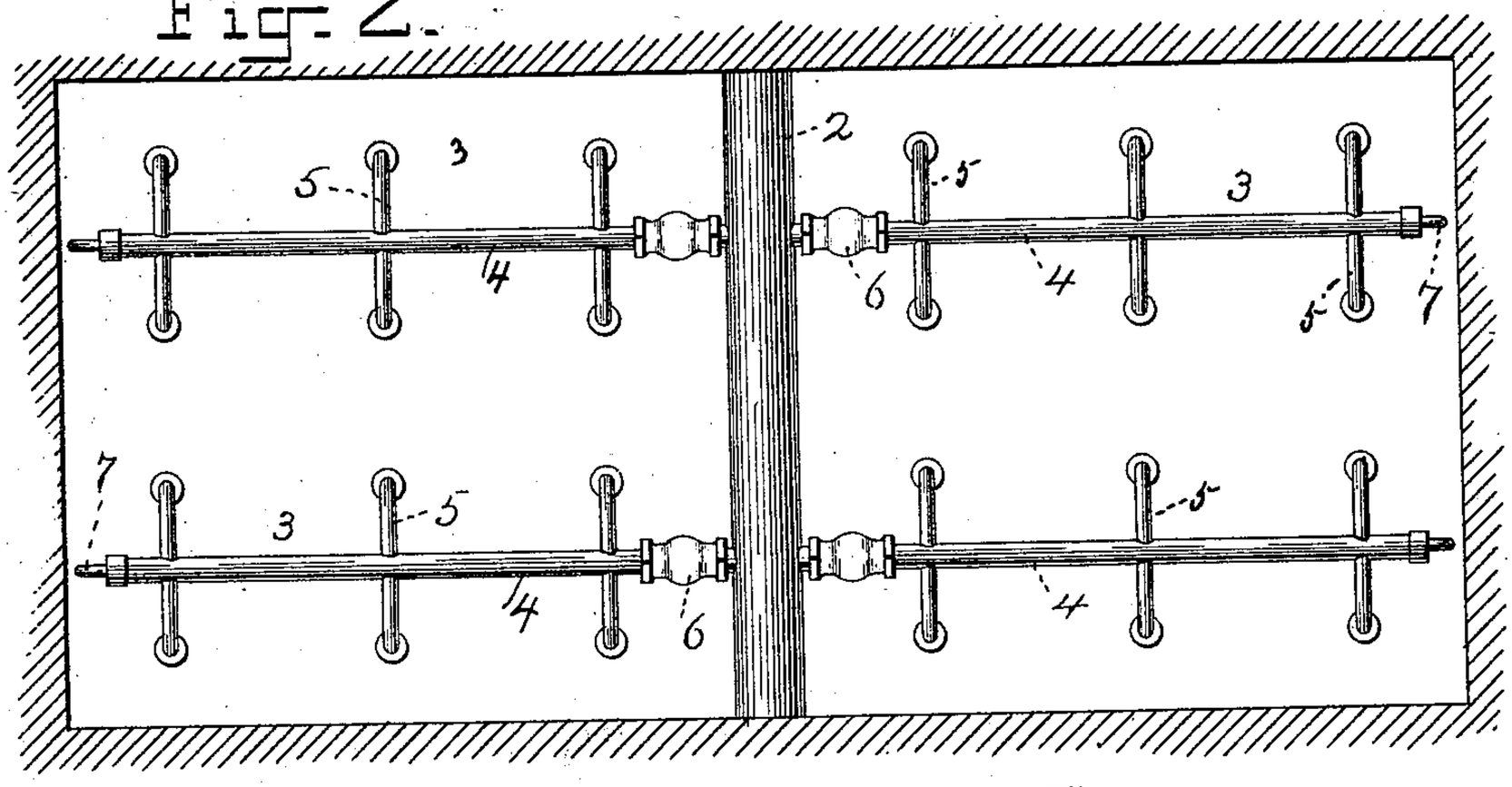


Fig. 3.

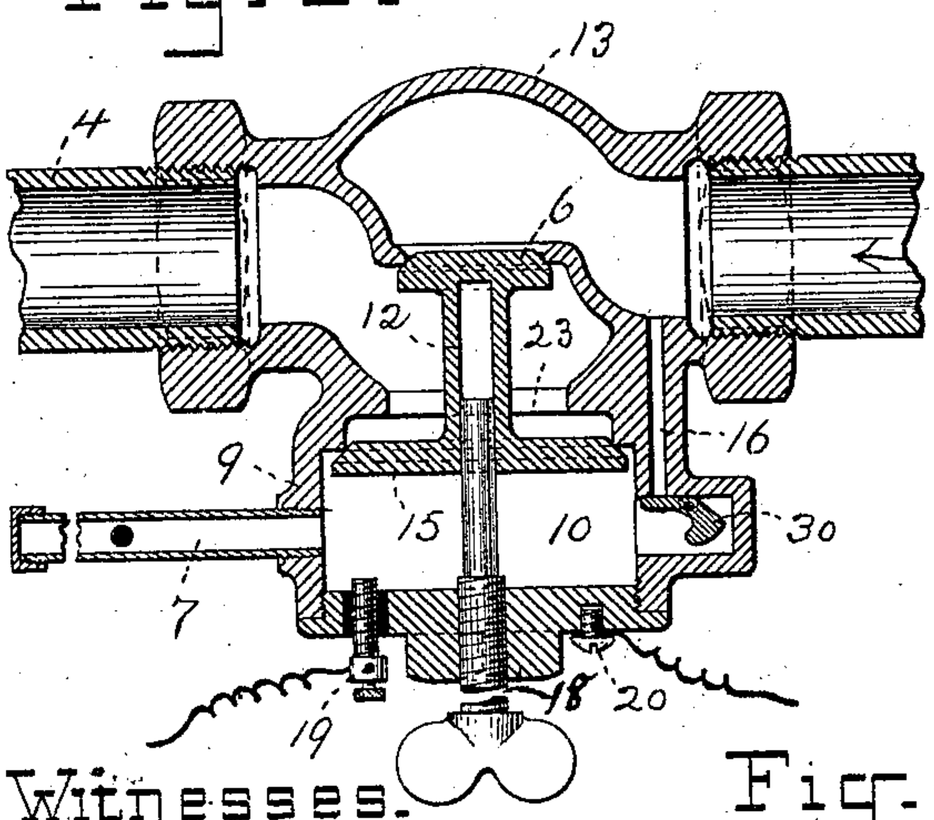


Fig. 5.

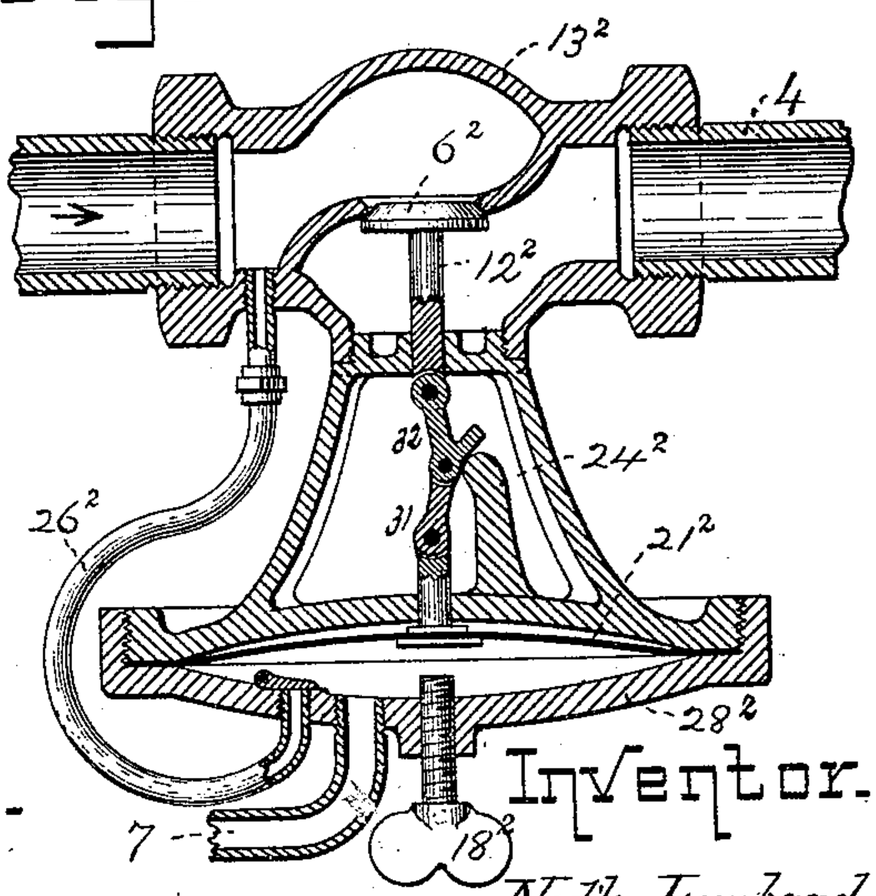
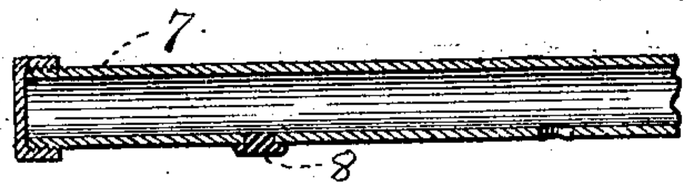


Fig. 4.



Witnesses.

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AUTOMATIC FIRE-EXTINGUISHING APPARATUS.

SPECIFICATION forming part of Letters Patent No. 514,154, dated February 6, 1894.

Application filed May 5, 1893. Serial No. 473,061. (No model.)

To all whom it may concern:

Be it known that I, NATHANIEL LOMBARD, a citizen of the United States, residing at Boston, in the county of Suffolk and State of Massachusetts, have invented certain new and useful Improvements in Automatic Fire-Extinguishing Apparatus; and I do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same, reference being had to the accompanying drawings, and to figures of reference marked thereon, which form a part of this specification.

This invention relates to apparatus which acts automatically to extinguish incipient fires.

My invention belongs to that class adapted to be set in operation by the heat of an adjacent fire, but which system requires the services of an attendant to restore it to the condition in which it was prior to the fire.

My invention is embodied in the mechanism and arrangement of the several elements, which co-operate to set the apparatus in operation and thereby extinguish the fire in proximity.

Briefly stated my invention consists in providing an unbalanced valve which is to be held to its seat by the pressure of the water in the system employed for extinguishing the fire.

Further my invention is particularly applicable to a dry system, so called, that is where the fire-extinguishing apparatus is composed of a number of pipe sections controlled by independent valves, the latter admitting water into the respective open sections only in times of danger. In connection with this system I employ a number of pipes, one for each section and termed operating pipes; these are to be pierced with holes or apertures at suitable intervals and said holes are to be closed by means of a fusible plug or cap. The main supply pipe connects with this system of operating pipes and likewise with a water-tight chamber under the same pressure. Said chamber contains a piston attached to the opposite end of the rod which supports the independent valve leading to one of the pipe sections above mentioned. This piston is of an area in excess of that of the valve disk and hence the hydrostatic pressure of the system is employed to hold the valve to its seat. The advantages of this method are apparent, since the pipe sections are always left open and in readiness for use, no thermostats are used but sprinklers are supplied to distribute water. The number of parts are reduced and the entire system simplified.

The drawings represent in Figure 1 an elevation, and Fig. 2 a plan of a system embodying my invention. Fig. 3 is an enlarged sectional elevation of valve operating mechanism for automatic fire-extinguishing apparatus. Fig. 4 is a portion of an operating pipe with fusible plug. Fig. 5 is a modified form of construction of valve operating mechanism.

In said drawings 2 represents the main supply pipe which extends through the building to be equipped with extinguishing apparatus after my invention. In each compartment is located a series of independent pipe sections 3, composed of a central tube 4 and a series of branch tubes 5. 5. which are equipped with sprinklers for more efficient distribution of water. These tubes may be perforated, but are always empty, except in case of a fire. In such event the independent valves 6 are then open and water from the main supply pipe 2 is then coursing through them. These independent valves are located one in each central tube 4 for every pipe section and prevents water from entering said sections except at stated times as premised. The operation of these valves and their construction embodies important features of my invention in connection with a system of operating pipes 7, so called. These latter are preferably of small size in order to be quickly heated and are arranged to co-operate, one for each pipe section. Moreover said pipes are closed at one extremity and perforated at suitable points, wherever danger is liable to occur. Said perforations or discharge orifices are closed or sealed by fusible metal caps or plugs 8. The opposite ends of said pipes connect preferably with a water-tight vessel 9 formed with a chamber 10 adapted to contain a portion of the valve operating mechanism. By experiment I find an unbalanced double piston valve is very efficient and hence I have

adjusted a valve rod 12 within the valve case 13 of one of the independent valves, and at the upper end affixed a disk 6, which controls the passage leading from the main pipe 2 into one of the pipe sections 3. At the opposite end of said rod and within the chamber 10 is positioned a piston 15 of larger area than the disk 6. A duct 16 interconnects the chamber with the main supply pipe 2. Hence since these two parts are under the same pressure the preponderating force exerted upon the larger area of the piston forces the disk 14 upon its seat and so retains it until a fire occurs. A check valve 30 prevents the return of water through the duct back to the main pipe should the pressure in the latter fall for any cause whatsoever; this arrangement always insures positive seating of the valve. In connection with the valve and valve-case is an electric alarm circuit which consists of an insulated terminal 19 and a plug 20 set into the valve-case with wires therefrom. Should a fire occur, the act of opening the valve closes the circuit, said valve coming in contact with the insulated plug 19. By such means the location of a fire is indicated at headquarters.

The operation of this automatic fire-extinguishing apparatus is as follows: Assuming the parts are as shown in Fig. 1, it is evident that the operating pipe system 7 and chamber 10 are under equal pressure with that of the main pipe system, so long as the operating pipe remains closed. Moreover the independent valve is shut and the pipe section 3 connected with and controlled by said valve is empty. If a fire occurs the heat in the apartment melts the fusible metal, which seals the apertures in the operating pipe. When this happens the water rushes from such apertures as have been opened by the heat, and the pressure in the chamber 10 is reduced, since the water therein now pours out faster than it can enter by the duct 16. As a result the pressure on the disk 6 of the valve serves to push the valve from its seat and water from the main at once rushes into the pipe section 3 and thence is distributed by the sprinklers. In Fig. 3 for convenience of manufacture I have so constructed the valve-case, that when the valve is moved it closes the aperture 23 in the valve-case by means of which it was inserted into said case. Upon extinction of the fire the apparatus must be set again for operation. To do this the valve (not shown) in the main supply is shut; the apertures in the operating pipes are again sealed by fusible metal and the valve held up to its seat by turning the screw-rod 18 inwardly. After such acts the water is again admitted into the main system, and the operating pipe system and chamber 10 are filled with water. The screw-rod is now turned back to the position shown in Fig. 3, and the apparatus is in readiness to perform its duty.

In Fig. 5 I have shown a modified form wherein a separate water-tight vessel 28^2 containing a diaphragm 21^2 is used. This latter is held in a convex position by liquid pressure from the main supply by means of a small pipe 26^2 operating in the manner of the duct as before described in Fig. 3. However the valve 6^2 is now held to its seat indirectly by mechanical means in lieu of directly by hydrostatic pressure. These holding elements consist of two short rods 31 32 adapted to be held in a locked oblique position with respect to each other by a finger or prong 24^2 attached to the exterior of the vessel 28^2. Reduction of the pressure causes resilient action of the diaphragm and the two short rods straighten and drop thus allowing the valve to be operated by the pressure of the main system and water rushes into the open pipes of the water distributing section.

The advantages obtained by this modified valve-holding device over and above that shown in Fig. 3 consist chiefly in the fact that the operating parts, viz:—the two short rods and the finger 24^2—are exteriorly placed, and thus positioned, cannot only be easily inspected, but are surrounded by air and hence not liable to rapid corrosion, which frequently occurs when the parts are immersed in water as shown in Fig. 3. This corrosion is likely to make the parts stick together and often renders them inoperative.

What I claim is—

1. In automatic fire extinguishing apparatus a main supply pipe, groups of open pipe sections for water distribution, combined with a closed pipe system in connection with and under the pressure of the main supply pipe and arranged to open by heat agency, and an unbalanced valve adapted to be held to its seat by the pressure in the closed pipe system extending about a building, said unbalanced valve preventing flow of water from the main pipe into the open pipe sections except at stated times, substantially as set forth and explained.

2. In combination with a main supply pipe, a series of open pipe sections, and independent unbalanced valves for each section, a water-tight vessel connected with the main supply pipe and under the same pressure to hold each valve to its seat, and a closed operating pipe extending about a floor of a building and connected with and under the pressure of the main supply and adapted to be opened by heat agency, substantially as and for purposes set forth and explained.

3. In automatic apparatus for extinguishing fires, a main supply pipe, a series of open pipe sections for water distribution, a water-tight vessel, and an apertured pipe system adapted to extend about an apartment, the apertures in this pipe system to be closed by fusible metal, and said pipe system and the water tight vessel both being connected with the main supply pipe, combined with an unbalanced valve equipped with a small disk to control the passage from the main pipe to the branch sections, and a larger piston within

the chamber; all operating substantially as stated.

4. A main supply pipe, an open pipe section leading therefrom, a closed pipe system extending around a room and united with the main supply pipe and to be operated by heat agency, a by-pass which leads from the main supply pipe, and a water tight vessel which interconnects said closed pipe system and by-pass, combined with an unbalanced valve composed of the rod, a disk at one end, and a piston of larger area at the opposite end, said piston being located in the water-tight vessel and by pressure to close the passage from the main supply pipe to the open pipe section, substantially as herein stated.

5. The combination with a main supply pipe, a water tight vessel, and a closed pipe system to be opened by heat agency and extending about a subdivision of a building to be protected, and means for normally maintaining said vessel and pipe system under the same pressure as the main supply, of groups of open pipe sections leading from the main supply pipe, and an independent valve for each section, said valves being unbalanced and held to their seats by pressure from the main exerted through the water tight vessel, and a check valve to maintain pressure in the said vessel at a maximum, substantially as described.

6. In combination with a main supply pipe, an open pipe section for water distribution, an independent unbalanced valve for each section, a water-tight vessel having a differential supply and discharge, composed of a small duct for a supply from the main pipe, and a larger closed pipe extending around an apartment, said closed pipe to be opened by heat agency, all operating to control the independent valve, substantially as explained.

In testimony whereof I affix my signature in presence of two witnesses.

NATHANIEL LOMBARD.

Witnesses:
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