(No Model.) 5 Sheets—Sheet 1.

W. NERACHER.

FIRE EXTINGUISHING AND ALARM APPARATUS.

No. 261,475. Patented July 18, 1882.

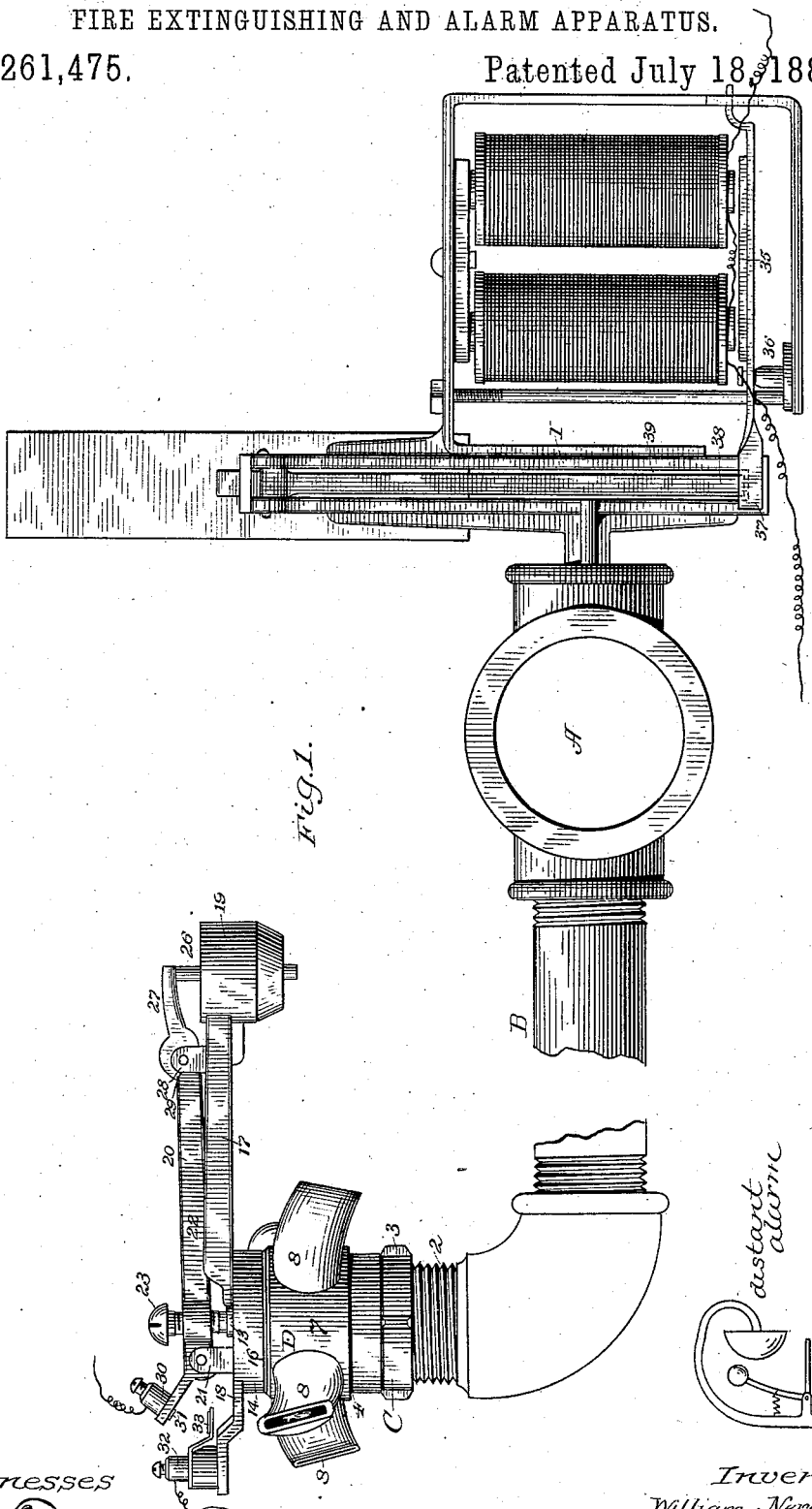

Fig. 1.

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(No Model.) 5 Sheets—Sheet 2.

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FIRE EXTINGUISHING AND ALARM APPARATUS.

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Fig. 2.

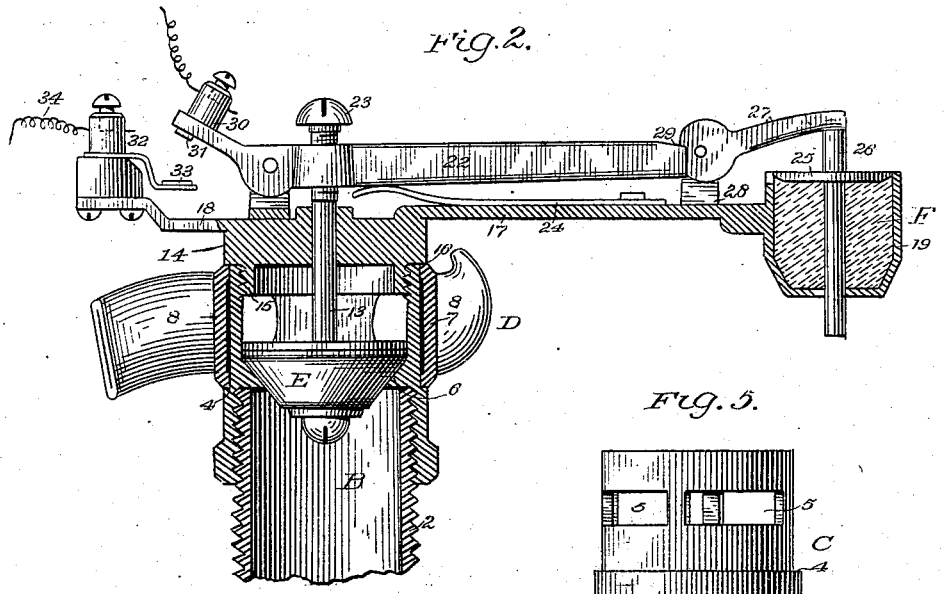


Fig. 5.

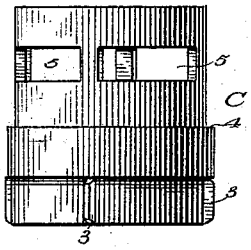


Fig. 6.

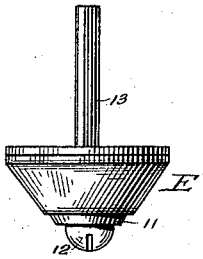


Fig. 7.

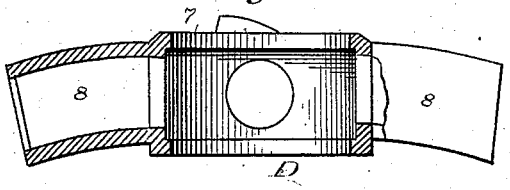
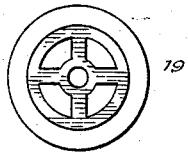


Fig. 8.



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FIRE EXTINGUISHING AND ALARM APPARATUS.

No. 261,475. Patented July 18, 1882.

Fig. 3.

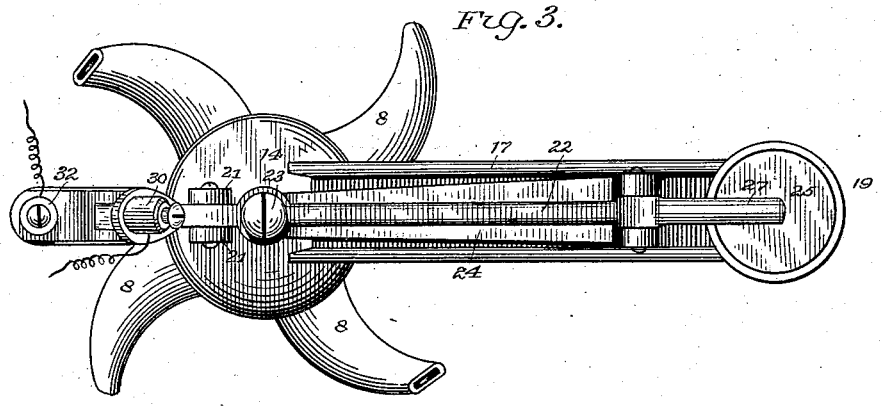
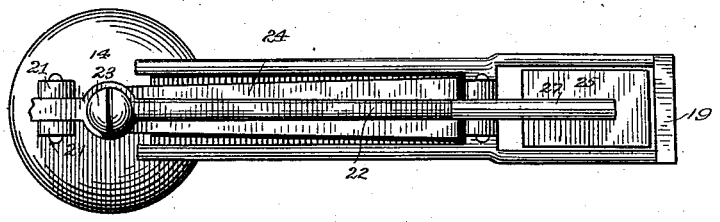


Fig. 4



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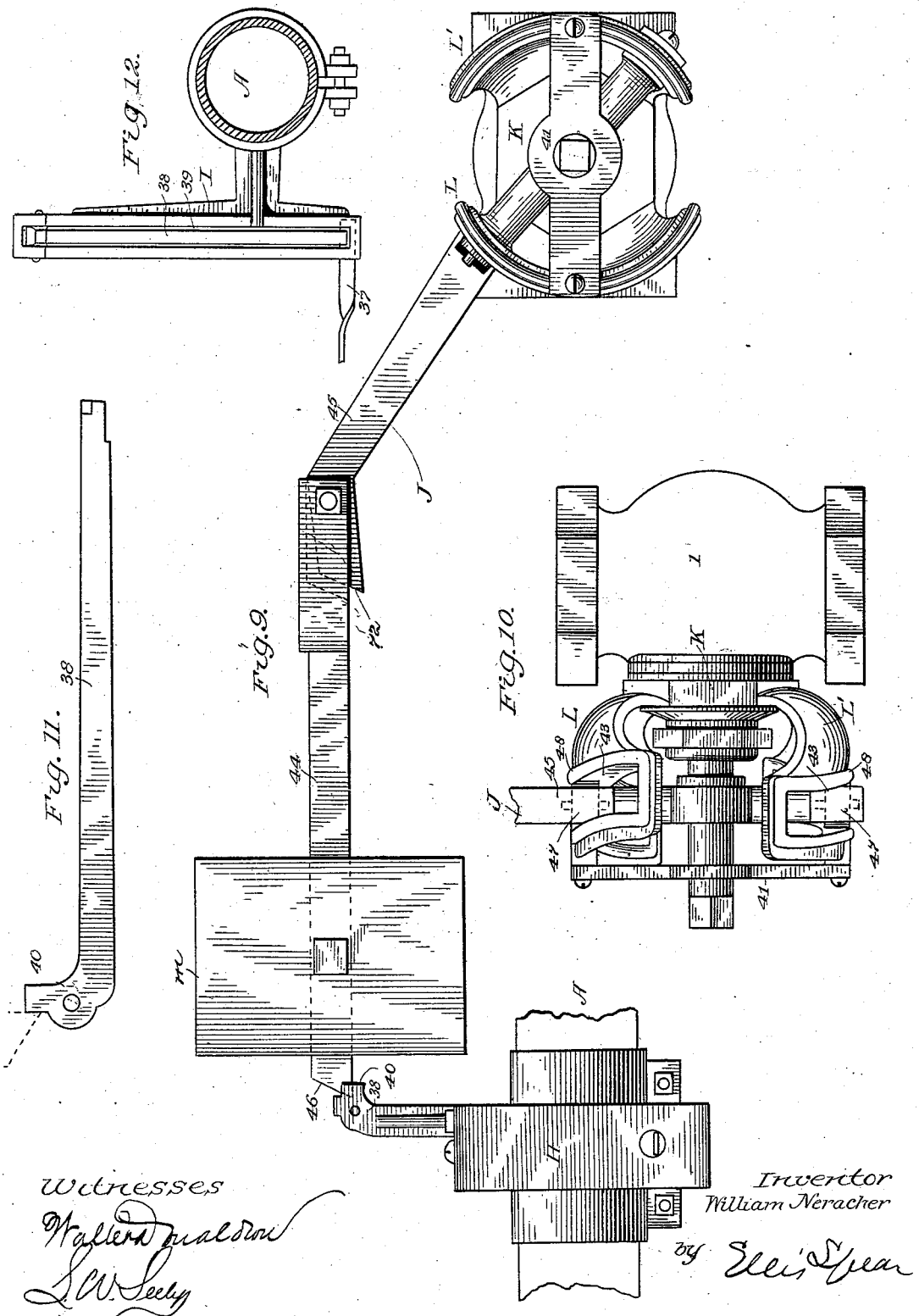

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(No Model.) 5 Sheets—Sheet 5.

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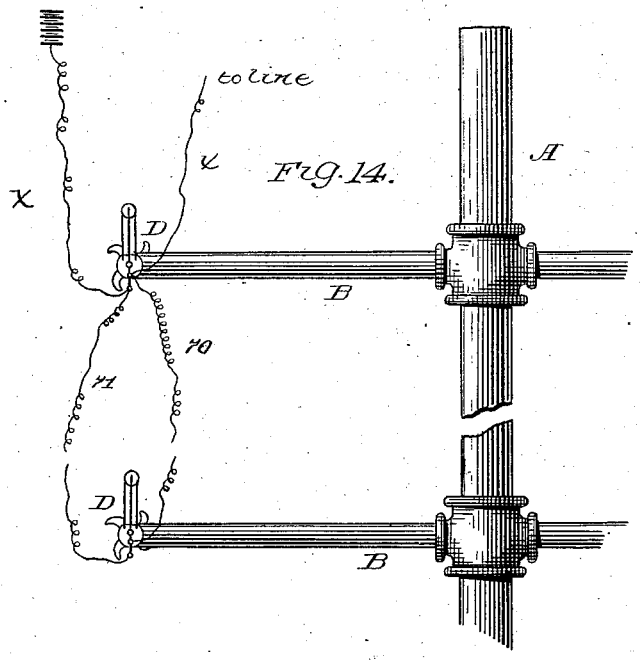

Fig. 14.

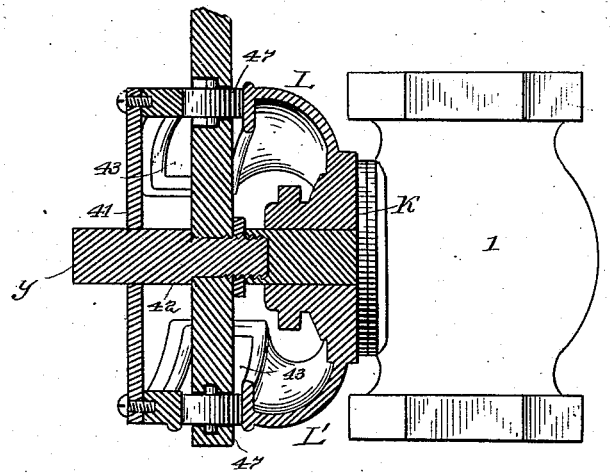

Fig. 13.

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UNITED STATES PATENT OFFICE.

WILLIAM NERACHER, OF CLEVELAND, OHIO.

FIRE EXTINGUISHING AND ALARM APPARATUS.

SPECIFICATION forming part of Letters Patent No. 261,475, dated July 18, 1882.

Application filed March 2, 1882. (No model.)

To all whom it may concern:

Be it known that I, WILLIAM NERACHER, of Cleveland, in the county of Cuyahoga and State of Ohio, have invented a new and useful Improvement in Fire Extinguishing and Alarm Apparatus; and I do hereby declare that the following is a full, clear, and exact description of the same.

My invention is an improvement in automatic fire-extinguishers having for its object the automatic supply of water to the building or rooms from any convenient head, the automatic distribution of the water uniformly through the rooms or building where the discharge-pipes are located, and the automatic transmission of an alarm of any ordinary alarm apparatus situated in an engine-house or any other distant position to which it may be desirable to send notice of the fire. Another object is to render the automatic apparatus more sensitive and operative at lower temperatures than the ordinary fusible apparatus heretofore used. In connection with these principal objects I have sought to simplify the apparatus and render it more effective. The apparatus is designed for mills, factories, hotels, theaters, and other large buildings, though equally applicable to all buildings connected with a water-supply under suitable pressure.

My invention consists, first, of a distributing-pipe, or a series of such pipes, located within the rooms or building, and connected to a water-supply under suitable pressure, with a valve in each distributer-pipe held in a closed position by suitable apparatus, and a plug, stop, or like device fusible by a given degree of heat in order to release the valve or valves, and an electric circuit connected to the distributer pipe or pipes by suitable means, with battery and line connections with the distant signal, the said circuit being open when the valves are closed, but automatically closed when the valves are opened, whereby the automatic opening of the valves is made to close the circuit and sound the alarm through any ordinary alarm apparatus, such as are used in engine-houses, &c.

In the second place my invention consists in connecting with this line and the described apparatus a valve in the cellar or basement of a building, closed ordinarily to shut out the supply of water, but having a temporary magnet in the circuit above described, whereby the pipes in the building may be kept empty ordinarily, but supplied automatically in case of fire, and the distributer-valves are opened and the alarm sounded simultaneously with the opening of the supply-valve.

My invention consists, in the third place, of a fusible or meltable plug inclosed in an open-bottom box or case, the said plug acting, while in a solid condition, to hold the valve or valves in closed position by suitable intermediate mechanism, and to maintain the breaks in the electric circuit, but to release the valves and close the circuit by yielding when melted.

The invention further consists in certain improved details of construction whereby my apparatus is made simple and effective.

In order to enable those skilled in the art to understand the construction of my apparatus, I now describe the same in connection with the accompanying drawings, in which—

Figure 1 is a side elevation of a branch pipe and its distributer; Fig. 2, a central vertical section through the distributer and its supply-pipe; Fig. 3, a top view of the cap-plate, the cup for the fusible plug, and the connecting-levers; Fig. 4, a modification; Fig. 5, a separate view of the valve-chamber; Fig. 6, a separate view of the valve; Fig. 7, a vertical section of the distributer; Fig. 8, a bottom view of the cup for the fusible plug; Fig. 9, a side elevation of the weighted levers and devices for operating the supply-valve; Fig. 10, a top view of the supply-valve chamber with its attachments; Fig. 11, an elevation of the latch 38 enlarged, the projection on the weighted lever being shown in dotted lines; Fig. 12, a front view of the bracket and latch; Fig. 13, a longitudinal section through the supply-valve stem; Fig. 14, a diagram showing the arrangement of the pipes and sprinklers and the electrical connections.

It will be understood primarily that in a mill, factory, hotel, or other large building any number of branch pipes each provided with a sprinkler or distributer may be employed, so as to fully protect every part of the building, all of such pipes being connected to the permanent water-supply of the building under pressure.

In the drawings, A, Figs. 1 and 14, represents the main water-pipe of a building connected to the street-main, tank, pump, or other water-supply, and having working in a suitable seat a globe-valve, 1, which would ordinarily be placed in the cellar or basement of the building.

B represents one of the branch pipes connected to the pipe A by any suitable joint, and having an upturned externally screw-threaded end, 2. Connected to this pipe B is the shell or valve-chamber C. (Shown separately in Fig. 5.) It is substantially cylindrical on its exterior, is screw-threaded internally for engagement with the supply-pipe, and has on its outside projecting lugs 3 to hold the pipe-wrench or other tool used for forcing it down upon the water-pipe. The shell C is slightly reduced in diameter above the shoulder 4, and is pierced with openings 5 5—usually four in number—placed just above a beveled or flat flange, 6, which forms the valve-seat. The upper end of the chamber C is internally screw-threaded, as shown.

D, Figs. 2, 3, and 7, is the rotating distributer, which is of peculiar construction. It is preferably a single brass casting consisting of an annular bearing-ring, 7, having perforations connecting with peculiar curved distributing arms or nozzles 8. There are ordinarily four of these curved arms, and, as shown, two are turned upwardly and two downwardly, the discharge-orifice being a narrow nearly-vertical slot, so that water forced through the openings 5 5 into the curved arms revolves the distributer by a twisting or screw pressure, and the water is thrown both upward and downward, toward the ceiling as well as the walls and floor, escaping from the nozzles in the form of vertical sheets, which are broken by the rotary motion into spray and thoroughly sprinkle the immediate vicinity in all directions. The annular ring 7 is mounted upon the perforated cylindrical end of the valve-chamber resting upon the shoulder 4, and is adapted to revolve freely when water is admitted, as hereinafter described.

The valve, as a whole, is represented by E, and shown separately in Fig. 6. It consists of a beveled disk or plate having a facing of rubber secured in place by a washer, 11, and screw 12, and a central stem, 13. The diameter of the disk or plate is such that it slides freely up and down in the valve-chamber, the sides of such chamber between the holes acting as a guide. The valve-stem 13 passes through a central opening in a cap-plate, 14, Fig. 2, which has a screw-threaded projection, 15, screwing into the upper end of the chamber C, a shoulder, 16, on said cap-plate holding the revolving distributer in place. Accurate vertical movement of the valve is insured by the guide before mentioned, as well as by the action of the stem in the perforated cap. The cap-plate is either secured to or cast integrally with projecting arms 17 18, extending in opposite directions, and at one end of the arm 17 is a cup or box, 19. A lever, 20, is pivoted in ears 21, Fig. 1, of the cap-plate, such lever having two arms of unequal length set at an angle, as shown. When the longer arm 22 of the lever is depressed it is made to press by means of an adjustable screw, 23, upon the upper end of the valve-stem, so that while the lever is depressed the valve is forced down tightly upon its seat. The lever is pressed constantly upward, however, by the free end of a leaf-spring, 24, attached to the arm 17, as shown. The tendency of the spring, as well as of the pressure of the water upon the valve, being to throw up the lever and permit the valve to open, an automatically-operated locking device is necessary to keep the valve normally closed. For this purpose the cup 19 is fixed on the arm 17 of the cap-plate for holding the fusible or meltable stop or plug which holds the locking-levers. It is provided preferably with an inclined or beveled bottom, a grating or series of perforations, and a central opening for the stem of the cap-plate. This cup is designed to contain a plug, F, made of spermaceti, paraffine, or similar material fusible at a temperature of about 120° Fahrenheit. The fusible plug or stop is perforated longitudinally to receive the stem of a plate, 25, adapted to rest upon its upper surface, and having an upward projection, 26. Upon this projection rests the lever end of the latch 27, pivoted in ears 28 on the arm 17, and provided with a catch, 29. It will now be evident that when the fusible plug is placed in the cup, if the arm 22 of lever 20 is caught by the catch 29 while the latch rests on the projection or stem 26 the lever 20 will be held down upon the valve-stem until the catch is released. The conical or beveled shape of the cup and plug adapts it to resist a much greater pressure without crushing than if the chamber were cylindrical; but when melted the material of the plug may escape through the opening in the bottom.

It should be observed that in practice the cap 14, its arms, the cup, and the standards or ears in which the levers are pivoted are preferably a single casting.

It will be clear from this description that the melting of the fusible plug by a very moderate degree of heat will release the catch, leave the lever free to rise, and the valve free to be opened by the inflowing water.

The devices thus far described would be operative if it were intended that the branch pipe A should be allowed to be filled constantly with water, and under some circumstances I may use the device in that form; but in order to prevent liability of freezing or leakage I prefer to exclude the water from the pipe A, and for that purpose have provided the globe-valve 1, which may be located in the cellar and shut the water off at a point where no danger will occur of leakage or freezing.

I now describe the means by which not only

the automatic operation of the globe-valve is accomplished for letting on the water to the series of pipes, but also an alarm of fire is sent to some station at a distance—as, for instance, to an engine-house—it being premised that the operations just described of placing the discharge-valve in readiness to let in the water into the room, of opening the globe-valve to admit the water to the pipes, and of sending the alarm are accomplished simultaneously.

Mention has been made of the lever 20 as having two arms of unequal length set at different angles. Attached to the shorter arm of the lever is an insulated binding-post, 30, which is in electrical connection with a battery arranged in any suitable position, and connected with the post is a platinum electrode, 31. The arm 18 of the cap-plate carries a properly-insulated post, 32, and an electrode, 33, and the post 32 is in electrical connection by wire 34 with the helix of an electro-magnet, G, near the globe-valve in the cellar. This magnet is carried in or on a frame, H, secured to a bracket, I, cast with or attached to the side of the pipe A. An armature, 35, is pivoted on a post, 36, mounted on the frame. It will be understood that each of the series of posts 30 on the valve-releasing lever is connected to the main wire leading to line and the helix of the temporary magnet aforesaid. In order that any one of the branches may open the main supply-valve in the cellar or basement and sound the distant alarm, I connect each insulated binding-post 32 opposite the levers with the battery by a single wire running through each. This is shown in the diagram Fig. 14, in which A represents the main and B the branch pipes. The binding-posts 30 upon the levers are all connected by a wire, 70, to the line Z, and the posts 32 are all connected by a wire, 71, with the battery. The main-line wire continues through the helix to suitable sounding apparatus at the engine-house or other distant station. Line and battery are properly grounded to complete the circuit. It will be apparent that whatever plug melt and lever be released its own sprinkler will be set in motion, and connection be made both with the magnet which operates the supply-valve mechanism (hereinafter more fully described) and also with the distant signal apparatus. This temporary magnet G, near the supply-valve, is provided with an armature, 35, mounted upon an arm, 37, which extends out to engage with a latch, 38, pivoted in the upper end of the vertical slot 39 in the bracket I, and to hold such latch in a vertical position, unless the armature is drawn up by the magnet, when the arm 37 will drop, releasing the latch. The latch is provided with a projection, 40, which engages with the jointed and weighted lever J, connected with the globe-valve at the junction of the pipe A and the water-main.

To the cap K, which closes the valve-chamber and contains a stuffing-box for the valve-stem, are firmly screwed or otherwise secured (or they may be cast therewith) projecting brackets L L′, connected and braced by cross-piece 41, which forms a bearing or guide for the valve-stem 42. Each of the brackets L L′ has a cam-slot, 43, inclined in opposite directions. The weighted lever J is composed of two parts, 44 45, hinged together, as shown, and the part 44 is provided with a heavy weight, M, and with a beveled end, 46, which is caught and held in an elevated position by the part 40 of the latch 38. Some movement is permitted at the joint, so as to allow the weight to fall a short distance before the part of the lever moving first brings up against the shoulder 72 on the other part, in order to permit the weight to acquire some momentum to start the lever in the slots. By means of this a lighter weight may be used.

The part 45 of the lever J is provided with anti-friction rollers 47, Figs. 10 and 13, which travel in the slots in the brackets L L′. The lever 45 is mounted on the valve-stem 42, so as to move in substantially vertical plane, and it is therefore evident that by the dropping of the weighted lever the valve-stem will receive a longitudinal movement in its bearings, due to the incline of the slots, and will open the valve to admit the water from the main to the pipe A. The stem of the valve is made in two parts, the outer part (marked *y*) being turned down to fit the hole in the lever and screwed into the other part of the stem fixed to the valve. This two-part construction is necessary in order to put the parts together, and very conveniently holds the lever in the turned-down position, whereby the movement of the said lever on the inclines of the slots moves the valve.

Manifestly the attraction of the armature by the magnet will depress the arm 37 and will release the latch 38, so that the weight is free to drop and move the valve to admit the water to the distributing-pipes. In order to prevent the pressure of the water in the main from starting the valve by reason of the inclined slots and the freedom from friction caused by the rollers, the ends of the slots are made straight, as shown at 48, so that the rollers have a square bearing, when in normal or closed position, at both ends of the slots, making it impossible for any pressure against the valve to start it when open or closed. The globe-valve and seat are of the ordinary or any convenient construction.

In Fig. 4 is shown a modified form of cap-plate and cup for the fusible plug or stop. The latter is simply a square cup having an open bottom and a flange to hold the plug, and a flat pivoted plate to rest on such plug, and a catch to hold the lever 20 down. This device may in some cases be preferable, as the fusible material is more fully exposed to the heat than in the cup before described.

In case the globe-valve should be dispensed with and water admitted directly to the branch pipe, the spring 24 might be unnecessary, as

the water-pressure would force up the valve-plunger when the catch 29 was released by the fusing of the plug.

Supposing the apparatus as hereinbefore described to be placed within a building. The main pipe runs from the supply-pipe in the basement or cellar or other point where such supply may enter the building. The branch or distributing pipes are arranged as near each other as may be found convenient, varying in this respect somewhat, according to the nature of the building or its contents. The wire connects one set of binding-posts with each other and with the battery properly connected to earth, and another wire connects the other set of posts (all insulated) to the main line, extending to the distant alarm, and including the helix of the temporary magnet which operates the globe-valve. Fire breaking out in the vicinity of any one of the branch pipes or its distributing apparatus melts, when only a little above summer heat, the fusible plug or stop, which, running out in liquid state, lets the catch-lever drop and releases the valve-lever and valve. At the same time the short end of lever 20 touches the contact-point of the opposite binding-post and closes the circuit. This causes the temporary magnet to release the weight and open the supply-valve, and sends a current to the signal-station, wherever it may be.

By means of the stop or plug of paraffine, wax, or the like, used in connection with the cap, and acting as a resistance, stop, or dog while solid, a very sensitive apparatus is provided, operating at comparatively low temperature, and adapted to indicate and to extinguish a fire at its earliest stages. The peculiar distributer uniformly diffuses the water let on in a better manner than any heretofore known to me.

It has heretofore been suggested to connect an alarm and water-supply by means of a wire connected by means of easily fusible solder, which wire, disconnected by the heat, was to break the circuit, and thereby sound an alarm. This would require solder to hold the wire together, and would not operate with ordinary alarms, by reason of breaking instead of closing the circuit. In my apparatus the wire may be connected to any ordinary alarm apparatus. The melting-point of solder, which is required whenever the wires or other parts are to be held together with considerable strength, is so high that it cannot be melted until the fire has come into close proximity and made considerable headway; but the wax or paraffine melts at low temperature, and by my plan no great amount of cohesive force is required.

Plainly the fusible stop may be used with an alarm apparatus alone or with extinguishing apparatus alone.

I am aware that an automatic fire-extinguisher having a perforated celluloid plate placed in a covered frame, said plate supporting a rod and weighted lever which holds the valve of a water-supply, and releases it when the plate is burned, so as to admit the water, is not new, and I limit my claims to a fusible or meltable plug as a resistance and support to the lever which retains the valve.

Having thus described my invention, what I claim is—

1. A fire extinguisher and alarm apparatus consisting of a water-pipe or a series of water-pipes each having a valve and distributing apparatus, mechanism acting in connection with a stop fusible at comparatively-low temperature for holding the valve in a closed position, a properly-insulated wire, with earth and battery connections, including in the circuit a distant alarm, and also including the mechanism for holding the valve, with a break in said line at the valve-holding mechanisms, the said break being closed when the stop is melted and the valve freed.

2. In an apparatus for automatically letting on water or giving alarm, a releasing apparatus consisting of a fusible plug or body held in a case, and acting as a resistance while solid, but yielding when melted, said plug operating in connection with suitable lever or equivalent mechanism, substantially as described.

3. In a fire alarm or extinguishing apparatus, a fusible stop or dog of wax or like material, included in a box or case, and serving, while solid, to dog or stop the releasing mechanism of the alarm or water-supply, as set forth.

4. The combination, with the distributer, the valve-chamber, and valve, of the cup 19, the fusible plug, and the levers 27 20.

5. The combination of the distributer and its valve with the independent cup 19, the pivoted catch 27, the lever 20, and the spring 24.

6. The revolving distributer D, having the curved nozzles inclined upward and downward, as shown, and having the flat discharge-orifices.

7. The combination of the valve-chamber B, the valve E and its stem, the perforated cap-plate 14, having the cup 19 and carrying the lever 20, and adjusting-screw 23.

8. The cup 19, having the perforated bottom, in combination with a fusible plug, a plate, 25, and a lever or levers connected with the valve of the distributer.

9. In combination with the distributer of a fire-extinguisher, a valve adapted to shut off the water from said distributer, and means for automatically raising said valve when released, a lever adapted to hold such valve in a closed position, a fusible or meltable plug adapted to hold the lever against the valve, an electric circuit in connection with said lever, and a point opposite the end of the lever, also in the electric circuit, the parts being arranged as specified, whereby the melting of the plug releases the valve and closes the circuit, substantially as described.

10. The combination of the valve 1 and its stem, the pivoted lever J, and the cam-grooved brackets L L′.

11. The valve 1 and its stem, in combination with the pivoted lever J and the cam-grooved brackets L L′, having straight ends.

12. The combination of the supply-valve, the standard having inclined grooves, the cross-bar, the two-part spindle, and the weighted lever.

13. In combination with the supply-valve, the weighted lever connected therewith and adapted to open the same by falling, the stop-lever adapted to hold up the weighted lever while the valve is closed, a temporary magnet, and electrical connections to the battery adapted to remove said stop-lever and allow the weighted lever to fall and open the valve.

In testimony whereof I have signed my name to this specification in the presence of two subscribing witnesses.

WILLIAM NERACHER.

Witnesses:
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DAVID H. MEAD.