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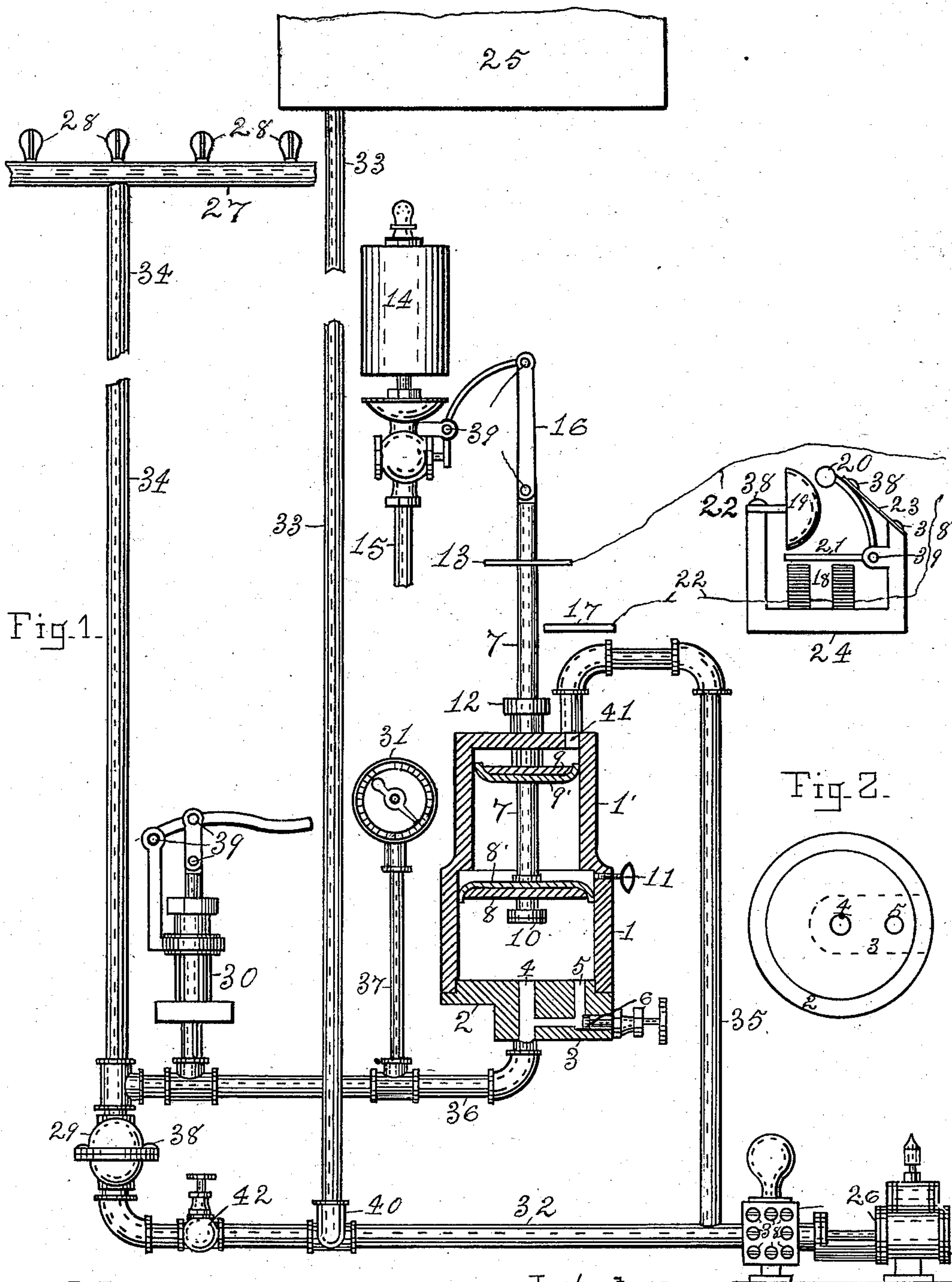
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J. HILL & A. V. RICHARDSON.

PNEUMATIC HYDRAULIC ALARM FOR FIRE EXTINGUISHING SPRINKLER SYSTEMS.

(Application filed Mar. 19, 1900.)

(No Model.)



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# UNITED STATES PATENT OFFICE.

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PNEUMATIC HYDRAULIC ALARM FOR FIRE-EXTINGUISHING SPRINKLER SYSTEMS.

SPECIFICATION forming part of Letters Patent No. 651,857, dated June 19, 1900.

Application filed March 19, 1900. Serial No. 9,169. (No model.)

*To all whom it may concern:*

Be it known that we, JOSEPH HILL and AMBROSE V. RICHARDSON, citizens of the United States, and residents of Menasha, in the county of Winnebago and State of Wisconsin, have invented a new and useful Improvement in Pneumatic Hydraulic Alarms for Fire-Extinguishing Sprinkler Systems, of which the following is a specification.

Our invention relates to a device for sounding an alarm in case a fire has broken out and melted one of the fusible fire-plugs or the normal pressure has fallen below a predetermined amount in the pipes of the system to which the device is attached; and it consists of two cylinders of different diameter, the smaller one being above the other and opening into it, a piston-rod arranged for a reciprocating movement in both cylinders and projecting through the upper or outer end of the smaller cylinder, and pistons thereon fitted for a substantially air-tight movement, one in each cylinder, said piston-rod having a valve upon its inner or lower end for closing the principal aperture for admitting air to the lower cylinder between its piston and head, a whistle arranged to be blown by the downward movement of the outer projecting end of said piston-rod, and a bell to be rung at one or more distant stations by said downward movement of the rod in completing an electric circuit, the smaller of said cylinders being charged with water under a pressure of forty pounds per square inch (more or less) from the elevated tank or fire-pump of the sprinkler system and the larger cylinder charged with air by the air-pump under a lower pressure—say about thirty pounds—it depending upon the comparative diameters of the two cylinders and the pressure carried by the smaller cylinder; but it must be sufficient to hold the pistons normally at the upward limit of their movement and being connected above the dry-pipe valve directly with the pipes of the sprinkler system, whereby whenever the pressure in the sprinkler system falls below a certain amount, about eighteen pounds, (more or less,) by reason of the melting out of one of the fusible plugs in the pipes of the sprinkler system or for any

other cause, then the greater pressure in the smaller cylinder will force the pistons down and close the valve through which the air is admitted to the larger cylinder, blow the whistle, and ring the bell, which alarms will continue to sound until an attendant admits a pressure of air under the lower piston by opening a by-pass valve leading from the air-pipe to said larger cylinder; and the object of our improvement is to make the sounding of the whistle and bell alarms a sure result of the lessening of the pressure in any one of the pipes of the sprinkler system below a predetermined amount whenever any one of the fusible plugs of the sprinkler-pipes shall become melted out by reason of a fire or be knocked off by accident or should leakage occur in one of the pipes; and an additional object is to permit a warning of about two minutes to be given to the attendant between the time the alarm is sounded and the time that the water enters through the dry-pipe valve of the sprinkler system, so that the attendant can make an examination of the cause of the alarm and shut the gate-valve between the pump and dry-pipe valve in case it is a false alarm, and thereby prevent the unnecessary wetting of the building or stock therein by the escape of water from the sprinkler-pipes and also avoid the uncertainty of action which attends the sounding of the alarm when the electric wires heretofore used for causing an alarm to be sounded become crossed, come in contact with each other or with anything for preventing their intended action, or where the diaphragm in the dry-pipe valve becomes deranged or in a leaky condition and making the perfect action of the alarm unreliable.

The whistle should and naturally will be placed within easy hearing distance of the person having the system in charge, so that this alarm will be sure to be heard; but the bell or bells may be in a distant room or be one connected with the city fire-alarm.

Our invention is shown in the accompanying drawings, in which—

Figure 1 is a general plan of a sprinkler system and illustrates the application of our invention to it, the cylinders, valves, &c.,



comprising our invention being shown in section. Fig. 2 is a plan of the inside of the removable head of the larger cylinder.

Similar numerals indicate like parts in both views.

1 1' indicate cylinders of different diameter having their smaller head integral with the smaller cylinder; 2, a removable head of the larger cylinder. This head may be secured to the lower end of the larger cylinder by means of a thread upon the circumference of the upper half of its thickness engaging a corresponding thread in the lower end of said cylinder; 3, a boss cast upon the outer side of the head, its form being shown in Fig. 2 in dotted lines; 4, a circular passage-way centrally arranged in the head; 5, a by-pass for providing communication between the larger cylinder and the passage 4 when said passage is closed by a valve resting upon the head; 6, a valve for closing the by-pass; 7, a piston-rod; 8 and 9, the larger and smaller pistons upon said rod; 8' and 9', compressible packing, such as leather, upon the pistons 8 and 9, respectively; 10, a flat valve for closing the passage 4; 11, a drainage passage or cock for draining the space below the smaller piston of any water that may accumulate; 12, the piston-rod gland; 13, a plate secured upon the piston-rod, to which a wire is connected and extends to one pole of an electric battery; 14, a whistle; 15, a pipe extending from the whistle for connection with a suitable source of air or steam supply; 16, a link connecting the piston-rod and whistle-valve lever; 17, a plate having a wire connected to it, which connects with the opposite pole of the aforesaid battery; 18, an electromagnet arranged in the path of the wire leading from the plate 17 to said battery; 19, a bell arranged to be acted upon by its hammer 20 by means of the action of the magnet 18 upon the lever 21 of the bell-hammer; 22, the wires extending from the plates 13 and 17 to a source of electricity; 23, a spring bolted upon the supporting-stand 24 and loosely to the bell-hammer arm near the hammer for holding the hammer normally out of contact with the bell; 25, an elevated water-tank for holding water for producing a continual pressure where desired in the pipes of the sprinkler system; 26, a fire-pump for filling said tank and increasing or continuing the pressure in the sprinkler-pipes in case of a fire in the vicinity of said pipes; 27, one of the pipes of the sprinkler system, which are provided with fusible plugs, fusible at a low temperature; 28, fusible plugs; 29, the dry-pipe valve; 30, an air-pump; 31, a pressure-gage for showing the degree of pressure which may be in the air-pipes; 32, the pipe from the fire-pump to the dry-pipe valve; 33, the pipe extending from the pipe 32 to the tank 25; 34, the pipe extending from the dry-pipe valve to the pipe 27; 35, the pipe extending from the pipe 32 to the smaller cylinder; 36, the pipe extend-

ing from the pipe 34 to the larger end of the cylinders; 37, the pipe from the pipe 36 to the pressure-gage; 38, bolts or screws for connecting various parts together; 39, pivot-pins for connecting various parts; 40, an elbow on pipe 33; 41, an aperture through the end of the smaller cylinder leading to the fire-pump; 42, a valve for closing communication between the fire-pump and dry-pipe valve.

The particular position of the several parts as herein shown is not essential relative to each other and no claim is made to the manner of operating an electric bell, as a bell arranged in any suitable manner may be used, the essential point in their arrangement being that the whistle and bell can be acted upon for sounding an alarm by the lessening of the pressure in the larger cylinder and causing the pistons, and consequently the piston-rod, to move and act upon the lever of the whistle-valve to open said valve and sound the alarm and also to act to bring the plates 13 and 17 into contact, and thereby complete the electric circuit and cause the bell to sound its alarm.

Whenever the pistons fall in the cylinders, the valve 10 closes the air-admission inlet 4 and holds said valve closed, while the whistle and bell will continue to sound their alarm until an attendant raises the piston-rod by admitting sufficient air-pressure through the by-pass 5 to raise the pistons. This by-pass is kept closed excepting when the valve 10 is closed, when it is to be opened for admitting a pressure of air between the lower piston and its head 2 for raising the piston-rod and stopping the alarms.

The air-pump shown in the drawings represents one operated by hand; but in a fire-extinguishing sprinkler system a pump operated by some convenient power, as water or steam, would be used.

Having described our invention, what we claim, and desire to secure by Letters Patent, is—

1. In a fire-extinguishing sprinkler system, an alarm-operating mechanism comprising two cylinders of different diameter, the smaller one opening into the larger, and a head in the outer end of each cylinder, a piston-rod extending out through the head of the smaller cylinder having a valve upon its inner end, a piston upon said rod for each cylinder arranged for a reciprocating movement therein, a central aperture in the larger cylinder-head adapted to be closed by the valve aforesaid and communicating with an air-pressure supply, an aperture in the smaller cylinder-head communicating with the water-pressure supply of the sprinkler system, means for producing a pressure of an elastic fluid between each piston and the head of its cylinder, that in the larger cylinder being sufficient to normally hold the pistons at the upward limit of their movement, a by-pass normally closed for opening communication



between the central aperture aforesaid outside of its closing valve, and the space between the larger cylinder-head and its piston, and an alarm arranged to be sounded by the downward movement of the piston-rod, whenever the pressure under the larger piston is lessened to such a degree as to allow the piston-rod to descend, close the valve thereon and sound said alarm, and to continue sounding said alarm until an attendant opens the by-pass valve and admits sufficient pressure under the larger cylinder to raise the piston-rod and thereby stop the alarm, substantially as described.

2. In a fire-extinguishing sprinkler system, an alarm-operating mechanism comprising two cylinders of different diameter, the smaller one opening into the larger, and a head in the outer end of each cylinder, a piston-rod extending out through the head of the smaller cylinder having a valve upon its inner end, a piston upon said rod for each cylinder arranged for a reciprocating movement therein, a central aperture in the larger cylinder-head adapted to be closed by the valve aforesaid and communicating with an air-pressure supply, an aperture in the smaller cylinder-head communicating with the water-pressure supply of the sprinkler system, means for producing a pressure of an elastic fluid between each piston and the head of its cylinder, that of the larger cylinder being sufficient to normally hold the pistons at the upward limit of their movement, a by-pass normally closed for opening communication between the central aperture aforesaid outside of its closing valve, and the space between the larger cylinder-head and its piston, and a whistle arranged to be blown by the downward movement of the piston-rod whenever the pressure under the larger piston is lessened to such a degree as to allow the piston-rod to descend, close the valve thereon and to open the whistle-valve, and to continue

the sounding of said whistle until an attendant opens the by-pass valve and admits sufficient pressure under the larger piston to raise the piston-rod, close the whistle-valve and thereby stop its sounding, substantially as set forth.

3. In a fire-extinguishing sprinkler system fire-alarm, the combination of two cylinders of different diameter, the smaller one opening into the larger, the smaller one having a head integral with it, and the larger cylinder a removable head, the piston-rod 7 extending out through the smaller head, pistons 8 and 9 having a compressible packing 8' and 9' respectively, arranged for a reciprocating movement in their cylinders, the central aperture 4 communicating with an air-pressure supply, the aperture 5 leading to said air-pressure supply, the valve 6 for closing the passage from the aperture 5 to said supply, the aperture 41 leading to the water-pressure supply of the sprinkler system, the drainage-outlet 11, the valve 10, means for producing a pressure of an elastic fluid between the pistons 8 and 9 and the heads of their respective cylinders, that in the larger cylinder being sufficient to normally hold the pistons at the upward limit of their movement, and an alarm arranged to be sounded by the downward movement of the piston-rod and the closure of the valve 10 whenever the pressure between the piston 8 and head 2 is lessened to such a degree as to allow the piston-rod to descend and close said valve, and also to continue the sounding of said alarm until an attendant opens the valve 6 and admits sufficient pressure under the piston 8 to raise the piston-rod, open the valve 10 and thereby stop said alarm, substantially as described.

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