A. GOLDSTEIN & H. F. BLACKWELL.

SPRINKLER ALARM SYSTEM.

APPLICATION FILED APR. 13, 1910.

984,210. Patented Feb. 14, 1911.

Fig. 2.

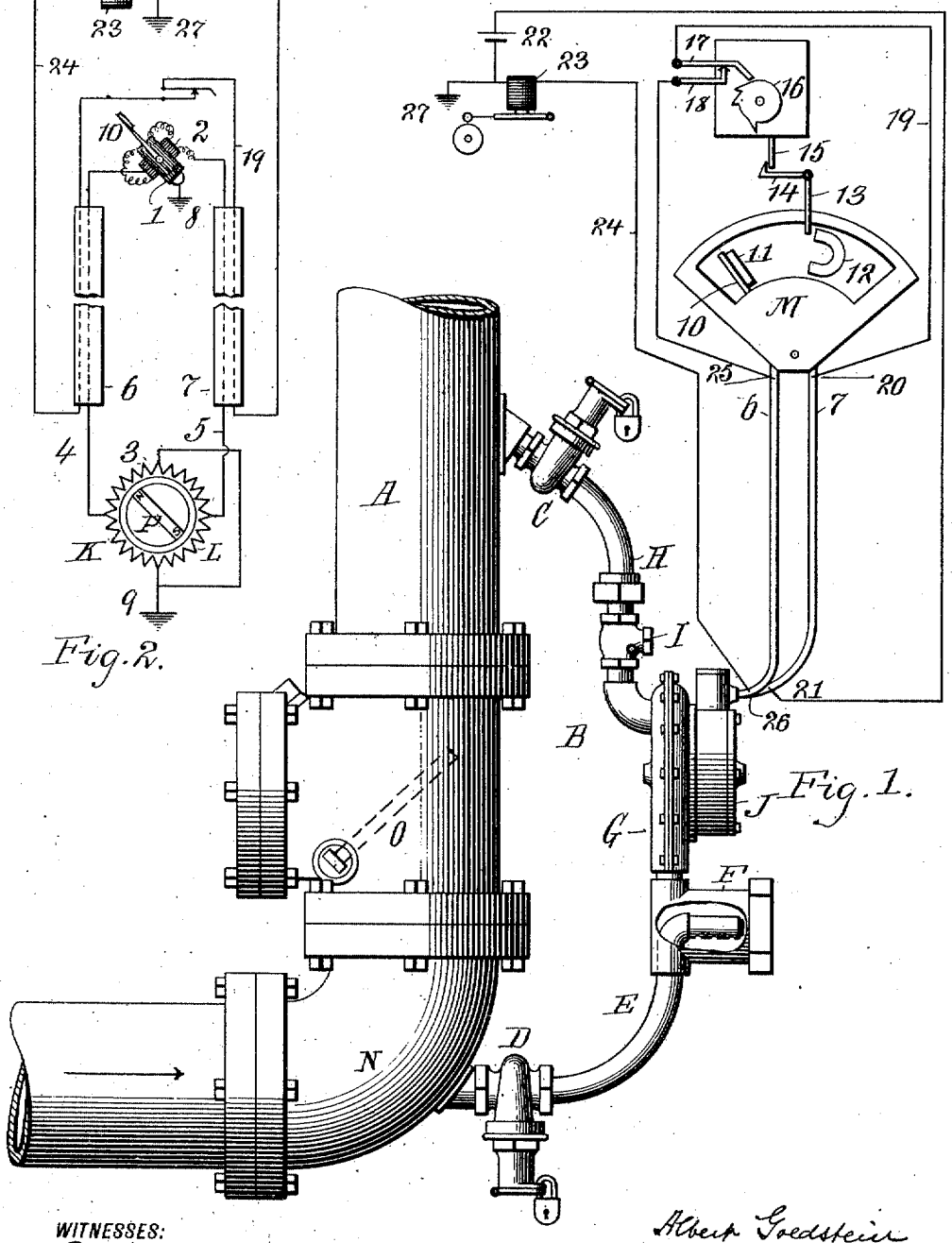

Fig. 1.

WITNESSES:

Allan A. Fosse.

May T. McGarry.

Albert Goldstein
Henry F. Blackwell
Inventors

BY Paul Benjamin
Their
ATTORNEY.

UNITED STATES PATENT OFFICE.

ALBERT GOLDSTEIN AND HENRY F. BLACKWELL, OF NEW YORK, N. Y., ASSIGNORS TO INTERNATIONAL ELECTRIC PROTECTION COMPANY, A CORPORATION OF NEW YORK.

SPRINKLER-ALARM SYSTEM.

Specification of Letters Patent. **Patented Feb. 14, 1911.**

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To all whom it may concern:

Be it known that we, ALBERT GOLDSTEIN and HENRY F. BLACKWELL, citizens of the United States, residing at New York, in the county of New York and State of New York, have invented a certain new and useful Improvement in Sprinkler-Alarm Systems, of which the following is a specification.

In sprinkler systems for the automatic supply of water for the fire protection of buildings, after the sprinklers have been set in operation by the melting of their fuses, or in any other way, the water continues to escape from them, and may go on drenching the building and its contents after the fire which has set them in operation has been extinguished. In this way damage to property by water often in excess of that due to the fire, may easily be caused.

The present invention provides an alarm which is set in operation by the flow in the sprinkler system supply pipe, and which will remain in operation as long as that flow continues, thus giving warning of the aforesaid escape.

In the accompanying drawings—Figure 1 is an elevation of a part of a main water supply conduit leading to the sprinkler system of a building, to which conduit our apparatus is shown applied. Fig. 2 illustrates diagrammatically the electrical parts of said apparatus.

Similar letters and numbers of reference indicate like parts.

The water current in the main supply pipe A moves in the direction of the arrow. Connected at its ends to said pipe is a by-pass B, in which, near the main pipe, are plugs C, D, which may be opened or closed for admitting the current to, or shutting it off from, the by-pass. Said plugs when so opened or closed, may be locked by means of the padlocks shown. The construction of these plugs is not material. In the lower portion of the by-pass is a pipe section E, the upper end of which is perforated and terminates in a casing F. The perforated pipe end and casing forms a guard to prevent mechanical obstructions passing to the water wheel which is contained in the casing G. Said wheel is not shown, but may be of any suitable construction to be rotated by the water flow which leaves the casing by the pipe H. In the pipe H at I may be placed any suitable form of check valve. On the side of the wheel casing G is secured a casing J, in which is a current generator K, Fig. 2, the rotary member L of which is carried on the shaft of the water wheel, and is rotated thereby, the fixed member P being secured to said casing.

Pivoted in the segmental box M is a coil 1, which incloses and is normally disposed at right angles to a fixed coil 2. The armature winding 3 of the generator connects by the wires 4, 5 passing through the protecting tubes 6, 7, with the fixed coil 2. The movable coil 1 is connected to the fixed coil, and also to ground at 8. The armature winding 3 is also connected to ground at 9.

On the movable coil 1 is an arm 10 which, at its end, carries the armature 11 of a permanent magnet 12 disposed within the box M. Entering box M and disposed between the magnet and armature is the arm 13 of a pivoted bell-crank lever, the other arm 14 of which is hooked to form a detent for the pallet tail 15 of the actuating mechanism of a break wheel 16. Said mechanism may be of any suitable construction, including, for example, a wound spring which, when released by the freeing of the pallet tail 15 from the detent 14, causes the wheel to rotate and so make and break circuit between its spring brush 17 and contact 18. Brush 17 and contact 18 are disposed in a local circuit which proceeds from brush 17, by wire 19 (which enters tube 7 through the wall thereof at 20, and leaves said tube at 21) to battery 22, magnet 23 of an electric gong, wire 24 (which enters tube 6 through the wall thereof at 26, and leaves said tube at 25) to contact 18. Battery 22 is connected to ground at 27.

The operation of the apparatus is as follows: When water flow is set up in pipe A, the wheel in casing G is rotated by the flow through the by-pass B. The current from the generator K passing to the coils 1 and 2 causes the movable coil 1 to turn, so as to bring the armature 11 on the arm 10 into the field of permanent magnet 12. The magnet then attracts the armature with sufficient force to cause said armature to move bell-crank lever 13, 14 to release the detent and so permit the break wheel 16 to be rotated by its wound spring. The consequent makes and breaks in the local circuit at 17, 18 cause alarm signals to be sounded by the

gong, indicating for as long as the flow through pipe A continues. Particular attention is called to the location of the by-pass B; namely, first, in that its lower pipe E connects with the main conduit A at the bend N therein, and for a certain distance is in line with the horizontal portion of said conduit, and, second, that said by-pass has its connections to the main conduit A on opposite sides of the usual check valve O (dotted lines) in said conduit. Suppose now the escape of liquid through pipe A is small—as may happen when only one out of many sprinklers fed by said pipe is in operation. Then the check valve O will lift but slightly, and in fact will oscillate to and from its seat. As this valve closes, the inertia of the liquid in pipe A moving in the direction of the arrow will tend to force said liquid into the by-pass B and thus increase the potential pressure difference between the ends of said by-pass. So also as the current turns the quarter circle at the bend N, centrifugal force will also tend to drive the liquid into pipe E and thus also will increase the aforesaid difference. As a consequence, the working pressure on the wheel in the by-pass is kept up even when the flow in pipe A is largely reduced, and the whole alarm device thus rendered very sensitive.

We claim:

1. In combination with a conduit for liquid flow, a by-pass communicating therewith and normally open at both ends, a water-wheel interposed in and actuated by the flow in said by-pass, an electric generator driven by said wheel, and an electrical alarm device controlled by said generator.

2. In combination with a conduit for liquid flow, a by-pass communicating therewith and normally open at both ends, a water-wheel interposed in and actuated by the flow in said by-pass, an electric generator having its rotor driven by said wheel, an electrical alarm device controlled by the current from said generator, and means for preventing the operation of said alarm device until the said rotor shall have attained a certain speed.

3. In combination with a conduit for liquid flow, a by-pass communicating therewith and normally open at both ends, a motor interposed in and actuated by the flow in said by-pass, a current generator driven by said motor, an alarm device, and means for actuating said alarm device operated by the current from said generator upon the attainment by said current of a certain predetermined electro-motive force.

4. In combination with a conduit for liquid flow, (1) a by-pass thereon, a motor interposed in and actuated by said flow in said by-pass, and a current generator driven by said motor, and, (2) in separate circuit, an electrical alarm device and a battery, and (3) means for releasing said alarm device controlled by the current from said generator upon the attainment by said current of a certain predetermined electro-motive force.

5. In combination with a conduit for liquid flow, a by-pass thereon, a motor interposed in and actuated by said flow in said by-pass, a current generator driven by said motor, a permanent magnet, an armature therefor, means actuated by a current from said generator of predetermined electro-motive force for moving said armature into the field of said magnet, and an alarm device controlled by the further movement of said armature due to the attraction of said magnet after entering said field.

6. In combination with a conduit for liquid flow having a bend, a by-pass on said conduit having one end connected to said conduit at said bend and in line with said conduit, a water-wheel interposed in and actuated by the flow in said by-pass, an electric generator having its rotor on the shaft of said wheel, and an electrical alarm device controlled by the current from said generator.

7. In combination with a conduit for liquid flow, a by-pass, a wheel actuated by the liquid current in said by-pass, a dynamo having its armature on the shaft of said wheel, a fixed coil, a pivoted coil inclosing said fixed coil, said coils being in circuit with the armature of said dynamo, an arm on said pivoted coil, a permanent magnet, an armature for said magnet carried by said arm, a break wheel and mechanism for rotating the same, a detent for said mechanism operated to release said mechanism by said magnet armature, and, in local circuit controlled by said break wheel, an electrical alarm device.

In testimony whereof we have affixed our signatures in presence of two witnesses.

ALBERT GOLDSTEIN.
HENRY F. BLACKWELL.

Witnesses:
GERTRUDE T. PORTER,
MAY T. MCGARRY.