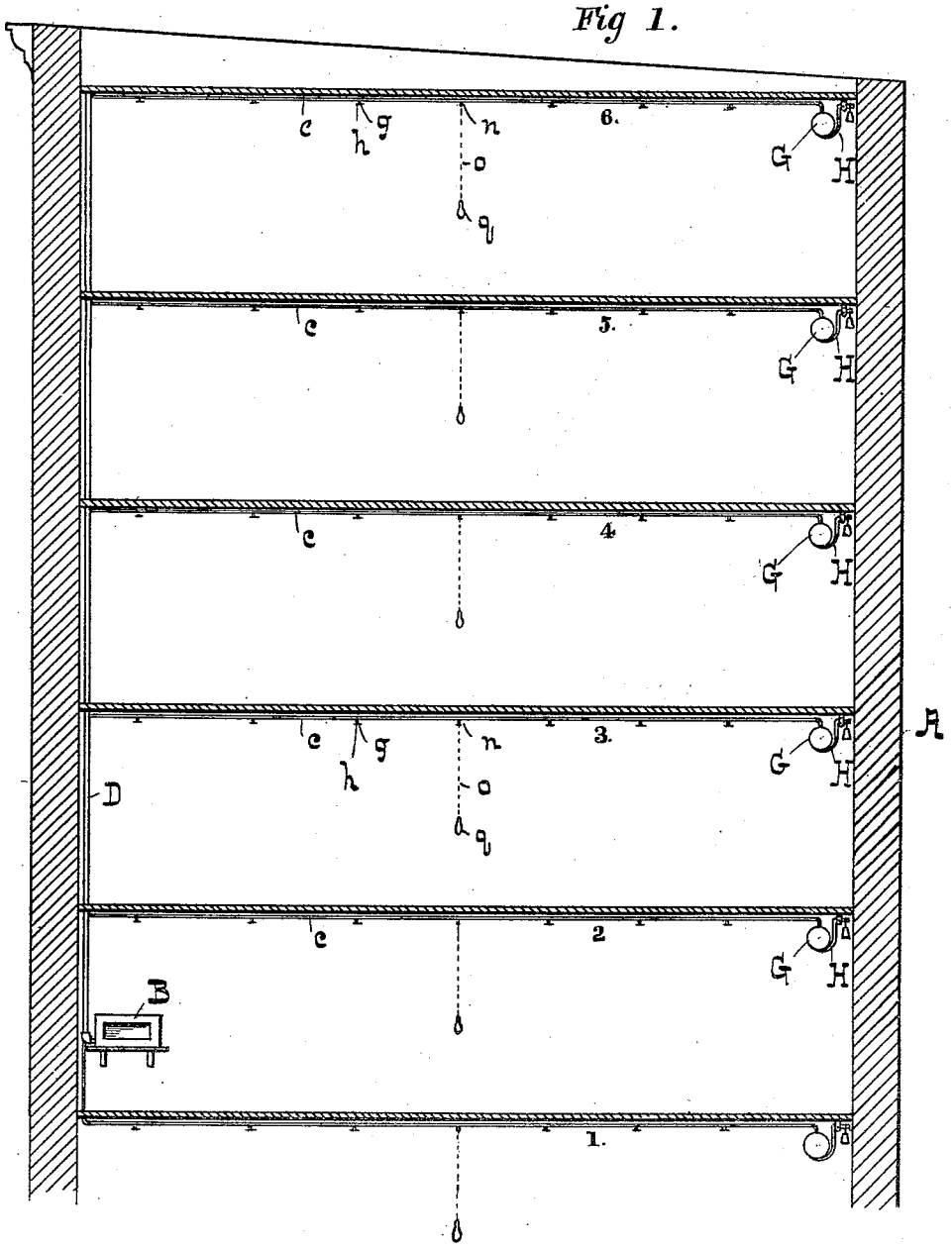
(No Model.) 3 Sheets—Sheet 1.

A. GOLDSTEIN.

FIRE ALARM APPARATUS.

No. 479,709. Patented July 26, 1892.

Fig 1.



-WITNESSES-

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FIRE ALARM APPARATUS.

No. 479,709. Patented July 26, 1892.

Fig 2.

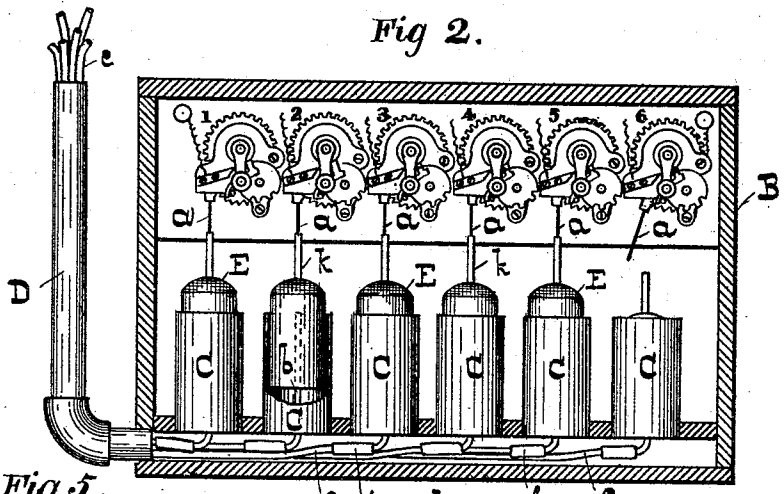


Fig 5.

Fig 3.

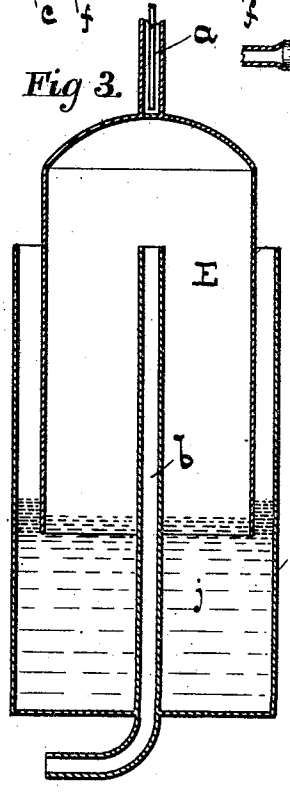
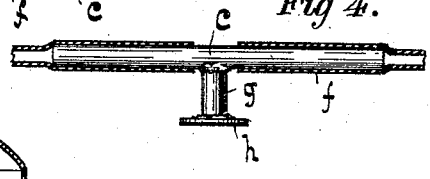


Fig 4.



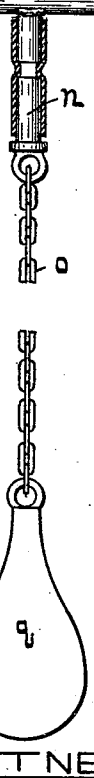
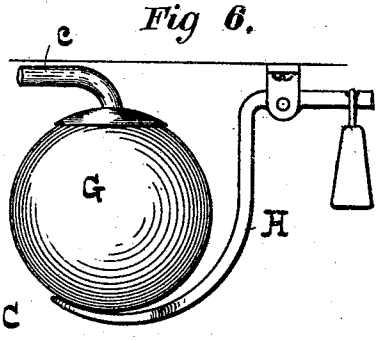


Fig 6.



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A. GOLDSTEIN.

FIRE ALARM APPARATUS.

No. 479,709. Patented July 26, 1892.

Fig 7.

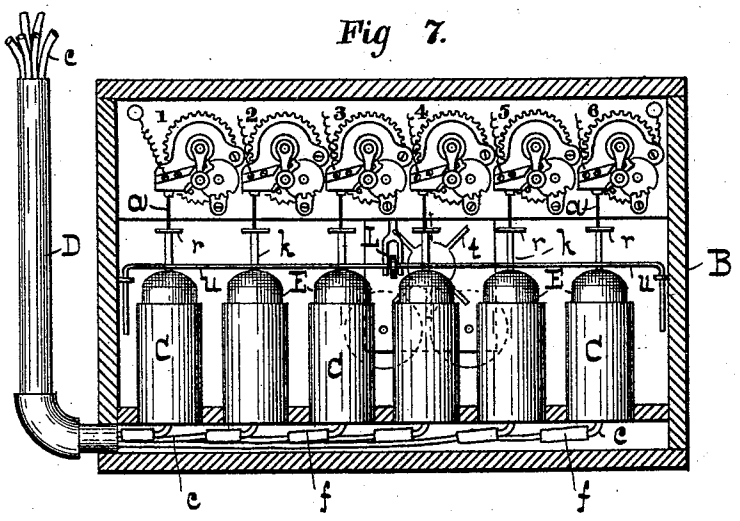
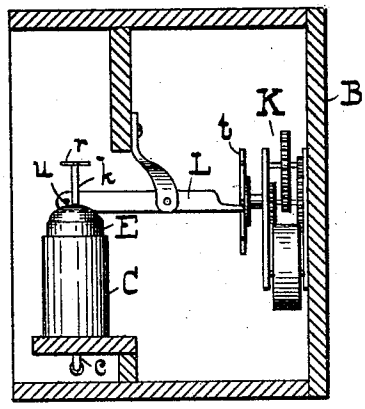


Fig 8.



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UNITED STATES PATENT OFFICE.

ALBERT GOLDSTEIN, OF BALTIMORE, MARYLAND, ASSIGNOR OF ONE-HALF TO ANTHONY A. LEHMANN, OF SAME PLACE.

FIRE-ALARM APPARATUS.

SPECIFICATION forming part of Letters Patent No. 479,709, dated July 26, 1892.

Application filed January 31, 1891. Serial No. 379,815. (No model.)

To all whom it may concern:

Be it known that I, ALBERT GOLDSTEIN, of Baltimore, Maryland, have invented certain Improvements in Pneumatic Fire-Alarm-Telegraph Apparatus, of which the following is a specification.

In the description of the said invention which follows reference is made to the accompanying drawings, forming a part hereof, and in which—

Figure 1 is a sectional elevation of a building provided with the present improvements; and Figs. 2, 3, 4, 5, and 6 are details of the invention, on an enlarged scale, and hereinafter fully described. Figs. 7 and 8 illustrate a further development of the invention hereinafter specified.

Referring to the drawings, A represents the building, and the numerals 1, 2, 3, 4, and 5 the various floors or stories of the same.

B is a cabinet supported in one of the lower stories of the building. In Fig. 1 the cabinet is shown as standing on a shelf projecting from the wall. Secured within this cabinet is a series of ordinary winding call-movements, one for each of the floors or stories of the building, the same being numbered to correspond with them. (See Fig. 2.) These call-movements are electrically connected with recording apparatus (not shown) at a station. Consequently if any one of them is set in motion its number and the story or floor which it represents are noted. Each call-movement has a trigger *a*, which when held in a vertical position, as shown in call-movements 1, 2, 3, 4, and 5, Fig. 2, prevents its running down and the noting of a signal; but when released and allowed to assume the angular position shown in movement 6 sets the call-movement in operation and sends in a signal, which is repeated until the call-movement is run down.

Immediately beneath each trigger is an open jar C, preferably of cylindrical shape, having a stand-pipe *b*, which passes through its bottom and extends to about its upper edge, as shown particularly in Fig. 3, which shows the jar and its immediate connections on an enlarged scale. To the lower end of the stand-pipe *b* is attached a tube *c*, made, preferably, of lead, so as to admit of its being easily bent, leading to one of the stories or floors of the building, where it is secured to the ceiling thereof, as shown in Fig. 1. The connection between the stand-pipe *b* and the lead tube *c* is made by means of a short piece of rubber tube *f*; but any other suitable means of making the connection may be employed.

For convenience and to prevent injury to the vertical portions of the lead tubes *c* they are grouped together and inclosed in an iron pipe D, (shown on an enlarged scale in Fig. 2;) but the horizontal parts of the lead tubes which are attached to the ceiling are exposed and fitted with nozzles *g*, having closing-plates *h* soldered thereto by what is termed "fusible metal," the same forming a thermostat, made to operate at a predetermined degree of heat.

The horizontal or exposed parts of the tubes *c* are generally made in lengths coupled together by pieces of rubber tubing *f*, as shown in Fig. 4, which is an enlarged view of a piece of lead tube with a nozzle and a closing-plate, which forms the thermostat, as before described.

Each jar is provided with a body *j*, of glycerine or other liquid adapted for the purpose, and also with an inverted cup E, the open end of which is immersed in the glycerine. To the top of the cup E is fastened a sleeve *k*, adapted to receive the trigger *a*. The lengths of the trigger and the sleeve are so arranged that when the cup is elevated, as is the case with all the cups shown, except the one used in connection with call-movement 6, the said trigger is sustained in a vertical position and its call-movement held in a wound condition; but when the cup and sleeve are dropped or lowered, as shown in the exceptional case 6, the sleeve and trigger become separated, and the latter being thereby released and free to vibrate the call-movement runs down and a signal is registered. Now it is evident that if the various lead tubes are tight and the cups lifted from the glycerine for a moment to admit additional air thereto and then dropped the confined air in the tubes and cups will be under a pressure which is in proportion to the weight of the cups, and the cups will be held in the elevated position described; but if, as in the case of fire and the conse-

quent operation of a thermostat at the predetermined degree of heat by the melting of the fusible solder, the air-pressure is reduced to the normal or atmospheric pressure the cups will fall by gravity, and the sleeves leaving the triggers the latter will be released with the result before described.

Owing to the expansion and contraction of the air in the cups and lead tubes, due to change in atmospheric temperature, it is necessary to provide some slack or loose movement of the sleeves, in order that a slight fall of the same will not affect the triggers. This is partially effected by making the triggers to enter the sleeves to a greater depth than would be necessary if the bulk of air in the cups were constant or uniform.

As a precaution against the setting-in motion of the call-movements by the contraction of the glycerine and the air confined in the pipes and cups, the contrivances shown in Figs. 7 and 8 are employed. These consist of collars *r*, fastened to the sleeves *k*, a clock-movement K, situated in the rear of the cabinet, having one of its revoluble shafts fitted with a series of radially-extending arms *t*, and a lever L, with its rear end so situated as to be periodically operated on by the said radial arms and with its outer or front end carrying a rod *u*, which extends across the sleeves *k*, but which is normally so far below the collars *r* as to not come in contact with them when the cups are down in their lowest position. The clock-movement is wound up, and in the revolution of the arms *t* each one of them will come in contact with the rear end of the lever L and depress it, which has the effect of raising the other end of the said lever, which carries the rod *u*, and that device being lifted strikes the collars *r* and the cups are elevated out of the body of glycerine and fresh air admitted to the cups. After the arm has passed the end of the lever the latter assumes it normal position and the rod *u* is so far below the collars *r* as to not interfere with the fall of the cups when an escape of air takes place by the operation of a thermostat in case of fire. With this arrangement the tubes of the apparatus are periodically supplied with fresh air by the lifting of the cups from the body of glycerine, and a uniform bulk of air is maintained in the cups and connecting tubes and pipes, notwithstanding that there is a liability to extraordinary contraction of the contained air occasioned by low atmospheric temperatures. The lowering of the cups by the condensation of the air therein may, however, be entirely prevented by providing each lead tube with a bulb G, of some flexible material, such as rubber, (shown on an enlarged scale in Fig. 6,) and a weighted lever H, adapted to bear against it. With this arrangement when the air is condensed and reduced in bulk the deficiency is supplied from the bulb, and when the original bulk is restored in the cups and tubes the bulb is again inflated and the lever made to assume its original position.

To admit of a signal being transmitted by hand in case of the discovery of a fire and before the alarm-signal is automatically given, the lead tube in each story or floor is fitted with a nozzle *m* without a closing-plate, and over this nozzle is placed a piece of rubber tube, the outer end of which is closed with a removable plug *n*, having a chain *o* and handle *q* within easy reach of the hand. I do not, however, confine myself to the exact arrangement of the plug and its connections shown, as the same effect may be produced by other means without changing the character of the invention.

The operation of the apparatus is as follows: Supposing that a fire is started in story 6, one thermostat in the lead tube *c* of that story is operated by the melting of its fusible solder at a predetermined temperature and the compressed air escaping, the cup connected with call-movement 6 is dropped, as shown in Fig. 2, thereby releasing its trigger, and a signal is given and recorded at the distant station. (Not shown.) After the extinguishment of the fire the normal condition of movement 6 is restored by replacing the destroyed thermostat with a new one then winding the call-movement, and finally lifting the fallen cup for a moment out of the glycerine and inserting the trigger in the sleeve.

The advantage of employing thermostats consisting of nozzles, fusible metal, and closing-plates, which will fall of their own gravity when the fusible metal which connects them to the nozzles is melted, is that the disclosure of an aperture for the escape of air is positive, which is not always the case when the aperture is merely closed by a drop of fusible material, which after becoming melted will adhere to the metallic surfaces around the aperture in a globular form and to some extent prevent the free escape of air unless the air-pressure is excessive, which is to be avoided.

I claim as my invention—

1. In a pneumatic fire-alarm apparatus, a winding call-movement having a trigger, combined with a jar provided with a body of liquid, an inverted cup in the said jar having an extension at its upper end adapted for connection with the said trigger, and a clock-movement with connecting mechanism to lift the said cup out of its body of liquid and admit fresh air to the said cup, substantially as and for the purpose specified.

2. In a pneumatic fire-alarm-telegraph apparatus, a winding call-movement having a trigger, combined with a jar provided with a body of liquid, and an inverted cup with an extension at its upper end, which may be connected to the said trigger when the cup is elevated to prevent the said call-movement from being set in motion, substantially as specified.

3. In a pneumatic fire-alarm-telegraph ap-

paratus, a winding call-movement having a trigger, combined with a jar partially filled with a body of liquid, and an inverted cup in the said jar, having a sleeve adapted for connection with the said trigger, whereby in the falling of the said inverted cup the said sleeve is detached from the said trigger and the call-movement set in operation, substantially as specified.

4. In a pneumatic fire-alarm-telegraph apparatus, a winding call-movement having a trigger, combined with a jar provided with a body of liquid, and an inverted cup in the said jar, having an extension at its upper end adapted for connection with the said trigger, a lever adapted at one end to engage with the said extension or some attachment thereof and at the other end operated by a clock-movement, whereby the said cup is periodically lifted out of its body of liquid and fresh air admitted to the said cup, substantially as specified.

5. In a pneumatic fire-alarm-telegraph apparatus, a series of winding call-movements having triggers, combined with a series of jars provided with liquid, inverted cups in the said jars, with extensions adapted to engage with the said triggers and when in an elevated position prevent the running down of the said call-movements, collars on the extensions of the said jars, a rod situated under the said collars, a lever extending from the said rod, and a clock-movement adapted to periodically operate the said lever and thereby elevate the said rod, and with it the series of cups, and thereby lift them from the liquid and admit fresh air thereto, substantially as and for the purpose specified.

6. In a pneumatic fire-alarm-telegraph apparatus, a tube having an aperture closed by fusible metal and a call-movement whereby on the escape of air from the said tube the said call-movement mechanism is put in operation, an inflated-bulb reservoir, and a weighted lever which bears on the said bulb to retain the air in the said tube at a uniform pressure, and thereby provide for variations in temperature, substantially as specified.

ALBERT GOLDSTEIN.

Witnesses:
WM. T. HOWARD,
DANL. FISHER.