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M. L. BUSH & C. F. SWAIN.

ELECTRIC ALARM WATER COLUMN.

(Application filed Apr. 8, 1899.)

(No Model.)

Fig. 1.

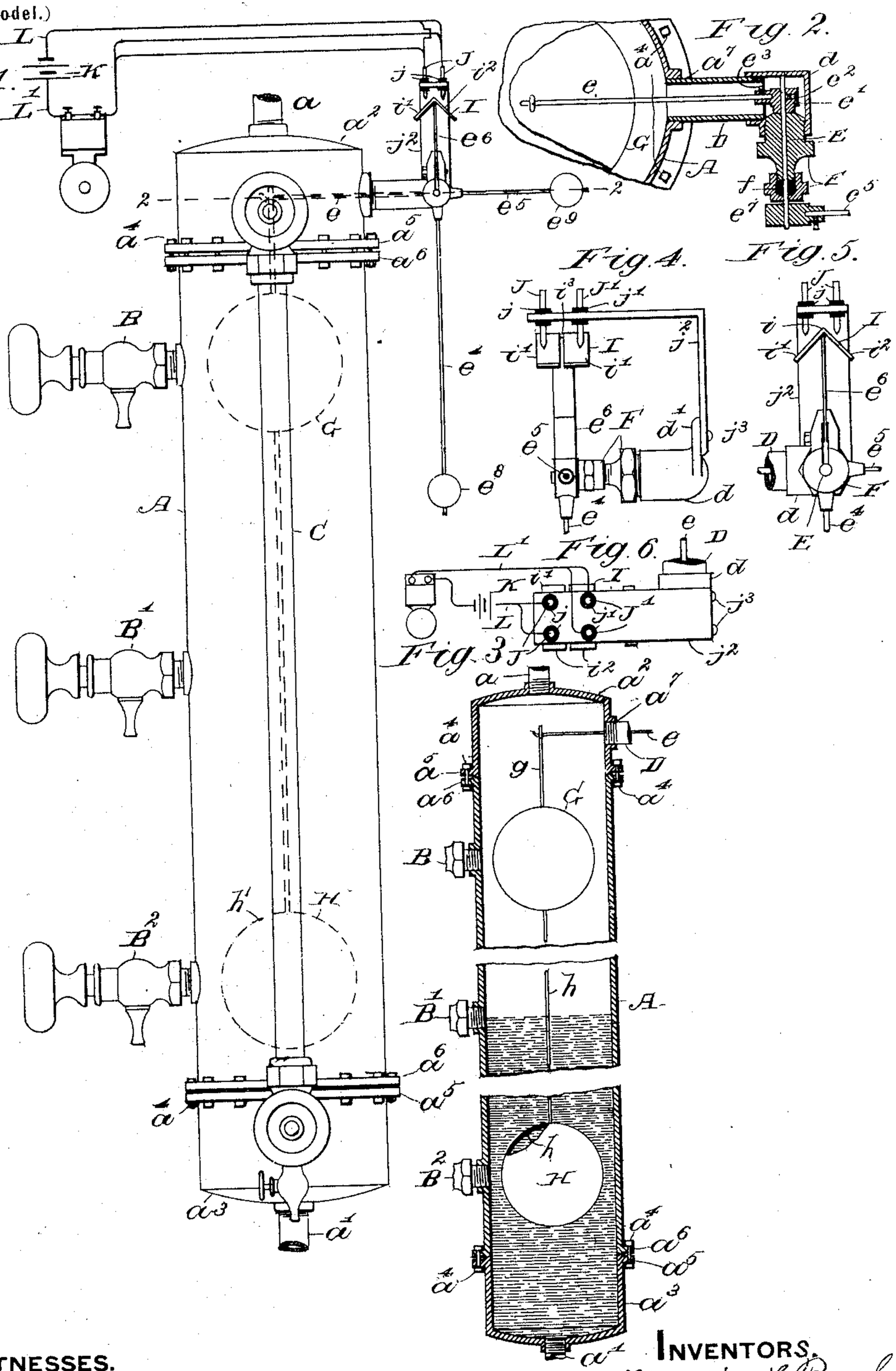

Fig. 2.

Fig. 4.

Fig. 5.

Fig. 6.

Fig. 3.

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UNITED STATES PATENT OFFICE.

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ELECTRIC-ALARM WATER-COLUMN.

SPECIFICATION forming part of Letters Patent No. 631,277, dated August 22, 1899.

Application filed April 8, 1899. Serial No. 712,204. (No model.)

To all whom it may concern:

Be it known that we, MARTIN L. BUSH, residing at Lawrence, and CHARLES F. SWAIN, residing at Methuen, in the county of Essex and State of Massachusetts, citizens of the United States, have invented certain new and useful Improvements in Electric-Alarm Water-Columns, of which the following is a specification.

Our invention relates to electric-alarm water-columns; and it consists in the combinations and devices hereinafter described and claimed.

The object of this invention is to furnish a cheap, simple, reliable, and durable alarm operated by the rising or falling of the water in the water-cylinder beyond certain predetermined limits. The movable parts of the device are at rest until these limits are reached, instead of being moved by every slight change in the height of the water in the cylinder or by the foaming of the water in the boiler, and are therefore not constantly wearing out themselves and said cylinder and destroying the packing, in which turns a circuit-closing lever, arranged partly within and partly without said cylinder. The construction is such that the alarm devices may be placed in position without removal or alteration of any part of the cylinder except the upper cap or head thereof, and said devices may be applied to cylinders now in use by merely boring and tapping a hole in said upper cap. The expense and labor required in applying the invention are therefore very small. The alarm, battery, and electrical connections are wholly outside of the cylinder, which forms no part of the circuit and may be arranged above the cylinder to be out of the way.

In the accompanying drawings, Figure 1 is a front elevation of a water-cylinder with our invention applied thereto; Fig. 2, a horizontal section on the line 2 2 in Fig. 1; Fig. 3, a vertical central section of the water-cylinder, showing the float and weight and part of the circuit-closing lever; Figs. 4 and 5, respectively, a side elevation and a front elevation of the upper part of the circuit-closing lever, the terminals, and the supporting of said lever and terminals; Fig. 6, a plan of the alarm, battery, battery connections or conductors, the terminals, a part of the circuit-closing lever, and the means which support said terminals and lever.

The water-cylinder A is represented as having the usual connections a a' to the boiler, (not shown,) two or more gage-cocks B B' B^2, (three being shown,) and a gage-glass C, all of which may be of any usual construction and operation, the cylinder A usually having separable heads or caps a^2 a^3, which are herein represented as secured to the body of said cylinder by bolts a^4, which connect flanges a^5 on said body to other flanges a^6, with which said caps are provided, in an obvious manner, as indicated in Fig. 3.

In applying the invention herein described we provide the upper part of the cylinder or upper cap a^2 with the hole a^7, as by drilling and tapping, and in this hole we secure the horizontal tube D, which is bent horizontally forward at right angles or is preferably provided with the quarter-turn or elbow d, Fig. 2. In the elbow d we arrange the rock-shaft E, which turns in a stuffing-box F, of ordinary construction, secured in the end of said elbow in any convenient usual manner, said rock-shaft projecting out through said stuffing-box. A suitable packing f surrounds said rock-shaft within the stuffing-box to prevent the escape of steam at the sides of said shaft.

An arm e is secured by any usual means to the shaft E and extends through the tube D into the cylinder A, the means shown, Fig. 2, consisting of a collar e', prevented from moving on said shaft by a radial set-screw e^2, which turns in said collar against said shaft, and another set-screw e^3, which turns in said collar against said arm. The other arms e^4 e^5 e^6, hereinafter mentioned, may be secured in like manner to said shaft E by a collar e^7, arranged outside of the stuffing-box F and fast on said shaft.

From the arm e is suspended within the cylinder A a float G, preferably an air and water tight hollow metallic ball of usual construction, and from said float hangs a weight H, which may be like the float G, except that a hole h' in the top, Fig. 1, allows the weight

to be filled with water. The float and weight may be suspended by any suitable inextensible connections *g h*, (whether flexible or inflexible,) as metallic rods or chains, these connections *g h* being of such length that said float will be above and said weight below the normal water-level when the arm *e* is in a horizontal position, the gravity of these parts being counterbalanced by one or more arms e^4 e^5, above mentioned, secured to the shaft E and properly weighted at e^8 e^9 to keep the arm *e* normally horizontal, one arm e^4 of said arms being represented as normally vertical and pendent and the other, e^5, as horizontal; but of course one of the arms e^4 e^5 may be used alone, and the direction in which said arms point may be varied to produce the desired counterbalancing effect. The specific gravity of the weight being greater and that of the float being less than the specific gravity of the water it follows that as long as the weight H is submerged it is partially supported by the surrounding water, but when the water falls sufficiently said weight will fall and rock the shaft E in one direction, and that when the water rises high enough it will raise the float G and rock said shaft in the other direction. (A slight rocking of said shaft causes an alarm to be operated, as described below.) Of course the distance apart of the float and weight are to some extent a matter of choice, it being necessary that they should be near enough to the normal water-level to be moved just before the water reaches a dangerous point in either direction, and they may be arranged considerably nearer to the normal water-level than is absolutely necessary, it only being required that the float should be wholly above and the weight wholly below said normal level.

The shaft E is provided with a fourth arm e^6, Figs. 1, 4, 5, and 6, which preferably projects upward from said shaft and has a cap or head I, which is an electrical conductor and serves as a circuit-closer. The head is preferably of spring sheet metal and bent in the middle *i* into two inclined sides i' i^2, which may be split, as shown at i^3 in Figs. 4 and 6, nearly or entirely through from side to side, so that each side has two springs in direct electrical connection or electrically connected through the upper end of the arm e^6, which upper end is of conducting material. Above the head I and normally out of contact therewith are arranged four terminals, two, J J′, on each side of said head, these terminals being represented, Figs. 1, 4, 5, and 6, as pins insulated at *j j′* from each other and from their supporting means, and these pins may be supported in any convenient manner, as on a bracket j^2, cast or otherwise secured to the elbow *d* or pipe D. The bracket j^2 is represented in Figs. 4 and 6 as secured by rivets j^3 to an arm *d′* on the elbow *d*. The two terminals J J′ on the same side of the head I are connected by wires L L′ to opposite poles of a battery K, Figs. 1 and 6, and a suitable alarm (represented as a buzz-bell) is in circuit with said battery and terminals, so that by a slight rise or fall of the float G and weight H the head or circuit-closer I comes in contact with the two terminals J J′, having opposite connections with the battery, and by closing the circuit causes the alarm to operate. Splitting the sides or leaves of the head I allows the separate parts or springs of each side to make a perfect contact with the corresponding terminals, even if one terminal should through wear or carelessness in the original construction be slightly shorter than the other terminal at the same side of said head, and the inclination of said sides causes a scraping contact between the sides and terminals, which will remove any collection of dirt on said sides and insure a perfect electrical connection.

The rock-shaft E and its arms *e* e^6 constitute a circuit-closing lever.

Obviously the alarm may be arranged in the boiler-room or at a distance therefrom, as in the counting-room or office of the manager of a factory or other establishment owning the boiler.

We claim as our invention—

1. The combination of the water-cylinder, having water connections above and below the normal water-level of said cylinder, of a float and a weight, both arranged in said cylinder, the one above and the other below said normal water-level, an inextensible connection between said weight and float, a lever, arranged partly within and partly without said cylinder, an inextensible connection between said float and the inner arm of said lever, battery and alarm connections and a circuit-closer carried by the outer arm of said lever, said battery and alarm connections and said circuit-closer being arranged wholly outside of said cylinder and being insulated therefrom.

2. The combination with a water-cylinder having boiler connections, of a float and a weight, both within said cylinder, a circuit-closing lever, arranged partly within and partly without said cylinder, inextensible connections between said weight and said float, said float and weight, respectively, being arranged above and below the normal water-level in said cylinder and said weight being suspended directly from said float, and the battery and alarm connections arranged wholly outside of said cylinder and insulated therefrom.

3. The combination in an electric-alarm water-cylinder having boiler connections, of a float and a weight, both arranged with said cylinder, an inextensible connection between said float and weight, said weight being normally below the water-level in said cylinder and said float being normally above said water-level, a lever, having an arm arranged within said water-cylinder, an inextensible

connection between said float and said arm, and battery and alarm connections having terminals outside of said cylinder, said lever having another arm, arranged outside of said cylinder and having inclined springs adapted to have a scraping contact with said terminals when said lever is rocked.

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

MARTIN L. BUSH.
CHARLES F. SWAIN.

Witnesses:
JOHN CROCKETT SANBON,
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