

No. 645,573.

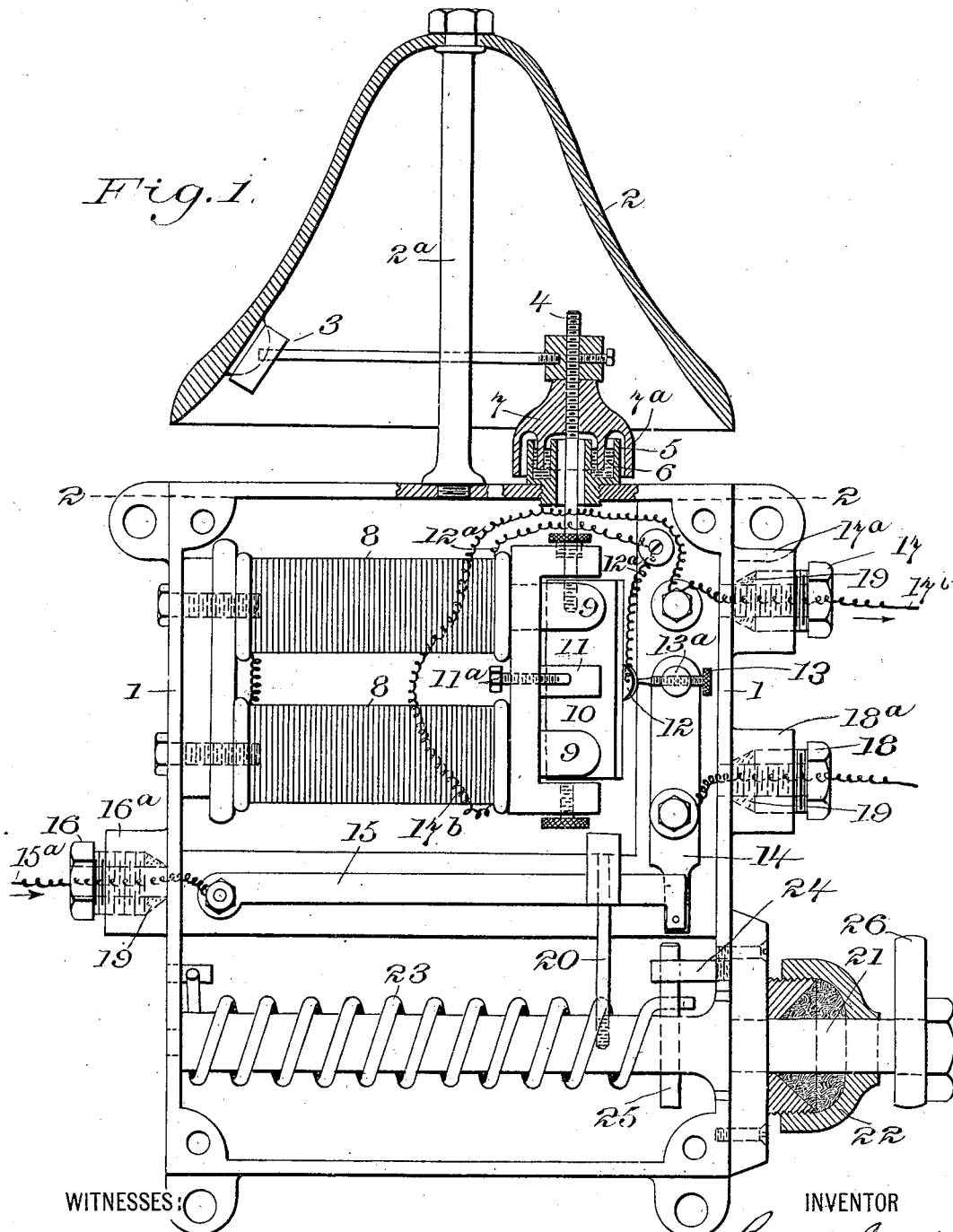
Patented Mar. 20, 1900.

B. SEARLE.
ELECTRIC MINE BELL.

(Application filed Aug. 7, 1899.)

(No Model.)

3 Sheets—Sheet 1.



WITNESSES:

J. E. Carson
N. H. Humphrey.

INVENTOR

Bury Searle
BY
A. H. Schmidt
ATTORNEY

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Fig. 2.

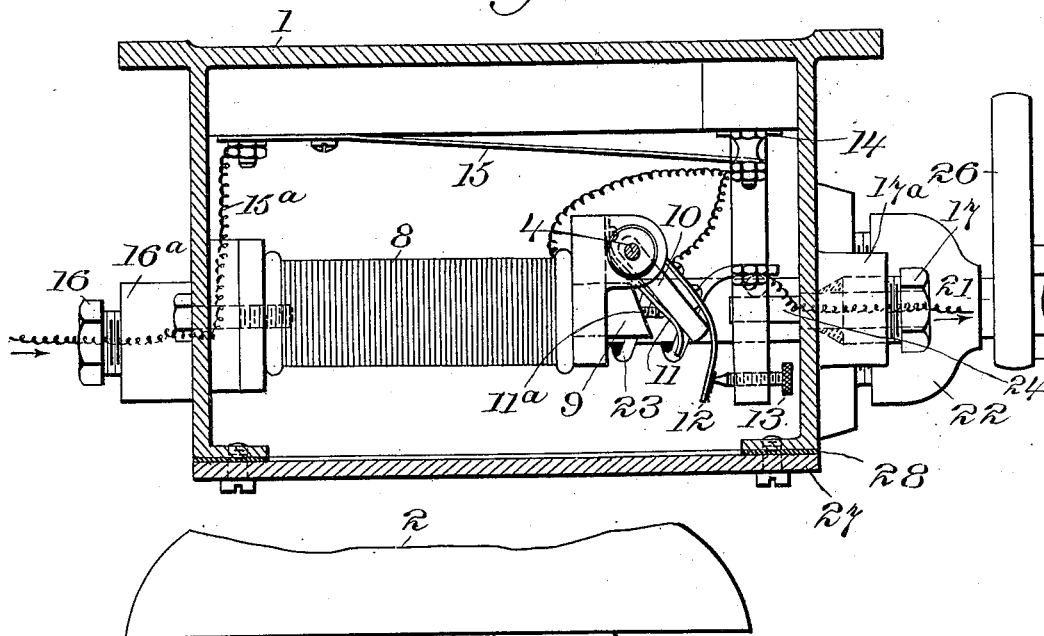


Fig. 3.

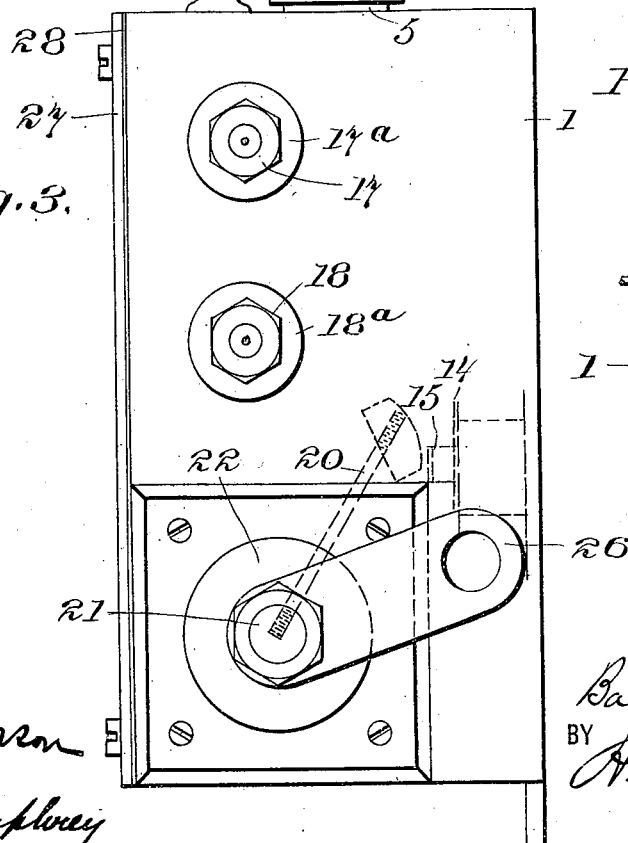
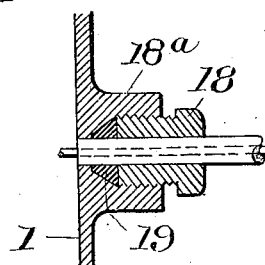


Fig. 4.



WITNESSES:

J. E. Pearson
M. H. Humphrey

INVENTOR

B. Searle
 BY *A. R. Schmidt*
 ATTORNEY

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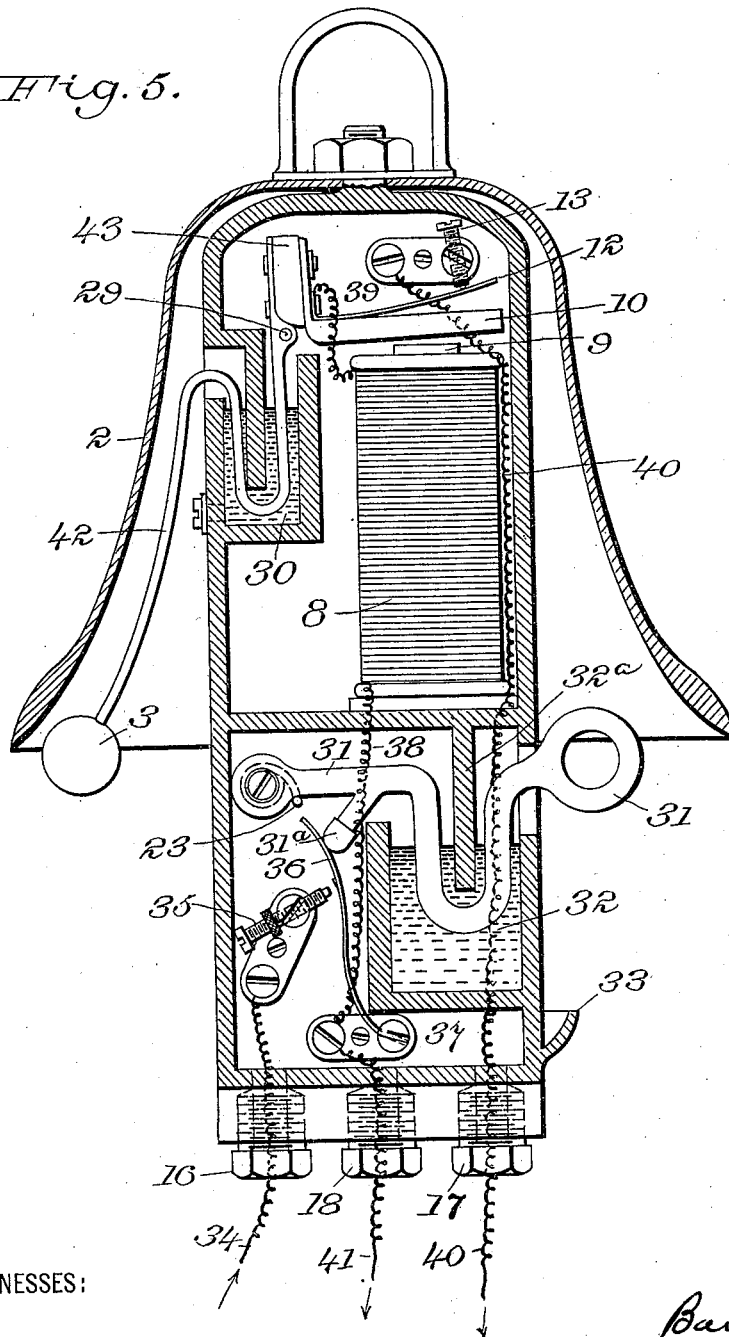
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3 Sheets—Sheet 3.

Fig. 5.



WITNESSES:

J. E. Pearson
W. H. Humphrey.

INVENTOR

Barry Searle

BY

A. P. R. Smith
ATTORNEY

UNITED STATES PATENT OFFICE.

BARRY SEARLE, OF MONTROSE, PENNSYLVANIA.

ELECTRIC MINE-BELL.

SPECIFICATION forming part of Letters Patent No. 645,573, dated March 20, 1900.

Application filed August 7, 1899. Serial No. 726,465. (No model.)

To all whom it may concern:

Be it known that I, BARRY SEARLE, a citizen of the United States of America, and a resident of Montrose, county of Susquehanna, State of Pennsylvania, have invented certain new and useful Improvements in Electric Mine-Bells, of which the following is a specification.

My invention relates to electrically-operated bells or alarms and other indicating apparatus designed to be employed in mines where explosive gases are apt to be ignited by the sparking of the contacts and switches of the apparatus if the same are exposed and also where moisture or corrosive gases are liable to destroy such parts if they have access to them while the same are in operation.

The preferred form of apparatus, with various modifications, is disclosed in the accompanying three sheets of drawings, in which—

Figure 1 is a partial vertical section through the bell and casing, the cover of the casing being removed to show the interior thereof. Fig. 2 is a horizontal section on line 2 2 of Fig. 1. Fig. 3 is a side elevation with the top of the bell broken away. Fig. 4 is a detail view of one of the screw-plugs through which the leading-in wires pass. Fig. 5 is a modification showing a cheaper form of apparatus. Throughout the drawings like reference-figures refer to like parts.

The operative parts of the automatic magnet make-and-break apparatus are inclosed in a casing 1, and preferably the circuit-closing device is also inclosed in said casing, though it might be placed in a separate compartment. The bell 2 is mounted on top of this casing on a post 2^a and has a projection adapted to be struck by the hammer 3, as shown in Fig. 1. The hammer is mounted on a vertical shaft 4, which passes down into the casing 1 and which is hermetically sealed into said casing by means of the annular mercury-cup 5, containing an amount of mercury 6, into which the annular cap 7 is immersed, said cap 7 being fixed on the shaft 4. The cap 7 has an external annular skirt 7^a, which overhangs the mercury-cup and prevents dirt from falling into the same.

Within the casing 1 is any suitable form of electric magnet 8, having core-pieces 9, beveled at the end, as shown in Fig. 2. The ar-

mature 10, in the shape of a plate swiveled on the shaft 4, is placed opposite the ends of the pole-pieces 9 in position to be attracted thereto. This armature is held away from contact with the pole-pieces normally by the spring 11, which is adjustable by means of the thumb-screw 11^a. In this normal position the spring projection or contact-piece 12, mounted on the armature, bears upon the contact-screw 13, which is electrically connected with the conducting-strip 14 by means of the metallic post 13^a, in which it is mounted, or by other suitable electrical connection. This strip 14, with the spring-strip 15, forms a circuit-breaker, the electrical connections from said strip 15 being through the wire 15^a, which passes out through the hollow screw-plug 16 and airtight seal formed by the compression of the packing 19 in the conical recess at the bottom of the threaded cup 16^a at the base of the screw-plug 16, as shown more clearly in Fig. 4, the connections in Figs. 1 and 2 being indicated diagrammatically only.

17 and 18 are circular hollow screw-plugs mounted in threaded cups 17^a and 18^a for other leading-in wires.

The electrical circuit, as shown, is through the wire coming in through the plug 16, through the spring-piece 15 when the latter is pressed down upon the strip 14, through said strip 14, post 13^a, contact-screw 13, spring projection 12, wire 12^a to one extremity of the magnet-coil, through said magnet-coils and out by the wire 17^b, through the plug 17 back to the battery or other source of power. The spring-strip 15 is normally lifted out of contact with the conducting-strip 14, as shown in Figs. 2 and 3. It can be pressed down into contact at the will of the operator by means of the lever 20, mounted on the shaft 21, which shaft 21 projects out through the casing through the stuffing-box 22. The spiral spring 23 tends normally to turn said shaft 21 in such direction as to lift the lever 20 off of the spring-contact 15, the position of said lever 20 being determined by the projection 25 on the shaft 21 coming against the stop 24. The shaft 21 has a crank-arm 26 on its outer end, provided with an eye, to which a pull-cord can be attached.

The contents of the case 1 are inclosed by means of the top plate 27, screwed down upon

the gasket 28, of rubber or other suitable material. The second leading-in wire through the hollow plug 18 is connected directly to the contact-strip 14, so that the circuit-closer may be employed to operate other circuits than that of the particular magneto apparatus inclosed in the same casing.

In the modified and somewhat-cheaper construction shown in Fig. 5 the bell 2 is dropped down, so as to cover the upper portion of the incasing frame, and in place of the rotating shafts for operating the bell-hammer and the contact-breaker other forms of swinging, movable, or vibrating members are employed in the shape of a pair of levers 42 and 31. The hammer-lever 42 is pivoted at 29 and has the armature 10 connected thereto, with an intervening strip of insulation 43. The hammer 3 and portion of the lever extending to it from the pivotal point 29 overbalance the armature 10, so that normally the parts are in the position shown in Fig. 5. When the magnet 8 is energized, the pole-piece 9 attracts the armature 10 and causes the hammer to strike the bell, freedom of movement being given by the curved portion of the lever 42 passing through the compartment 30, which contains mercury, oil, glycerin, or even water or other fluid, which in conjunction with the central partition 30^a forms a gas-tight seal for this movable member. A similar cup or compartment 32 and downwardly-extending partition 32^a form a similar gas-tight seal for the pull-lever 31, which lever is normally held up by a spiral spring (indicated at 23) and has a projection 31^a, tipped with non-conducting material, which operates the circuit-breaker 36, mounted in the binding-post 37 and arranged to make contact with the adjustable contact-screw 35. 33 is a cup exterior of the casing to catch any overflow from the compartment 32. The connections are through the wire 34 to the contact-screw 35, to spring contact-breaker 36, to binding-post 37, where the current divides, part going out through the wire 41 to other bells and the rest going through the wire 38, energizing the coils of magnet 8, through the wire 39, through contact-spring 12, contact-screw 13, and wire 40 back to the battery or source of supply. Screw-plugs 16, 17, and 18 may be provided, as before, for these various wires, or they may be otherwise carried through the wall of the casing without affording openings for the passage of air or gas.

The operation of my invention is evident from the foregoing description. Normally the circuit-closer 14 15 is open and the parts of the magneto make-and-break apparatus are in the position shown in Fig. 2. When the operator pulls down on the crank-arm 26, the spring-piece 15 is forced down by the lever 20 into contact with the strip 14 and the circuit is established through the magneto apparatus, as above described. This energizes the magnet 8, and the latter attracts the plate-armature 10 to the ends of the pole-

pieces 9. This causes the hammer 3 to strike the lug on the interior of the bell 2. The circuit being broken, however, by the lifting of the spring 12 from the contact-screw 13, the spring 11 immediately acts to force the armature back, so as to lift the hammer 3 from contact with the projection on the bell and also to reestablish the electric connections, as before. The magnet again becomes operative and the operation is repeated, producing a violent ringing of the bell in the well-known manner. The pressing down of the spring 15 also establishes a derived circuit through the leading-in wires passing through plugs 16 and 18, which second circuit can be used for other work.

It is evident that when the armature 10 is vibrated and the shaft 4 rotated back and forth to operate the bell the cap or flange 7 will rotate freely in the mercury 6 within the annular cup 5 without permitting any gas to enter the casing 1. In the same way the shaft 21 rotates in the stuffing-box 22 without destroying the air-tight seal.

In operating the construction shown in Fig. 5 the lever or movable member 31 is pulled down until the projection 31^a forces the spring contact-piece 36 against the contact-screw 35. The current then being sent through the circuits, as before described, the magnet 8 is energized and the armature 10 pulled down. The contact is thus broken at the contact-screw 13, and the weight of the hammer 3 lifts the armature and pulls the hammer away from the bell, thus reestablishing the circuit and feeding the action in the well-known manner. The operation also closes the circuit through wire 41, and other bells in the branch circuit may also be operated. The movable members 42 and 31 move freely in the liquid in the chambers 30 and 32 without admitting of passage of any gas to the interior of the casing.

It is evident that various changes could be made in the apparatus described without departing from the spirit and scope of my invention. Other forms of magneto make-and-break apparatus might be substituted and different forms of bell might be operated thereby, the mercury-cup and coöperating parts might be given different shapes from those shown, other convenient forms of circuit-breaker might be substituted for those shown, &c.; but all such modifications I consider to be still within the scope of my invention.

Having therefore described my invention, what I claim as new, and desire to protect by Letters Patent, is—

1. The combination with an automatic magnetic make-and-break mechanism, of a hermetically-closed casing for said mechanism, a movable member projecting through said casing and controlled by the magneto make-and-break mechanism, and a gas-tight liquid seal through which said member passes, substantially as described.

2. The combination with an automatic magnetic make-and-break mechanism, of a hermetically-closed casing for said mechanism, a shaft projecting through said casing, an annular mercury-cup surrounding the shaft, and a cap on the shaft partly immersed in the mercury, substantially as described.

3. The combination with an automatic magnetic make-and-break mechanism, of a hermetically-closed casing for said mechanism, a movable member projecting through said casing and controlled by the magneto make-and-break mechanism, and a gas-tight liquid seal through which said member passes, together with a hammer mounted on said member, and a bell against which said hammer strikes, substantially as described.

4. The combination with an automatic magnetic make-and-break mechanism, of a hermetically-closed casing for said mechanism, and a circuit-closer also in said casing, together with a movable member for operating said circuit-closer projecting through the casing, and a gas-tight liquid seal for said moving member, substantially as described.

5. The combination with an automatic magnetic make-and-break mechanism, of a hermetically-closed casing for said mechanism, a circuit-closer also in said casing, a movable member for operating such circuit-closer projecting through the casing, a gas-tight liquid

seal for such moving member and a spring normally holding such member in such position as to open the circuit.

6. The combination with an automatic magnetic make-and-break mechanism, of a hermetically-closed casing for said mechanism, a circuit-closer also in said casing, a movable member for operating such circuit-closer projecting through the casing, a gas-tight liquid seal for such moving member and a spring normally holding such member in such position as to open the circuit together with means for attaching a pull-cord to said movable member.

7. The combination of an automatic magnetic make-and-break mechanism, a hermetically-closed casing for said mechanism, a movable member projecting through said casing and controlled by the magnetic make-and-break mechanism, a gas-tight liquid seal through which said member passes, a circuit-closer also in said casing, a movable member for operating said circuit-closer projecting through the casing, and a gas-tight liquid seal for said circuit-closer-operating member.

Signed by me at New York city, New York, this 28th day of July, 1899.

BARRY SEARLE.

Witnesses:

LILIAN FOSTER,
W. H. PUMPHREY.