No. 649,264. Patented May 8, 1900.

L. D. & E. D. TILLYER.

ELECTRIC BELL STRIKING APPARATUS.

(Application filed Nov. 17, 1899.)

(No Model.) 4 Sheets—Sheet 1.

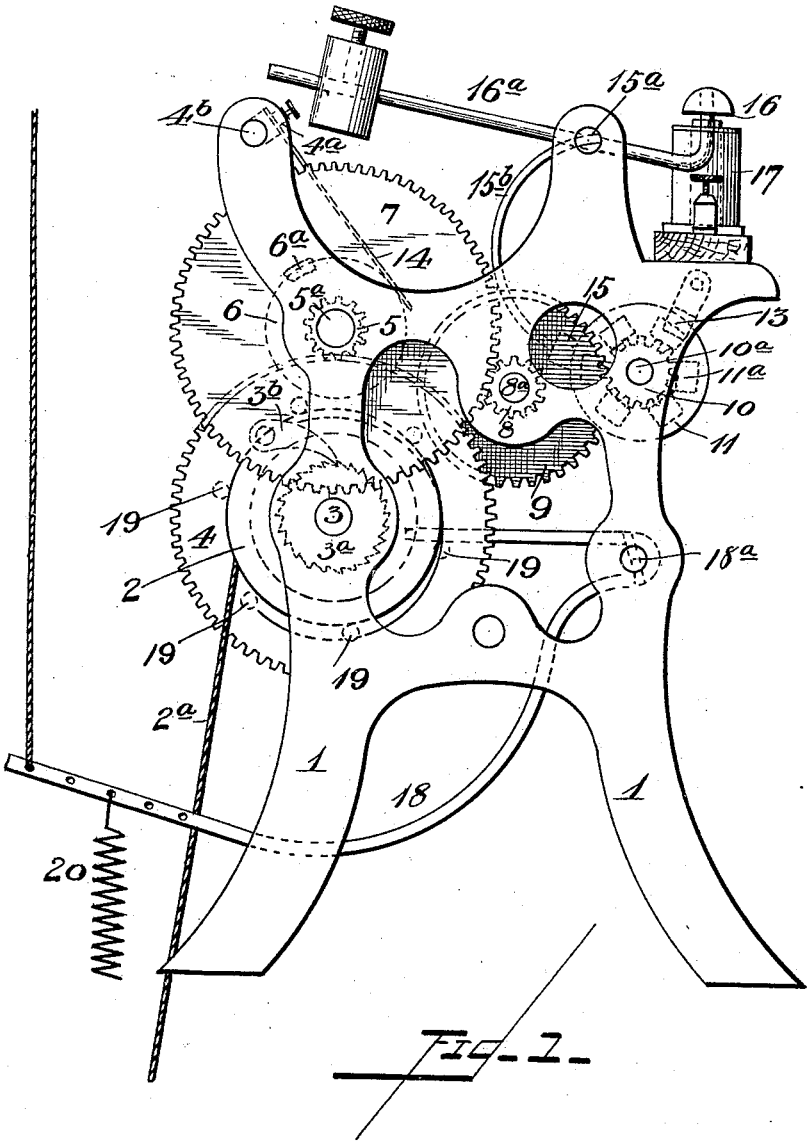

FIG. 1.

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(No Model.) 4 Sheets—Sheet 2.

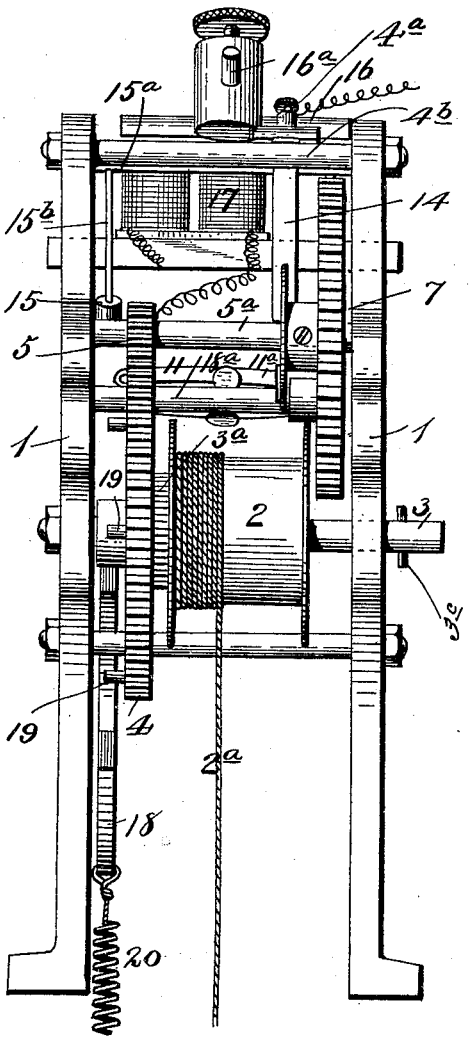

FIG. 2.

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(No Model.)

4 Sheets—Sheet 3.

Fig. 3.

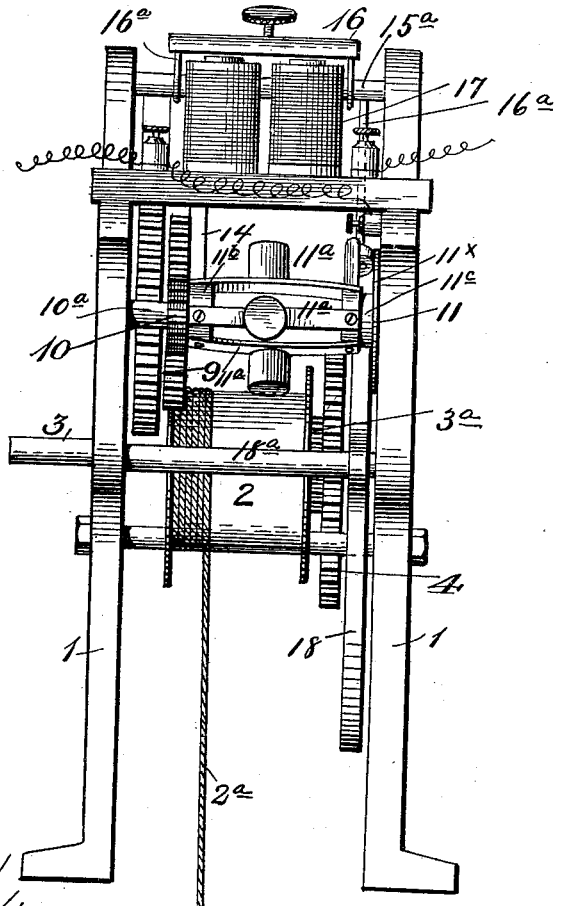

Fig. 4.

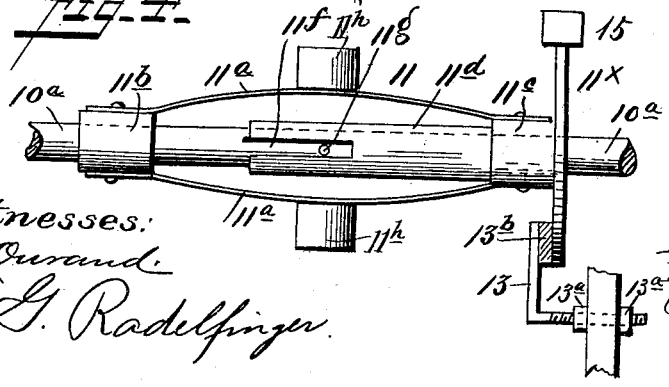

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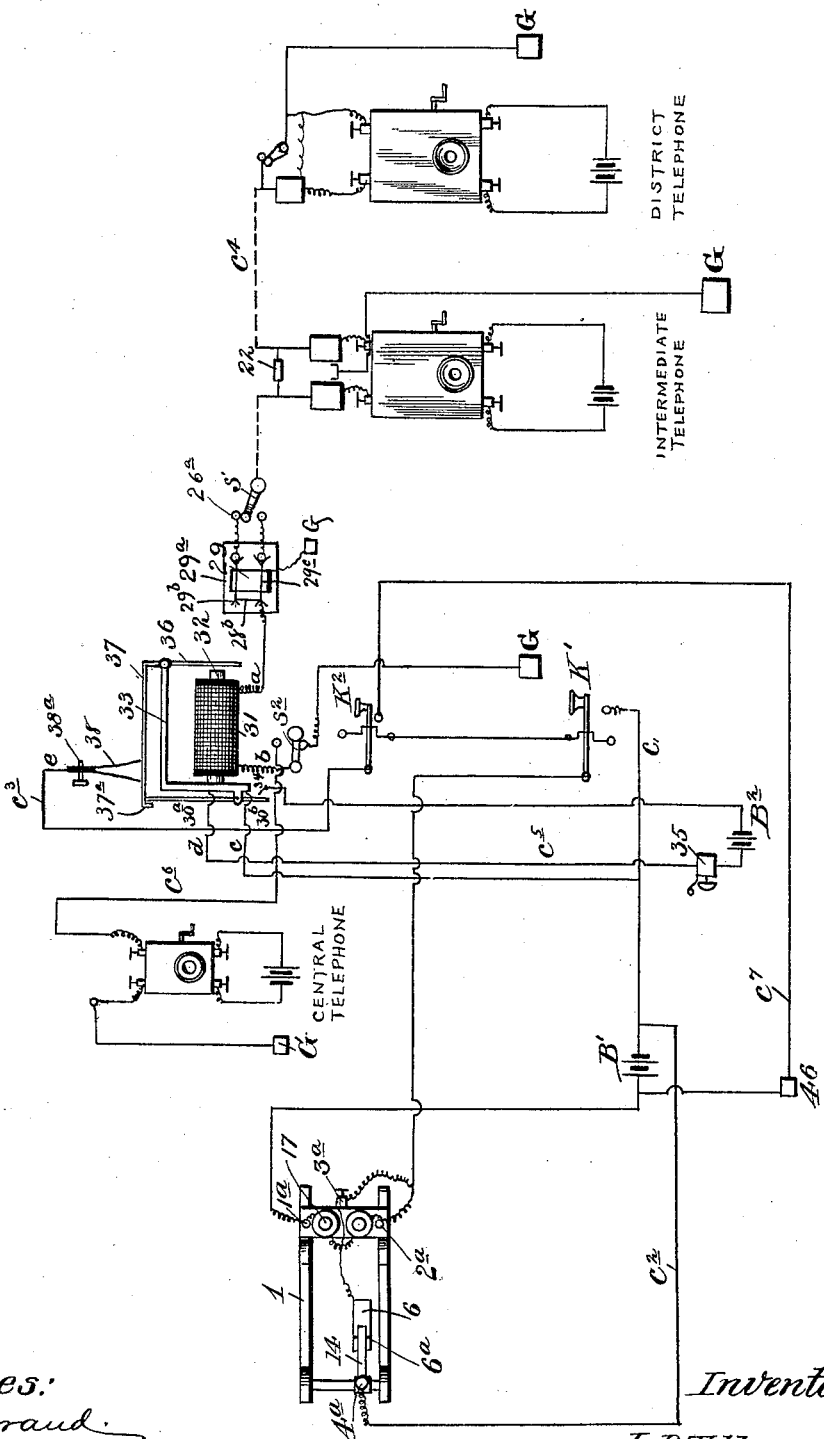
Fig. 5.



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UNITED STATES PATENT OFFICE.

LORENZO D. TILLYER AND EDGAR D. TILLYER, OF DOVER, NEW JERSEY.

ELECTRIC BELL-STRIKING APPARATUS.

SPECIFICATION forming part of Letters Patent No. 649,264, dated May 8, 1900.

Application filed November 17, 1899. Serial No. 737,352. (No model.)

To all whom it may concern:

Be it known that we, LORENZO D. TILLYER and EDGAR D. TILLYER, citizens of the United States, residing at Dover, in the county of Morris and State of New Jersey, have invented new and useful Improvements in Electric Bell-Striking Apparatus, of which the following is a specification.

Our invention relates to improvements in electromechanical strikers, especially for fire-alarm bells, while it is equally adapted for bells for other purposes, as well as to steam-whistles.

It has for its objects, among other things, to guard against lightning burning out the magnet-coil and ringing the tower-bell; to provide for controlling the speed of action of the striker, and thereby preventing the striker from operating more rapidly when a large number of strokes is to be made on the bell, as in sending in a general alarm, than when only a few strokes are desired, as in ringing the numbers of the districts; to keep the mechanism in motion until a stroke is made by the striker upon the bell and then automatically stopping the same after producing such stroke, and to greatly simplify the construction and arrangement of the parts.

It consists of certain mechanism whereby the aforesaid results or objects are attained, substantially as hereinafter more fully disclosed, and specifically pointed out in the claims.

It will be understood that latitude is allowed herein as to details, as they may be varied or changed at will without departing from the spirit of our invention and the same yet remain intact and be protected.

In the accompanying drawings, illustrating the preferred embodiment of our invention, Figure 1 is a side elevation of the striking mechanism. Figs. 2 and 3 are opposite end elevations of the same. Fig. 4 is an enlarged detail of the governor. Fig. 5 is a diagrammatic view showing the arrangement of the circuit-wires, switches, &c.

In carrying out our invention we suitably arrange in a proper frame or support 1 a cylinder or drum 2, upon which is coiled or wound a weighted cable or rope 2^a to run the machine, said drum or cylinder being keyed to a shaft 3, journaled in said frame. The drum 2 carries a ratchet 3^a, engaged by a pawl 3^b, carried by a cog-wheel 4, loosely mounted on said shaft 3. The cogged drive-wheel 4 is geared to a pinion 5, keyed to a shaft 5^a, said shaft carrying a wheel 6, which is provided with an insulation 6^a, mounted on its periphery, the function of which will appear hereinafter. The shaft 5^a also has secured thereon a large gear or cogged wheel 7, geared with a small pinion 8, whose shaft 8^a, journaled in frame 1, carries a large pinion or gear-wheel 9, geared to a small pinion 10, whose shaft 10^a, journaled in said frame, carries the governor 11. The governor 11 comprises a series of flat springs 11^a, one end of each of which is secured to a fixed collar 11^b on the shaft 10^a, alongside of pinion 10, and their opposite ends connected to a collar or shoulder 11^c of a loose or sliding sleeve 11^d on said shaft. This sleeve has oppositely-arranged slots 11^f, and a pin 11^g extends through shaft 10^a and projects into the slots 11^f, whereby the sleeve is permitted a longitudinal sliding movement and compelled to revolve with shaft 10^a.

Secured centrally to each spring 11^a is a weight 11^h, the purpose of which is to throw the central portions of the springs outward from the shaft 10^a when revolved and to bow the springs, thus drawing disk $11^\times$ into contact with a friction-brake consisting of an arm 13 and a friction-surface 13^b, said arm being suitably attached to the frame. The brake-arm 13 comprises the right-angled metal bar with one arm screw-threaded and passed through an aperture or opening in a bar of the frame and fitted with nuts 13^a 13^a, arranged upon the opposite sides of said bar. This permits of the ready lateral adjustment of said brake with relation to the governor-disk $11^\times$, regulating the pressure thereof upon the latter, as will be readily understood. The brake 13 is thus adapted to regulate or control the speed of the governor to prevent the striker from operating more rapidly when a large number of strokes are to be made on the bell, as in sending in a general alarm, than when only a few strokes are produced, as in ringing the numbers of the districts.

The tie-rod 4^b extends across the frame 1, and connected to this rod, but insulated therefrom, is a brush 14, secured to said rod

by a binding-post 4^a. This brush is in the form of a spring, the free end of which is in contact with the periphery of wheel 6, excepting when the insulation 6^a is interposed. Suitably hung within said frame upon a pivot or axis 15^a is a second brake 15, of suitable frictional material, adapted to also bear against the governor-wheel $11^\times$ at its periphery. This brake has its shoe or friction portion secured to the lower end of a quadrant-shaped arm ar bar 15^b, the upper end of said arm or bar being secured to the pivot or axis 15^a.

A weighted arm or rod 16^a of an armature 16, opposite to electromagnets 17, which are suitably supported upon and insulated from the frame, is connected to the axis or pivot 15^a of the brake 15. The weight of the armature arm or rod 16^a is adjustably held thereon, as shown, and said arm or rod is preferably bifurcated or forked and has its armature-bearing end portion at an approximately right angle to its other portion and passing up vertically through and secured to the armature.

A striker rod or lever 18 is suitably hung or pivoted upon the frame 1, preferably being bent or curved around and pinned to a pivot 18^a therein, with one arm arranged horizontally and adapted to engage at or near its slightly-beveled free end successively a series of circularly-arranged lateral studs or projections 19 on the side of the wheel 4. The other arm of said striking rod or lever is carried downward and extended horizontally beyond said frame for the convenient and adjustable attachment thereto of a spring 20. As the end of lever 18 is raised by the studs or projections 19 the spring 20 is put under tension, and when the beveled end of the lever 18 passes the stud and is released the spring forcibly pulls the lever 18 down and pulls on a rod 18^b, connected to said lever to operate the bell-hammer. (Not shown.)

As shown in Fig. 5, the numeral 31 designates a magnet-coil having a core 32 and mounted on a frame 33, having a horizontal arm 33^a, to the outer end of which an armature 36 is pivoted near one of its ends. Rigidly connected to said armature at its upper end is a latch 37, provided with a toe 37^a. Pivoted to the vertical arm of the frame 33 is a drop 30^a, having a projecting portion 30^b, and this drop is normally held up by the toe 37^a, which engages the upper edge thereof. When the armature is attracted by the magnet 32, the toe of the latch is elevated to release the drop 30^a. The magnet-coil 31 is provided with connections *a* and *b*, and connections *c* and *d* are made with the frame. These connections will be traced hereinafter. Secured to an insulated binding-post 38^a, above the latch 37, is a connection *e*, which extends downwardly and has fastened to its lower end a circuit-closer comprising the two platinum plates 38 38, which straddle the latch 37 and are adapted to complete a circuit when the latch is raised.

There are three circuits for the striking mechanism, and they are designated C′, C^2, and C^3, as shown in Fig. 5.

Circuit C′ starts from battery B′ and connects with magnet-coil 17 through binding-post 1^a, coming out of binding-post 2^a and proceeding through key K′ to battery B′. This circuit is normally broken and is only used by the operator at the central station in continuing the alarm.

Circuit C^2 starts from battery B′ and proceeds through binding-post 1^a, through coil 17, through binding-post 2^a, thence proceeding to binding-post 3^a, then through metal frame 1 to wheel 6, through brush 14 and binding-post 4^a, and thence back to battery B′. This circuit always exists unless the insulation 6^a is interposed between wheel 6 and the brush 14, which is always the condition when the machine is not in operation.

Circuit C^3 starts from battery B′ to binding-post 1^a, to binding-post 2^a, to key K′, to key K^2, to circuit-closer 38, joining to connection *e*, Fig. 5, through arm 37, through frame 33, joining with connection *c*, thence to battery B′. This circuit is normally only interrupted at the circuit-closer, as keys K′ and K^2 are kept set in its favor. When, however, the latch 37 is thrown up by the armature, the circuit is completed and an alarm given.

Circuit C^4 starts from any one of the district telephones which is provided with a ground connection and proceeds to the central station through a two-point switch S′ to the lightning-arrester 29 and through indicator-coil 31, through two-point switch S^2, to ground. This circuit always exists in condition to send an alarm by simply ringing the magneto-bell on the telephone. This action energizes the coil, which attracts the armature, throws up the latch, completes the circuit C^3, and sounds the alarm.

Circuit C^5 starts from battery B^2 and proceeds to frame 33, to spring 34, to bell 35, to battery B^2. This circuit is always interrupted unless drop 30^a is released, which causes the lower end of the drop 30^b to come in contact with spring 34, thus completing the circuit and ringing the bell 35. This occurs whenever an alarm is given or whenever there is an interference in the line, as by lightning or cross-current from trolley or electric-light wires.

Circuit C^6 starts from central telephone and proceeds to switch S^2, thence through magnet-coil 31 to district telephone. This circuit is broken except when the central office wishes to communicate with one of the districts. It will be understood that there is a switch S^2 for each district, so that this connection may be made with any district.

Circuit C^7 starts from battery B′ and proceeds to buzz 46, thence to key K^2, to circuit-closer, through arm 37 and frame 33 to battery B′. This circuit is for the purpose of testing the circuit through the circuit-closer without striking the tower-bell, and it is nor-

mally broken unless completed by key K^2. When the circuit is closed, key K′ must be set to break all circuits passing through it to cut out the tower-bell mechanism.

The lightning-arrester 29 is placed in circuit C^4 between switch S′ and magnet-coil 31. This device consists of an insulated base 29^a, having opposite pairs of spring-clamps 29^b and an intermediate ground-plate 29^c. The fuses 29^d each consist of a lead-wire 29^e, supported upon a strip of mica 29^f, and these mica strips have attached at their ends contact-pieces to which the ends of the lead-wire are soldered. These fuses are held in place by the spring-clamps 29^b. The two upper clamps are each connected with a switch-point 26^a, and the two left-hand clamps are joined by wire 28^b, and one of these clamps is connected in line-wire in circuit C^4. The operation of this device is as follows: The switch S′ is normally set to always include one of the fuses in the line-circuit. When the line-wire becomes overcharged by lightning or sneak currents, the fuse in the line is burned out. The attendant may now operate the switch to connect up through the other fuse while the destroyed fuse is being replaced by a new one. The bell 35 is started to ring as soon as a fuse is burned out, and the drop 30^a is released, closing the circuit C^5, and the bell continues to ring until the drop is raised. The tower-bell is not struck when the fuse is burned out, because the make and break occurs so quickly that the insulation 6^a on the wheel 6 would not have time to pass from beneath the brush 14 in the interval.

The central station contains the striking mechanism shown in Fig. 1, the keys K′ K^2, bell 35, buzz 46, and their connections, central telephone, which connects with each of the district telephones, and a switchboard, which has mounted upon it two switches S′ and S^2, a lightning-arrester 29, and a drop mechanism 30, with their connections. It will be understood that the switches S′ S^2, the lightning-arrester 29, and the drop mechanism 30 are duplicated on the switchboard for each district telephone.

Each district-station consists of a telephone having a magneto-bell attached, as usual, for use in operating the alarm, the telephone being also provided with a fuse in circuit for protection against heavy currents and a switch for grounding the line-wire before it reaches the telephone. This line is always grounded when not in use. It will be understood that there may be any number of telephones connected up to the district-line; but in this case all of these telephones could not be grounded, but a short-circuit switch 22 is used at the intermediate stations.

The operation of the striking mechanism shown in Fig. 1 is as follows: The cable or rope 2^a is wound upon the drum 2 by a key which fits the projecting end of the shaft 3. A pin 3^c passes through the shaft 3, and the ends of the pin extend outward, the key having a slotted tubular end to engage the pins, as shown in Fig. 1. The governor 11 is normally held by the brake 15 being in contact with disk $11^\times$, and the brush 14 rests upon the insulation 6^a. When a circuit is completed through coil 17, the armature 16 is attracted, thereby raising brake 15 from disk $11^\times$, releasing the governor 11, and permitting the weight on the end of the cable 2^a to start the striking mechanism. When the circuit C^3 is completed through the coil 17, the tower-bell continues to strike until the circuit is broken either by the person discontinuing the alarm at the district-station or the attendant at the central station cutting him out by operating the key K′. When the circuit C′ is completed through the coil 17, the tower-bell continues to strike until the circuit is broken by the attendant at the central station using key K′. This circuit is always used by the attendant, in connection with circuit C^2, in getting the mechanism under headway for striking an alarm. When circuit C^3 is completed through the coil 17, wheel 6, and brush 14, which can only be done after the striking mechanism is under way, since the insulation 6^a is normally interposed between the brush 14 and wheel 6, the bell continues to ring during one revolution of wheel 6, or, in other words, strikes once. Now the attendant may complete circuit C′, start the mechanism again, then complete the circuit C^2, and strike the tower-bell again. Continuing thus, he can denote the district for which the alarm is given.

When an alarm is to be given from a district-telephone, the person switches in the telephone and rings the magneto-bell. This energizes coil 31 in circuit C^4, which attracts the armature 36, throws up the latch 37, making contact with relay, thereby closing circuit C^3, which strikes the bell, as hereinbefore described. This throwing up of the latch 37 releases the drop 30^a, which simultaneously indicates the number of the district and completes circuit C^5, ringing bell 35. The tower-bell alarm will continue as long as the magneto-bell is operated or until the attendant at the central station breaks circuit C^3.

It is also designed to adapt this apparatus for blowing steam-whistles. This may be done by connecting striking rod or lever 8 with a whistle-valve instead of the tower-bell.

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

1. In an alarm system, a telephone-circuit, a magneto-bell, a magnet-coil which operates a circuit-closer, both included in said circuit, a second circuit, said circuit-closer, a key, the magnet-coils on a bell-striking mechanism for operating a brake, all three included in said second circuit, said bell-striking mechanism, said brake, a third circuit, including said battery and said magnet-coils on the bell-striking mechanism, and an automatic circuit maker and breaker which is set in operation

by releasing said brake, included in said third circuit, substantially as described.

2. In an alarm system, a telephone-circuit, a magnet-coil which operates a circuit-closer, a switch, both included in said circuit, a central telephone provided with a ground and connected to said switch, a second circuit, said circuit-closer, a battery, a key, the magnet-coils on a bell-striking mechanism for operating a brake, all four included in said second circuit, said bell-striking mechanism, said brake, a third circuit, including said battery and said magnet-coils on the bell-striking mechanism, and an automatic circuit maker and breaker which is set in operation by releasing said brake, included in said third circuit, substantially as described.

3. In a fire-alarm system, a telephone-circuit, a magneto-bell, a magnet-coil which operates a circuit-closer and drop mechanism, both included in said circuit, a second circuit, including the flap on the said drop mechanism when said flap is released, a battery, an electric bell, both included in said second circuit, a third circuit, said circuit-closer, a second battery, a key, the magnet-coils on a bell-striking mechanism for operating a brake, all four included in said third circuit, said bell-striking mechanism, said brake, a fourth circuit, including said second battery and said magnet-coils, and an automatic circuit maker and breaker which is set in operation by releasing said brake, included in said fourth circuit, substantially as described.

4. In an alarm system, a telephone-circuit, a magneto-bell, a magnet-coil which operates a circuit-closer, both included in said circuit, a second circuit, said circuit-closer, a battery, a key, the magnet-coils on a bell-striking mechanism for operating a brake, all four included in said second circuit, said bell-striking mechanism, said brake, a third circuit, including said battery and said magnet-coils on the bell-striking mechanism, an automatic circuit maker and breaker which is set in operation by releasing said brake, included in said third circuit, a fourth circuit, including said key, a second battery, and a buzz, both included in said fourth circuit, substantially as described.

5. In an alarm system, a telephone-circuit, a magneto-bell, a magnet-coil which operates a circuit-closer, both included in said telephone-circuit, a second circuit, said circuit-closer, a battery, a key, the magnet-coils on a bell-striking mechanism for operating a brake, all four included in said second circuit, said bell-striking mechanism, said brake, a third circuit including said battery and said magnet-coils on the bell-striker, an automatic circuit maker and breaker which is set in operation by releasing said brake, included in said third circuit, a fourth circuit, including said battery, said magnet-coils on the bell-striker, and said key, substantially as described.

6. In an alarm system, a telephone-circuit, a magneto-bell, a magnet-coil which operates a circuit-closer, both included in said telephone-circuit, a second circuit, said circuit-closer, the magnet-coils on a bell-striking mechanism for operating a brake, a battery, two keys, all five included in said second circuit, said bell-striking mechanism, said brake, a third circuit, including said battery and said magnet-coils on the bell-striker, an automatic circuit maker and breaker which is set in operation by releasing said brake, included in said third circuit, a fourth circuit, including said battery, said magnet-coils on the bell-striker, and one of said keys in said second circuit, a fifth circuit including the other key in said second circuit, said circuit-closer, and said battery, and a buzz, included in said fifth circuit, substantially as described.

7. In a fire-alarm system, a telephone-circuit, a magneto-bell, a lightning-arrester near said telephone, a switch, a second lightning-arrester, near a circuit-breaker, a magnet-coil which operates said circuit-breaker, all five included in said telephone-circuit, a second circuit, a battery, said circuit-closer, a key, the magnet-coils on a bell-striking mechanism for operating a brake, all four included in said second circuit, said bell-striking mechanism, said brake, a third circuit including said battery and said magnet-coils on the bell-striker, an automatic circuit maker and breaker which is set in operation by releasing said brake, included in said third circuit, substantially as described.

In testimony whereof we have hereunto set our hands in presence of two subscribing witnesses.

LORENZO D. TILLYER.
EDGAR D. TILLYER.

Witnesses:
ISRAEL D. CONDIT,
CORNELIUS B. GAGE.