

No. 650,358.

Patented May 22, 1900.

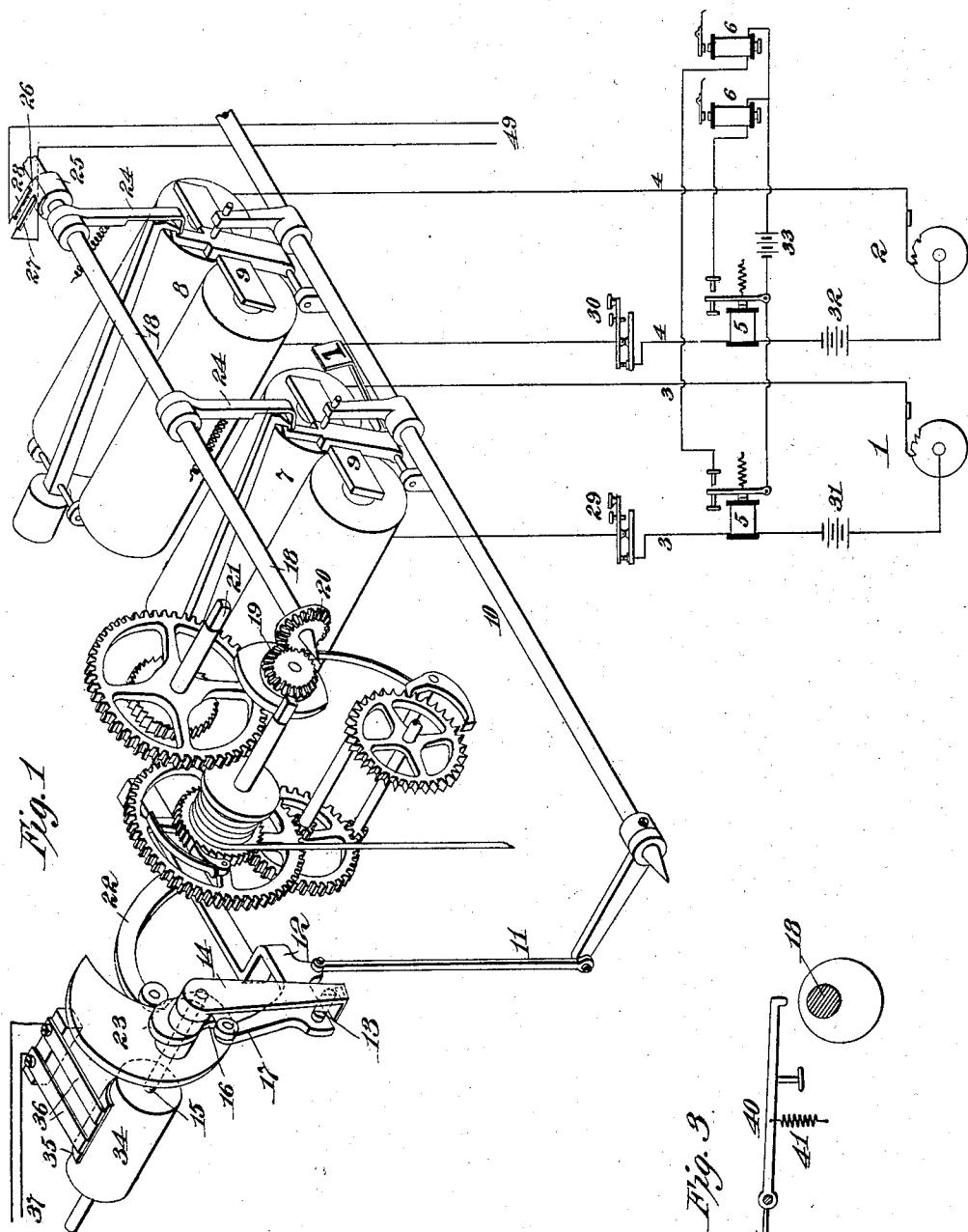
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FIRE ALARM TELEGRAPH APPARATUS.

(Application filed Oct. 13, 1899.)

(No Model.)

2 Sheets—Sheet 1.



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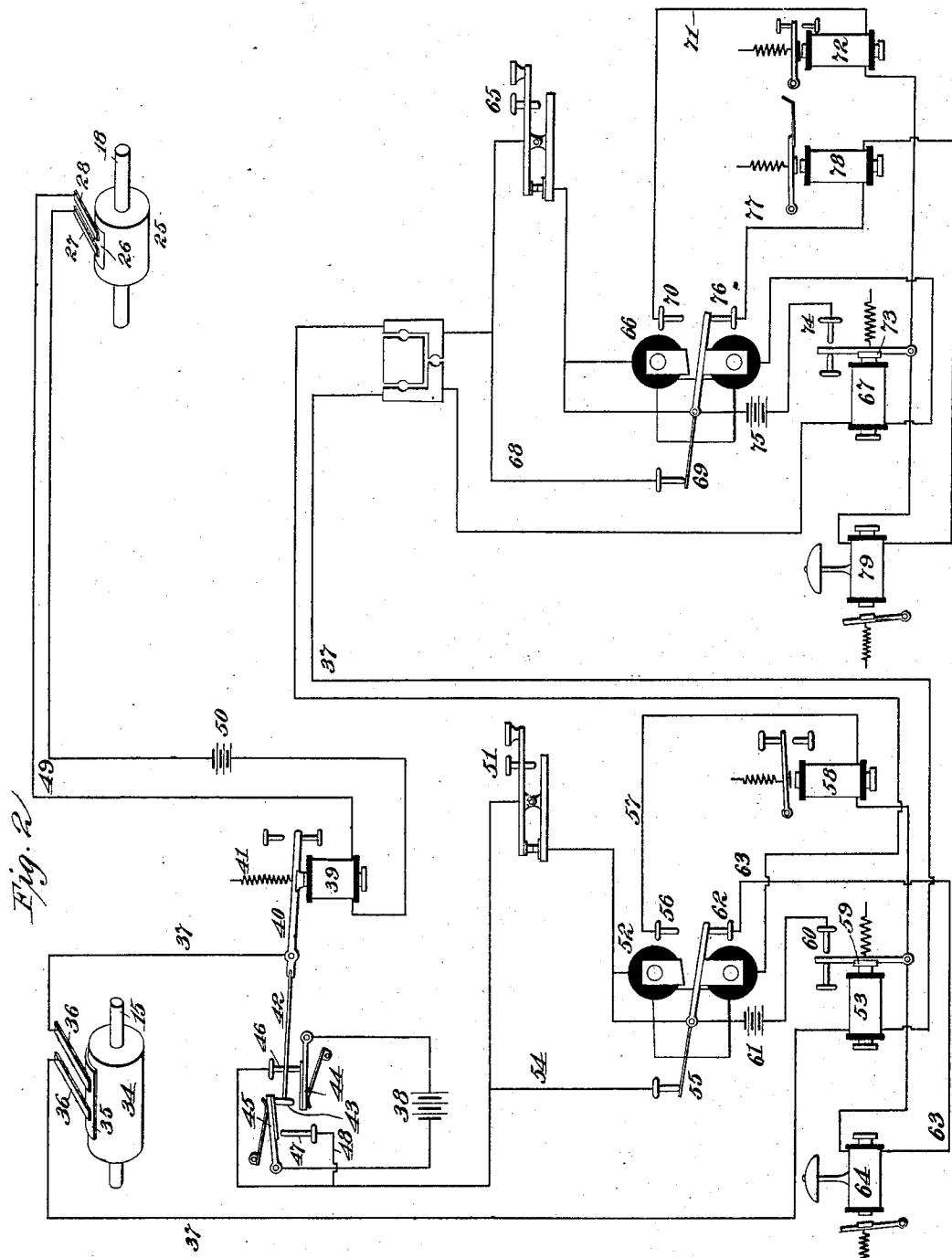
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(Application filed Oct. 13, 1899.)

(No Model.)

2 Sheets—Sheet 2.



# UNITED STATES PATENT OFFICE.

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## FIRE-ALARM TELEGRAPH APPARATUS.

SPECIFICATION forming part of Letters Patent No. 650,358, dated May 22, 1900.

Application filed October 13, 1899. Serial No. 733,455. (No model.)

*To all whom it may concern:*

Be it known that I, WILLIAM H. KIRNAN, a citizen of the United States, residing at Bayonne, in the county of Hudson, State of New Jersey, have invented a certain new and useful Improvement in Fire-Alarm Telegraph Apparatus, of which the following is a description.

My invention relates to various new and useful improvements in fire-alarm telegraph apparatus, and particularly to an improved system including the central-station and engine-house apparatus.

At the present time it is the practice to employ at the central station a so-called "joker" transmitter or repeater, by means of which alarms received at the central station will be repeated upon one or more joker-circuits, each including one or more engine-houses, the joker-signal thus sent being transmitted at a high speed corresponding to that of the street-box and being recorded upon a tape. It is the usual practice also at the present time to succeed the joker-signal with a slower repetition of the alarm, which is sounded upon a heavy and powerful gong in each engine-house. It thus becomes possible in the case of alarms received at night for the operator at each engine-house to observe, by an inspection of the record produced by the joker-signal, whether the alarm is to be responded to by his station, and if not it becomes possible, by short-circuiting the gong mechanism, to prevent the gong from being sounded and the firemen from being awakened. A well-known form of repeater in extensive use in this country is covered by the patents to Rogers and Crane, No. 223,248, dated January 6, 1880, and to Skelton, No. 415,578, dated November 19, 1889. With this repeater one or more repeater-magnets are employed, each connected with a particular street-circuit, generally normally closed. The armatures of these magnets when released operate a rock-shaft with which is connected a tripping mechanism to permit the power-driven joker-transmitter shaft to partake of a single revolution to transmit an impulse over one or more joker-circuits. The armatures of the repeater-magnets are restored either magnetically upon the reclosure of the circuit or positively from the joker-transmitter shaft. In order that inter-

ference may be avoided, the repeater is provided with non-interference mechanism operated from a non-interference shaft, which is actuated at the commencement of movement of the first rotation of the joker-transmitter shaft to lock the armatures of all the other repeater-magnets except the one in active operation, whereby the operation of any one of such other repeater-magnets will not result in aberrations in the repeating mechanism. After a signal has been received the non-interference mechanism is automatically released and the apparatus placed in position for reoperation.

With the fire-alarm telegraph systems using repeaters of the type referred to it is the practice to provide a telegraph apparatus at each engine-house and in the central station, whereby communication between the several engine-houses or between the engine-houses and the central station may be carried on over the joker-line. It is therefore possible, as these systems are now-installed, for any engine-house to practically disable the joker-line by breaking it at any telegraph-key, which, if done, will prevent the joker-signals from being transmitted or received.

The object of the invention is to provide a system of the character described, using a repeater of substantially the type referred to, by means of which telegraphic communication between one or more engine-houses or between any engine-house and the central station may be carried on in the absence of any joker-signals on the line, but which telegraph apparatus will be immediately disabled and the joker-line placed in condition for the transmission and reception of fire-alarm signals upon the receipt of such signals at the central office, thus making it impossible for any one, either accidentally or intentionally, to disable the joker-line by breaking the circuit at the key.

In order that my invention may be better understood, attention is directed to the accompanying drawings, forming a part of this specification, and in which—

Figure 1 is a plan view of a repeater of the general type referred to, showing such parts thereof as may be necessary to enable a clear understanding of the present improvements to be secured and illustrating two street-cir-

cuits in diagram; Fig. 2, a diagram of the joker-transmitter, the joker-line, the apparatus in the joker-line, the non-interference shaft, and an electrically - controlled pole-changer; and Fig. 3, a section through the non-interference shaft, showing a modification by which the pole-changer will be operated mechanically.

In all of the above views corresponding parts are represented by the same numerals of reference.

1 and 2 represent the mechanism of two street-boxes in two street-circuits 3 4. Each street-circuit controls a relay 5 at the central station, each of said relays closing a local circuit through a register 6 at each break in the street-circuit.

7 and 8 represent two repeater-magnets forming part of the repeater mechanism of the type described in said patents. The armatures 9 of the repeater-magnets are adapted when released to slightly rock a shaft 10, connected by a link 11 with a lever 12. The said lever carries a stop 13, with which an arm 14 normally engages, said arm being mounted on the joker-transmitter shaft 15. A cam 16 engages a lever 17 to return the stop 13 into the path of the arm 14 at each rotation of the shaft 15.

18 is a non - interference shaft which is driven by gears 19 and 20 from a power-shaft 21. The latter shaft is normally locked against rotation by a stop mechanism controlled by a lever 22, as described in said patents, said lever being actuated by a cam 23. The non-interference shaft 18 in making a half-rotation operates the fingers 24 24 to engage one or the other of the armatures 9 to hold the same from operation, while the other armature is free to operate to provide for oscillations of the shaft 10 and consequent rotations of the joker-transmitter shaft. Carried upon the non-interference shaft 18 is an insulated sleeve 25, supporting a contact-plate 26, with which two contact-fingers 27 and 28 engage. The contact-plate 26 is brought into position to electrically connect said contact-fingers when the non-interference shaft 18 is turned to the position to lock one or the other of the armatures of the repeater-magnets from operation. Generally the street-circuits are provided with telegraph-keys 29 and 30, located in the street-boxes for the purpose of holding communication with the central station. The street-circuits may be supplied with current from batteries 31 and 32, while a single battery 33 in the central station is connected in the common return from the two registers 6 6.

Carried by the shaft 15 is a drum 34, carrying a contact-plate 35, with which contact-springs 36 are normally in engagement. The springs 36 connect with a joker-circuit 37, leading to one or more engine-houses. It will be understood that by employing more than one of the contact-plates 35 upon the drum 34 the said drum may be employed for the trans-

mission of messages over a plurality of joker-circuits in multiple. The joker-circuit 37 includes in the central station a pole-changer, 70 by which the polarity of the current from a battery 38, impressed on the joker-circuit, may be reversed. This pole-changer comprises, Fig. 2, a pole-changer magnet 39, which operates a lever 40 against the tension of the 75 restoring-spring 41. The lever 40 is pivoted and is provided with an extension 42, having a contact device 43 at its end, adapted to engage, respectively, with the spring-pressed electrodes 44 and 45 and force said electrodes 80 out of engagement with the binding-screws 46 and 47. The electrodes 44 and 45 are connected with opposite poles of the battery 38, and the circuit 37 leads to the armature-lever 40 and from the binding-post 46, a branch 48 85 connecting the binding-post 47 with said circuit, as shown. It will be observed that when the pole-changer magnet 39 is energized to attract the armature-lever 40 the contact-piece 43 will engage the electrode 45 to separate it 90 from the binding-screw 47 and will allow the electrode 44 to engage the binding-screw 46. The current from the battery 38, therefore, instead of passing directly to the extension 42 of the armature-lever 40 through the electrode 44 will pass from the electrode 44 to the binding-screw 46 and thence through the circuit 37 in the opposite direction, returning to the battery 38 through the extension 42 of the lever 40, contact device 43, and electrode 45. When the pole-changer magnet 39 is energized, therefore, current of opposite polarity will be impressed upon the joker-circuit 37 to that when the said magnet is not energized. The pole-changer magnet 39 is 105 included in a circuit 49 on a battery 50, said circuit including the contact-fingers 27 and 28. Thus when the non-interference shaft 18 is turned to its locking position the circuit 49 will be closed to energize the magnet 39 110 and change the polarity of the current on the joker-circuit. The joker-circuit 37 at the central station also includes a telegraph-key 51, from the contacts of which the circuit extends through a polarized relay 52 and a direct relay 53. A shunt 54 extends around the key 51 to the polarized relay 52 and includes a circuit-breaking device 55, by which said shunt-circuit will be broken when the polarized relay 52 is in its normal condition— 115 i. e., when a fire-alarm signal is not being transmitted. When the shunt-circuit 54 is broken at 55, therefore, the key 51 will control the joker-circuit. The front stop 56 of the polarized relay 52 connects with a circuit 120 57, which includes a sounder 58 and leads to the armature 59 of the direct relay 53, the back stop 60 of which connects with the armature of the polarized relay 52. This local circuit includes a local battery 61 between 125 the back stop 60 and the armature of the polarized relay. The back stop 62 of the polarized relay connects with a circuit 63, including a bell 64 and leading also to the arma-

ture 59 of the direct relay 53. When the polarized relay is in its normal position, with its armature in engagement with the front stop 56, it will be observed that the demagnetization of the direct relay 53, allowing its armature 59 to engage the back stop 60, will close the battery 61 on the sounder 58, while when the armature of the polarized relay is in contact with the back stop 62 the de-energization of the direct relay 53, allowing its armature 59 to engage the back stop 60 thereof, will close the battery 61 on the bell 64. At each engine-house the arrangement thus described is practically duplicated, the joker-circuit 37 extending to a key 65, thence to a polarized relay 66, and returning through a direct relay 67. A shunt 68 connects the polarized relay 66 around the key 65, said shunt having a break device 69 therein controlled by the armature-lever of the polarized relay. The front stop 70 of the polarized relay is included in a circuit 71, in which is placed a sounder 72, said circuit extending to the armature-lever 73 of the direct relay 67. The back stop 74 is connected with a battery 75 to the armature of the polarized relay 66. The back stop 76 of the polarized relay is connected by a circuit 77 with the register 78 and bell 79, said circuit 77 also extending to the armature 73 of the direct relay 67.

Instead of operating the pole-changer by a magnet 39, included in the circuit, which is closed across the contact-fingers 27 and 28, as described, the lever 40 of the pole-changer 35 may be operated directly by a cam carried on the non-interference shaft 18, as shown in Fig. 3, whereby the giving of a half-turn to said shaft will result in the operation of the lever 40 to change the polarity of the current 40 on the joker-circuit.

The operation of a fire-alarm telegraph system equipped with my present improvements will be as follows: With the parts in the position shown the assumption is that both of the street-circuits are closed and that no signal is being transmitted. The breaking of any one of the street-circuits 3 or 4 results in the demagnetization of the corresponding repeater-magnet 7 or 8, whereby the armature thereof will be released to rock the shaft 10 and elevate the stop 13 from out of engagement with the arm 14. The joker-transmitter shaft, therefore, is permitted to make a single turn, when it will be again arrested by the stop 13. For each break of the street-circuit, therefore, the joker-transmitter shaft will make a complete turn, thereby repeating over the joker circuit or circuits the same signal received at the central station from the street-circuit. The engagement of the cam 23 with the arm 22 serves at the commencement of the movement of the joker-transmitter shaft, as described in said patents, to release the non-interference mechanism, and the shaft 18 will thereupon make a half-turn to cause the fingers 24 to engage with the armatures of all the repeater-mag-

nets except the one in direct operation, thereby preventing interference. This rotation of the shaft 18 also, either electrically or mechanically, actuates the pole-changer to reverse the polarity of the current from the battery 38 on the joker-circuit 37. The reversal of current on the joker-circuit energizing the polarized relays 52 and 66, respectively, will move the armatures of said polarized relays into contact with the back stops 62 and 76, respectively, thereof. Thus the telegraph-keys at the central station and at the several engine-houses will be prevented from breaking the joker-circuit by the closure of the shunts 54 and 68 through the contact devices 55 and 69, respectively. As soon, therefore, as the non-interference shaft 18 is operated, which takes place an instant after the break 85 in the street-circuit, the polarized relays will be operated on the joker-circuit to prevent the disablement of that circuit by any one of the signaling-keys, and it thus becomes impossible for a person, either accidentally or intentionally, to disable the joker-circuit by the manipulation of one of such keys. The reversal of the current by the pole-changer throwing the armature of the polarized relay 52 into contact with the back stop 62 thereof places the bell 64 in condition for signaling upon the energization and de-energization of the direct relay 53, while the corresponding movement of the armature of the polarized relay 66 places the register 78 and bell 79 in condition for 100 operation when the direct relay 67 is affected. The movements which have been described take place immediately after the breaking of the line-circuit to one of the repeater-magnets 7 or 8, thus allowing the joker-shaft 15 105 to turn a complete rotation and breaking the joker-circuit between the springs 36 36. The breaking of this circuit allows the direct relays 53 and 67 to close the local circuits 63 and 77, respectively, on the bell 64 at the central station and upon the register 78 and bell 79 at each engine-house. Upon the completion of the street-circuit to again energize the magnet 7 or 8 the armature thereof will either be restored by the attraction of said magnet 110 or mechanically by connections from the joker-shaft. This restoration of the armature of the operating repeater-magnet 7 or 8 does not, however, affect the non-interference shaft 18, which still remains in its locked 115 condition and stays in that condition until sufficient time has elapsed after the reception of a signal at the central station as to allow the arm 22 to be moved down to its full limit to release the non-interference shaft. During the normal condition of the joker-circuit, when the pole-changer circuit 49 is broken at the contact-fingers 27 28, the armatures of the polarized relays 52 and 66, respectively, will be in engagement with their front stops. The 120 shunts 54 and 68 are therefore broken at the contacts 55 and 69, respectively, so that the joker-circuit can be controlled from the telegraph-keys. The breaking of the circuit at

one of the telegraph-keys will therefore result in the deenergization of the direct relays 53 and 67, respectively, closing the battery 61 at the central station on the sounder 58 through the front stop 56 and circuit 57 and closing the sounder 72 at the engine-house on the battery 75 through the front stop 70 and circuit 71. Ordinary telegraphic communication can in this way be established; but the moment a signal is received at the central station to result in the operation of the non-interference shaft 18, and consequently of the pole-changer, the movement of the armatures of both polarized relays will complete the shunt around each key, throw out the sounder, and connect in the bell at the central station and the register and bell at the engine-house. It thus becomes possible during the normal condition of the joker-circuit to establish communication between any two engine-houses or between an engine-house and the central station; but such communication will be automatically interrupted immediately a signal is received at the central station.

Having now described my invention, what I claim as new, and desire to secure by Letters Patent, is as follows:

1. In a fire-alarm telegraph system, the combination of a street-circuit, a repeater-magnet controlled by said circuit, a joker-circuit controlled by said repeater-magnet, telegraphic apparatus in the joker-circuit, a polarized relay for disabling said telegraphic apparatus, a pole-changer for reversing the current in the joker-circuit, and a non-interference mechanism for the repeater-magnet, said mechanism controlling the pole-changer, substantially as set forth.
2. In a fire-alarm telegraph system, the combination with a street-circuit and a repeater-magnet controlled thereby, of a joker-circuit, a joker-transmitter controlled by the repeater-magnet, a polarized relay in the joker-circuit, a telegraph-key connected to said relay, a shunt around said key adapted to be broken by reversal of current in the relay, a pole-changer in the joker-circuit, and non-interference mechanism for the repeater-magnet controlling said pole-changer, substantially as set forth.
3. In a fire-alarm telegraph system, the combination with a street-circuit and a repeater-magnet controlled thereby, of a joker-circuit, a joker-transmitter controlled by the repeater-magnet, a polarized relay in the joker-circuit, a telegraph-key connected to said relay, a shunt around said key adapted to be broken by a reversal of current in the relay, a pole-changer in the joker-circuit, non-interference

mechanism for the repeater-magnet controlling said pole-changer, a sounder connected to the front stop of said polarized relay, and a bell connected to the back stop of said polarized relay, substantially as set forth.

4. In a fire-alarm telegraph system, the combination with a street-circuit and a repeater-magnet controlled thereby, of a joker-circuit, a joker-transmitter controlled by the repeater-magnet, a polarized relay in the joker-circuit, a telegraph-key connected to said relay, a shunt around said key adapted to be broken by reversal of current in the relay, a pole-changer in the joker-circuit, non-interference mechanism for the repeater-magnet controlling said pole-changer, a sounder connected to the front stop of said polarized relay, and a bell and register connected to the back stop of said polarized relay, substantially as set forth.

5. In a fire-alarm telegraph system, the combination with a street-circuit and a repeater-magnet controlled thereby, of a joker-circuit, a joker-transmitter controlled by the repeater-magnet, a polarized relay in the joker-circuit, a telegraph-key connected to said relay, a shunt around said key adapted to be broken by reversal of current in the relay, a pole-changer in the joker-circuit, non-interference mechanism for the repeater-magnet controlling said pole-changer, a sounder connected to the front stop of said polarized relay, a bell connected to the back stop of said polarized relay, and a direct relay in the joker-circuit for actuating said sounder, substantially as set forth.

6. In a fire-alarm telegraph system, the combination with a street-circuit and a repeater-magnet controlled thereby, of a joker-circuit, a joker-transmitter controlled by the repeater-magnet, a polarized relay in the joker-circuit, a telegraph-key connected to said relay, a shunt around said key adapted to be broken by reversal of current in the relay, a pole-changer in the joker-circuit, non-interference mechanism for the repeater-magnet controlling said pole-changer, a sounder connected to the front stop of said polarized relay, a bell connected to the back stop of said polarized relay, and a direct relay in said joker-circuit for actuating the sounder and bell, substantially as set forth.

This specification signed and witnessed this 21st day of September, 1899.

WILLIAM H. KIRNAN.

Witnesses:

JNO. R. TAYLOR,  
FRANK L. DYER.