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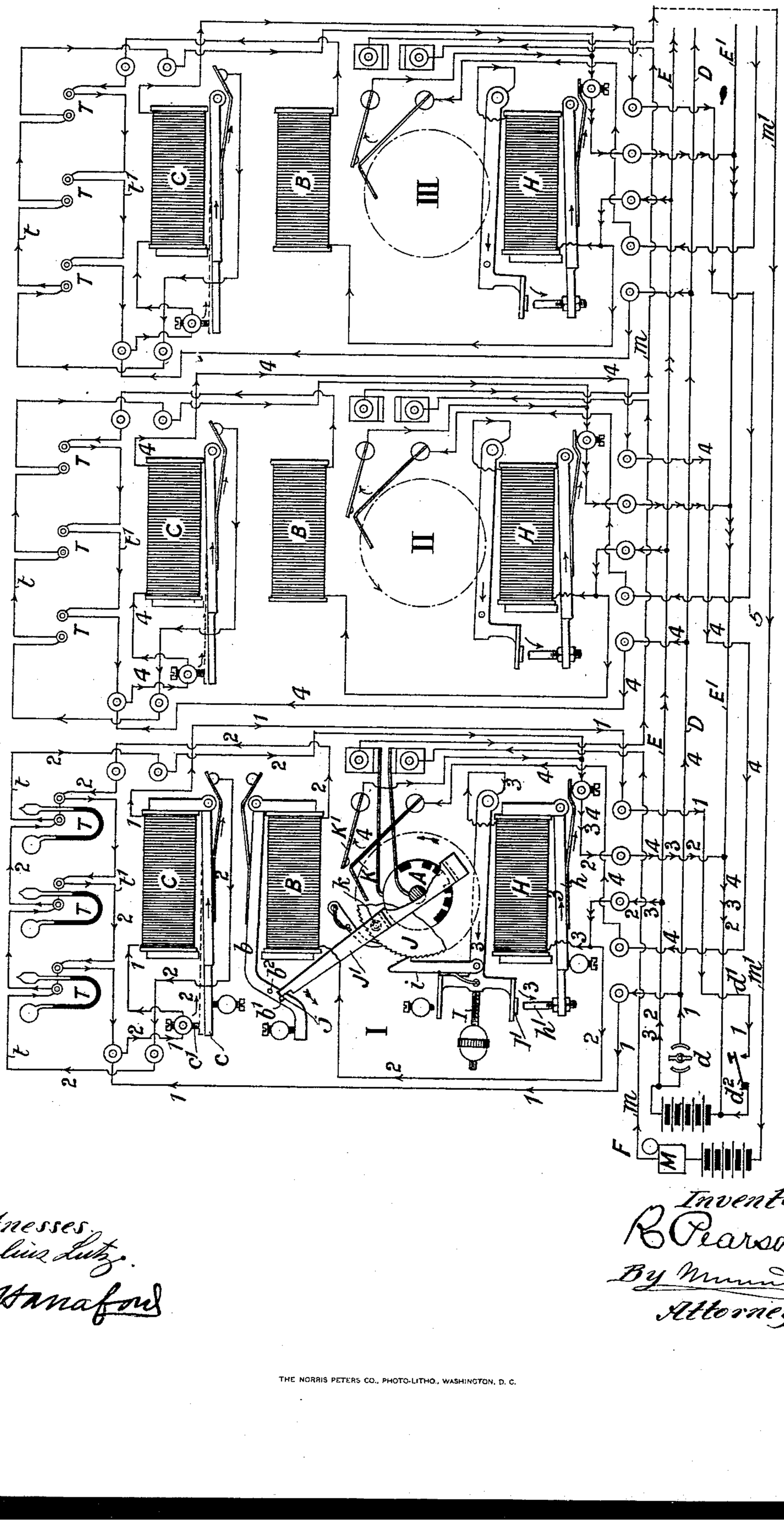
R. PEARSON.

AUTOMATIC CODE TELEGRAPH FIRE ALARM APPARATUS.

(Application filed Dec. 7, 1898.)

(No Model.)



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UNITED STATES PATENT OFFICE.

RICHARD PEARSON, OF LONDON, ENGLAND.

AUTOMATIC CODE TELEGRAPH FIRE-ALARM APPARATUS.

SPECIFICATION forming part of Letters Patent No. 632,586, dated September 5, 1899.

Application filed December 7, 1898. Serial No. 698,561. (No model.)

To all whom it may concern:

Be it known that I, RICHARD PEARSON, engineer, a resident of 100 St. Martin's lane, London, England, have invented new and useful Improvements in Automatic Code Telegraph Fire-Alarm Apparatus, (for which an application for patent has been filed in Great Britain, dated July 23, 1898, No. 16,125,) of which the following is a full, clear, and exact description.

This invention relates, essentially, to the testing of the circuits upon which automatic fire-alarm instruments are installed, for the transmission to a central fire-engine (or other) station of a "code" message denoting an alarm of fire and indicating the precise locality at which the fire has broken out.

It is desirable for many reasons that the working efficiency of the alarm mechanisms and of the circuits through which they are operated should be frequently tested; and the object of this invention is to enable the whole of the alarm mechanisms upon the same main circuit to be separately tested by momentarily closing a testing-circuit at the fire-engine station, so that not only is personal inspection of the several installations unnecessary, but the test may be made with such facility that it may be repeated at such frequent intervals as to insure the immediate detection of any accidental or intentional injury to the circuits or instruments.

The invention is illustrated in the accompanying drawing, which is a diagram representing on the same main circuit three separate installations, of which the complete mechanism is represented in the first only, and the other two are illustrated diagrammatically, the parts being shown in normal position.

I II III are three separate installations contained in distinct buildings at any distance apart. F is a fire-engine (or other) station at which the alarm of fire is to be given. Each installation comprises an alarm transmitter mechanism for the whole building adapted to be set in action by the closure of the circuit of the electromagnetic mechanism by which the transmitter is operated, said closure being brought about by the operation of any one of a number of thermostatic circuit-closers T distributed in the various rooms of the building, or (as the case may be) by the operation of the testing mechanism hereinafter described. The alarm transmitter mechanism is of that kind in which by the revolution of a code-wheel A, through the agency of electromagnetic releasing and propelment mechanism, a code message denoting the particular building at which the installation is located is sent through a main circuit $m\ m'$ to a Morse printing instrument M at the fire-station, all the code-wheels of the several installations being on the same main circuit $m\ m'$, but having insulating-segments differently spaced so as to send distinctive messages. The sending of a message happens when the circuit of the station-battery is closed through a releasing-magnet B of an installation either by the action under heat of any one of the thermostatic circuit-closers T or by the action of a circuit-closing electromagnet C. The thermostatic circuit-closers are by preference, U-shaped thermometers having in one limb of the tube contact-wires of platinum at which the circuits are normally broken, which contacts are normally bathed in creosote, the circuit being completed when mercury contained in the bend of the tube is caused (by the expansion of the motive fluid contained in the other limb of the tube) to make electrical connection between the contacts. The thermostats T, which control the action of the transmitter of installation No. I, for example, are arranged in multiple arc upon a normally-open circuit $t\ t'$, running through the various rooms wherein the thermostats are situated and terminating at an electromagnetic circuit-closer $c\ c'$, contained in the transmitter instrument, whereby for testing purposes the thermostat-circuit $t\ t'$ may be closed by the operation of the electromagnet C in connection with a "testing-circuit." The circuit-closer $c\ c'$ being at the extremity of the circuit $t\ t'$, the whole circuit will be tested up to the very terminals of the thermostats T.

The object of the invention being to enable the whole of the various installations I II III, &c., upon the same main circuit to be tested separately in response to the single momentary closure of one testing-circuit at the station, I provide means whereby the testing-circuits of the installations shall be automatically closed in succession in order that

each of the installations shall automatically and separately transmit to the station its distinctive code message. With this object all the electromagnets C by which the thermostat-circuits of the several installations are closed for testing purposes are connected by one terminal with a testing-main D, running to the station F, and capable, when the test is to be made, of being there connected by a switch *d* to the outfeed-main E, through which current is supplied to the code-wheel-releasing magnet B and the code-wheel-propelment magnet H. The other terminal of the magnet C of the installation No. I is connected to a return-test wire *d'*, also running to the station F and capable of being there connected by a key d^2 to the return-main E', common to the magnets B H of all the installations. When a test is to be made, the switch *d* is first closed and the key d^2 is momentarily pressed, whereupon the magnet C of the installation No. I will be excited and will attract its armature *c*, which forms one member of the electromagnetic circuit-closer, whereupon the circuit will be closed at *c c'*, first through the releasing-magnet B and then through the propelment-magnet H of the code-wheel mechanism, which will thus be brought into action in the same way as though the circuit were closed by the action of a thermostat T. The arrows 1 indicate the path of the initial testing-current for installation No. I, the arrow 2 the current for releasing the code-wheel, the arrows 3 the code-wheel-propelment current, the arrows 4 the initial testing-current for installation No. II, and the arrows 5 the current in the alarm-circuit.

The construction and operation of the propelment mechanism are as follows: I is a lever which carries a driving-pawl *i*, that engages with and propels a ratchet-wheel J, fast on the same axis with but insulated from the code-transmitting wheel A. An arm J', fixed to this ratchet-wheel, has a rearwardly-projecting lug *j* at its extremity, which is normally engaged by the pin *b'* of the escapement carried by the armature *b* of the releasing-magnet B, and in this position a contact-piece I', carried by lever I, is held (by the engagement of pawl *i* with wheel J) out of contact with a contact-piece *h'*, carried by the armature *h* of the propelment-magnet H, the connections of the coil of magnet H and of the parts I I' *h h'* with the outfeed and return mains E E' being such, as shown, that by the release of the arm J the contact-piece I' will be allowed to fall onto the contact *h'*, thus closing the circuit through coil H, as shown by arrows 3, which being excited attracts its armature *h*, whereupon (by the circuit becoming broken between *h'* and I' in consequence of the momentum acquired by the latter) the armature *h* falls and is again attracted, and so on, thereby causing the pawl *i* to revolve the wheel J tooth by tooth, and with it the code-wheel A, until the arm J' is again arrested by the escapement. Should the armature of magnet B then still be attracted this arrest will be effected by the pin b^2.

In combination with the transmitter of each installation of the series is a circuit-closer, whereby the operation of such transmitter in response to a testing-current will automatically bring about the closure of the testing-circuit of the next installation of the series. This circuit-closer may be conveniently formed of a pair of contact-springs K K', which are normally separated and are momentarily pressed into contact by a tappet *k* on the ratchet-wheel J, the connections being such that when the springs K K' are pressed into contact by the wheel J of installation No. I the magnet C of installation No. II will be connected to the return-main E', with the effect that this magnet being excited (by the current indicated by arrows 4) the thermostat-circuit *t t'* of installation No. II is closed, and the code-transmitter of that installation is set in operation and transmits its distinctive message to the station. Its code-wheel consequently acts in turn and in the same way on the testing-circuit of the installation No. III, and so on, the action being similarly repeated for each next-following installation in succession. This closure of the testing-circuits of the several installations in succession only happens, however, when the switch *d* is closed for testing purposes, so that the testing-main D being normally open the individual operation of any one installation by the action of fire on a thermostatic circuit-closer will not entail the operation of the other installations and so cause confusion as to the locality of the fire.

The following is a concise description of the operation: When a test is to be made, the switch *d* at the fire-engine station is closed and the key d^2 is momentarily depressed. The current then passing through circuit No. 1 energizes magnet C, whose armature being attracted closes at *c c* the circuit for the current No. 2, which current at once energizes magnet B, whose armature *b* being attracted removes the stop *b'* out of the path of the rearwardly-projecting lug *j* at the end of the arm J'. The wheel J being thus free to rotate, the lever I, which remained held up by the engagement of the pawl *i* with a tooth of wheel J when J' was stopped by *b'* at the previous operation, (this being the position shown in the drawing,) falls by its own weight until the contact-piece I' rests upon the contact-piece *h'*. Current No. 3 thereupon passes by way of lever I and the armature-lever *h* of magnet H. This magnet being excited attracts its armature *h* and raises lever I so suddenly that the momentum of lever I continues to carry lever I upward after the movement of armature *h* is arrested. Two effects are produced—namely, first, contact at I' *h'* is broken, the magnet H ceases to be energized, and the armature H falls, and, second, the pawl *i* is made to engage with a fresh—*i. e.*, higher—tooth of wheel J, and the lever then

descends until contact is again established at I′ h', whereupon lever I is again thrown up, breaking contact again, and so on, the repeated oscillation of lever I continuing until wheel J has performed a complete revolution, whereupon it is stopped by lug j on arm J′ coming against top b'. Should the key d^2 (instead of being depressed momentarily) have been held down up to this time, so that current 2 continues, the arm J′ will be arrested by the stop b^2, which is then presented in the path of j by reason of the continued attraction of the armature b. When key d^2 is finally released, armature b rises, and b' is substituted for b^2. The revolution of code-wheel A and of the wheel J, besides causing the code message of installation No. I to be sent through circuit 5, has the further effect of closing the initial testing-circuit of installation No. II. This happens when the tappet k on wheel J of installation No. I causes spring K to make contact with spring K′, so that circuit No. 4 is closed through magnet C of installation No. II, in whose apparatus the cycle of operations described is repeated, whereby installation No. III is actuated, and so on.

Having now particularly described and ascertained the nature of the said invention and in what manner the same is to be performed, I declare that what I claim is—

1. The combination with an electrically-operated fire-alarm transmitter such as described and with a normally open circuit upon which thermostatic circuit-closers are arranged in multiple arc, said circuit including a releasing-electromagnet whose armature normally prevents the action of the transmitter, of an electromagnetically-operated circuit-closer at the extremity of such thermostat-circuit, a testing-circuit including the electromagnet-coil of such circuit-closer and a switch on such testing-circuit at the station, whereby the current of a battery may be passed through the testing-circuit so as to cause the releasing-electromagnet to be energized and the operation of the whole transmitter to be determined and consequently to enable the efficiency of the transmitter mechanism and that of the thermostat circuit to be ascertained by closing the switch at the station, as described.

2. The combination with a series of electrically-operated fire-alarm-transmitting installations on the same main circuit, each such installation comprising a normally open circuit upon which thermostatic circuit-closers are arranged in multiple arc, said thermostat-circuit including a releasing-electromagnet whose armature normally prevents the action of the transmitter, of electromagnetically-operated circuit-closers, one at the extremity of each such thermostat-circuit capable when excited of closing the thermostat-circuit through the coil of the releasing-magnet of the transmitter to which it corresponds, and of normally open testing-circuits for each installation, each testing-circuit including the coil of the corresponding thermostatic circuit-closer and a testing-circuit closer for each such testing-circuit, the testing-circuit closer for the first installation being situated at the central station and the testing-circuit closers appertaining to the testing-circuits for the second and succeeding installations of the series being respectively combined each with the transmitter appertaining to the installation preceding in order that to whose testing-circuit said testing-circuit closer appertains, so that the operation of the transmitter-wheel of each installation will determine in turn the closure of the testing-circuit of the next succeeding installation and will consequently determine the operation of the transmitter of the said installation each in turn, substantially as specified.

Signed by me, the said RICHARD PEARSON, this 20th day of October, 1898.

RICHARD PEARSON.

In presence of—

T. W. KENNARD,

FRED C. HARRIS.