J. E. SHEPHERD.

AUTOMATIC FIRE PROTECTION SIGNAL SYSTEM.

APPLICATION FILED JAN. 20, 1908.

1,018,451.

Patented Feb. 27, 1912.

3 SHEETS—SHEET 1.

Fig. 1.

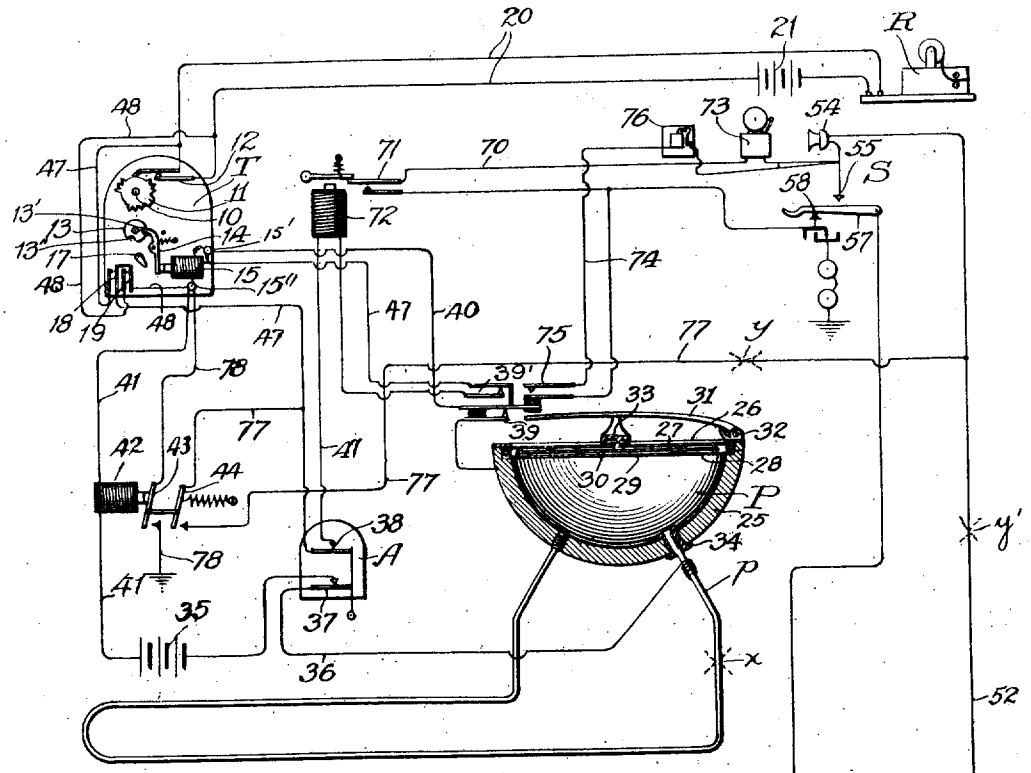
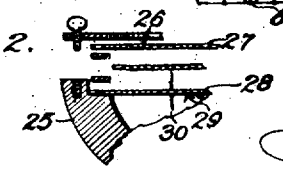


Fig. 2.



Witnesses
R. A. White
Harry R. L. White

Inventor
John E. Shepherd
By Coriell Bain & Gray
Attys

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3 SHEETS—SHEET 2.

Fig 3.

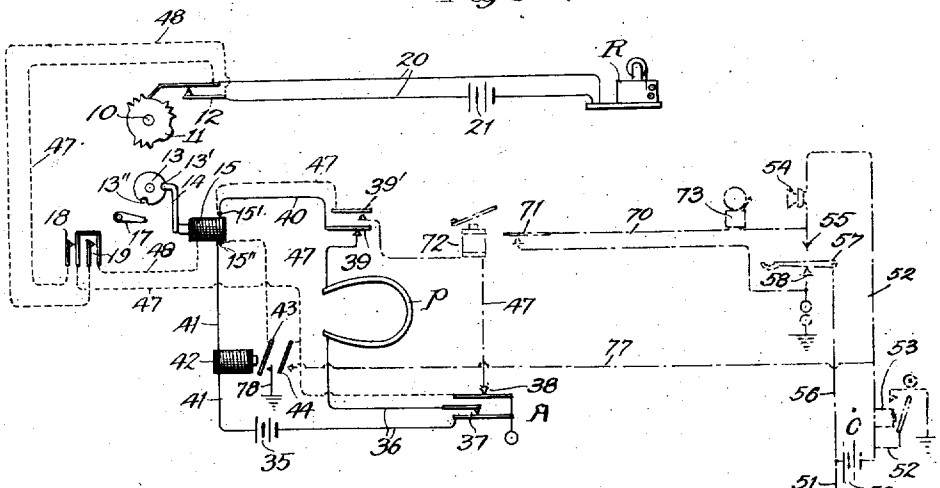


Fig. 4

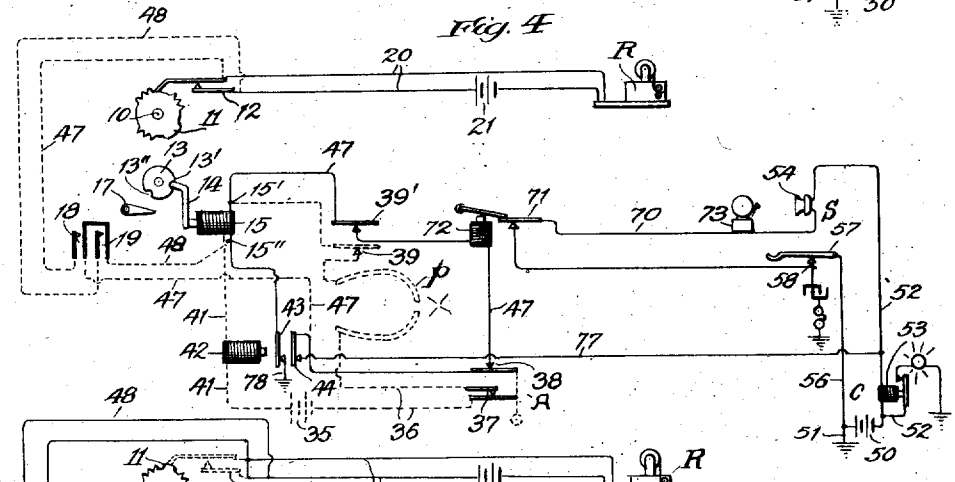
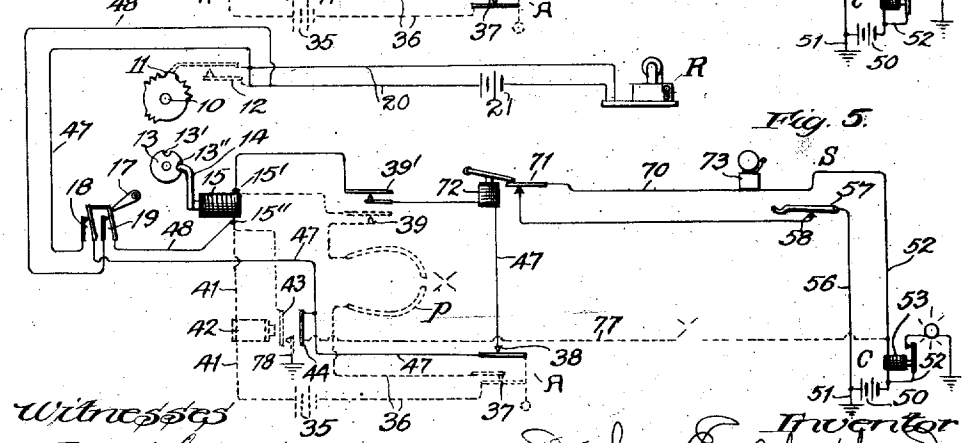


Fig. 5.



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R. A. White.

Harry R Lerlute

Inventor

John E Shepherd

By Dodge Bain and Dodge Attys

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3 SHEETS—SHEET 3.

Fig. 6.

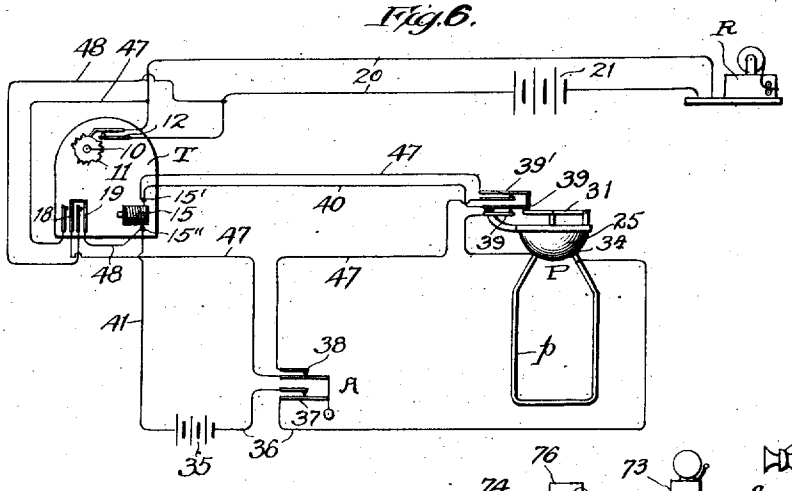


Fig. 7.

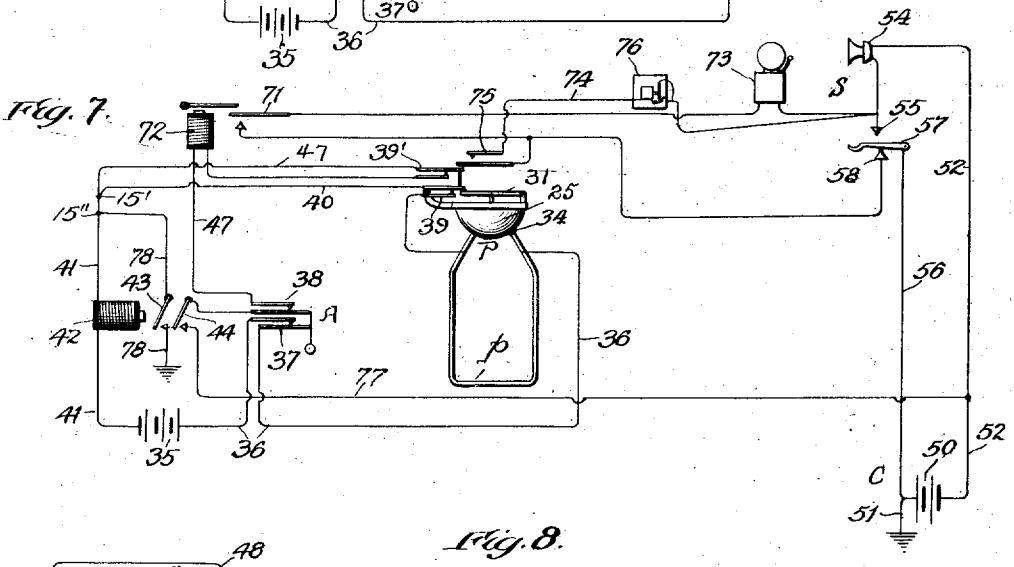
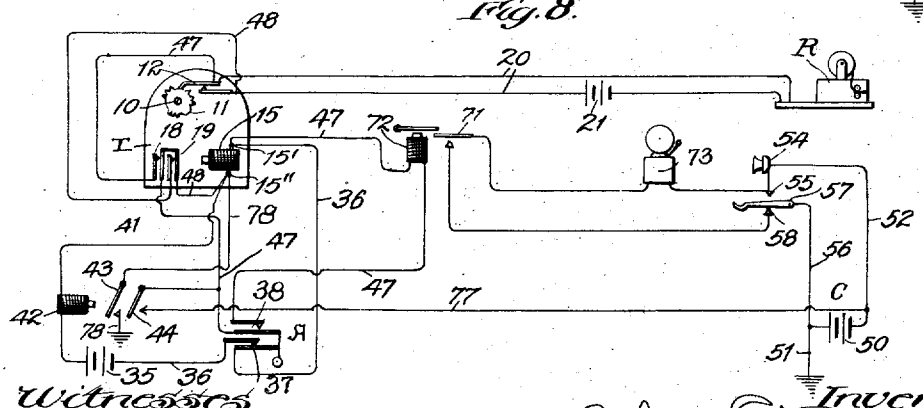


Fig. 8.



Witnesses:
R. A. White.
Harry R Livlite

Inventor
John E. Shepherd
By Howell Bain and May
Attys

UNITED STATES PATENT OFFICE.

JOHN E. SHEPHERD, OF CHICAGO, ILLINOIS, ASSIGNOR TO AUTOMATIC FIRE PROTECTION COMPANY, OF NEW YORK, N. Y., A CORPORATION OF MAINE.

AUTOMATIC FIRE-PROTECTION SIGNAL SYSTEM.

1,018,451. Specification of Letters Patent. Patented Feb. 27, 1912.

Application filed January 20, 1908. Serial No. 411,827.

To all whom it may concern:

Be it known that I, JOHN E. SHEPHERD, a citizen of the United States, residing at Chicago, in the county of Cook and State of Illinois, have invented certain new and useful Improvements in Automatic Fire-Protection Signal Systems, of which the following is a specification.

This invention relates to improvements in automatic fire protection signal systems, and has for its general object to provide improvements applicable to systems for automatic fire alarm signaling, manual alarm signaling, or a combination of the two.

It has heretofore been to some extent the practice to provide manual fire alarm signaling systems comprising a master transmitter located at some suitable point and connected in a signaling circuit with a supervising station, usually at some distance therefrom, and to arrange "auxiliary" boxes at different points within the area to be afforded protection, such auxiliary boxes when actuated serving merely to close an electric circuit, including master-box controlling mechanism, which, when energized, serves to actuate the master transmitter and occasion it to transmit a signal in the signaling circuit; but such systems as heretofore practiced have been open to objections in that the auxiliary circuit and boxes were not under test and might be so deranged as to leave the area supposedly protected without means of fire alarm transmission without any supervising authority becoming aware of the failure of the apparatus. Furthermore it has heretofore been suggested to employ a fire detecting and signal initiating system comprising a piping installation, preferably of small diameter, containing air maintained under atmospheric pressure by the relief of a constantly-open vent, such piping closed at one end and extending throughout the area to be protected and at its open end communicating with a pressure responsive device capable of closing a circuit to initiate a bell signal upon a sudden increase of pressure due to sudden heating of the piping, but such system is likewise disadvantageous in that the detector piping may be broken or cut in two and the system rendered inoperative without the knowledge of the supervising authorities.

Among the objects of the present invention are, to provide an "auxiliary box" fire alarm telegraph system in which the auxiliary circuit is under test; to provide such a system in which the failure of the auxiliary circuit will result in the initiation of a trouble-signal distinctive from a fire alarm signal; to arrange for such supervision of the auxiliary circuit and devices of the fire alarm system, through the medium of a telephone system, without reorganization of the telephone system, or impairment of its normal functions; to provide supervision for the auxiliary system through the fire alarm telegraph system itself; to provide an improved and highly sensitive heat detector system and improved means for maintaining normally atmospheric pressure within the system at all times while insuring maximum pressure efficiency within the system under undue conditions of heat, such as those occasioned by fire; to provide for constant supervision of the continuity of the detector piping system; and portions of the wiring of the auxiliary alarm circuit, or the telephone system, or both, in such manner that the signal transmitted upon the rupture of the piping will be distinctive from the alarm transmitted upon the actuation of the system by fire; and further to provide most effective and certain service for insuring prompt transmission of a true fire alarm signal to suitable supervising authorities in the event of the occurrence of fire.

It is further an object of this invention to unify in a fire protection system a heat detecting system, a telegraph signaling system and a telephone signaling system, in such manner that the telephone signaling system alone will be affected by trouble in the automatic fire detector system or the auxiliary service of the telegraph system, under normal conditions, while the telegraph system, and the telephone system as well if desired, will be immediately actuated by the pulling of the manual auxiliary boxes or the actuation of the automatic fire indicating devices.

Also it is an object of this invention to so arrange the telegraph system that its transmitting mechanism will be actuated by trouble in the event that the telephone system has been incapacited, but in such man-

ner only as to transmit a distinctive signal from its true fire alarm signal and to be capable of further transmitting a fire alarm upon the subsequent actuation of the signal indicating devices either in the form of auxiliary boxes or temperature detectors.

Other objects of the present invention will become apparent to those skilled in the art from the following description taken in conjunction with the accompanying drawings wherein is diagrammatically illustrated an embodiment of the invention;

Figure 1 is a general diagrammatic view; Fig. 2 is a detail of the illustrated pressure responsive device; Fig. 3 is a simplified diagram showing the circuits under normal conditions; Fig. 4 is a similar view showing the operation occasioned by the rupture of the detector piping; Fig. 5 is a similar view showing the operation when the auxiliary circuit and telephone connection are both broken; Fig. 6 shows the circuit with the telephone signaling devices eliminated; Fig. 7 is a like view, eliminating the telegraph signaling parts, and; Fig. 8 is a similar view showing the heat detecting system eliminated.

In the illustrative embodiment of the invention herein shown is provided in general a fire alarm telegraph system comprising the potentially active transmitter T, and a suitable signaling circuit therefor including the central station recorder R. Auxiliary boxes or signal initiators A are distributed throughout the area, such auxiliary boxes being arranged in a local auxiliary circuit normally energized and including means magnetically restraining the transmitter T, adapted when the auxiliary boxes are actuated to condition the master transmitter T for fire alarm signaling operation, the arrangement providing for partial operation of said transmitter T to transmit telegraphically a trouble signal in the event of a mere break of the auxiliary circuit, (unless other supervision intervenes as hereafter described).

The heat detecting system shown in general comprises a pressure responsive device P and a piping system p connected therewith, extending throughout the whole or part of the protected area, so arranged that under certain conditions of heat the medium within the piping occasions a change of pressure in the responsive device P, sufficient to actuate such device to do useful work. The detecting piping p is constantly supervised as to its continuity by inclusion in a closed, energized and supervised electric circuit, preferably as part of the electric circuit in which the auxiliary boxes A are contained, so that supervision of the auxiliary circuit constitutes supervision of the continuity of the heat detecting system.

The telephone equipment is shown as comprising a central station equipment generally shown at C, and including a source of current supply; signal lamps and a receiver; suitable line wires; and a subscriber's station equipment, generally indicated at S. The telephone system is provided at the protected area with means responsive to rupture of the auxiliary wiring system or piping to initiate a signal receivable telephonically at the central station, and if desired with means responsive to actuation of the pressure responsive device P to initiate a distinctive alarm receivable telephonically. The embodiment herein illustrated comprises an electric and electromechanical combination of these three general systems,—telegraph, telephone and heat-detecting, in such a way that normally the telephone line is perfectly clear and the telegraph system in energized condition, the auxiliary wiring system under test maintaining the transmitter T potentially active, or restrained against the operation for which it is normally prepared. The arrangement is preferably such that in the event of the deënergization of the auxiliary system, as by breaking a wire or the failure of the source of current supply in said auxiliary system, changes in the electrical connection are made which throw the source of current supply from the telephone circuit into service to continue the restraint upon transmitter T and prevent the transmission of a fire alarm over the telegraph system, but to occasion the transmission of a distinctive signal over the telephone system to indicate that trouble exists in the fire protection arrangement of the supervised risk. Also the arrangement is preferably such that in the event that the telephone system has become disabled to perform this function the supervisory function is imposed upon the telegraph signaling service itself, but in such wise that the actuation of the transmitter by trouble occasions it to send a signal which is readily distinguishable from a true fire alarm. Furthermore, the association of the several systems is such that the control of the properly constructed fire alarm initiating devices is absolute and occasions the transmission of a desired true fire alarm. Such complete system I regard as advantageous, but it will be apparent that the telegraph system may be used alone; that the telephone supervision of the telegraph, with or without supplemental self supervision of the telegraph, may be employed; and that telephone or telegraph supervision of the heat detecting system may be employed within the scope of my invention.

Referring now to the specific showing of the drawing, the transmitter T is diagrammatically shown as a clock work box of the normally wound type, typifying any potentially active transmitter, involving a

number wheel 10 for occasioning a plural-impulse signal several times repeated, said wheel preferably having between the first and second number, or tooth series, a projection 11, and the wheel coacting with the normally closed circuit breaking switch 12. A controlling wheel 13 provided with two peripheral notches 13′, 13″ is arranged to rotate coincidentally with the rotation of the wheel 10, and is arranged to be normally locked against movement by engagement of a lever 14, with the notch 13′.

15 indicates a transmitter controlling electromagnet, the armature whereof is carried by lever 14, so that the transmitter is restrained only while the electroresponsive magnet is energized.

A switch controlling arm 17 is provided to rotate coincidentally with the wheel 13, and is arranged in respect to two circuit making switches 18 and 19 to close them both just as the second notch 13″ of the wheel 13 comes into position for engagement with the lever 14, and to then pass by such switches if the armature remains free. The switch 12 normally closes a telegraph signaling circuit 20 including a source of current supply such as a battery 21 and the recorder R of any usual or desired type.

The heat detecting signal initiating system may be of any desired structure involving piping extending throughout the protected area and responsive means actuated to do useful work by changes in pressure in the piping due to sudden or dangerous heat. In the heat detecting system herein shown, the pressure responsive device P may conveniently comprise a receptacle 25 having one face formed by a diaphragm 26, provided with small vent openings 27 arranged to merely permit slow passage of air into or out of the receptacle to compensate for gradual changes in temperature and barometric pressure, but arranged to bulge outwardly and have its orifice closed upon a sudden increase of pressure within the receptacle 25. Constructions subserving this end are many and will readily occur to those skilled in the art, but the showing discloses a highly sensitive organization for the purpose, in which the diaphragm 26 is underlaid by a second diaphragm 28 having therein an orifice 29 preferably non-registering with the orifice 27 in the outer diaphragm, so that the air passage through the two diaphragms is somewhat tortuous, and sensitiveness is further increased by the provision of a loose paper disk or washer 30 interposed between the two diaphragms. Obviously slow and gradual increases or decreases of pressure within the receptacle 25 above or below atmospheric pressure result in the slow passage of air through the tortuous passage provided through the diaphragm valve thus provided, without occasioning movement of the diaphragms, but a comparatively sudden or violent increase in pressure within the receptacle, such as is occasioned by a sudden rise in temperature due to fire, instantly affects the inner diaphragm and causes the paper washer to seat against the orifice of the outer diaphragm, so sealing the relief way and causing the diaphragms to bulge outwardly together. Such movement of the diaphragms acts upon a lever 31 pivoted as at 32 upon the casing, and preferably provided with an aperture-sealing disk 33 at such point that the outward pressure of the diaphragm 26 causes the vent aperture 27 to be sealed from the outside. Movements of the lever 31 are utilized in doing work which will be hereafter described.

The heat detecting piping system *p* comprises a pipe which may be of very small diameter and correspondingly small bore, extending throughout the area supervised, and, preferably at both ends communicating with the receptacle 25, one extremity of the piping *p* being electrically insulated as at 34 from the receptacle. The heat detecting piping *p* is preferably included as a part of the auxiliary circuit for the transmitter T normally controlling the electromagnet 15, and such circuit is maintained under test.

35 indicates a local source of current supply for the auxiliary circuit, connected to the auxiliary box A which preferably has for purposes of the full embodiment of the present invention two sets of circuit breaking switches 37 and 38, respectively, arranged for manual operation to simultaneously break the respective circuits, the switch 37 being connected in a wire 36 which leads from the battery 35 to the insulated end of the piping *p*, the normal auxiliary circuit thence continuing throughout the entire piping system and the shell of the pressure chamber to the lower leaf of a normally closed circuit breaking switch 39, which with a companion switch 39′ is arranged to be opened by the elevation of lever 31. The upper leaf of such switch 39 is connected by wire 40 to binding post 15′ of the controlling magnet 15 of the transmitter T, and from the other terminal 15″ of said magnet the circuit is connected back to the battery 35 through a wire 41, including therein the windings of a relay 42, which is thereby normally energized and normally holds open two circuit closing switches 43 and 44 respectively, adapted to close the circuit connectors controlled thereby whenever the relay winding 42 becomes deënergized.

The switches 18 and 19 which are incorporated to form part of the circuit connections for telegraph supervision of the auxiliary circuit and prevent the transmission of false alarms under certain conditions of operation of the system described, are con-

nected as follows: The switch 18 is connected in a wire 47, which connects one leg of circuit 20 through the circuit breaker 38 of the auxiliary box A, a relay 72 (which is useful only in conjunction with the telephone circuit to be hereafter described and which for the moment may be omitted from consideration) and the switch 39′ to magnet terminal 15′, while the remaining switch 19 is connected in a wire 48, which extends to and is connected with the binding post 15″ of the transmitter controlling magnet 15.

The system thus far described is in itself operative, and constitutes a complete supervised-auxiliary system, supervising also as to "trouble" and fire indicating conditions, a heat detecting system. Such system is shown in simple form in Fig. 6.

It will be obvious with respect to the heat detecting system that slow rises or falls in the pressure within the system due to normal changes in temperature or barometric pressure within the area protected occasion comparatively slow movements of the air to maintain the medium within the system always at atmospheric pressure, the diaphragm-valve arrangement serving to permit such breathing or passage of air to or from the system as is necessary to maintain the desired equilibrium of pressure within and without the same. If, however, heat is applied to a portion of the detector piping system, as by the presence of a conflagration in the area protected, a sudden impulse of pressure is occasioned in the system which is communicated to the diaphragm arrangement and instantly closes the relief orifices and causes the diaphragm arrangement to bulge outwardly, moving lever 31 and opening the switches 39 and 39′. This destroys the continuity of the circuits for the controlling magnet 15 of the transmitter, thereby freeing the armature which is spring retracted, and frees the transmitter motor for operation. As under such conditions nothing intervenes to again energize the magnet 15 while the switches 39 and 39′ are held open, the transmitter goes through its full cycle of operation and the wheel 10 operates upon the switch 12 to transmit its full round or complete signal to the recorder R over the telegraph circuit 20. If, however, the rupture occurs in the auxiliary circuit alone, only a trouble alarm is transmitted. For example in the event that the heat detecting piping system p is ruptured at a point marked X the auxiliary circuit is interrupted and the relay 15 becomes deenergized, freeing the transmitter wheel for operation as heretofore described, but now when the wheel is rotated a third of its cycle sending its number signal but once, the rise 11 on the wheel 10 breaks the circuit through the switch 12, and at the same time the operating arm 17 closes the switches 18 and 19 just as the second notch 13″ in the wheel 13 comes opposite the armature-carrying lever 14. Closure of the switches 18 and 19 occasions the energization of the magnet 15 from the battery 21 through a subsidiary or emergency circuit as follows: one line wire 20—47 (including 18, 38 and 39′)—15—48 (including 19)—other line wire 20— back to 21, so that the magnet 15, reënergized, attracts its armature and causes the lever 14 to engage the second notch of wheel 13 and thereby stop the activity of the transmitter T. Obviously if either the switch 38 or switch 39′ be now actuated it will break the transmitter controlling subsidiary circuit and again free the transmitter for further operation to transmit the balance of its signal, and either the manual box A or the initiator of the heat detecting system will, when actuated break such circuits, so that at the central station the receipt of the master box number once only transmitted may be construed as a trouble signal, a receipt of the said number twice or more transmitted may be construed as a fire alarm.

The telephone system illustrated is one of ordinary construction, involving at the central station a battery 50 grounded on one side as at 51 and on the other side communicating through line wire 52, including the line signal relay winding 53, with the transmitter 54 at the subscriber's station, and terminating at the upper switch hook contact 55, the other wire of the line, 56, connected with the grounded side of the battery extending to the subscriber's switch hook 57, which normally contacts with the lower contact point 58, customarily grounded through a condenser and bell. At the central station the jack 60 has its tip spring connected with the line 52, its sleeve spring connected with the line 56, and its test contact connected to ground through the line cut-out relay 61 in customary fashion. The cord circuit illustratively shown has its tip strand 62 connected to the non-grounded side of the battery 50, its sleeve strand 63, (which includes the winding of supervisory relay 64) connected to the grounded side of said battery, and the test strand 65, including the supervisory lamp 66, connected with the test contact of the plug, the supervisory lamp being provided with the usual short-circuiting switch 67 for operation by the supervisory relay magnet. 68 indicates the customary central station receiver. This telephone system is in general well known, and its normal operation needs no description.

For the supervision of the heat detecting system through the agency of the telephone system, provision is made for transmitting telephonic signals in the event of deënergization of the test auxiliary circuit, and transmitting a different alarm telephonically upon actuation of the heat responsive

device P, while in the supervision of the fire alarm telegraph system provision is made for preventing a telegraphic signal in the exent of mere breaking of the auxiliary circuit and transmitting a telephonic signal, without interfering with intentional fire alarm operations of the telegraphic system. To these ends provision is made for effecting an operation of the line signaling devices of the telephone system to attract the operator's attention and initiate an alarm audible through the agency of the central operator's telephone receiver in the event of trouble in the fire alarm or heat detecting system supervised, and, if desired, the initiation of a distinguishable signal in the event of actuation of the heat detecting system to indicate fire. In general, therefore, in the complete system shown are provided means responsive to deënergization of the auxiliary and pipe-testing circuit, for establishing connections such as will energize the central line lamp, actuate an alarm device at the subscriber's station and close the gap normally open between the legs of the line at the switch hook to cut in the transmitter, and will also establish a circuit energized by the telephone battery, which will include the telegraph-transmitter controlling-magnet and prevent the operation of the telegraph transmitter.

In the specific disclosures 70 indicates a wire including a normally open switch 71, controlled by the magnet of a normally deenergized relay 72 (included, as heretofore described, in the wire 47,) the wire 70 also including in circuit therein, for illustrative purposes, a vibrating bell 73, in such proximity to the telephone transmitter 54 as to easily communicate vibrations to the line receivable and recognizable in the central station receiving instrument 68, such circuit 70 being connected to the upper and lower contacts of the switch hook so as to bridge the gap normally open at said switch hook. A parallel circuit 74 may also be run to like points, such circuit including the normally open switch 75, arranged to be closed by the raising of the lever 31, of the heat detecting pressure responsive apparatus, and including an aurally distinguishable signaling device 76, such as a buzzer. Further, preferably, a wire 77 is run from the telephone line 52 through the normally open switch 44, to the wire 47, between the switches 18 and 38 and a ground connection 78 including the normally open switch 43 associated with the relay 42, is provided in connection with the binding post 15″ of telegraph transmitter controlling magnet 15. The arrangement thus described is adapted in the present installation to supervise the heat detecting system both as to rupture of the piping, and as to true fire alarm, (as may best be seen in Fig. 7) and is likewise arranged to effect supervision of the auxiliary system for the fire alarm telegraph and to prevent the transmission of trouble alarm over said telegraph system save in the event that the telephone system is out of commission (as may best be seen in Fig. 8). It will be apparent, moreover, from the description, particularly in view of Figs. 7 and 8, of the drawings, that the telephone system shown may be employed to supervise the heat detecting system completely without association of the telegraph system, or that it may be used to supervise the telegraph system without regard to the heat detecting system.

The operation in supervising the continuity of the auxiliary telegraph installation, (including, in the embodiment shown, the heat detecting piping system) is as follows: In the event that the auxiliary circuit 35—36—*p*—40—15—41 becomes deënergized both of the magnets 15 and 42 tend to become deënergized, but the magnet 42 is arranged to lose its magnetism more rapidly than the magnet 15 (the magnet 15 for example being jacketed.) Consequently before the armature 14 is actually released the relay 42 is deënergized and switches 43 and 44 are closed, establishing a subsidiary restraining circuit for the telegraph transmitter magnet as follows: ground—51—50—52 (53)—77 (44)—47 (38—72—39′) 15—78—(43)—ground, thereby establishing a ground return circuit, including the line signal devices 53 of the central station, the relay 72 and the telegraph transmitter controlling magnet 15, so that the latter is instantly reënergized and does not permit the commencement of operation of the telegraph transmitter, but retains it in potentially active condition. Of course the central operator plugs in when the line signal flashes, and it will be observed that the energization of magnet 72 causes the closing of the switch 71 so bridging the normally open switch contacts 55—58 and throwing into the bridged circuit thus established the bell 73 which rings in proximity to the transmitter 54 and occasions vibrations in the line audible in the central station receiving instrument 68. It will further be observed that even in the event the line 56 is broken, so that the audible signal may not be received, the central operator is yet apprised of the character of the signal because there being a ground on the leg 52 of the circuit to which the tip-strand of the cord is connected through the jack such ground return connection robs the sleeve strand of the cord circuit of current to such extent that the relay 64 is unable to hold up the switch 67 and the supervisory lamp is thrown into its test-ring and contact circuit and glows,—a condition which cannot prevail in the ordinary operation of the telephone system.

Obviously if a true fire alarm be occa-

sioned by the bulging of the diaphragm, the circuit 74 is closed, bridging a buzzer 76 across the line, so lighting the line lamp and calling the central operator, and upon her plugging in giving an alarm distinguishable from the trouble alarm. Such operation of the heat detecting initiator or the auxiliary box, moreover, breaks the subsidiary telephonically energized circuit for the controlling magnet 15 of the telegraphic transmitter, and causes the telegraphic alarm to be sent in. It will further be observed that if the telephonic grounding wire 77 is broken at some point as indicated at y in Fig. 1, or line wire 52 is broken, as at y', and the auxiliary telegraph circuit is also broken, as indicated at X in Fig. 1, the telegraph system is merely thrown on to the self-supervision of the telegraph apparatus and the telegraph system operates as described earlier in this application, to restrain its own operation to the trouble signal distinguishable from a true fire alarm.

In the brief résumé it is pointed out that the present system provides a fire alarm telegraph system in which the master transmitter is controlled by an auxiliary circuit under constant test; and that the arrangement is such that failure of the auxiliary test circuit may result in the transmission by the master transmitter of a trouble signal distinguishable from a true fire alarm signal, leaving the transmitter in condition to further transmit a true fire alarm in the event of further actuation. Further, provision is made for the supervision of the condition of the auxiliary circuit of a telegraph system through the agency of a telephone system, (and such provision is believed to be new) and in such manner, too, that the actuation of mechanism controlling the supervised auxiliary circuit may occasion the transmission telephonically of a signal distinctive from the trouble signal. Further, provision is made (and such provision is believed to be new) of an atmospheric pressure heat detecting system, wherein the detector piping is at both ends open to a pressure indicating device, and in such system is embodied also a structure permitting the normal maintenance of atmospheric pressure within the system but hermetically closing upon the sudden rise of pressure within the system to secure maximum efficiency in indicating sudden rise in pressure; such system further providing for the electrical supervision of the continuity of its heat detecting piping as part of a circuit under test, supervised either telegraphically or telephonically or both.

It will be apparent to those skilled in the art that numerous changes may be made in the system in its physical embodiments without departure from the spirit and scope of this invention, and it will be understood that wide variations from the specific embodiment herein may be made by those skilled in the art in the application of the scope of this invention to different forms of heat detecting systems, telephone systems and telegraph systems heretofore known or hereafter evolved.

Having thus described my invention, what I claim and desire to secure by Letters Patent, is:

1. In a fire protection signaling system, a telegraph system comprising a signal transmitter, an auxiliary system embodying means for conditioning said transmitter for operation, and a source of current supply therefor, a normally independent source of current supply, and means for automatically connecting said independent source of current supply to control the transmitter operation upon the occurrence of certain conditions in the auxiliary system.

2. In a fire protection signaling system, a telegraph system comprising a signal transmitter, an auxiliary system embodying means for conditioning the said transmitter for operation, and a source of current supply therefor, a telephone system comprising a source of current supply, and means for automatically connecting said telephone source of current supply to affect the transmitter operation upon the occurrence of certain conditions in the auxiliary system.

3. In a fire protection signaling system, a potentially active signal transmitter, a signaling circuit therefor, controlling means for said transmitter comprising an electromagnet adapted to restrain the transmitter from operation when energized, a normally energized local circuit therefor, an independent source of current supply, and means responsive to break of the normally energized local circuit for connecting said second source of current supply to energize the transmitter-restraining electromagnet.

4. In a fire protection signaling system, a potentially active transmitter, a suitable circuit therefor, controlling means for said transmitter, arranged normally to restrain it from operation, a telephone system comprising a source of current supply, and means for connecting said source of current supply of the telephone system to control the transmitter-controlling electroresponsive device.

5. In a fire protection signaling system, a potentially active transmitter, a suitable signaling circuit therefor, controlling means for said transmitter, an auxiliary circuit including said controlling means, a telephone system including a cource of current supply, and means operable upon rupture of the auxiliary circuit for initiating a signal in the telephone system, and connecting the telephone source of supply to control the transmitter-controlling electroresponsive device.

6. In a fire protection signaling system, a potentially active signal transmitter, suitable signaling circuit therefor, means controlling said transmitter comprising an electromagnet adapted to restrain the transmitter from operation while energized, a normally energized local circuit, including the said electromagnet an independently energized telephone system, normally open circuit connections including said electromagnet in a circuit energized by a source of supply for the telephone system, and means responsive to a rupture of the normally energized local circuit system for closing said subsidiary circuit connections.

7. In a fire protection signaling system, a potentially active transmitter, a suitable circuit therefor, controlling means for said transmitter comprising an electroresponsive device, arranged when energized to restrain the transmitter, a normally energized closed circuit for said responsive device, a telephone system, and means operable upon deenergization of the normally energized auxiliary circuit, for initiating a signal in the telephone system and establishing a circuit for the electroresponsive controlling device, including a source of current supply independent of the normal source of supply therefor.

8. In a fire protection signaling system, a potentially active signal transmitter, a suitably energized circuit therefor, controlling means comprising an electroresponsive controlling device arranged to restrain the transmitter when energized, a normally closed and energized auxiliary circuit including said electroresponsive motor controlling means, a telephone system including a source of current supply, and means responsive to a rupture of the auxiliary circuit for establishing a subsidiary circuit energized by the source of supply for the telephone system and including the electroresponsive motor-controlling means, and initiating a signal in the telephone system, and fire alarm initiating means comprising switching mechanism for contemporaneously breaking both the auxiliary circuit and said subsidiary circuit connections.

9. In a fire protection signaling system, a potentially active fire alarm signal transmitter box, a suitable signaling circuit therefor, controlling means normally maintaining said transmitter against operation including an electromagnet and an energized normal circuit therefor, a metallic telephone circuit, comprising at the central station a line signal, and a source of current supply, and at the subscriber's station a normally open switch, means responsive to a rupture of the normal magnet circuit to close a subsidiary, independently energized circuit for said magnet, actuate an audible signal in effective distance for a telephone transmitter, and to close the normal opening of the telephone circuit to operatively include the said transmitter.

10. In a fire protection signaling system, a heat detecting system comprising a piping extending throughout a protected area, and a responsive part movable under change of pressure within said system, a normally closed and energized electric circuit including said piping system, a telephone system, means for initiating a signal through the agency of the telephone system upon the rupture of the normally closed circuit including the piping.

11. In a fire protection signaling system, a heat detecting system comprising piping extending throughout a protected area, and a responsive part movable under change of pressure due to application of heat to the piping system, a telephone system and means for initiating in the telephone system different alarms, respectively, upon the rupture of the circuit including the piping and upon the actuation of the responsive part of said heat detecting system.

12. In a fire protection signaling system, a heat detecting system comprising piping extending throughout a protected area and a responsive part movable under change of pressure due to the application of heat to the piping system, a telephone system, and means for initiating an alarm in said telephone system upon the actuation of said responsive part.

13. In a fire protection signaling system, a heat detecting system, comprising piping extending throughout a protected area and a responsive part movable under change of pressure due to application of heat in the piping system, a telephone system comprising line wires, at the subscriber's station a normally grounded source of current supply and a line lamp, and at the subscriber's station a normally open switch, a normally energized electric circuit, including the piping, normally open circuit connections, at the protected stations for closing a telephone signaling circuit and initiating a signal therein, and means responsive to a rupture of the circuit including the piping for initiating the activity of the telephone signal initiating means.

14. In a fire protection system, a heat protecting system comprising piping extending throughout a protected area, and a responsive part movable under change of pressure due to application of heat to the piping, a telephone system, comprising at central station a signal responsive device, and at the subscriber's station a signaling device, a normally closed and energized electric circuit, including said piping, and means responsive to break in said normal circuit for conditioning the telephone signaling device for operation.

15. In a fire protection system, a telegraph signaling circuit, including a potentially active transmitter and a register, an auxiliary circuit controlling the transmitter, and a telephone system independent of the telegraph system arranged for automatic supervision of the auxiliary circuit.

In testimony whereof I hereunto set my hand in the presence of two witnesses.

JOHN E. SHEPHERD.

In the presence of—
GEO. T. MAY, JR.,
MARY F. ALLEN.