O. B. KAISER.

ALARM SYSTEM.

APPLICATION FILED JUNE 20, 1908.

948,055. Patented Feb. 1, 1910.

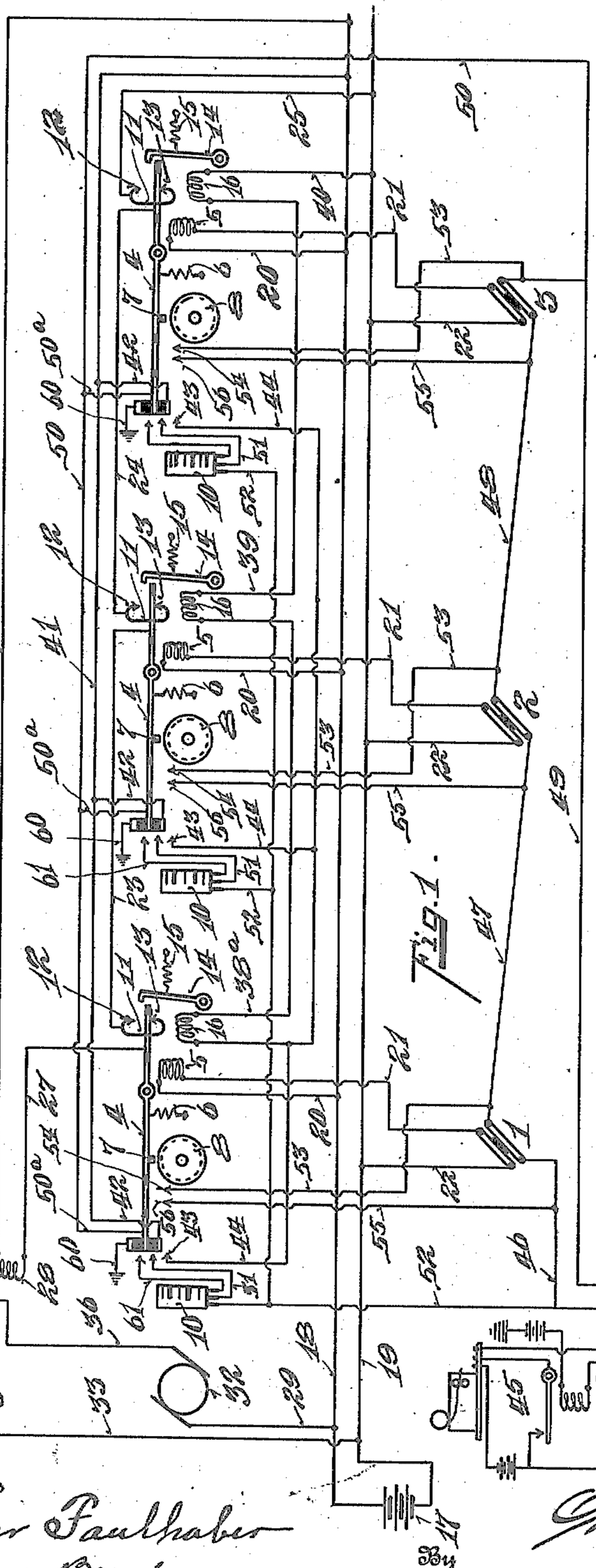

Fig. 1.

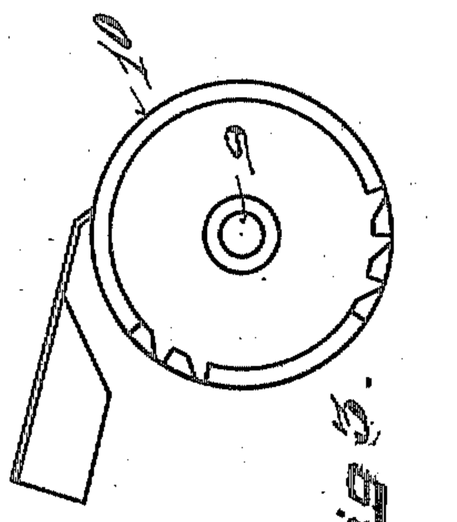

Fig. 3.

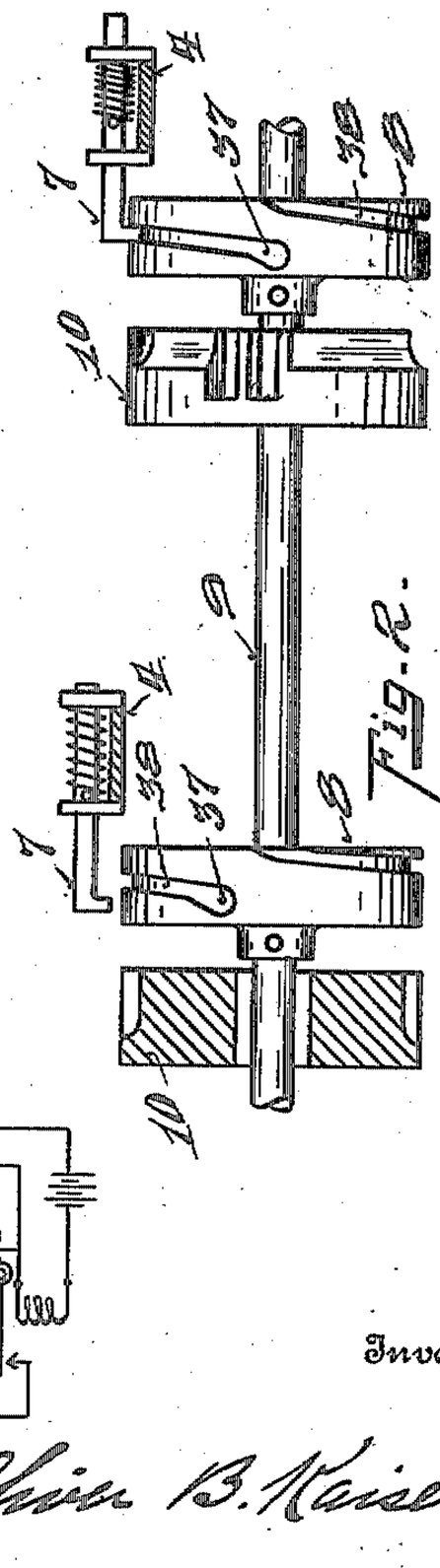

Fig. 2.

Witnesses

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ALARM SYSTEM.

948,055. Specification of Letters Patent. Patented Feb. 1, 1910.

Application filed June 20, 1908. Serial No. 439,613.

To all whom it may concern:

Be it known that I, OLIVER B. KAISER, a citizen of the United States, residing at Madisonville, in the county of Hamilton and State of Ohio, have invented certain new and useful Improvements in Alarm Systems, of which the following is a specification.

My invention relates to an improvement in an alarm system, primarily adapted to be employed in a supervisory capacity for indicating the condition of a fire protection system, as for instance, a sprinkler system of a building.

One of the objects of my invention is to provide an alarm system with one or more alarm signal mechanisms in circuit with the governing or controlling mechanism of a fire protection system, wherein said alarm mechanism is set into operation after one or more circuits of the fire protection system become broken or placed in an abnormal state, with means for automatically effecting a signal transmission of independent signals for each particular governing mechanism of the fire protection system, without interference of signals, cutting off the motive power after the abnormal conditions have all been reported, and automatically restoring the mechanism to normal position upon restoration of the fire protection system to normal condition.

Another object of my invention is to provide an alarm signal system in which one or more circuit controllers are governed or actuated by the normal and abnormal condition of a fire protection system in which an alarm circuit is maintained under test condition with a supervisory station and controllers during the normal condition of the fire protection system and alarm signal mechanism in circuit with each controller for indicating or transmitting a signal indicative of each particular abnormal controller and in which the alarm circuit is maintained under test condition through the alarm mechanism after signal transmission and during abnormal condition of the fire protection system.

Another object of my invention is to provide a series of alarm signal mechanisms in circuit and actuated by the several controllers of a sprinkler system in which only one alarm can be indicated or transmitted at a time, but in which all abnormal conditions occurring at or about the same time will be serially indicated.

Another object of my invention is to provide a system of signal supervision in which the transmitting mechanism, in connection with a given controller of a sprinkler system, automatically locks out the signal indication of a second or more controllers during the indication of one signal.

Another object of my invention is to provide an alarm system in which the main transmitting circuit is under test condition directly with the sprinkler apparatus, thereby indicating at the receiving station a broken circuit, should the alarm fail to operate after the sprinkler mechanism has been placed in abnormal condition.

The various features of my invention are more fully set forth in the description of the accompanying drawings, forming a part of this specification, in which:—

Figure 1 is a diagrammatic view of my improved signal system and alarm mechanism. Fig. 2 is a detail view of the signal indicating control mechanism. Fig. 3 is a side elevation of the transmitting wheel.

This invention embodies the subject-matter of a former application filed by me January 19th, 1907, Serial No. 353,149.

In the drawings I have shown three branch connections or controllers, marked 1, 2, and 3 illustrating the same by a switch installed in or controlled by, or forming a part of the sprinkler system. Any number may be employed, as desired, with the same result. An electric motor serving as the driving means for imparting rotation to the signal mechanism is employed, the signal mechanism and circuit controlling mechanism being preferably fixed to a main driving shaft, but any source of power for actuating the said mechanism may be employed.

For a clear understanding of the system, I will first describe one of the devices necessary for the control and indication of a signal of one branch or controller of the sprinkler system. Duplicate mechanism is employed when several branches are connected to one system.

4 represents an armature lever suitably supported or pivoted. The armature lever, as shown in the diagrammatic view, is formed of a series of sections, insulated from each other, which is merely to illustrate that the various circuits are independent of each

other, and for a convenient understanding of the operation of the system. It is obvious that various forms of construction for controlling the various circuits, through the action of the armature lever, may be employed and devised, and I do not in this description wish to be limited to any specific form. 5 represents a magnet coil or coils for controlling one movement of said armature lever.

6 represents a spring fixed to armature lever 4 for controlling the opposite movement of the armature lever after the magnet 5 has become deënergized. 7 represents a spring controlled pin supported upon said armature lever 4, adapted to contact with the guide disk 8, fixed to the shaft 9, (see Fig. 2), said shaft 9 being driven by the electric motor or such motive power as employed.

10 represents an indicating wheel fixed to shaft 9 and preferably adjacent, and occupying a relative position to the guide disk 8, the purpose of which will be hereinafter described.

A guide disk 8 and an indicating or break wheel 10 is employed for each branch of the system, it being understood that each indicating wheel of the series is provided with different notches or indications commonly employed in transmitting wheels to indicate a different signal for each branch.

11 represents a contact bar provided with contacts 12, 13, in a position adapted to be engaged by the armature lever 4 at its limits of movement for controlling the operation of the motor or motive power.

14 represents a lock armature lever, the free end of which is adapted to be engaged and lock the armature lever 4 against movement. 15 represents a spring for retracting said armature lever. 16 represents a magnet coil or coils for attracting said lock armature lever 14, the functions of which will be hereinafter described.

The controllers 1, 2, 3, for convenience are shown as double break switches controlling two circuits. These switches are actuated automatically by various devices employed in a sprinkler system as, for instance, a double break switch is applied to a valve of the sprinkler system wherein when the valve is closed the electric circuits will be broken. These devices may be of any construction to break the circuits from normal to abnormal condition of the sprinkler system and vice versa.

As shown in the drawings, the source of electric supply is distributed from a given point which is termed a central station, but it is obvious that the electric energy supply may be local with the transmitting mechanism with equally efficient results. 17 represents a source of supply. 18 represents a wire in connection with one pole of the source of supply and extending forward to which the partial circuits of the various instrument magnet coils of a system are connected. 19 represents a wire connected to the opposite pole of the source of supply and extending parallel with wire 18. The said wires 18 and 19 form the main feed wires for the various apparatus employed in the operation of the alarm system. 20 represents a wire in contact with wire 18 and one pole of the magnet coils 5. 21 represents a wire connected at one end to the opposite pole of the magnet coils 5, and at its opposite end to a contact of the switch or controller 1. 22 represents a wire leading from the switch 1 to the wire 19. Thus when the switch is closed the circuit to magnet coil 5, will be as follows:—from the source of supply 17, wire 18, wire 20, through the magnet coils 5, wire 21, thence controlled by the switch or controller 1, thence through wire 22 and wire 19 to the opposite pole of the source of electric supply. The partial circuits of the magnet coils 5 of the branches governed by controllers 2 and 3 are wired in parallel, with the feed wires 18 and 19, throughout the series, the duplicate of that described for the controller 1. Thus when the controller 1 is broken the magnet coils 5 in said branch will become deënergized permitting armature lever 4 to be retracted by the springs 6, which action will start the motive power into commission, the same being controlled as follows:—23 represents a wire, one end of which is connected to contact bar 11 of branch 1, the opposite end to the armature lever 4 of branch 2. 24 represents a wire, one end of which is connected to the contact bar 11 of branch 2, the opposite end to the armature 4 of branch 3. 25 represents a wire, one end of which is connected to the contact bar 11 of branch 3, the opposite end to the main feed wire 19. 26 represents a wire connected to the main feed wire 18 at one end and to magnet coils 28 at its opposite end. 27 represents a wire connected to the armature lever 4 of branch 1 at one end, its opposite end is in connection with the magnet coil 28. 30 represents an armature lever adapted to be attracted by the magnet coils 28, and 31 represents a spring for retracting the armature lever 30 after the magnet coils have become deënergized. 32 represents an electric motor. 33 represents a wire leading from wire 19 of the source of supply to the switch contact 35. 36 represents a wire carried by the armature lever 30 at one end, and connected to one pole of the motor 32. 29 represents a wire leading from the opposite pole of the motor to the energy supply wire 18. Thus when the magnet 28 becomes deënergized the armature lever 30 will contact with contact point 35, completing the circuit from the source of supply to the motor. It will be seen that the magnet coils 28 will be energized attracting armature lever 30, breaking the mo-

tor circuit when all the instruments or armature levers 4 of the various branches contact with either of the contacts 12, 13, before or after signal transmission.

The circuit of magnet coils 28, is as follows:—from the main feed wire 19, through wire 25, contact bar 11, through armature lever 4 of branch 3, through wire 24, contact bar 11 and armature lever 4 of branch 2, thence through wire 23, contact bar 11, armature lever 4 of branch 1, through the wire 27, magnet coils 28, wire 26 to the main feed wire 18. When one of the magnet coils 5 of the various branches becomes deënergized, for instance, say branch 1, the armature lever 4 of said branch will be retracted, breaking the circuit to the magnet coils 28 between the contact point 13 of the contact bar 11 and the armature lever 4. After the signal has been transmitted and the armature lever 4 permitted to retract its limit of movement, the armature lever 4 of said branch 1 will then be brought into contact with the contact point 12 of the contact bar 11, again closing the circuit to the magnet coils 28, attracting armature lever 30, shutting off the motive power if the remaining branches of the series are in normal condition. Should one or more of the remaining branches of the system be broken, the magnet coils 28 would remain deënergized until all the signals had been transmitted and the various armature levers 4 brought into contact with the contact points 12. The armature levers of the series must be in contact with either one of the contact points 12 and 13 in their respective branches before the magnet coils 28 can be energized. Therefore, as long as magnet coils 28 are deënergized the motor circuit will be completed, operating the motor, and rotating the transmitting shaft 9 for signal transmission and circuit control.

A signal transmitting operation is effected as follows:—Assuming that branch 1 was broken, the magnet coils 5 of said branch would become deënergized, permitting the armature lever 4 to be retracted, which movement would cause the spring controlled pin 7 to engage with the periphery of the guide wheel 8, such action of the armature lever 4, as before described, would start the motor, thereby revolving shaft 9. The pin 7 will ride on the periphery of said guide wheel 8 until it alines with the bore 37, dropping into the groove 38, which would permit the armature lever 4 to descend the depth of the spiral groove 38, and travel therein, and which descent would complete the partial circuits for signal transmission and lock out mechanism, hereinafter to be described. The circuits thus controlled would remain in such completed condition until the pin 7 reached its limits of travel within the spiral groove 38, permitting the armature lever 4 to be further retracted by the spring 6, which further descent of armature lever would break the circuits and close the main transmitting line and place the armature lever 4 in such position as to energize magnet coils 28, cutting off the motive power.

In order to prevent more than one of the pins 7 of the various branches to drop into the groove of its respective guide wheel at a single instance, the guide wheels are set upon the shaft with the bores or slots 37 staggered or set in advance of each other, thereby permitting but one pin 7 of a given branch to drop into the groove of its guide wheel, which action would immediately complete a circuit for locking the various armature levers 4 of such broken branches against further descent, thereby preventing the pins of such remaining broken branches from dropping into their respective guide grooves and causing them to rest on the periphery of their respective guide wheels until the first signal transmitting operation has been completed. After which the lock of the various armature levers will be released, permitting a second armature lever 4 to engage with the groove of its respective guide wheel, which action would instantly lock such other released armature levers 4 against movement. The circuits and control of the lock mechanism, are as follows:—The magnet coils 16, when energized, attract the lock armature levers 14 of a system. They, as illustrated, are wired in series with each other throughout the branches, and in such a manner, that when the lock circuit controlled by any one of the armature levers 4 of the various branches, is completed, all of the magnet coils 16 throughout the system will become energized attracting their respective lock armature levers 14. This action will lock all of the released armature levers 4 from further descent, excepting one which has engaged the groove of its guide wheel 8, closing the lock circuit, in which position the rear end of the armature lever will have passed beyond the locking point of the armature lever 14. Nor will any locking engagement be effected after the armature lever 4 has passed out of groove engagement with its guide wheel 8. In other words, the armature levers 4 are only locked against moving to a circuit closing position during the transmission of a signal.

38ª represents a wire connecting one pole of the magnet coils 16 in branch 1 with one pole of the magnet coils 16 in branch 2. 39 represents a wire connecting the opposite pole of the magnet coils 16 in branch 2 with one pole of the magnet coils 16 in branch 3. 40 represents a wire connecting the opposite pole of magnet coils 16 in branch 3 with the main feed wire 19.

41 represents a feed wire connected with the main feed wire 18, and carried forward

with branch connections 42 to each of the armature levers 4 throughout the series.

43 represents contact points, adapted to be engaged by the armature levers 4.

44 represents a wire in connection with said contact points 43 at one end and leading to one pole of the magnet coils 16 in branch 1. Similar wires 44, being in connection with similar contact points 43 throughout the series, all leading to the same pole of magnet coils 16 in branch 1, by which arrangement the circuit will be completed to all of the magnet coils 16 of the series or system as soon as one of the armature levers 4 comes in contact with its respective contact points 43. Such armature lever 4, as before described, can only come into engagement with its respective contact point 43 after the spring controlled pin of such armature lever is engaged into the spiral groove of its guide wheel. Therefore, as before stated, the initial points of pin entry being set in advance of each other, but one can enter at a time, which entry of any single one would instantly lock the remainder released armature levers 4 against entry until such given instrument has performed its signal operation.

As illustrated, two signal circuits are employed, a closed and open, or ground. It is very desirable to have the closed signal transmitting circuit under test condition at all times. This has heretofore been accomplished, but only in connection with the transmitting instrument, but with my system I maintain the line in test condition with each branch at the point of break. The advantage of this is that should the branch be broken and the transmitting instrument fail to operate, the central or receiving station would immediately know through the operation of its receiver that the line was open and in trouble; and I regard it as essential to provide a signal system and instruments in which the transmitting lines can be maintained in such test condition directly with the controllers and independent of the transmitting devices. This is accomplished as follows:—45 represents the central or receiving station equipped with well-known single receiving instruments, etc. 46 represents a wire leading from said central station to the switch of branch 1. 47 represents a wire leading from the controller of branch 1 to the controller of branch 2. 48 represents a wire leading from the controller of branch 2 to the controller of branch 3, and so on throughout the system, according to the number of branches employed. 49 represents a wire leading from the last branch controller of the series to the central or receiving office. Thus when any one of the branches are broken the same will be indicated at the central office as a broken line. 50 represents a wire connecting with wire 49, and provided with branch connections 50^a, to each of the armature levers 4, completing a partial circuit from the central station 45 to and with the armature levers 4 of the series. 51 represents a wire leading to one of the brushes of the transmitting wheel 10. 52 represents a wire leading from the second transmitting wheel brush to the wire 46. The wires 52 of the branches 2, 3, likewise lead to wire 46, the same construction of wiring is carried out for any number of branches employed. Consequently should any one of the branches be broken or any number of them at a single instance, the first armature lever 4 moving to its circuit closing position would immediately lock the remainder of the armature levers 4 of the series and complete the transmitting circuit between wire 50^a and 51.

For convenience of illustration, say the branch and switch 1 is broken, and the armature lever has dropped to its circuit closing position, the closed transmitting circuit would be as follows:—from the central station through wire 49, wire 50, 50^a, 51, through the signal transmitting brushes and transmitting wheel, wires 52 and 46 to the central station. And the make and break caused by the transmitting wheel would transmit such signal to the central station.

In order to restore the main transmitting line to its closed circuit after one or more signals have been transmitted, and during the period in which such branch switch remains broken, the main is shunted around such broken branch switches, as follows:—53 represents a wire connected to the wire 47 at one end and leading to a contact 54 at its opposite end. 55 represents a wire leading from contact 56 at one end to the wire 46 at its opposite end, these wires 53 and 55 are connected throughout the series to the wires connecting the several branches in series with the transmitting circuit. Therefore, when the armature lever 4 of a given branch has completed its signal operation it will descend sufficiently to enable the circuit to be completed between contacts 54 and 56, completing the partial circuit the same as closing the controller of such given branch, but such closing of circuit at such point would not be complete nor desired to be complete, unless the remaining branches are in normal condition or after all signals have been transmitted.

It is obvious that the wiring shown and described may be changed without affecting my invention, and I do not wish to be limited to such specific wiring, further than mention is made of it in the claims.

It is also obvious that by closing or restoring any of the branches in their normal position that the magnet coils 5 will become energized, likewise restoring the armature levers 4 and mechanism to its normal posi-

tion automatically, thereby placing the system in condition for a second operation automatically.

Further, it is also obvious that the guiding wheel 8 can be so arranged as to permit of a predetermined idle rotation prior to an engagement of the armature pin 7 into the grooves or into a position of signal transmission; thus should any one of a particular branch be broken and instantly restored a signal operation would not be effected.

The open or ground transmitting circuit is arranged, as follows:—60 represents a grounded wire leading to the armature lever 4 of each of the branches. 61 represents a wire in connection with the break or transmitting wheel. When an armature lever is in its circuit closing position, the circuit is maintained from the central station 45, through wires 46, 52, break wheel 10, wires 61, 60, and through ground back to central station.

It has been found in practical operation of my invention that it is impossible to disturb an alarm while the same is being transmitted by throwing the controller to normal position. For during a signal transmission the lock armature levers 14 are moved and held in their locking position, thereby it will be impossible for the armature lever 4, which has assumed a position for signal transmission, to be thrown back to release the locks for the reason that the armature lever 4 will rest on top of the armature lever 14. It is absolutely necessary for the armature lever 4 to move to its third or releasing position before it can be thrown to normal position. Therefore it will be impossible at the central station to receive a partial signal.

Having described my invention, I claim:—

1. In an alarm system, one or more controllers of a system under supervision, signal circuit controlling mechanism set into operation upon the abnormal condition of a controller, an alarm circuit, signal transmitter mechanism for indicating a signal, set into operation upon abnormal condition of a controller, and means for automatically effecting step movements of the circuit controlling mechanism for throwing said signal transmitter mechanism into and out of circuit with said alarm circuit for transmitting a signal, substantially as described.

2. In an alarm system, one or more controllers of a system under supervision, an alarm circuit, circuit controlling mechanism set into operation upon abnormal condition of one or more controllers, a motive power, signal transmitter mechanism operated by said motive power for indicating a signal for each controller, and means for causing step movements of the circuit controlling mechanism for first, setting said motive power into commission, second, throwing the signal transmitter mechanism into circuit with the alarm circuit, and third, cutting off the motive power after signal indication, substantially as described.

3. In an alarm signal system, a series of controllers of a system under supervision, an alarm circuit, circuit controlling mechanism for each controller set into operation upon abnormal condition of its controller, a motive power, signal transmitter mechanism for indicating an independent signal for each controller, means for automatically locking said circuit controlling mechanism of one or more controllers against operation during a signal transmission of one of them, means for causing step movements of the circuit controller mechanism for first, setting the motive power into commission, second, throwing the signal transmitter mechanism of a given controller into circuit with said alarm circuit, and simultaneously completing a circuit for operating the locking means of the remainder of the series, and third, cutting off the motive power after a signal has been transmitted for each abnormal controller, substantially as described.

4. In an alarm system, one or more controllers of a system under supervision, alarm signal mechanism for each controller and in circuit therewith, means for setting said signal mechanism into operation after the circuit with one or more of said controllers has been broken, means for automatically serially effecting a signal transmission of independent signals when more than one controller is broken, means for cutting off said motive power automatically after a signal transmission, and means for automatically restoring the mechanism to normal position upon restoration of the controller to normal condition, substantially as described.

5. In an alarm signal system, one or more controllers of a system under supervision, alarm signal mechanism for each controller and in circuit therewith, means for setting said signal mechanism into operation after the circuit with one or more of said controllers has been broken, means for automatically serially effecting a signal transmission for each broken controller, means for locking the signal indicating mechanism of such broken controllers during the signal transmission of one of them, means for cutting off said motive power automatically after the signal transmission, and means for automatically restoring the mechanism to normal position upon restoration of the controllers to normal condition, substantially as described.

6. In an alarm signal system, one or more controllers of a system under supervision, an alarm circuit, an alarm signal circuit controlling mechanism in circuit with said controllers, alarm indicating means, and means for maintaining said alarm signal circuit controlling mechanism in a circuit closing

position for completing the alarm circuit with the alarm indicating means after one or more of said controllers occupy an abnormal position and during a signal transmission, and means for automatically restoring the parts to normal position upon restoration of the controllers to normal condition, substantially as described.

7. In an alarm signal system, one or more controllers of a system under supervision, an alarm circuit, alarm signal circuit controlling mechanism in circuit with said controllers, means for maintaining said alarm signal circuit mechanism in transmission condition after one or more of said controllers occupy an abnormal position and during a signal transmission, alarm signal indicating mechanism for indicating an independent signal for each controller, motive power for operating said alarm signal indicating mechanism, and means for throwing said motive power into commission after one or more of the controllers assume abnormal positions, and for constantly maintaining it in such commission until the signal of each abnormal controller has been indicated, substantially as described.

8. In an alarm signal system, one or more controllers of a system under supervision, an alarm circuit, a supervisory station in connection with said alarm circuit, said alarm circuit being maintained under test condition direct and independent of the signal alarm mechanism between said controller or controllers and supervisory station while the controllers are in normal condition, alarm signal circuit controlling mechanism in circuit with said controllers, means for maintaining said alarm signal circuit mechanism in transmission condition after one or more of said controllers occupy an abnormal position and during signal transmission, alarm signal mechanism for indicating an independent signal for each abnormal controller, motive power for operating said signal indicating mechanism, and means for throwing said motive power into commission after one or more of the controllers assume abnormal position and out of commission after the signals have been transmitted, substantially as described.

9. In an alarm signal system, one or more controllers of a system under supervision, an alarm circuit, independent alarm signal circuit controlling mechanisms for each controller and in circuit therewith, means for maintaining said alarm signal circuit mechanisms automatically serially in transmission condition after any number of said controllers occupy an abnormal position and during a signal transmission, independent alarm signal indicator mechanism for each controller, motive power for operating said alarm signal indicator mechanism, and means for throwing said motive power into commission after one or more of the controllers assume abnormal positions and out of commission after the signals have been transmitted, substantially as described.

10. In an alarm signal system, one or more controllers of a system under supervision, an alarm circuit in connection with said controllers, a supervisory station in connection with said alarm circuit, said alarm circuit being maintained under test condition, direct between said controllers and supervisory station while the controllers are in normal condition, independent alarm signal circuit controlling mechanisms for each controller and in circuit therewith, means for maintaining said alarm signal circuit mechanism serially in transmission condition after one or more of said controllers occupy an abnormal position and during a signal transmission, independent alarm signal indicating mechanism for each controller, motive power for operating said alarm signal indicating mechanism, and means for throwing said motive power into commission after one or more of the controllers assume abnormal positions, and out of commission after the signals have been transmitted, and means for maintaining said alarm circuit under test conditions through the signal circuit controlling mechanism after signal transmission, substantially as described.

11. In an alarm signal system, one or more controllers of a system, alarm signal indicating mechanism for each controller, a single motive power for the combined alarm signal indicating mechanisms of the series, means for setting said motive power into operation under abnormal conditions of one or more of said controllers for signal transmission, and means for automatically serially transmitting independent signals when any number of controllers assume abnormal condition, substantially as described.

12. In an alarm signal system, one or more controllers of a system, alarm signal indicating mechanism for each controller, a single motive power for the combined alarm signal indicating mechanisms of the series, means for setting said motive power into operation under abnormal conditions of one or more of said controllers for signal transmission, means for automatically serially transmitting independent signals when any number of controllers assume abnormal condition, and means for automatically throwing said motive power out of commission after signal transmission, substantially as described.

13. In an alarm signal system, one or more controllers of a system under supervision, an alarm signal indicating mechanism for transmitting distinguishable signals for each controller, an alarm signal circuit, alarm circuit controlling mechanism for each controller, alarm indicating mechanism, a sin-

gle motive power for a given series of alarm signal indicating mechanisms, means for setting said motive power into operation under abnormal conditions of one or more of said controllers of said series for signal transmission, means for throwing said signal mechanisms serially into circuit closing operation during the abnormal condition of its controller, locking means for locking said signal circuit mechanisms of said given series and any number of series out of commission during the signal transmission of one of them, and means for automatically throwing said motive power of said given series out of commission after a signal transmission, substantially as described.

14. In an alarm signal system, one or more controllers of a system under supervision, an alarm signal indicating mechanism for each controller, an alarm signal circuit, a supervisory station, and means for maintaining said alarm circuit under test condition direct between the controllers and supervisory station while the controllers are in normal position, alarm circuit controlling mechanism for each alarm indicating mechanism in circuit with its controller, motive power for said alarm signal indicating mechanism, means for setting said motive power into operation under abnormal conditions of one or more of said controllers for signal transmission, means for throwing said signal indicating mechanism serially into circuit closing operation during abnormal condition of its controller, locking means for locking said signal circuit mechanisms of the series out of commission during the signal transmission of one of them, means for automatically throwing said motive power out of commission after signal transmission, and means whereby said alarm circuit is maintained through said alarm circuit controlling mechanism during abnormal condition of its controllers, substantially as described.

15. In an alarm signal system, one or more controllers of a system under supervision, an alarm signal transmission mechanism for each controller, an alarm signal circuit, alarm circuit controlling mechanism for each controller, motive power for said alarm signal indicator mechanism, means for setting said motive power into operation under abnormal conditions of one or more of said controllers for signal transmission, means for throwing said signal circuit mechanism of each controller serially into circuit closing operation during abnormal condition of the controllers for automatically indicating independent signals of the abnormal controllers, locking means for locking said signal circuit mechanisms of the series out of commission during the signal transmission of one of them, means for automatically throwing said motive power out of commission after signal transmission, and means for automatically restoring the parts to normal position upon restoration of the controllers to normal condition, substantially as described.

16. In an alarm system, one or more controllers of a system under supervision, an alarm circuit maintained under test condition with said controllers in normal condition thereof, and means governed by the abnormal conditions of the controllers for automatically serially transmitting an independent signal for each abnormal controller, and maintaining the alarm circuit in transmitting and under test condition during abnormal condition of the controllers through the alarm mechanism, and restoring the parts to normal position upon restoration of the controllers to normal condition, substantially as described.

17. In a transmitter device for transmitting alarms, alarm indicating mechanism, an armature lever for controlling a series of circuits, motive power, and means for controlling said armature lever in step like action for automatically controlling the motive power for starting and stopping the same, substantially as described.

18. In an alarm system, a series of lock circuit controlling levers, a lock lever and controlling magnet, for each circuit controlling lever adapted to be simultaneously actuated upon the closing of the lock circuit, said circuit controlling levers being adapted to close the lock circuit after they have moved beyond engagement of lock levers, and means for governing an independent movement of said lock circuit controlling levers for preventing two or more levers moving to circuit closing position simultaneously, substantially as described.

19. In an alarm system, one or more controllers of a system under supervision, alarm signal mechanism for each controller and in circuit therewith, means for setting said signal mechanism into operation after the circuit with one or more of said controllers has been broken, means for automatically serially effecting a signal transmission of independent signals when more than one controller is broken, and means for automatically restoring the mechanism to normal position upon restoration of the controller to normal position, substantially as described.

20. In an alarm system, one or more controllers of a system under supervision, independent alarm signal mechanism for each controller, means governed by the abnormal conditions of the controllers for automatically transmitting an independent signal for each controller, locking out the transmission of a signal or signals of abnormal controllers during the transmission of one of them.

21. In an alarm system, one or more con-

trollers, of a system under supervision, alarm signal mechanism, means for setting said alarm signal mechanism into operation after one or more of said controllers become abnormal, means for automatically, serially effecting a signal transmission of independent signals for each abnormal controller.

22. In an alarm system, one or more controllers of a system under supervision, an alarm circuit maintained under test condition with said controllers in normal condition thereof, and means governed by the abnormal conditions of the controllers for automatically, serially transmitting an independent signal for each abnormal controller, and maintaining the alarm circuit in transmitting and under test condition during the abnormal condition of the controllers.

In testimony whereof, I have hereunto set my hand.

OLIVER B. KAISER.

Witnesses:

LUISE BECK,

ARTHUR PAULHABER.