May 3, 1949. R. A. SEARS 2,469,278

TELEPHONE ALARM SYSTEM

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FIG. 1.

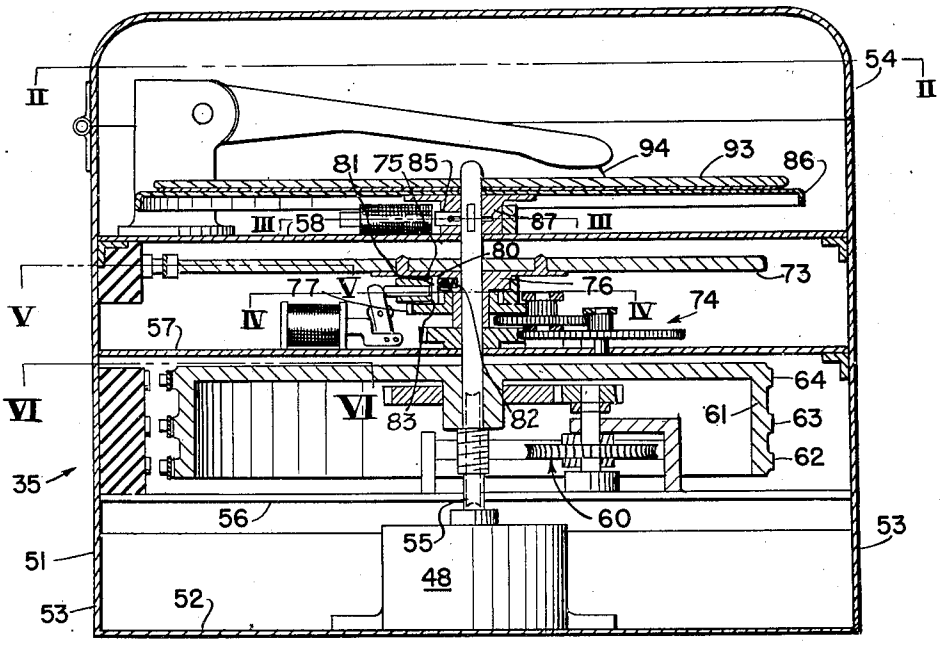


FIG. 2.

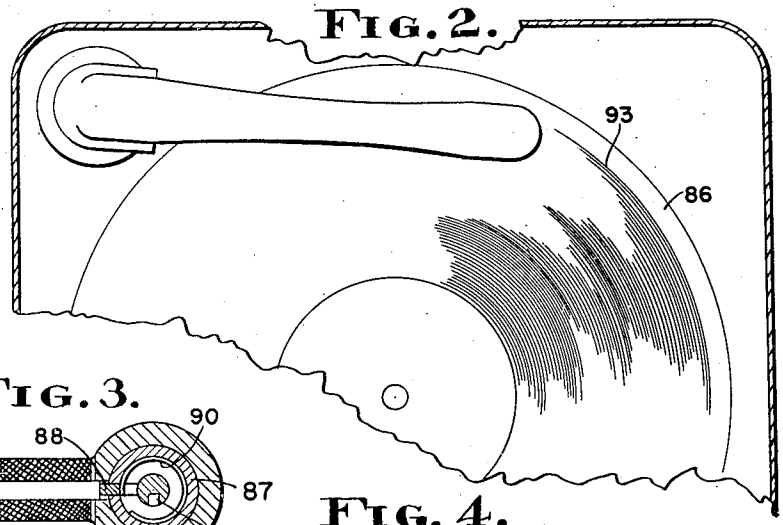
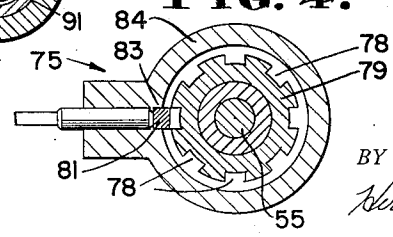


FIG. 3.

FIG. 4.



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FIG. 7.

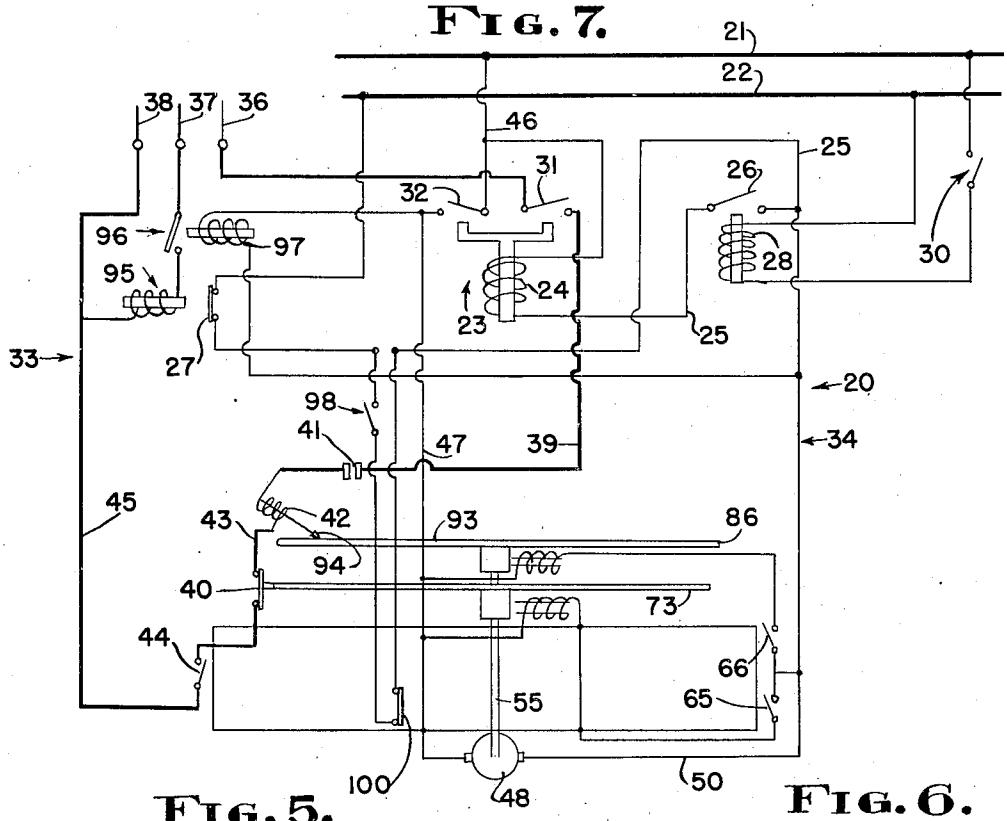


FIG. 5.

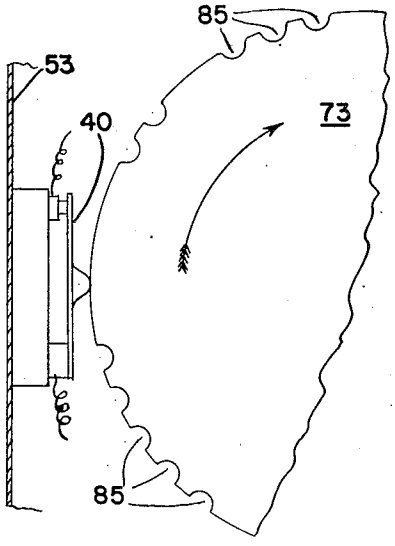
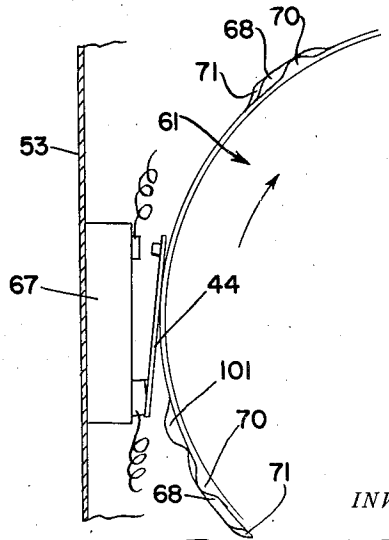


FIG. 6.



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TELEPHONE ALARM SYSTEM

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8 Claims. (Cl. 179—5)

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This invention relates generally to indicating systems and is particularly directed to a system by which the protective branches of local governments may be utilized to a greater advantage in the preservation of life and property.

One object of the present invention resides in providing an indicating system which will automatically notify one or more members of a protective branch of the local government of the existence of an emergency in a region served by the indicating system to the end that the emergency may be quickly and efficiently attended to in the proper manner to remedy the situation.

Another object of the invention resides in providing an indicating system which may be connected in a conventional telephone circuit to utilize such circuit, in the event an emergency arises, to notify the proper authorities in a quick, expeditious manner and without the attention of an operator.

A further object of the invention is to provide an indicating system for use in a house or other buiding to notify the police that a burglary is being committed or that some other emergency exists, the system having an electrical circuit including a trip switch arranged to be actuated by an intruder or by an unusual condition, to close the circuit; means for initiating a telephone call to the proper authorities and informing them of the emergency; means for causing the repetition of the call a suitable number of times to offset the possibility of the failure of one or more calls to be completed due to the telephone number called being busy, and switch means for interrupting the circuit after a call has been completed.

A still further object of the invention is to provide a mechanism including a driving motor, a plurality of switches operating in timed sequence by such motor, one of the switches serving to connect an electric circuit which forms a part of the mechanism, with a telephone line, a second switch being operative to interrupt the circuit to effect the dialing of a number, a third switch serving to initiate the operation of a sound reproducing mechanism which transmits a message over the telephone line to the number previously dialed, other switches and mechanism causing the series of operations to be repeated a predetermined number of times and then be discontinued.

Another object of the invention is to provide a warning circuit containing a relay, a trip switch of any suitable type for connecting the relay to a source of electric current, an electric

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motor which is supplied with current when the relay is connected with the current source, a telephone circuit also completed when the relay is actuated, the telephone circuit containing a pickup unit for transmitting a message from a record to the telephone circuit, a dialing switch which is operative to transmit impulses to the telephone circuit to place a call for a particular station and a switch in the ringing section of the telephone circuit which operates to interrupt or break the warning circuit after it has once been placed in operation.

Other objects and advantages will be apparent from the following description and the accompanying drawings in which one embodiment of the invention has been illustrated in detail, it being understood at this time that the form of the invention selected is for illustration only and not for limiting the invention.

In the drawings:

Fig. 1 is a vertical sectional view of one form of mechanism which may be employed to carry out the present invention;

Fig. 2 is a fragmentary horizontal sectional view taken through the mechanism on the plane indicated by the line II—II of Fig. 1;

Figs. 3, 4, 5, and 6 are detail horizontal sectional views taken through the mechanism shown in Fig. 1 on the planes indicated by the lines III—III, IV—IV, V—V and VI—VI, respectively, of Fig. 1;

Fig. 7 is a diagrammatic view of circuits employed in carrying out the present invention.

Referring more particularly to the drawings and particularly Fig. 7, the numeral **20** designates the completed circuit in its entirety. This circuit is connected with conventional electrical supply lines **21** and **22**; it includes a relay **23** having an operating coil **24** connected at one side directly with one of the supply lines and at the other with the second supply line through a line **25** containing a pair of switches **26** and **27**. Switch **27** is a normally closed type and its purpose will be set forth later in the description. Switch **26** is an electro-magnetically operated one having an actuating coil **28** disposed in a circuit branch containing a trip switch **30** which may be of any suitable type, a photoelectric switch being one example. The switch **30** when of the photo-electric type includes a photo-electric cell which is disposed in the path of a light beam and controls the opening and closing operations of an electric switch. As long as the light beam impinges upon the cell the switch will re-

main open, when the light beam is interrupted in any manner the switch will close and remain closed even though the beam was only temporarily interrupted. It will be seen that the switch **30** may be located remotely from the mechanism **35** controlled thereby. For example it may be placed in a doorway or a plurality of switches may be arranged at window openings. Such switches might also be arranged in the duct of an air conditioning system and adjusted so as to be sensitive to smoke thus making the device function as a fire as well as a burglar alarm. When the switch is arranged on one side of a space and the source of the light beam on the other any object passing through the light beam will interrupt it and cause the closing of the switch to initiate the operation of the mechanism. The switch **30** may be any of a number of commercial types now available on the open market the switch, per se, forming no part of the present invention. Switch **30** is such that it will remain closed after having been once tripped even though the person, thing or condition causing it to be tripped has moved away or been changed. When switch **30** has been closed, electric current is supplied to coil **28** causing switch **26** to close and provide for current flow to coil **24** of the relay. When this coil **24** is energized, each of a pair of switch arms **31** and **32** are moved to circuit completing positions.

The circuit **20** includes two sections, one, the telephone section **33**, shown by the heavy lines, and the other, the power section **34**, shown by the lighter lines, for operating a mechanism **35**, shown in Fig. 1, used to control the telephone circuit and send messages thereover.

The telephone section **33** of the circuit includes three terminals **36**, **37** and **38** which connect the section with the conventional telephone system. Terminal **36** is connected with the switch **31** of relay **23** which switch is moved to a circuit closing position when the coil **24** is energized. A line **39** leads from the switch **31** to a normally closed switch **40**, the line **39** containing a fixed resistance element **41** and an electrical pickup device **42**. Line **43** extends from switch **40** to a normally open switch **44** which in turn is connected by a line **45** with terminal **37**.

When coil **24** is energized, the switch **32** is also moved to circuit-closing position. This switch **32** controls the power section of the circuit **20**; it is connected with one of the power supply lines **21** by a line **46**. It is also connected by a line **47** with a synchronous motor **48** which is in turn connected by line **50** with line **25** which contains switch **27** and is connected with power supply line **22** to complete the circuit for the motor **48**. This motor drives the mechanism **35**.

The mechanism **35** which has been shown in Figs. 1 to 6 as one example only of mechanism for utilizing the circuit comprising the present invention, includes a casing **51** having a bottom wall **52**, side walls **53** and a hinged top **54**. Wall **52** receives and supports the motor **48** which may be of any suitable type having a vertically extending armature shaft **55** caused to rotate, when the motor is energized, at a desired speed which in this instance is 78 R. P. M. Side walls **53** support a plurality of horizontal partitions **56**, **57** and **58** through which the shaft **55** extends. The first partition **56** supports a gear train **60** which serves to reduce the speed and transmit rotary motion from the shaft **55** to a drum **61** journalled for rotation on the shaft **55**. The gear

train selected reduces the speed of rotation to cause the drum to revolve at the rate of $\frac{1}{10}$ R. P. M.

Drum **61** is provided with vertically spaced cam tracks **62**, **63** and **64** which are disposed in registration with three switches one of which is switch **44** and the others being designated by numerals **65** and **66**. These switches are supported by a dielectric block **67** mounted on one of the side walls **53**. Cam tracks **62**, **63** and **64** are provided with spaced, switch actuating humps **68**, **70** and **71** of different shapes designed and located to actuate the respective switches **44**, **65** and **66** in certain sequence. The cam tracks are provided with three sets of these humps in the form of the invention shown so that the cycle of operations controlled thereby may be repeated at desired intervals of time.

Humps **68** are arranged to actuate switch **44**, moving the same to circuit-closing position and maintaining such position for a predetermined length of time. Since switch **44** is in the telephone section of the circuit, this section will be completed after the relay has been energized and motor **48** revolves the drum **61** far enough to cause the hump **68** to engage and move switch **44** to the circuit-closing position. It will be maintained in completed condition until the hump **68** has moved beyond the switch.

Humps **70** are arranged to engage and close switch **65** which switch controls the operation of a dialing disk **73**. Disk **73** is also journalled for rotation about the axis of shaft **55**, being driven therefrom by a second gear train **74**. This gearing reduces the speed to the rate desired for disk **73**. Since disk **73** is only rotated once for each cycle of operation of the device, a magnetically actuated clutch **75** is employed between the disk and the gear train **74** to discontinue the driving operation of the disk after one complete revolution thereof.

Clutch **75** includes a hub **76** which is secured to the disk **73** and a gear **77** disposed for rotation about the axis of shaft **55**. Gear **77** has a plurality of keyways **78** and hub **76** has a single keyway **80** in which key **81** is disposed, this key being urged outwardly by a suitable spring **82** into a keyway **83** formed in a collar **84** surrounding the hub **76** and the keyway-carrying part of the gear **77**. When the key **81** is in the keyway **83** of the collar **84** the hub and consequently the disk **73** will be held in stationary relation. Since the collar is fixed, the disk will be stopped and held at the same place between successive revolutions. To cause the rotation of the disk **73** the key **81** is urged inwardly into the keyway **80** and one of the keyways **78**. When so positioned, gear **77** will be keyed to hub **76** and rotation of shaft **55** will cause the disk **73** to revolve. The ratio of the gear train **74** is such as to reduce the rate of revolution from 78 R. P. M. on the part of shaft **55** to 2 R. P. M. on the part of disk **73**, the latter rate being selected to cause spaced notches **85** in the periphery of disk **73** to pass a given point at a predetermined number per second.

Notches **85** are employed to effect the opening and closing movements of switch **40** when disk **73** is revolved. These notches **85** are spaced and grouped to conform to selected telephone numbers, sufficient notches to represent one complete number only being formed on each disk. Only one disk **73** is employed in each mechanism **35**. When the disk **73** makes one revolution, switch **40** will be opened and closed a sufficient number of times and at the proper rate to send impulses

over the telephone line in groups conforming in number and frequency to the notches in disk 73 previously selected to represent a desired telephone number. Due to the impulses, the telephone represented by such number will be connected with the circuit section 33 by the usual mechanism in the central exchange and the call signal of such telephone energized in the usual manner. After the dialing disk 73 has completed its revolution, spring 82 will move key 81 outwardly until gear 77 is released from hub 76 and key 81 has entered the keyway 83 in collar 84. At this time disk 73 will be restrained against further rotation.

Immediately upon the completion of a revolution by disk 73, hump 71 will move switch 66 to a circuit-closing position. This switch 66 controls the operation of a second magnetically operated clutch 85, this clutch serving to connect a turntable 86 directly to and disconnect the same from the shaft 55. Clutch 85 is shown in section in Fig. 3; it includes a hub 87 which is suitably secured to the turntable 86, a key 88 and a spring 90 employed to urge the key outwardly from a keyway 91 formed in the shaft 55. The clutch also includes a solenoid 92 the core of which is employed to move and retain the key 88 in the keyway 91 to effect the rotation of the turntable 86. The rate of 78 R. P. M. has been selected because it has been the most desirable for record reproduction. Turntable 86 receives a record disk 93 on which is recorded a suitable warning message. This record disk is engaged by the stylus 94 of the pickup unit 42. As the turntable revolves, the message will be transmitted to the telephone section of the circuit in the form of impulses in the usual manner. If the telephone station called has answered, the message will be received just as though it had been transmitted by an individual. If such station did not answer or if the line was busy at the time the number was first dialed, the cycle of operation will be repeated. To cause the automatic repetition of the cycle, the drum 61, or the cam tracks thereon are provided with three sets of humps 68, 70 and 71 as above described. These sets of humps are uniformly spaced around the drum 61. Since this drum is revolved at the rate of $\frac{1}{15}$ R. P. M., three cycles of operation of the mechanism spaced at three minute intervals will occur unless the operation of the mechanism is sooner terminated.

Provisions have been made to effect the termination of the operation of the mechanism after a call is completed. These provisions include the switch 27 which is disposed in the holding circuit for the relay 23. They further include an electromagnet 95 the coil of which is connected in the ground or ringing circuit of the section 33. The message on the record disk 93 may be concluded with instructions to the person receiving the same to dial the number of the place where the alarm system is located. When this number is called, the impulses which would ordinarily cause the energization of the signal will energize the coil of the electromagnet 94 causing the opening of switch 27. The relay coil 24 will then be deenergized permitting switches 31 and 32 to open and place the mechanism in condition for a subsequent operation. Electromagnet 95 is connected in the ringing circuit by another electromagnetic switch 96 the coil 97 of which is connected with lines 50 and 47 so that when switch 32 is closed it will be energized to hold switch 96 closed. This arrangement prevents an incoming call from disconnecting the warning system in the event such a call should come in before the system is operated.

In the event the number called by the device does not respond the cycles will be repeated until the mechanism is disconnected from the power supply lines 21 and 22. This action may be accomplished either manually or automatically as desired through the operation of one or the other of suitable switches 98 and 100. The latter switch may be operated by another hump 101 on drum 61 or by any suitable time controlled device.

From the foregoing it will be seen that there has been provided an alarm system which will without the attention of an operator effectively transmit a message to a station over the telephone to warn the recipient of the message of the existence of an emergency in the region served by the system. The apparatus employed to effect these ends is compact, requires a minimum of service, is quiet in operation in order to avoid attracting the attention of the intruder when used to warn of an intrusion and will not have any deleterious effects on the telephone circuit with which it is connected. It will increase the effectiveness of the protective branches of the local governments and render the apprehension of criminals or housebreakers more probable.

While the invention has been shown and described in only one form it is obvious that many minor changes may be made in the construction and arrangement of parts without departing from the spirit and scope of the invention as defined in the appended claims.

What is claimed is:

1. An alarm system comprising a circuit having a power section and a telephone section; a relay with a pair of switches, one of said switches being disposed in said telephone section and the other in said power section; a trip switch operative to actuate said relay to close said switches when a predetermined condition exists in the region served by the system; a dialing switch in the telephone section; record reproducing means having a pickup device connected in said telephone section; means for actuating said dialing switch and record reproducing means in timed sequence; means operated by an incoming signal on said telephone section to interrupt the operation of said alarm system; and means in said power section for rendering said interrupting means effective only when said relay switches are closed.

2. An alarm system comprising a circuit having a telephone section and a power section; switch means for controlling said sections; means responsive to the existence of a predetermined condition in the region served by the system to effect the closing of said switch means; means connected in the telephone section for dialing a selected telephone number; record reproducing means having a pickup device connected in said telephone section; motor driven means for effecting the operation of said dialing means and the record reproducing means in the order named; means in the telephone section operated by an incoming signal for interrupting the operation of said system; and means operative when said system is operative to place said interrupting means in condition for operation.

3. An alarm system comprising a circuit having a telephone section and a power section; a relay having a switch in said telephone branch and a switch in said power branch; a trip switch for energizing said relay to close said switches upon the existence of a predetermined condition in the region served by said alarm system; a driving

motor in said power circuit, said driving motor being energized when the relay switches are closed; cam means operated by said driving motor; a plurality of switch elements disposed for actuation by said cam means, one of said switch elements being arranged in the telephone section of said circuit; a normally closed switch in said telephone section; means for opening and closing said normally closed switch a plurality of times; electric clutch means for establishing a driving connection between said last-named means and said motor, said clutch being controlled by one of said cam operated switches; a message reproducer having an electrical pickup device connected in said telephone section; a second electric clutch means for establishing a driving connection between said message reproducer and said driving motor, said second clutch being controlled by another of said cam operated switches; and an electro-responsive switch in said power section responsive to an incoming signal on said telephone section to interrupt the operation of the system.

4. An alarm system comprising a circuit having a telephone section and a power section; a relay in said circuit, said relay having a switch in said telephone section and a second switch in said power section; a trip switch for controlling said relay and effecting the closing of said pair of switches upon the existence of a predetermined condition in the region served by the system; a dialing switch in the telephone section; a message reproducer in said telephone section; switch means in the power section for controlling the operation of said dialing switch and message reproducer; and motor driven cam means for effecting sequential operation of said last-named switch means.

5. An alarm system comprising a signal circuit formed for connection to the two outside lines of a conventional three wire telephone circuit; a first normally-open switch; a pickup device having a record contacting device; a normally closed switch; a second normally-open switch, said switches and pickup device being connected in series in the order named in said signal circuit; a power circuit; a motor in said power circuit; a normally-open switch in said power circuit; electro-responsive means for closing the first normally-open switch in said signal circuit and the normally-open switch in said power circuit upon the creation of a predetermined condition in the region served by said alarm system; means operated by said motor for successively closing said second normally-open switch in said signal circuit, repeatedly opening and closing said normally-closed switch a predetermined number of times and moving a record bearing member relative to the contact device of said pickup device.

6. An alarm system comprising a circuit having a telephone signal section and a power section; a relay in said circuit, said relay having a switch in said telephonic signal section and a second switch in said power section; a trip switch responsive to the occurrence of a predetermined condition in the region served by the system to

close said switches; a dialing switch in said telephonic signal system; a message reproducer connected in said telephonic signal section; means in said power section for actuating said message reproducer and said dialing switch; switch means operated by said last-named means for interrupting the operation of said system upon the completion of a predetermined number of operations of said message reproducer; and means responsive to an incoming signal on said telephonic section to interrupt the operation of the system prior to the operation of said last-mentioned switch means.

7. An alarm system comprising a circuit having a telephonic signal section and a power section; a relay in said circuit, said relay having a switch to control said telephonic section and another switch to control said power section; a trip switch for controlling the operation of said relay; a magnetic pickup reproducer connected in said telephonic signal system; a dialing switch; means for operating a record bearing member relative to said pickup and a dialing cam relative to said dialing switch; a switch operated by said last-named means to interrupt the operation of said system after the passage of a predetermined time interval; and means responsive to an incoming signal on said telephonic signal section to interrupt the operation of said system prior to the passage of such predetermined time interval.

8. An alarm system comprising a circuit having a telephonic signal section and a power section; a relay in said circuit, said relay having a pair of switches one being arranged in said telephonic signal section and the other in said power section; a pickup device and a dialing switch in said telephonic signal section; a message carrying record movable relative to said pickup device; an actuating device movable relative to said dialing switch; driving means for said record and dialing switch actuating devices; means operated by said driving means for rendering said dial switch actuating device and said message carrying record operative in such order; switch means for interrupting said driving means after a predetermined period of operation thereof; said switch means being operated by said driving means; and a second switch means for interrupting the operation of said system, said second switch means being closed when said power section is energized and opened by an incoming signal or said telephonic signal section, the second switch means being capable of operation prior to the operation of the interrupting switch which is operated by the driving means.

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