

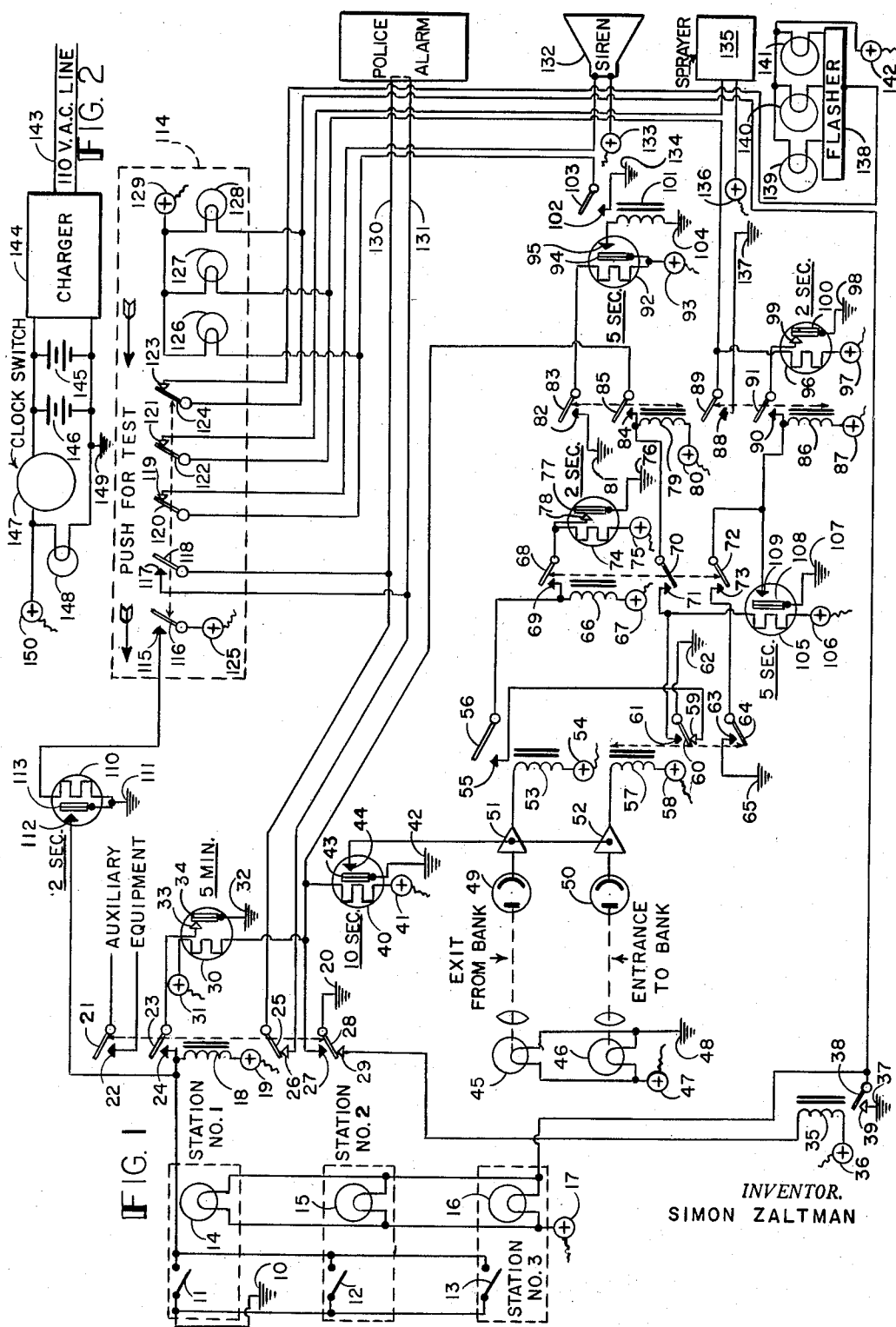
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BANK HOLDUP DETERRENT SYSTEMS

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BANK HOLDUP DETERRENT SYSTEMS

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This invention relates to holdup alarm systems and more particularly to a system that is both protective and a deterrent due to its novel construction and arrangement of parts.

Banking institutions have become the ready prey of holdup men, due to the nature of their normal operations, requiring the handling of large sums of money within view of the public.

The most common types of alarm systems now used by banks utilize instantaneous interior and exterior audible signals. These signals often alarm and excite the holdup men and involve employees and customers in hazardous situations.

A primary object of my invention is to provide a system which, when installed and duly publicized, will discourage the planning of holdups and will greatly assist in apprehending the holdup men if one should take place. The operating components are concealed, there being no visual or audible alarm signals within the bank. Only employees within the bank are alerted. Accidental operation is minimized and counteracted. The system cannot be successfully tampered with. It can be safely, readily and accurately tested without operating the actual protective components. The dual power supply is reliable and fool proof.

The public and police in the neighborhood of the bank would be alerted to the holdup by flashing lights which would also serve to warn those outside not to enter during the holdup. Mobile police units, being alerted by the blinkers or by the central police radio, would get valuable descriptive assistance upon arrival at the scene, as the dye, lights, and siren would have drawn attention to the men and their getaway car.

My system consists of one in which any employee can touch a contact button, a number of which are strategically located throughout the bank. They can be operated either by hand, body or by foot movement. These contacts can also be installed as "money traps" in the teller's trays. With the initial contact, small pilot lights, concealed at the various employees stations will immediately signal to the personnel that a holdup is in progress and the system in operation.

When contact is made, an alarm is flashed to a local police station over leased telephone wires, a battery of red blinker lights, mounted across the front of the bank exterior start flashing. These are situated in such a manner that they will not reflect back into the bank. A photoelectric infra-red beam system, located just inside the entrance or entrances, of the bank is activated, after a timed delay. As the holdup men leave the bank, their movement through the invisible infra-red beam activates a spraying device concealed inside the entrance of the bank, to suddenly discharge jets of a vivid dye upon the men. The sprayer is re-activated as each man interrupts the photoelectric beams. Five seconds after the initial dye discharge, a siren exteriorly mounted outside the bank, is sounded. This siren is set off by the first man passing through the photoelectric beam.

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Once the system is set in operation, it remains active for five minutes. The purpose of a pre-determined automatic time limit insures the fact that it can not be interrupted by the holdup men or by the bank personnel and also permits the personnel, in the event of an accidental activation, to know when normal traffic through the entrances can be resumed.

In the event of an accidental contact, the pilot lamps are illuminated at the various stations; the police are alerted and the blinkers go into operation as previously described. However, the time delay in the activation of the photoelectric circuit permits the personnel time to warn customers not to use the entrances for the prescribed five minutes. In this way, the dye and siren will not operate.

A novel arrangement of the circuits, timing, and method of activation of the photoelectric units operating in tandem prevents the activation of the dye and the siren by anyone entering the bank during a holdup. Attempts to disable the photoelectric components in my system by shutting off the second outer light beam nearer to the door will result in this case in the operation of the sprayer, the discharge of livid red dye upon the perpetrators and the operation of the siren. Another object of my system is to permit the holdup men to leave the bank premises before the siren is activated, thus giving people inside the bank further assurances of safety. The degree of flexibility of this system in both installation and operation is such that it can be adapted to premises of any size. Timing units are adjustable to the requirements of the premises concerned, and are tamper-proof.

Permanent test equipment is made a part of the system. Throwing a test switch immediately starts a duplicate five minute test period through the true operating paths of the various components, reporting by means of test lamps that they are in working order without the operation of the actual signal devices and in their proper working sequence. Immediately the test lamp for the exterior flashing lights comes on. The closed circuit to the police station remains closed. The test lamp for the sprayer comes on after ten seconds delay by the deliberate interruption of the photoelectric light beams by having someone pass through them. The test lamp for the siren comes on five seconds after the sprayer test lamp.

The entire system is automatically turned on and off, just before and after banking hours, through a clock controlled switch which may be battery operated or mechanical, the lamp mounted on a plaque being the "ready" indicator. For purposes of reliability, all equipment is primarily powered by storage batteries which are charged on a floating battery basis and maintained on a standard routine basis.

Further objects of the invention will hereinafter appear from the following description of a preferred embodiment illustrative of the invention and shown in the accompanying drawings in which,

Fig. 1 is a diagrammatic plan indicating the various protective components and their associated operating circuit layouts.

Fig. 2 is a diagrammatic plan indicating the power equipment and its associated circuit layout.

Referring to the drawings, the system therein shown, as illustrative of one embodiment of my invention comprises a multiplicity of substations, three of which are shown, each having a push button switch 11, 12 and 13. These are standard units and may consist of conventional buttons, foot or body operated rails or bars distributed in any appropriate manner and arranged in accordance with the conditions prevailing at the location to be protected. At each station there is also a pilot lamp 14, 15, or 16 which reports to the employee at that station that someone has activated the system. These combinations of

push buttons and lamps are strategically placed about the premises so that they are not readily visible to the public. The lamps are energized from the battery 17. The manual operation of any one of the contractor buttons at any station pulls up the starting gang relay 18 by completing a circuit from battery 19 to ground 10. The relay means 18 has four armatures 21, 23, 25 and 28, and five contacts 22, 24, 26, 27 and 29. Connected to armature 28 of relay 18 is a ground 20. Connected to armature 23 of relay 18 is a thermal time delay unit 30 energized by battery 31 to ground 32 through contact 33 and armature 34. Connected to contact 29 of relay 18 is a relay 35 energized by battery 36 and operating armature 38 to contact 39 to ground 37. Connected to contact 27 of relay 18 is thermal time delay unit 40 energized by battery 41 to ground 20 connecting armature 43 to contact 44 establishing a ground to 42. Contact 44 of thermal time delay unit 40 is connected to amplifiers 51 and 52 of a photoelectric detecting apparatus having a first inner infra-red light source 45 beaming to cell 49 and a second outer source 46 beaming to cell 50, the sources of light 45 and 46 being energized by battery 47 to ground 48. These beams operate in tandem to produce all the desired results. Conventional photoelectric devices are used with an infra-red exciter lamp and photoelectric cell amplifier in the output circuit of which a current is generated which is capable of actuating the associated relays. Feeding from amplifier 51 is relay 53 with energizing battery 54 connecting contact 55 and armature 56. Feeding from amplifier 52 is relay 57 having armatures 60, and 64 with contacts 59, 61, 63 and energizing battery 58. Connected to contact 63 is ground 65. Connected to contact 59 is ground 62. Connected to armature 56 is relay 66 with armatures 68, 70, 72 and contacts 69, 71, 73 and energizing battery 67. Connected to armature 68 is thermal time delay unit 74 energized by battery 75 to ground 76 through armature 77 and contact 78. Connected to armature 70 is relay 79 energized by battery 80 and having armatures 83, 85 and contacts 82, 84. Connected to contact 82 is ground 81. Connected to contact 61 of relay 57 is thermal time delay unit 105. Associated with relay 66 and thermal time delay unit 105 is a relay 86 energized by battery 87 and having contacts 88, 90 and armatures 89, 91. Connected to armature 83 is thermal time delay unit 92, energized by battery 93 and having an armature 94, contact 95 and ground 104. Connected to contact 88 of relay 86 is ground 137. Connected to armature 89 is thermal time delay unit 96, energized by battery 97 to ground 137 through 88—89 and having contact 99, armature 100 and ground 98. Connected to contact 95 is relay 101 operating to ground 104 and having contact 102 and armature 103. Connected to contact 61 of relay 57 and contact 71 of relay 66 is thermal time delay unit 105 energized by battery 106 to ground 107 having an armature 108 and contact 109. Connected to one side of the station button 11 is thermal time delay unit 110 operating to ground 111 and having contact 112 and armature 113. Test switch 114 has contacts 115, 117, 119, 121, 123 and blades 116, 118, 120, 122, 124. Blade 116 has battery 125 connected to it. Test pilot signal lamps 126 for the siren, 127 for the sprayer and 128 for the flashing lights, are energized by battery 129.

Leads 130 and 131 may complete a remote controlled closed circuit alarm to the police station.

An electrically operated exteriorly mounted siren 132 is energized by battery 133 to ground 134 through contacts 103 of relay 101.

An electrically operated sprayer 135 is energized by battery 136 to ground 137 through armature 89 of relay 86. A bank of exteriorly mounted lamps 139, 140, 141 are energized by battery 142 and caused to flash by conventional flasher 138 through armature 38 of relay 35.

Power is supplied from a 110 volt A.C. supply 143 feeding through a charger 144. Across the line are two

floating batteries 145, 146. The power circuit is activated by a clock switch 147. Pilot lamp 148 works to ground 149. The available power lead is 150.

Common with and strapped to power lead 150, are battery leads 17, 19, 31, 36, 41, 47, 54, 58, 67, 75, 80, 87, 93, 97, 106, 125, 129, 133, 136, and 142.

In operation, manually closing push button 11 pulls up relay 18 by completing the starting circuit 19—11—10. This closes 21—22, closes 23—24, opens 25—26, closes 27—28 and opens 28—29. Cameras and recording devices may be energized through the auxiliary equipment contacts 21—22. The thermal time delay unit 30 locks relay 18 for five minutes which is the complete cycle interval through the five minute control circuit 19—24—23—33—34—32, controlled by the circuit 31—27—28—20. The opening of 25—26 opens up a remote controlled closed police alarm circuit at the police station through conductors 130 and 131. The opening of 28—29 allows flasher relay 35, held up by circuit 36—29—28—20, to fall off completing the outside flasher circuit 37—39—38—124—123—138—139—142 to the bank of flashing lights on the outside of the building and also the station pilot light circuit 37—39—38—16—17 to the station pilot lamps which notifies the bank employees that someone has put the system into operation. The closing of 27—28 operates the thermal time delay unit 40 through the photoelectric ten second delay circuit 20—28—27—41. After ten seconds' delay the photoelectric amplifying devices 51 and 52 are energized through the photoelectric energizing circuit 42—43—44—51—52. The thermal time delay unit 40 allows this delay to permit bank officials to proceed to the bank door in order to prevent customers from passing through the doors in case of an accidental operation of one of the push buttons. The operation of relays 18, 53, 66, 57, 79, 86 and the thermal time delay units 74 and 92 as described below perform under notification from the photoelectric cells a timed series of contact and armature closings and openings under time delays which are required to perform some of the novel functions of my invention.

Anyone leaving the bank causes the interruption on egress only from the bank of a first infra-red beam from source 45 to photoelectric cell 49, generating a current which is amplified by 51 operating relay 53. The operation of relay 53 closing 55—56 causes relay 66 to operate through circuit 62—60—59—55—56—67, closing 68—69, closing 70—71 and closing 72—73. The thermal time delay unit 74 locks relay 66 for two seconds through the circuit 67—69—68—78—77—76 controlled by the circuit 75—78—77—76 so that subsequent operation of relay 57 does not allow relay 66 to fall off in spite of the opening of 61—60. The successive interruption in sequence of a second infra-red beam from source 46 to photoelectric cell 50 on egress from the bank generating a current which is amplified by 52, operates relay 57, opening 59—60, closing 60—61 and closing 63—64. Closing 60—61 operates relay 79 through circuit 62—60—61—71—70—80, closing 82—83 and closing 84—85 and operates relay 86 through the circuit 65—63—64—73—72—87, closing 88—89 and 90—91. The operation of relay 57 before 53 opens the operating path for relay 66. A person passing in through the doors of the bank will eventually cause relay 53 to operate after relay 57 has fallen off. However since contacts 59—60—61 are not "make" before "break," and the operating paths for 79 and 86 are through 59—60—61 and 63—64 as well as normally open contacts on relay 66, relays 79 and 86 will not come up due to a person passing in through the entrance to the bank. The relay 79 locks up through the closing of 27—28 on relay 18 through the circuit 20—28—27—85—84—80 and will not fall off for the remainder of the five minute interval because thermal delay unit locks in relay 18. The relay 79 also operates the thermal time delay unit 92 through circuit 81—82—83—93 which after five sec-

ends closes 94—95 and pulls up relay 101 through circuit 93—94—95—104, closing 102—103 and operating the siren 132 through the siren operating circuit 134—102—103—120—119—132—133. Relay 86 is locked up for two seconds by thermal time delay unit 96 through the two second delay circuit 87—90—91—99—100—98, controlled by circuit 97—89—88—137, after which the sprayer 135 is operated through the sprayer operating circuit 136—135—89—88—137. The siren 132 continues to operate until after relay 18 falls off after five minutes on the opening of circuit 20—28—27—85—84—80. The sprayer operates for two seconds through two second delay circuit 137—88—89—122—121—135—136 and circuit 65—63—64—73—72—87, each time that someone leaves the bank during the same five minute period. People entering the bank during this period will operate relay 57 before relay 53. This sequence of operation will not produce a complete operating path for relays 79 or 86, hence the siren 132 and the sprayer 135 will not operate. Attempts to disable the photoelectric system by obstructing the beam 46—50 will result in the operation of the dye sprayer 135, after five seconds' delay caused by thermal time delay unit 105 through the circuit 107—108—109—87 and the operation of the circuit 137—88—89—122—121—135—136 and the operation of the siren.

For the daily testing out the alarm components of the system, the operation of the test switch 114 in the direction indicated, closes 115—116, closes 117—118, opens 119—120, opens 121—122 and opens 123—124. Closing 115—116 provides battery for the operation of thermal time delay unit 110 through the two second delay circuit 125—116—115—111, operating relay 18 after a two second delay through circuit 111—112—19. Closing 117—118 keeps closed the closed circuit police station leads.

Proper operation is visually indicated by three test pilot signal lamps; 126 for the siren, 127 for the sprayer and 128 for the flashing lights. Lamp 128 operates immediately after the operation of relays 18 and 35. Lamp 127 operates when the light beam to the photoelectric cell is purposely interrupted after the ten second period described above. Lamp 126 operates five seconds after lamp 127. All these three lamps and sequences are operated through the circuit paths actually used when the system is in protective operation. Power for all of said alarm equipment, relays, time delay units and circuits is supplied from a 110 volt alternating current line 143, operating a charger 144 producing a direct current supply across which are two floating batteries, 145 and 146, a ground 149 and a pilot lamp 148.

The system is automatically energized and deenergized by a clock operated switch 147 producing a plus power lead 150.

This equipment excluding the photoelectric light sources, cells, amplifiers, sprayer and associated circuitry may be adapted in modified forms for use in residences, small stores and locations other than banks and the like, by connecting the siren to the flasher circuit through a time delay unit.

While the preferred embodiment illustrative of my invention has been described in detail, it will be understood that I do not wish to be limited to the particular construction set forth, since various changes in the form, equipment, circuitry and arrangement of parts and in the details of construction may be resorted to without departing from the spirit and scope of the invention, or destroying any of the advantages contained in the same, heretofore described and defined in the appended claims.

I claim:

1. An electrically operated bank holdup deterrent alarm system comprising in combination a number of substations, each of said stations having a start switch and a pilot lamp, flashing lights mounted on exterior of a bank, a remote controlled police alarm, an electrically

operated spraying device positioned inside the entrance of said bank, an electrically operated siren mounted on outside of said bank, auxiliary equipment mounted inside the bank, and an inner and outer photoelectric detection device, the photoelectric cells of these devices operating in tandem with infra-red light sources and amplifiers, the beams from said two light sources traversing the interior exit from said bank; said start switch being connected to a gang relay circuit controlled by an electric thermal time delay circuit set for a complete cycle interval, one armature of said gang relay being connected to and opening a closed police alarm circuit, one armature being connected to and opening a release relay circuit to activate a circuit to said flasher together with a circuit to said pilot lamps, one armature being connected to and closing an auxiliary equipment circuit and one armature being connected to and closing an electric thermal predetermined-time delay circuit which after a predetermined interval controls the operation of a circuit to said photoelectric amplifiers, said sprayer and siren being energized by relay and electrical time delay means responsive to said photoelectric circuits, said signal and alarm components and their energizing circuits being wired to testing means, said means being connected to said circuits and reporting directly by visual test signals.

2. An electrically operated bank holdup deterrent alarm system comprising in combination a number of substations, each of said stations having a start switch and a pilot lamp, flashing lights mounted on exterior of a bank, a remote controlled police alarm, an electrically operated spraying device positioned inside the entrance of said bank, an electrically operated siren mounted on outside of said bank, auxiliary equipment mounted inside the bank, and an inner and outer photoelectric detection device, the photoelectric cells of these devices operating in tandem with infra-red light sources and amplifiers, the beams from said two light sources traversing the interior exit from said bank; said start switch being connected to a gang relay circuit controlled by an electric thermal time delay circuit set for a complete cycle interval, one armature of said gang relay being connected to and opening a closed police alarm circuit, one armature being connected to and opening a release relay circuit to activate a circuit to said flasher together with a circuit to said pilot lamps, one armature being connected to and closing an auxiliary equipment circuit and one armature being connected to and closing an electric thermal predetermined-time delay circuit which after a predetermined interval controls the operation of a circuit to said photoelectric amplifiers, said pilot lamps, flashing lights, police alarm and photoelectric amplifiers being operated in predetermined sequence and at predetermined intervals through a relay energizing circuit with electrical thermal time delay units for controlling said timed operation of said energizing circuits, said spraying device and siren being connected to multi-relay circuits energized by said amplified photoelectric circuits with electrical thermal time delay units for controlling said timed operation of said multi-relay circuits.

3. An electrically operated bank holdup deterrent alarm system comprising in combination a number of substations, each having a start switch and a pilot lamp, flashing exteriorly mounted lights, a remote controlled police alarm circuit, photoelectric circuits having two photoelectric cells operating in tandem, with infra-red light sources and amplifiers, the beams from the first and second light sources traversing the entrance to said bank, an electrically operated spraying device positioned at said entrances, and an exteriorly mounted electrically operated siren, said pilot lamps, flashing lights, police alarm and photoelectric amplifiers being operated in predetermined sequence and at predetermined intervals through a relay energizing circuit with electrical thermal time delay units to control said timed operation of said energizing circuit,

said spraying device and siren being connected to multi-relay circuits energized by said amplified photoelectric circuits with electrical thermal time delay units to control said timed operation of said multi-relay circuits, said photoelectric circuits with associated relays and thermal time delay relays being wired, connected and arranged so that their sequence of operation due to interruptions of the first and then the second beams on egress only from the bank, energizes associated sprayer and siren circuits, said photoelectric circuits with associated relays and thermal time delay relays being wired, connected and arranged so that their sequence of operation due to interruptions of the second and then the first beams on entrance to the bank prevents the setting up of an operating circuit for energizing associated sprayer and siren, said photoelectric circuits with associated relays and thermal time delay relays being wired, connected and arranged so that the operation of only the second of said photoelectric circuits due to interruption of the second beam alone on entrance to the bank energizes the sprayer circuit and the connected sprayer.

4. An electrically operated bank holdup deterrent alarm system comprising in combination a number of substations, each of said stations having a start switch and a pilot lamp, flashing lights mounted on exterior of a bank, a remote controlled police alarm, an electrically operated spraying device positioned inside the entrance of said bank, an electrically operated siren mounted on outside of said bank, auxiliary equipment mounted inside the bank, and an inner and outer photoelectric detection device, the photoelectric cells of these devices operating in tandem with infra-red light sources and amplifiers, the beams from said two light sources traversing the interior exit from said bank; said start switch being connected to a gang relay circuit controlled by an electric thermal time delay circuit set for a complete cycle interval, one armature of said gang relay being connected to and opening a closed police alarm circuit, one armature being connected to and opening a release relay circuit to activate a circuit to said flasher together with a circuit to said pilot lamps, one armature being connected to and closing an auxiliary equipment circuit and one armature being connected to and closing an electric thermal predetermined-time delay circuit which after a predetermined interval controls the operation of a circuit to said photoelectric amplifiers, all of said alarm equipment, relays, time delay units, and circuits being powered from a 110 volt alternating current supply line, operating a charger producing a direct current supply, across which are two floating batteries, a ground and a pilot lamp, said alarm components and their energizing circuits, relays and time delay units being connected to said testing means, said testing means comprising a test switch and test lamps, the operation of said switch immediately starting a five minute test period through the true operating circuit paths of said components indicating the continuity of said paths and the predetermined sequence of operations by means of said test lamps.

5. An electrically operated bank holdup deterrent system comprising in combination a number of substations, each of said stations having a start switch and a pilot lamp, flashing lights mounted on exterior of a bank, a remote controlled police alarm, an electrically operated spraying device positioned inside the entrance of said bank, an electrically operated siren mounted on outside of

said bank, auxiliary equipment mounted inside the bank, and an inner and outer photoelectric detection device, the photoelectric cells of these devices operating in tandem with infra-red light sources and amplifiers, the beams from said two light sources traversing the interior exit from said bank; said start switch being connected to a gang relay circuit controlled by an electric thermal time delay circuit set for a complete cycle interval, one armature of said gang relay being connected to and opening a closed police alarm circuit, one armature being connected to and opening a release relay circuit to activate a circuit to said flasher together with a circuit to said pilot lamps, one armature being connected to and closing an auxiliary equipment circuit and one armature being connected to and closing an electric thermal predetermined-time delay circuit which after a predetermined interval controls the operation of a circuit to said photoelectric amplifiers, said amplifiers being connected to circuits containing relay means and electrical thermal predetermined-time delay means activated by the interruption of first the inner and then the outer of said light beams, said relay means and cooperating time delay means setting up an operating circuit for said sprayer for a given interval each time the inner and then the outer beams are interrupted and after a predetermined period setting up an operating circuit for said siren, said siren remaining connected and operating for the balance of said time interval.

6. Claim 5, wherein the interruption of first the said outer beam and then the said inner beam prevents the setting up of operating circuits to energize said sprayer and said siren.

7. Claim 5, wherein the interruption of only the said outer beam sets up operating circuits to energize said sprayer and siren.

8. Claim 5, wherein said system is provided with a gang test switch and test lamps, the operation of said switch simultaneously closing a circuit through an electric thermal time delay relay unit to said starting gang relay, closing a shunt across said police alarm circuit, opening the siren circuit and throwing in a siren test lamp, opening the sprayer circuit and throwing in a sprayer test lamp and opening the flasher circuit and throwing in a flasher test lamp, the operation of said switch energizing a time delay relay unit to start a test of full cycle period length to test through the true operating circuit paths connected to said alarm components indicating the continuity of said paths and the predetermined sequence of operation by means of said lamps.

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