Aug. 8, 1950 A. S. H. PICKING ET AL 2,518,174

AUTOMATIC ALARM SYSTEM

Filed Jan. 7, 1948 2 Sheets-Sheet 1

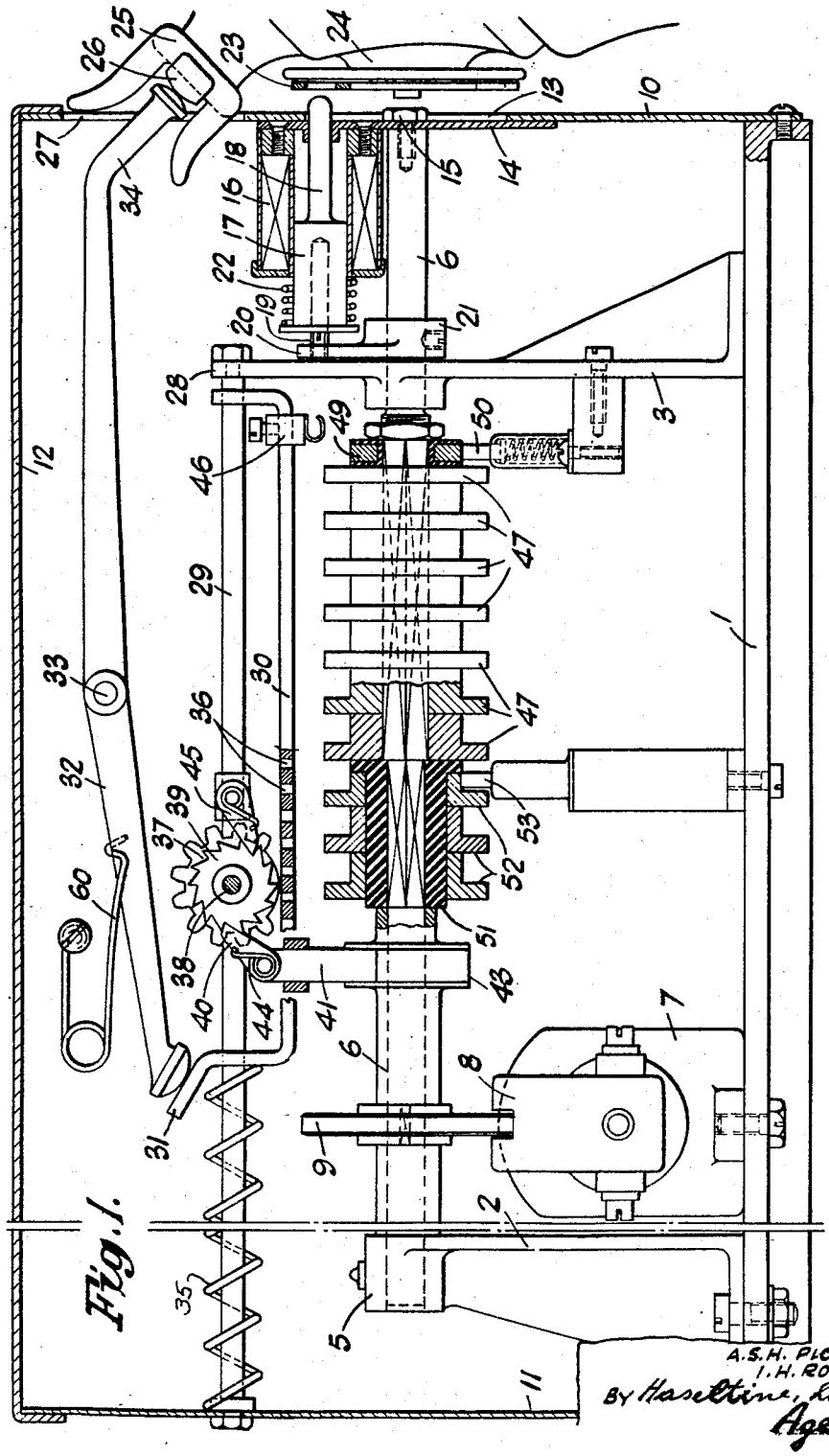


Fig. 1.

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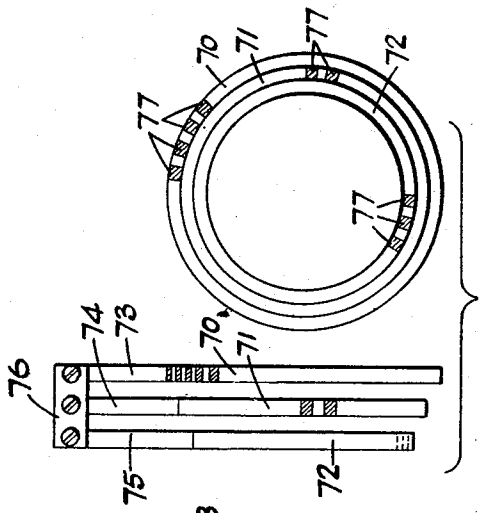


Fig. 5.

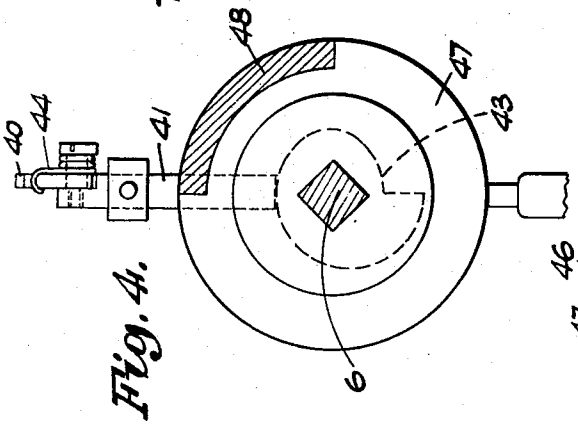


Fig. 4.

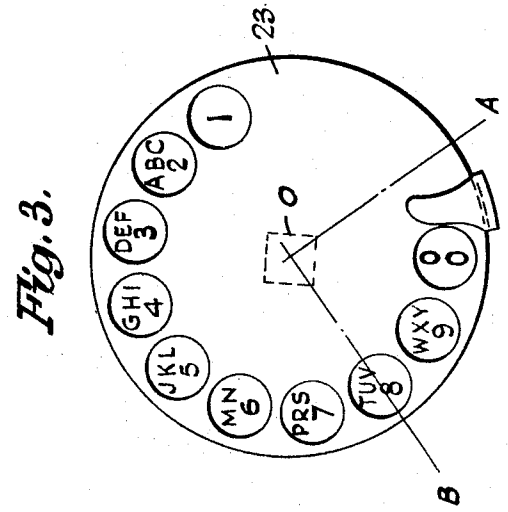


Fig. 3.

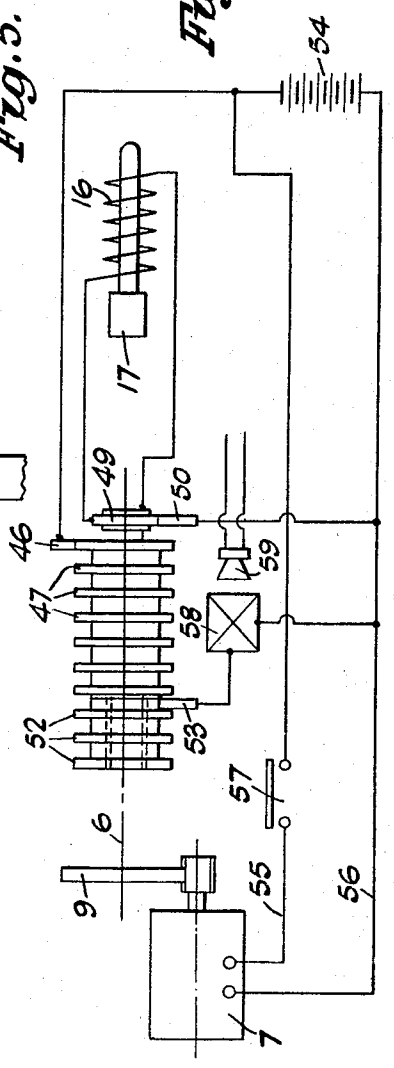


Fig. 2.

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AUTOMATIC ALARM SYSTEM

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In Great Britain March 15, 1945

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7 Claims. (Cl. 179—5)

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This invention relates to automatic alarm system for giving warning of flood, fire, unauthorised entry into buildings and other incidents. The invention may be used in conjunction with any known detecting devices capable of giving an initial alarm signal and the object of the invention is to provide apparatus for putting through a telephone call on receipt of an alarm signal so as to call the police, fire-brigade or other authority or assistance as may be required.

In its broadest aspect the invention consists in an automatic alarm system for use in conjunction with a dialling telephone set for the purpose of dialling a predetermined telephone number and sending a warning signal, wherein an initiating alarm signal is arranged to cause a rotating switch device to be set in operation, said rotating switch device essentially comprising a plurality of rotating discs and a contact member progressively translated so as consecutively to co-operate with the peripheries of said discs, such peripheries being chosen to have conducting and non-conducting parts whereby each disc may make electrical connection with said translatable contact over a pre-determined angular travel of the disc to allow intermittent completion through the switch device of a circuit that includes an electromagnetic means which, when energised, causes a member to engage a finger hole in a telephone set dial, and which itself rotates synchronously with the switch device so as to be capable of carrying out predetermined dialling operations, said switch device being such that when the pre-determined dialling operation is completed a sound producer is then brought into operation thereby, to provide an audible signal for transmission by the telephone transmitter of the telephone set.

Fig. 1 is a sectional layout of an apparatus in accordance with the invention, the drawing being diagrammatic,

Fig. 2 is an electrical circuit diagram,

Fig. 3 is a view of a normal telephone dial,

Fig. 4 is a sectional detail, and

Fig. 5 shows in side and end elevation a detail of a modification, the drawing being mainly diagrammatic.

The apparatus shown in Fig. 1 essentially consists of a bed plate 1 supporting brackets 2 and 3. The latter have bearings 4 and 5 for the support of a shaft 6 to permit the same to be turned about its axis. An electric motor 7 is also mounted on the bed 1, and through a reduction gear 8 drives a gear-wheel 9 fast upon the shaft 6. Walls 10 and 11 are secured to the bed 1 and form part of an enclosing casing there being also an upper

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lid-like wall 12. The end wall 10 has a circular aperture 13 normally masked by a disc 14 secured as by a bolt 15 to one extremity of the shaft 6. A solenoid winding 16 is secured to the disc 14 and has a movable core 17 provided with a finger 18. The core 17 rides upon a stub-shaft 19 which is secured as by screw-threading in an arm 20 formed integral with a boss 21 fixed upon the shaft 6. A helical spring 22 at one end presses upon a rim formed upon the exterior of the core 17 and at the other end reacts upon the casing of the solenoid winding 16, so that the core 17 is normally pressed towards an outer position with respect to the solenoid winding in the manner shown in Fig. 1 of the drawings. In the outer position of the core 17 it will be noticed that the finger 18 projects through the disc 14 and through the circular aperture 13. In a manner which will be explained hereafter, the finger 18 is intended to co-operate with the dial 23 of a telephone set generally indicated at 24. The set 24 is of normal kind and has a rest 25 which normally supports the receiver-microphone of the instrument. The rest 25 is associated with the normal switch element 26, and the end panel 10 is formed with an aperture 27 which allows the telephone set 24 to be held in the position indicated in Fig. 1 in relation to the apparatus of the invention.

The bracket 3 is extended at its upper part to form an anchorage 28 for one end of a rod 29 the other end of which is secured in the end plate 11 of the casing. A carriage 30 slides upon the rod 29 and possesses an inclined abutment 31 adapted to engage with the end of a lever 32 pivoted as at 33. The lever 32 is formed with a cranked end 34 which is adapted to engage the switch element 26 of the telephone set 24. A spring 35 tends to hold the carriage 30 always in the position shown in Fig. 1 and resists the movement of the carriage in its travel towards the left. The carriage 30 is formed with a series of indentations or gaps 36 forming a rack which co-operates with the teeth of a gear wheel 37. The latter is carried upon a shaft 38 on which there is also fixed a ratchet wheel 39. A pawl 40 engages the ratchet teeth upon the wheel 39 and is pivotally carried upon a rod 41 spring loaded to engage with a steep snail cam 43 (see Fig. 4) mounted rigidly upon the shaft 6. A torsion spring 44 ensures that the pawl 40 remains in engagement with the teeth of the ratchet wheel 39, and an additional pawl 45 checks any undesired rotation of the ratchet wheel 39.

The carriage 30 supports a wiping contact 46 adapted to co-operate with the peripheries of

discs 47. It will be observed that there are seven of the discs 47 and they are all mounted against one another upon the shaft 6. The shaft is conveniently formed with a square section so as to locate the discs 47 in a fixed angular relation to one another and to the shaft. The discs are all formed of an electrically conducting material, but peripherally each possesses a portion which is non-conducting. In the illustration of Fig. 4, a typical disc 47 is seen, and it will be observed that a portion 48 of the periphery thereof is formed from a non-conducting material, such portion 48 extending over an arc of approximately 90 degrees. There is also mounted upon the shaft 6 a slip-ring 49 insulated from its surroundings, but engaged by a brush 50 which establishes electrical connection with the ring 49 when the latter is rotating with the shaft 6. The shaft 6 is hollow and one end of the solenoid winding 16 is connected by an insulated conductor which runs through the hollow of the shaft 6 and is connected to the ring 49. The other end of the solenoid winding 16 is connected to the shaft 6 and is therefore in electrical connection with all the discs 47.

Adjacent the discs 47 upon the shaft 6, there is an insulating sleeve 51 upon which further discs 52 are mounted. All three of the discs 52 are in close contact with one another and a brush 53 rides upon one of the discs so as to provide an electrical connection with all three of them.

It will now be useful to consider the electrical circuit diagram of Fig. 2 and from this diagram it will be observed that there is a source of electro-motive force 54 at one side connected with the contact 46. The other side of the source is connected with the brush 50 which co-operates with the slip-ring 49 that is permanently connected with one end of the solenoid winding 16. The other end of the solenoid winding connects with all the discs 47. In Figure 2 the contact 46 is shown as co-operating with the first disc 47 and when the contact 46 embraces a conducting portion of the periphery of the disc 47, then a circuit will be completed through the solenoid winding 16. With a circuit completed between the winding 16 and the source of electro-motive force 54, the core 17 will be drawn into the solenoid winding 16.

The electric motor 7 is connected by means of leads 55 and 56 with the source 54 and in the lead 55 there is a switch 57. When the switch 57 is closed it will be obvious that the motor 7 will be supplied with power and will operate. The discs 52 are all in electric connection with the brush 53 and the latter is connected to a sound producer 58 the other side of which is connected to the lead 56. When the contact 46 engages a conducting portion of the periphery of any one of the discs 52, a circuit will be completed through the sound producer 58 which will then emit an audible signal which could be picked up by a telephone microphone 59.

The apparatus described above is intended to operate in conjunction with an initiating alarm device of some known kind, which will mechanically, or through the agency of electric relays, serve to close the switch 57. When the switch 57 is initially closed, the apparatus of the invention is in the position shown in Fig. 1 and the contact 46 does not engage the periphery of any of the discs 47 or 52. The closing of the switch 57 therefore initially completes a circuit only through the motor 7 and the latter begins to drive the shaft 6 through the intermediary of the

reduction gear box 8 and the gear wheel 9. As the shaft 6 revolves, the cam 43 thereon causes the member 41 to be vertically reciprocated. In each revolution of the shaft 6, the member 41 makes one vertical reciprocation and this causes the pawl 40 to rotate the ratchet wheel 39 sharply through one tooth pitch. This corresponds to an angular displacement of the gear-wheel 37 through one tooth pitch and hence the carriage 30 is translated to the left (as seen in Fig. 1) by an equivalent amount. The showing of the gear wheel 37, as also the ratchet 39 in Fig. 1, is diagrammatic only in the sense that the number of teeth thereon will have to be determined by the desired operation of the apparatus as described hereafter. There is a gap in the teeth upon the wheel 37, which gap is opposite the series of teeth in the carriage 30 formed by the indentations 36, so that during the initial revolution of the shaft 6 the gear wheel 37 may not necessarily engage the rack formed in the carriage. As soon as the wheel 37 does engage the rack it begins to translate the carriage to the left so that the abutment 31 moves away from the end of the lever 32 with which it is in contact. To ensure that this contact is normally maintained, a spring 60 is provided. Under the action of this spring the lever 32 swings about its pivot 33 and thereby allows the cranked end 34 to lift so that the switch element 26 of the telephone set is raised. This brings the telephone set to the position normal for dialing to obtain a desired number. As the shaft 6 continues to rotate the contact 46 is brought into engagement with the periphery of the first disc 47. It remains in contact therewith during a complete (or almost complete) revolution of the disc 47 and it is, for the purposes of illustration, assumed that this disc 47 is that indicated in Fig. 4. Thus over the arc 48 the contact 46 will not be in effective electrical connection with the disc 47, but will be so connected over the remainder of the periphery of the disc. In Fig. 3 a normal telephone dial is illustrated, and it will be supposed that such dial has a centre O. If it is desired to dial the number "8" then it will be appreciated that the dial must be turned through the angle BOA, where B indicates the normal position of the finger hole in the dial corresponding to the digit "8," whilst A indicates the limit position to which one of the dial holes may be turned during a dialling operation. It is of course the major arc BOA which comes into question. The disc 47 shown in Fig. 4 is so arranged that when the finger 18 is opposite the dial hole corresponding to the digit "8," the contact 46 begins to cooperate with the conducting portion of the disc 47. Such co-operation will at once energise the solenoid winding 16 whereupon the finger 18 will be thrust forward into the desired dial hole. The solenoid and finger will then continue to rotate with the finger in the selected dial hole until the position corresponding to that indicated at A in Fig. 3 is reached, whereupon the contact 46 will once more encounter the insulated portion 48 of the disc 47 whereupon the solenoid will be de-energised and the finger 18 will leave the dial hole. The telephone dial 23 will now be free to make its return displacement and during the next complete revolution of the shaft 6 the contact 46 will be lying between the first disc 47 and the second one. This will ensure that the telephone dial has ample time to re-set itself. The next revolution of the shaft 6 will take place whilst the contact 46 is in co-operation with the second disc 47. Such second

disc has a periphery designed to select by means of the solenoid finger 18 a further dial hole on the dial 23 in the same manner as described in connection with the first disc 47. In the illustrated example it has been supposed that seven discs 47 will be necessary to secure a complete dialling of the telephone and the arrangement may be such that the first three discs select the characteristic three letters of an exchange whilst the next four discs select the characteristic numbers which are associated with the subscriber that it is desired to call with the aid of the telephone set 24. After the contact 46 has co-operated with all the discs 47 the carriage 30 is further translated to the left to bring the contact into co-operation with the first of the discs 52. At this time the dialling is complete and the subscriber who has been called would have answered at his end. The continued revolution of the discs 52 will cause the contact 46 to make consecutive engagement therewith and the sound producer 58 may be impulsed by temporary completion of the circuit therethrough corresponding to the co-operation with the three discs 52. Thus the sound producer 58 might for example take the form of an electric bell or buzzer which will produce in Morse a signal depending upon the arrangement of the discs 52. In Fig. 5 there is shown an alternative arrangement of these discs in which they are replaced by three discs 70, 71 and 72 made each of a different diameter and co-operating with wiping contacts 73, 74 and 75 which are in permanent co-operation with the discs. All the contacts 73, 74 and 75 are joined to a single conducting strip 76 and it is intended that in the final travel of the wiping contact 46 the latter should be continuously in engagement with the stationary strip 76. There are conducting inserts 77 upon the peripheries of the discs 70, 71 and 72 which will account for transmission of a given code signal from the sound producer 58.

Other forms of warning device may be employed and are within the scope of the invention. Thus for example the discs 52 or the discs 70, 71 and 72 may be wholly replaced by a conducting cylinder which will remain in continuous co-operation with the contact 46, and the sound producer 58 may then be in the form of a phonograph which will produce a pre-determined audible message so long as it is energised.

When the carriage 30 has been translated to the position where the contact 46 has co-operated with the last disc 52 (or other equivalent arrangement) the gear-wheel 37 is once more in the position shown in Fig. 1 where the blank in its teeth is opposite the rack formed in the carriage 30. As a result the carriage 30 is free to resume its inoperative position under the action of the spring 35 and the whole apparatus is re-set. Thereafter if the switch 57 still remains in the closed position the cycle described will once more be followed and the dialling operation will commence afresh. This ensures that if the first warning signal is not answered by the subscriber to whom it is to be addressed, then the subscriber will be called afresh.

It must once more be emphasised that the illustration of Fig. 1 is wholly diagrammatic in the sense that the gear wheel 37 must clearly have more teeth than indicated thereon. For convenience in drawing and clarity of reproduction, the teeth upon the gear-wheel 37 have been shown as enlarged beyond the size which they would normally appear. In like manner the degree of travel apparently permitted in Fig. 1 to the carriage 30 would clearly be insufficient, since the abutment 31 would contact the casing before the travel of the carriage is complete. It may also be remarked that seven discs 47 have been shown in Fig. 1 as also in Fig. 4, but the number of discs employed in practice will clearly depend upon the number of individual dialling movements that must be made in order to obtain a desired subscriber with the telephone set. The employment of an electric motor 7 represents a desirable feature, but a clockwork mechanism could of course be substituted therefor. In this case the switch 57 would be replaced by an equivalent mechanical arrangement capable of releasing the clockwork for operation when an alarm signal is to be transmitted. Alternatively, instead of clockwork gravity driven mechanism could be employed.

The audible sound-producer may advantageously be arranged to transmit indications of the place and/or nature of the alarm message which is to be sent to the subscriber.

We claim:

1. An automatic alarm system for use in conjunction with a dialling telephone set for the purpose of dialling a predetermined telephone number and sending a warning signal, comprising a member arranged to perform axial movements, a support for said member such support being disposed for rotation about an axis set substantially in continuation of the axis of rotation of the telephone dial, electro-magnetic means disposed to effect, on energisation, axial movement of said member in order that the member should engage a finger hole of the telephone dial, means for rotationally driving said support, a device for initiating a simple alarm signal, such device serving to bring into operation said means for rotationally driving said support when the device initiates an alarm signal, a rotating switch driven from said means for rotationally driving said support and having a plurality of co-axial rotating discs, a contact member associated with said discs and disposed for translational movements thereby to consecutively co-operate with the peripheries of said discs, electrically conducting and non-conducting parts disposed about the peripheries of said discs, a pair of electrical supply terminals, electrical connections as between a number of said conducting parts and said contact member, this number corresponding to the number of integers in the predetermined telephone number, said electrical connections including in series the electro-magnetic means and said terminals, an electrical sound producing device disposed in the vicinity of the microphone of the associated telephone to produce audible sounds for transmission by said telephone, and further electrical connections as between at least one of the remaining said conducting parts and said contact member, this remaining conducting part being one which is disposed for co-operation with said contact member after co-operation between the latter and said member of conducting parts has taken place, said further electrical connections including in series said terminals and said sound producing device.

2. A system according to claim 1, and further comprising a translationally displaceable carriage for said contact member, a support for the carriage and means operable from the movement of the rotating switch to cause the translation of said carriage.

3. A system as claimed in claim 2 and further comprising reciprocating mechanism driven in common with the rotating switch to produce

reciprocations during the rotation of the rotating switch device, a pawl disposed to experience said reciprocations, ratchet mechanism for co-operation with said pawl to produce a rotational movement, a toothed wheel connected to follow said rotational movement, and a rack bar attached to said carriage and disposed for co-operation with said toothed wheel to produce the translational movement of the carriage.

4. A system according to claim 1, and further comprising a control member for contacting the switch element of the standard telephone set, and means for releasing said control member to close said switch element, said means being brought into operation by the initial rotating movement of the rotating switch device.

5. A system according to claim 4, in which said control member takes the form of a lever pivoted as between its ends and disposed with one end for engagement with the switch element of the telephone set, the releasing means being at the other end of said lever and serving to displace the lever upon initial rotating movement of the rotating switch.

6. A system according to claim 1, in which said electro-magnetic means consists of a solenoid device having a core carrying the member adapted to engage the finger holes in the telephone dial.

7. A system according to claim 1, in which several additional discs are provided in the rotating switch, such system further comprising several wiping contacts one in respect of each additional disc, a strip effectively electrically connecting all said wiping contacts, the strip being disposed for encountering by said contact member after co-operation between said contact member and said number of conducting parts has taken place, and additional electrical connections as between the additional discs and said contact member, said additional electrical connections including in series the electrical supply terminals and said sound producing device.

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IAN HAROLD ROONEY.

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