

Aug. 9, 1932.

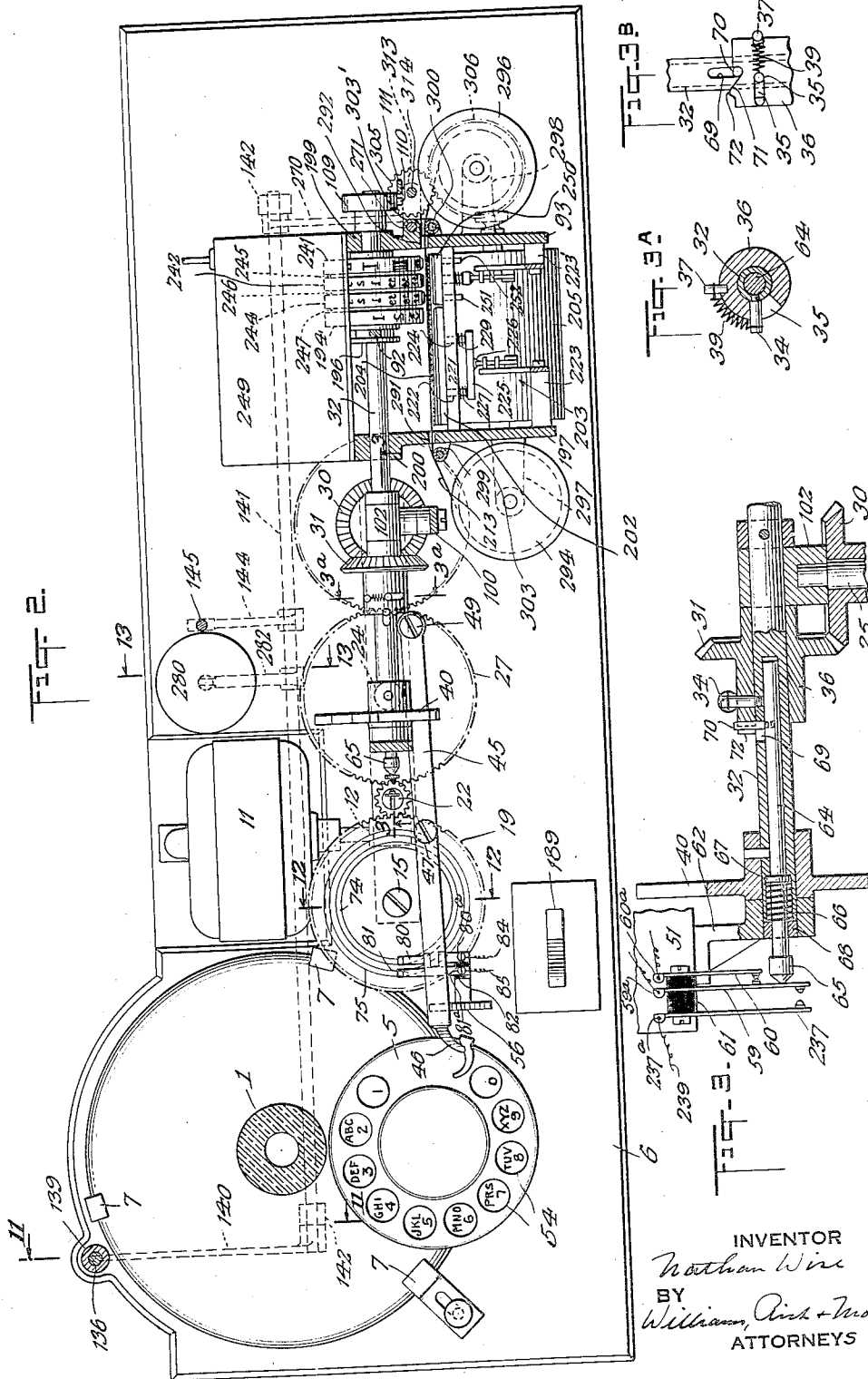
N. WISE

1,870,547

AUTOMATIC TELEPHONE DIALING AND RECORDING APPARATUS

Filed Jan. 23, 1930

6 Sheets-Sheet 2



Aug. 9, 1932.

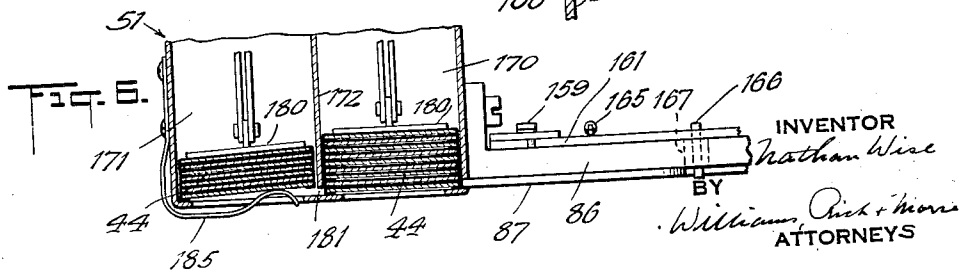
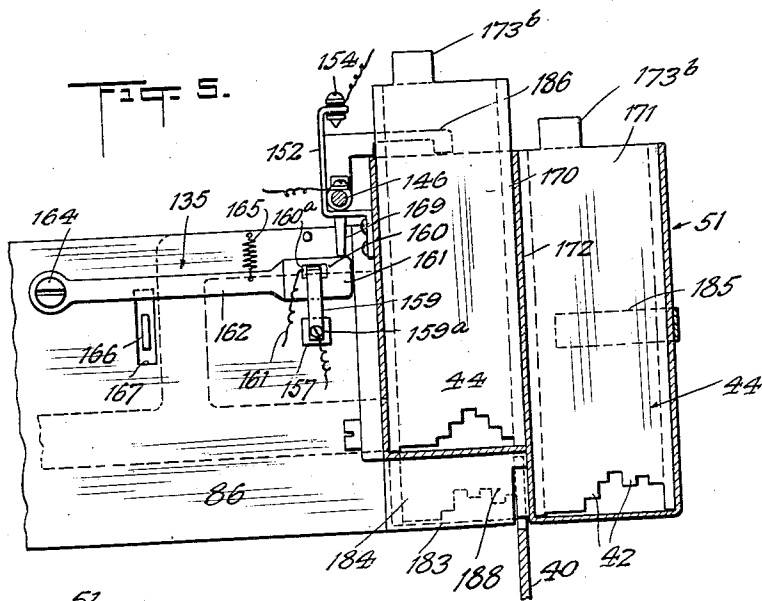
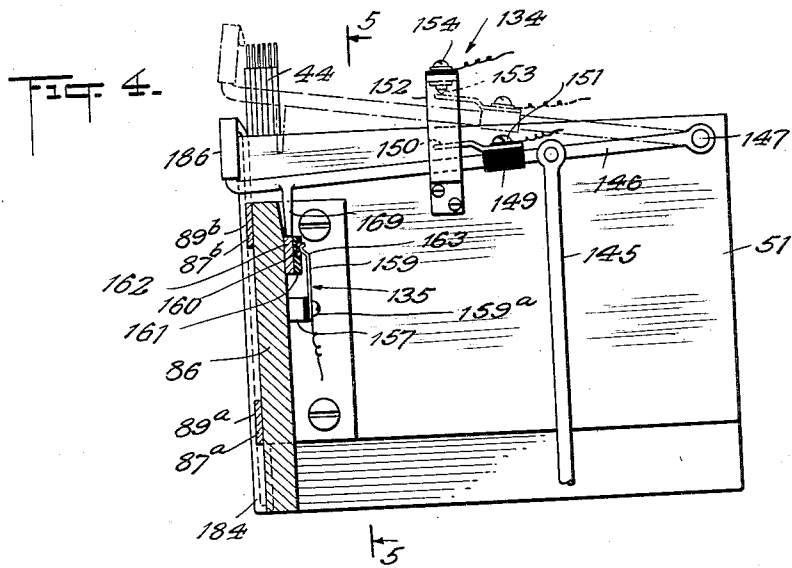
N. WISE

1,870,547

32. AUTOMATIC TELEPHONE DIALING AND RECORDING APPARATUS

Filed Jan. 23, 1930

6 Sheets-Sheet 3



Aug. 9, 1932.

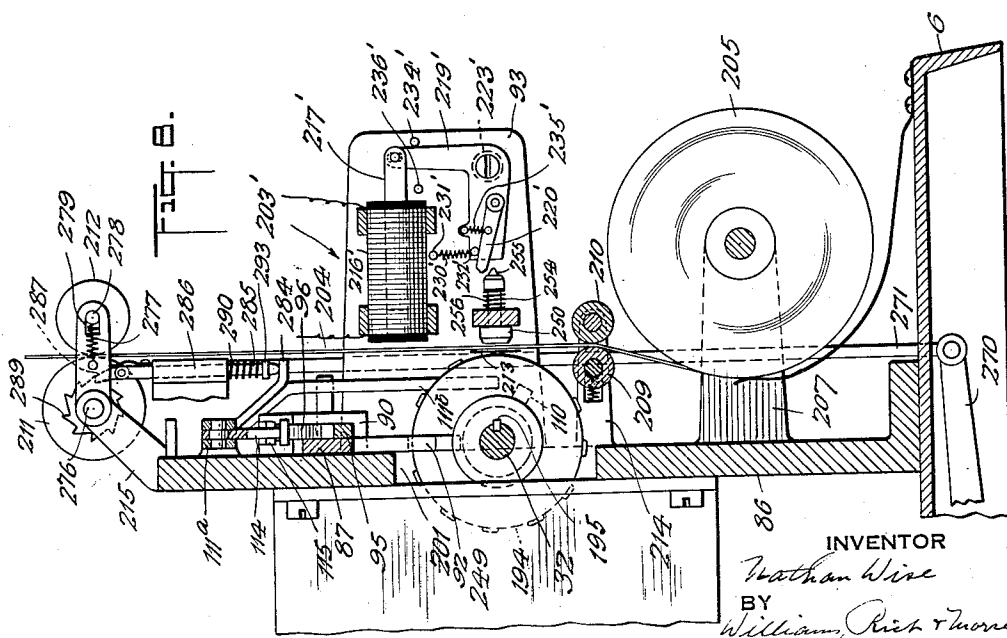
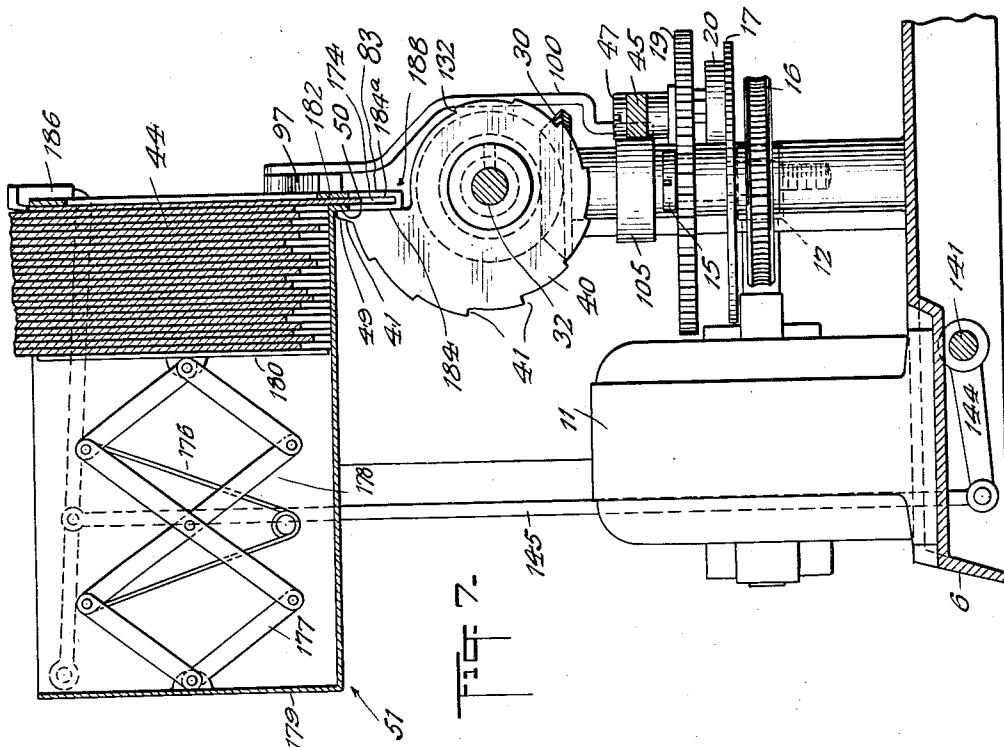
N. WISE

1,870,547

AUTOMATIC TELEPHONE DIALING AND RECORDING APPARATUS

Filed Jan. 23, 1930

6 Sheets-Sheet 4



Aug. 9, 1932.

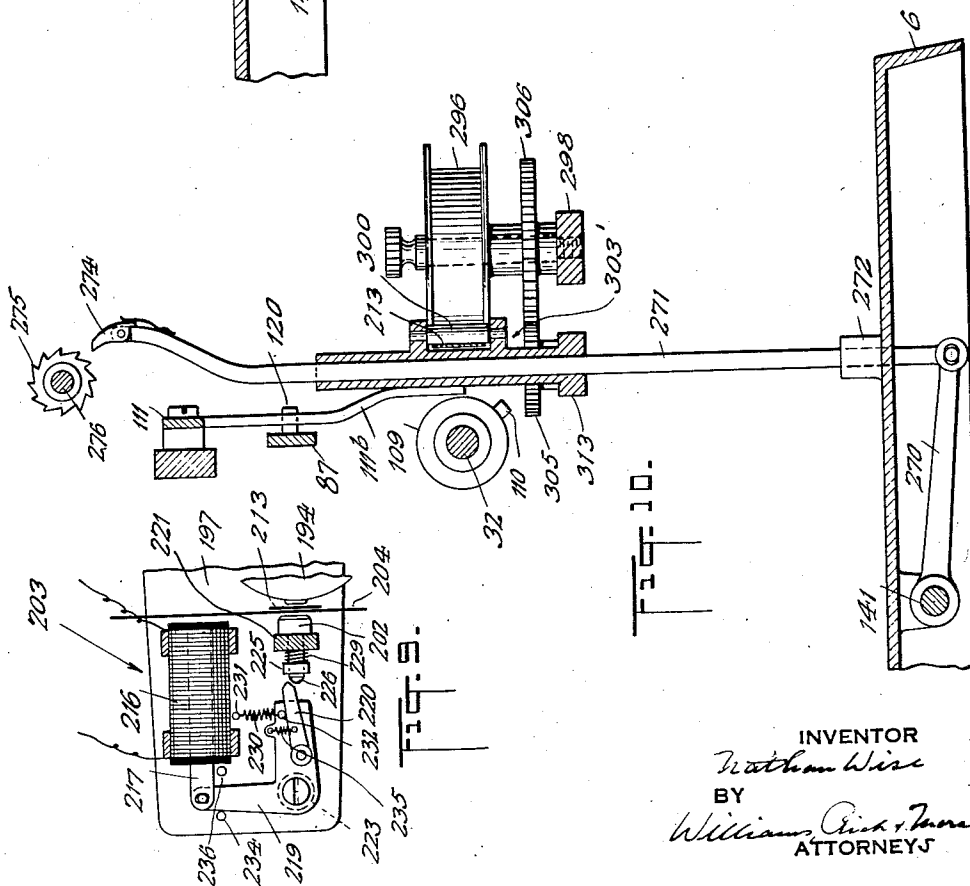
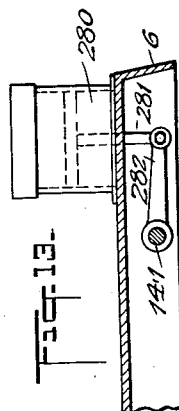
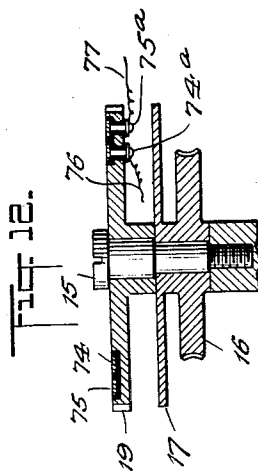
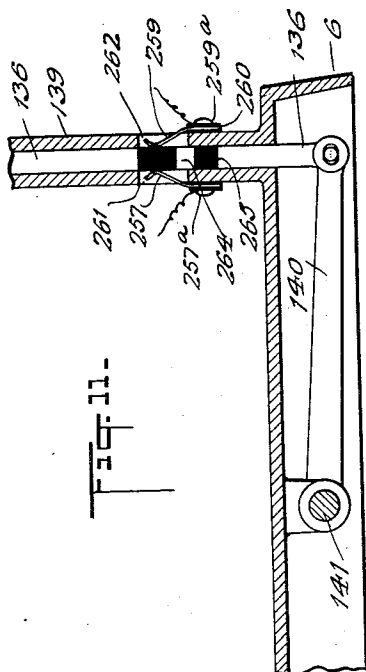
N. WISE

1,870,547

AUTOMATIC TELEPHONE DIALING AND RECORDING APPARATUS

Filed Jan. 23, 1930

6 Sheets-Sheet 5



INVENTOR
Nathan Wise
BY
William C. R. Thomas
ATTORNEYS

Aug. 9, 1932.

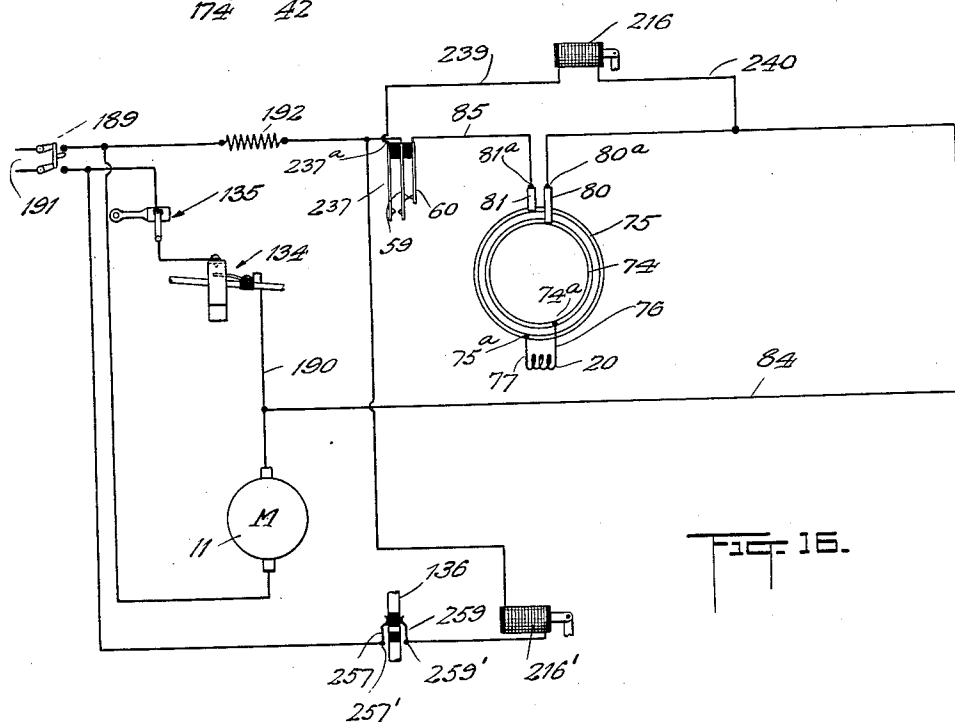
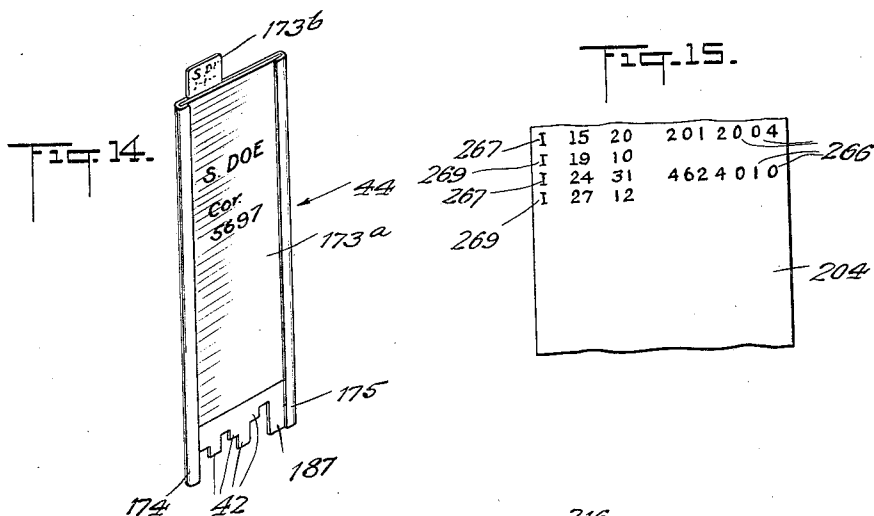
N. WISE

1,870,547

AUTOMATIC TELEPHONE DIALING AND RECORDING APPARATUS

Filed Jan. 23, 1930

6 Sheets-Sheet 6



T-19 16.

INVENTOR
Nathan Wise
BY
Williams, Rich & Turner
ATTORNEYS

UNITED STATES PATENT OFFICE

NATHAN WISE, OF MOUNT VERNON, NEW YORK; PEARL L. WISE AND AARON WILLIAM LEVY EXECUTORS OF SAID NATHAN WISE, DECEASED

AUTOMATIC TELEPHONE DIALING AND RECORDING APPARATUS

Application filed January 23, 1930. Serial No. 422,719.

The present invention relates to telephone apparatus and has particular reference to automatic telephone dialing and recording apparatus for use with telephone equipment such as is ordinarily employed at subscribers' stations in connection with automatic telephone systems.

An object of the invention is to provide an apparatus which, when operatively associated with a telephone equipped with a device for the manual transmittal of telephone numbers, is adapted to automatically transmit a telephone number without recourse to any manual operation of said manual transmittal device.

Another object of the invention is to provide, in an apparatus of the character mentioned, means whereby the numbers called with the aid of such apparatus may be automatically recorded.

A further object of the invention is to provide, in an apparatus of the character mentioned, means whereby the time at which each call is made may be automatically recorded.

Another object of the invention is to provide, in an apparatus of the character mentioned, means whereby the time at which each call is completed may be recorded.

A further object of the invention is to provide, in an apparatus of the character mentioned, means whereby the time at which each call is begun and the time at which each call is completed may be automatically recorded, respectively, in accordance with the instant at which the receiver is lifted from its supporting hook and replaced thereon, whereby the duration of individual calls may be readily determined.

Another object of the invention is to provide an apparatus of the character mentioned which is adapted to automatically transmit in succession the telephone numbers of various parties without necessitating any attention or manual operation on the part of the subscriber or operator other than the raising of the receiver from and the lowering of the same to its supporting hook to respectively start and end each call.

A further object of the invention is to provide

an apparatus of the character mentioned which is so constructed that it may be operatively associated with a telephone of the dial-operated type without requiring any alteration whatsoever of such telephone.

Another object of the invention is to provide an apparatus of the character mentioned which is adapted to be easily and quickly attached to and detached from a standard type of dial-operated telephone and which is so constructed that it does not interfere with the usual operation of such telephone when it is in association therewith.

A further object of the invention is to provide, in an apparatus of the character mentioned, means adapted to cooperate with the usual dialing device of standard types of dial-operated telephones, whereby definite accurate movements may be imparted to such dialing device to promote accuracy and reliability in the automatic transmittal of telephone numbers.

Other objects and advantages of the invention will become apparent from the following description, taken in connection with the accompanying drawings in which Fig. 1 is a front view of said apparatus with some parts removed and operatively attached to a telephone having a receiver and a finger-wheel for transmittal of telephone numbers; Fig. 2 is a plan view, partly in section, of said apparatus with upper parts removed; Fig. 3 is a front sectional view, taken on the line 3—3 of Fig. 2, of an automatic switch mechanism; Fig. 3a is a sectional view taken on the line 3a—3a of Fig. 2 and illustrates a detail of the switch mechanism of Fig. 3; Fig. 3b is a fragmental view illustrating another detail of the switch mechanism of Fig. 3; Fig. 4 is a profile view, taken on the line 4—4 of Fig. 1, of magazines carrying telephone number records and two operatively associated automatic power control switches; Fig. 5 is a back view, taken on the line 5—5 of Fig. 4, of said magazines, shown in section, said power control switches and additional parts operatively associated with the latter; Fig. 6 is a fragmental plan view, partly in section and taken on the line 6—6 of Fig. 1, of some of the parts shown in Figs. 4

and 5; Fig. 7 is a profile view, partly in section, taken on the broken lines 7—7 of Fig. 1, and illustrates details of the apparatus; Fig. 8 is a fragmental profile view, partly in section, taken on the line 8—8 of Fig. 1, and illustrates other details of the apparatus; Fig. 9 is a detail view of a solenoid mechanism and telephone number recording hammer co-operating therewith; Fig. 10 is a profile view, partly in section, taken on the line 10—10 of Fig. 1 and illustrates still other details of the apparatus; Fig. 11 is a profile view, taken on the line 11—11 of Fig. 2 and illustrates another automatic switch mechanism; Fig. 12 is a fragmental sectional view, taken on the line 12—12 of Fig. 2 and illustrates a gear having slip rings and terminals thereon; Fig. 13 is a fragmental profile view, taken on the line 13—13 of Fig. 2, and illustrates a dash-pot; Fig. 14 is a perspective view of a telephone number record; Fig. 15 is a fragmental view of a paper ribbon having time and telephone number records printed thereon; and Fig. 16 is a wiring diagram of the electrical parts of the apparatus.

The apparatus embodying this invention may be advantageously used, wherever dial-operated telephones are used, with substantial saving in time and labor and with the elimination of possible errors in dialing, and will be found particularly advantageous for use by such subscribers as banks, brokerage houses and the like whose business require them or their private-branch-exchange operators to make a large number of daily calls in succession or in repeated succession.

Referring to Fig. 1, an ordinary telephone of the dial-operated type usually employed at subscriber-stations is shown, and comprises a telephone 1, a receiver 2, a receiver hook 4 and a finger-wheel 5 for manual transmittal of telephone numbers. The telephone 1 is adapted to be fixedly held to a base 6 by means of a plurality of brackets 7 engaging the lower sides of the telephone base 9. As shown in Fig. 2, one of these brackets is movable and adapted to be operated by any suitable means, to provide for the positioning and removal, whenever desired, of the telephone 1 on and from the base 6 respectively.

Referring particularly to Figs. 1 and 7, the base 6 has fixed thereto a motor 11, the shaft of which carries a worm 12. Also secured to the base 1 is a frame 14 carrying a stud 15 around which a gear 16 engaging with the worm 12 is adapted to rotate. A magnetic element 17, preferably in the form of a disc, is adapted to rotate with the gear 16. The stud 15 also provides a pivot for a gear 19 which may rotate independently of the gear 16 and the disc 17. A magnetic clutch 20 is so secured to the gear 19 as to move with the latter and cooperate with the magnetic disc 17 for any position of said clutch relative to said disc. Said clutch 20 may be car-

ried by a member 21 connected to the lower surface of the gear 19. Thus, when the clutch 20 is energized, a rotation of the disc 17 produced by the motor 11, causes a rotation of the gear 19 by reason of the action of the clutch 20 on the disc 17.

Also carried by the frame 14 are pivots 22, 24 and 25 for, respectively, a pinion 26 meshing with the gear 19, a gear 27 meshing with said pinion 26, and a gear 29 meshing with said gear 27. A bevel gear 30 is adapted to rotate with the gear 29 and may be made integral with the latter so as to rotate around the pivot 25. Meshing with the bevel gear 30 is another bevel gear 31 movably fitted around a rotatable shaft 32, the bearings and supports of which will be described hereinafter.

Referring to Figs. 3 and 3a, the shaft 32 carries a pin 34 which extends through a slot 35 formed through a hub 36 movably fitted around the shaft 32 and which may be integral with the bevel gear 31 so as to rotate with the latter. Carried by the hub 36 is a pin 37 and a tension spring 39 has its ends connected to pins 34 and 37 respectively. The pin 34 serves to maintain the bevel gear 31 in engagement with the bevel gear 30, and, in cooperation with the pin 37 and the spring 39, to provide rotation of the shaft 32 by reason of a rotation of the bevel gear 31. The pin 34 and the slot 35 serve, however, an additional purpose which will be understood in the later description. Fixed to the shaft 32, near one end thereof, is a rotatable element or cam 40 having a series of steps or projections 41 (Fig. 7) which are predeterminedly positioned and which may be formed integral therewith.

From the above description, it now becomes apparent that a rotation of the gear 19, by reason of the action of the clutch 20 on the revolving disc 17, causes a corresponding rotation of the element 40 through the medium of the pinion 26, the gears 27 and 29, the bevel gears 30 and 31 and the shaft 32.

In accordance with the invention, the element 40 is caused to rotate successively from a normal position of rest, and abutments 42, predeterminedly formed on telephone number records 44, (see Fig. 14), are caused to successively cooperate with projections 41 of the element 40 in limiting the successive rotations of the element 40, whereby definite arcuate movements are imparted to the element 40; and movable means are provided for imparting to the impulse transmitting device 5 movements corresponding to said successive movements of the element 40. In the embodiment of the invention shown in the drawings, these movable means comprise the shaft 32, the train of gears already described, and a link 45 cooperating with the pair of gears 19 and 27 and terminating with a fin-

ger 46 which engages and actuates the device 5 when the element 40 is rotated.

Referring to Figs. 1 and 2, said link 45 is pivotally mounted on said gears 19 and 27, (which, it is noted, are caused to rotate in the same direction by reason of the pinion 26 meshing therebetween), by means of the studs 47 and 49 eccentrically secured to the gears 19 and 27, so that arcuate motions are imparted to the finger 46 for actuation of the device 5 whenever the gears 19 and 27 and the element 40 are rotated. The rotatable element 40 and the movable means in liaison therewith are retained in a normal position of rest by any suitable means, such as a projection 49, (Fig. 7), formed on the element 40 and cooperating with a fixed abutment 50 and with a helical spring 52 (Fig. 1), coiled around the stud 24, one end of which spring may be fixed to the lower surface of the gear 27 and the other end of which may be fixed to the frame 14. Said abutment 50 is preferably formed on a magazine structure 51 which will be described hereinafter. Said spring 52 also serves to restore the element 40 and the movable means including the link 45 to their normal position of rest after each successive movement of same.

The projections 41 on the element 40 are necessarily equal in number to the number of the usual finger-wheel openings 54. (usually ten). These projections 41 are so positioned relatively to one another and to the projection 49, which governs their positions of rest, that, with the finger 46 preferably engaging the opening 54 furthest away in the direction of advance of the device 5 from the finger-catch 53, actuations of the device 5, corresponding to definite movements of the element 40 governed by said projections 41 co-acting with telephone number record abutments 42 predeterminedly placed in their path, result in proper transmittal of telephone numbers.

Means are preferably provided for maintaining the finger 46 out of engagement with the device 5 when said finger is in its position of rest. In the embodiment of the invention shown in the drawings, these means comprise a pivotal connection 55 of the finger 46 to the main body of the link 45 and a supporting post 56, fixed to the frame 6. Said post 56 has its upper end formed with an inclined surface over which the finger 46 is adapted to move, whereby the finger 46 is raised out of engagement with the device 5 when it is restored to its normal position of rest, and lowered in operative engagement with the device 5 when it is rotated from its position of rest. A projection 57 fixed to the finger 46 cooperates with the link 45 in limiting the downward movement of the finger 47 for proper cooperative action with the device 5. The spring (not shown) usually associated with a finger-wheel for restoring the latter to its position of rest assists the function of the spring

52 in restoring the element 40 and the movable means including the link 45 to their normal position of rest.

It is to be noted that the lowering and raising of the finger 46 in and out of engagement with the device 5 necessitates an initial movement of the finger 46 before engagement of the latter with the edge of the opening 54, successive movements of the finger 46 for actuation of the device 5 being thus necessarily greater than the movements of the latter by this initial movement of the finger 46. These required greater movements of the finger 46 are provided by suitably positioning the projections 41 with relation to the projection 49 which governs the position of rest of the element 40. A relative disposition of the projections 41 and of the projection 49 on the element 40, suitable for proper operation of a finger-wheel 5 of the usual type provided in telephone apparatus, is shown in Fig. 7. One of the edges of the projection 49 cooperates with the abutment 50 in determining the position of rest of the element 40, but the opposite edge of said projection 49 serves as a projection 41 to produce, in cooperation with a telephone number record abutment 42, the greatest arcuate movement of the element 40 for transmittal of an electrical impulse by the finger-wheel 5.

The clutch 20, cooperating with the revolving disc 17, is caused to be energized and de-energized, respectively, at substantially the instant the element 40 reaches its position of rest and at substantially the instant such element cooperates with an abutment 42. Referring particularly to Fig. 3, two spring contacts 59 and 60 providing switching means for the magnetic clutch 20 are adapted to be held normally in contact with one another, and, when in this normal position of contact, permits a current to flow through the clutch 20. Said contacts 59 and 60 are carried by an insulating block 61, which may be secured to the magazine structure 51, and may be provided with terminals 59a and 60a for connection thereto of lead-in wires. The shaft 32, rotatably mounted at one end in a supporting bracket 62 which may be secured to said structure 51, has an inner bore in which is slidably fitted a plunger 64, to the outer projecting end of which is secured an insulating cap 65 co-operating with the spring contact 59 in opening and closing the spring contacts 59 and 60. A compression spring 66 located between a collar 67, fixed to the plunger 64, and an apertured plug 68, secured to the bracket 62 and loosely fitting around the plunger 64 to adapt the latter for sliding movement therethrough, maintains the plunger 64 normally retracted so as to permit contact between the springs 59 and 60. Referring particularly to Fig. 3b, the shaft 32 has a longitudinal slot 69 through which projects a pin 70 fixed to the plunger

64. Said pin 70 cooperates with a projection or cam 71 formed on the hub 36 in causing outward movement of the plunger 64, as will be presently understood, and corresponding separation of the springs 59 and 60. Thus, when a telephone number record abutment 42 is placed in the path of a projection 41 of the element 40, the rotation of said element and of the shaft 32 fixed thereto is instantaneously arrested, although the train of gears 19, 26, 27, 29, 30 and 31 may still continue rotating by reason of the yieldable connection of the gear 31 with the shaft 32, the pin 34 being relatively displaced in the slot 35 against the tension of the spring 39. The gear 31, upon rotation with respect to the shaft 32, causes the pin 70 to cooperate with the cam 71, so that an outward movement of the plunger 64 and a corresponding separation of the springs 59 and 60 is produced, this de-energizing the clutch 20 whereupon rotation of the gear 31 and its associated train is discontinued. The cam 71 is formed with a catch 72 which retains the pin 70 in an outward position against the force of the spring 39, this permitting a continued separation of the springs 59 and 60 and correspondingly permitting the element 40 and the movable means in liaison therewith to reverse in rotation and be restored to their normal positions of rest by reason of the action of the spring 52. It is noted that, when the reverse rotation of the element 40 is checked by the cooperative action of the projection 49 on said element with the abutment 50 (Fig. 7), the reverse rotation of the shaft 32 and of the pin 34 is also arrested, but a continued rotation of the train of gears including the bevel gear 31 is caused by the action of the springs 52 and 39, effecting a reverse relative displacement of the pin 34 in the slot 35 and a release of the pin 70 from the catch 72 and cam 71. The plunger 64 is then retracted by the spring 66 and the springs 59 and 60 close to again energize the clutch 20. Evidently the normal position of rest of all of the gears described is determined by the pin 34 co-acting with one end of the slot 35, as shown in Figs. 3a and 3b.

Means for permitting passage of current through the movable clutch 20 comprise a pair of slip rings 74 and 75 (Figs. 2 and 12), carried by an insulating element secured to the gear 19 on its upper surface. Said slip rings 74 and 75 may be provided with terminals 74a and 75a respectively. Conductors 76 and 77 connect the terminals of the clutch 20 to the slip ring terminals 79a and 79b respectively, said conductors 76 and 77 rotating with the gear 19 and the clutch 20. An insulating plate 82 (Fig. 2) holds a pair of brushes 80 and 81 in operative engagement with the slip rings 74 and 75 respectively. Said plate 82 may be conveniently secured to the post 56. Terminals 80a and 81a for the

brushes 80 and 81 respectively permit connection of lead-in wires 84 and 85.

From the above description it becomes apparent that by proper energization and de-energization of the clutch 20, definite successive movements from a position of rest may be automatically imparted to the finger 46. It is noted that these movements are not in exact identical proportion to the movements of the element 40 by reason of the displacements of the gears 19 to 31 and of the link 45 relative to said element 40 at the instant the latter cooperates with either an abutment 42 or the abutment 50. These relative displacements are however comparatively small so that the movements of the finger 46 are sufficiently accurately proportioned to properly actuate the device 5 for transmittal of telephone numbers, when definite arcuate movements are imparted to the element 40.

In accordance with the invention, means are provided for displacing a telephone number record 44 the distance of an abutment 42 for each successive rotation of the element 40, so as to provide successive rotation limiting actions of abutments 42 with cooperative projections 41. Referring particularly to Fig. 1, the magazine structure 51, which will be later completely described, has an open slot 83 within which the projections 41 of the element 40 are normally free to rotate and the inner end of which forms the aforesaid abutment 50 co-acting with the projection 49 on the element 40 in limiting reverse rotations of the latter.

Said structure 51 so carries a telephone number record 44 as to permit the abutments 42 of said record to be successively positioned within the slot 83 in the path of projections 41 for cooperation therewith, when said record is caused to be displaced.

Said structure 51 is carried by a flat angular bracket 86 having legs secured respectively to one side of the structure 51 and to the base 6. A carriage 87, preferably in the form of an elongated flat strip, has bifurcated ends 87a and 87b slidably held within corresponding slots 89a and 89b (Fig. 4) formed through the side of the structure 51, and is also slidably held by a clamp 90 secured to the supporting bracket 86. The ends 87a and 87b of the carriage 87, when the carriage 87 is caused to move, cooperate with a long edge of a telephone number record 44, assumed to be initially operatively positioned in the structure 51, in displacing said record in the structure 51.

A spring 91, one end of which may be secured to a projection 92 integral with the carriage 87 and the other end of which may be secured to a side bracket 93 fixed to or integral with the bracket 86, cooperates with a pin 94 co-acting with the carriage 87 in retaining the latter in a normal position of rest,

the ends 87a and 87b of the carriage 87 being then still retained within the slots 89a and 89b. Secured to the carriage 87 is a ratchet 95 which cooperates with a pair of pawls 96 and 97 in displacing the carriage 87 and correspondingly displacing abutments 42 within the slot 83 in the path of projections 41. The pawl 96 serves to retain the carriage 87 against the force of the spring 91 when said carriage 87 has been displaced by the pawl 97 by means which will be presently described. The pawl 96 may be pivotally carried by the bracket 86 and is normally held in operative engagement with the ratchet 95 by means of a spring 99 which may be secured at its ends to the pawl 96 and to the clamp 90 respectively. The mechanism actuating the pawl 97 comprises a lever 100 pivotally connected between its ends to a fixed stud 101, which is secured to a support 102. The latter may provide a bearing for the shaft 32 and may be made integral with the stud 25 secured to the frame 14. One end of the lever 100 is pivotally connected to the pawl 97, and its other end 103 cooperates with a recess 104 formed on the upper surface of a wheel 105 which may be secured to or made integral with the gears 29 and 30, so as to rotate with the latter. A spring 107 having its ends secured respectively to the pawl 97 and to the lever 100 normally retains the pawl 97 in operative engagement with the ratchet 95. When the element 40 and the movable means in liaison therewith including the wheel 105 are in their normal position of rest, end 103 of the lever 100 normally rests in the recess 104; but, when said element and wheel are caused to rotate, said end 103 is caused to slide out of the recess 104, this causing an arcuate movement of the lever 100 and permitting the latter in cooperation with the pawl 97 to advance the ratchet 95 and the carriage 87 against the force of the spring 91, thereby advancing the telephone number record 44 the distance of an abutment 42 in the structure 51 and placing an abutment 42 within the slot 83. When said element and wheel are being restored to their position of rest, the lever end 103 slides back into the recess 104, thus restoring the pawl 97 to its original position but advancing same along the ratchet 95 by reason of the action of the other pawl 96 which has retained the ratchet 95 in its displaced position. Thus the lever 100 and the pawl 97 may again advance the ratchet 95 and the carriage 87 when said element 40 and movable means are again rotated. It is noted that the action of the lever end 103 with the recess 104 is such that the carriage 87 is quickly displaced the moment the element 40 starts rotating, a telephone number record abutment 42 being thus quickly displaced into the slot 83 so as to place said abutment in operative position for cooperative action with a forthcoming cooperative projection 41 of

the element 40. By proper design of the mechanism described it is readily seen that a telephone number record 44 may be displaced the distance of an abutment 42 for each successive rotation of the element 40, so that the abutments 42 of said record are successively placed into the slot 83 in the path of a forthcoming cooperative projection 41, this permitting definite arcuate movements to be imparted to the element 40 for proper automatic actuation of the device 5.

In accordance with the invention, means are provided for automatically releasing the carriage 87 to its normal position of rest after completion of successive cooperative actions of projections 41 with abutments 42 of a telephone number record 44. Also, means in cooperation with the usual switch or receiver hook 4, rendering the telephone operative and inoperative to start and end a call, are provided for automatically rendering operative the motor 11 and the clutch 20, which cause the various movements of the apparatus described. Still other means are provided for automatically rendering inoperative said motor 11 and clutch 20 after the device 5 has been actuated for proper transmittal of a telephone number.

Referring particularly to Fig. 1, the shaft 32 has an end projecting outwardly from the aforesaid bracket 93 to which it is rotatably mounted, this end being fitted with a collar 109 revolving with the shaft 32 and to which is secured a pin 110 predeterminedly positioned thereon. A bell crank 111 may be pivotally mounted on a small bracket 112 secured to or formed integral with the bracket 86. Secured to arm 111a of the bell crank 111 is a catch 114, which cooperates with lugs 115 and 116 respectively formed on the pawls 96 and 97 in lifting the latter out of engagement with the ratchet 95. A spring 117, one end of which may be connected to the bell crank 111 and the other end to the bracket 86, cooperates with a pin 119, fixed to the bracket 86, in retaining the bell crank 111 in a normal position of rest, thereby permitting engagement of the pawls 96 and 97 with the ratchet 95. A pin 120 is predeterminedly secured to the outermost end of the carriage 87 so that the last displacement of the carriage 87, caused by the last rotation of the element 40, causes said pin 120 to cooperate with arm 111b of the bell crank 111 in forcing the inclined surface 121, formed on the end of said arm 111b, in the path of the pin 110, thereby causing a swinging action of the bell-crank 111 against the force of the spring 117 and a raising of the pawls 96 and 97 by the catch 114 out of operative engagement with the ratchet 95. When this action occurs, the carriage 87 is substantially instantaneously restored to its normal position of rest by reason of the action of the spring 91.

It is noted that the operation of the bell crank 111 depends on a rotation of the element 40. For a purpose which will be later understood, the operation of the bell crank 111 is caused by a rotation of the element 40 produced after all of the abutments 42 of a telephone number record have co-acted with the element 40. This after-employed rotation of the element 40 is made small so that the corresponding movement of the device 5 by the finger 46 does not result in a transmittal of an electrical impulse. It is noted that a device 5 of the type shown in the drawings must be actuated over an appreciable arcuate length, before an electrical impulse may be transmitted by same, so that proper transmittal of telephone numbers is not impaired by the last movement of the device 5 caused by said after-employed rotation of the element 40. As will be later understood, said after-employed short rotation of the element 40 is checked by a de-energization of the clutch 20, caused by the means, which are to be described, for automatically rendering the motor 11 and the clutch 20 inoperative after a transmittal of a telephone number.

Thus, the checking of this final rotation of the element 40 by a de-energization of the magnetic clutch 20 permits the element 40 and the pin 110 to reverse in rotation and be restored by the spring 52 to their normal position of rest. When this reverse rotation of the pin 110 occurs, the end 121 of the bell crank 111 moves out of engagement with the pin 110, thereby causing a lowering of the catch 114 by reason of the action of the spring 117. The pawls 96 and 97 are then lowered, by reason of the action of the springs 99 and 107, in operative engagement with the ratchet 95 in its position of rest so that the carriage 87 may be again displaced for cooperation with a telephone number record for a succeeding automatic operation of the device 5. Referring particularly to Figs. 4 and 5, the means for rendering the power means including the motor 11 and the clutch 20, controlling the various movements of the apparatus described, automatically operative and inoperative, comprise two switches 134 and 135 both of which control said power means. One switch 134 is automatically closed and opened upon actuation of the switch or receiver hook 4 to start and end a call, respectively. The other switch 135 is automatically closed when actuating the receiver hook 4 to end a call, and is automatically opened after the various movements of the apparatus to automatically transmit a telephone number, including the release of the carriage 87, have taken place.

A vertical rod 136 (Fig. 1), having its upper end formed with a clasp 137, engaging the receiver hook 4 so as to move the same, slidably engages a tubular support 139, se-

cured to the base 6. Said clasp 137 is linked to the rod 136, so that it may be properly connected to and removed from the receiver hook 4 whenever desired. The lower end of the rod 136 projects into the base 6, which is preferably made hollow, and is pivotally connected to the outer end of a crank 140 (Fig. 2). The inner end of the latter is fixedly secured to a shaft 141, rotatably held in place within the base 6 by means of a plurality of brackets 142 secured to the lower surface of the base 6. Fixedly secured to the shaft 141, at a predetermined point, is another crank 144, (Fig. 7), the outer end of which is pivotally connected to a vertical rod 145 extending through the base 6. The upper end of the rod 145 is pivotally connected to a link 146, pivotally mounted on the structure 51 by the pin 147 fixed to one side of said structure, said pin 147 permitting an arcuate motion of the link 146. Said link 146 carries an insulating block 149 to which is secured a spring contact 150 and a terminal 151 for same. Secured to the same side of the structure 51 is a bracket 152 which carries a contact point 153 cooperating with the spring contact 150 in providing the power control switch 134. Said contact 153 is also provided with a terminal 154, said contact 153 and terminal 154 being insulated from the bracket 152 by any suitable means.

The upper end portion of the tubular support 139 is formed with an inner bore 155 of diameter suitably greater than that of the rod 136. A compression spring 156 is positioned in said bore 155 between a collar 157 fixed to the rod 136 and the shoulder 158 formed by the lower end of the bore 155. This spring 156 serves to move the rod 136 upwardly when the receiver 2 is removed from the receiver hook 4, the rod 136 being moved downwardly, by reason of the weight of the receiver 2, against the force of the spring 156, when the receiver 2 is again placed in position on the receiver hook 4. It is noted that the spring arrangement, (not shown), usually associated with a receiver hook 4, assists the function of the spring 156 in raising the rod 136 when the receiver 2 is removed from the receiver hook 4. It is now readily seen that a removal of the receiver 2 from its support 4 causes an upward movement of the rod 145 and of the link 146, thereby automatically closing the contacts 150 and 153. The latter are adapted to control both the operation of the motor 11 and of the magnetic clutch 20, so that, when a telephone record 44 is properly positioned in the structure 51, the apparatus described automatically starts to dial the device 5 for transmittal of a telephone number.

Secured to the back surface of the bracket 86 is an insulating block 157, (Figs. 4 and 5), which carries a spring contact 159 provided with a terminal 159a. Said contact 159 co-

operates with a movable contact 160, which may be provided with a terminal 160a. Said contact 160 and terminal 160a are secured to an insulating block 161 carried by an arcuately movable member 162, the latter together with the contacts 159 and 160 forming the power control switch 135. The member 162 is pivotally mounted on a stud 164 fixed to the bracket 86. The contacts 159 and 160 are frictionally held in engagement with each other against the force of a tension spring 165 one end of which may be connected to the member 162 and the other end to the bracket 86, this holding engagement being insured by providing a recess 163 on the contact 160 into which recess the curved end of the contact spring 159 is adapted to enter as shown in Fig. 4.

A right-angle foot 166, fixed to or integral with the arm 111a of the bell crank 111 at one end thereof, projects through a slot 167 formed through the bracket 86. This foot 166 raises the member 162, thereby causing a disengagement of the contacts 159 and 160, when the arm 111a is caused to be raised by the action of the pin 110 with the inclined surface 121 of the bell crank 111, said spring 165 then functioning to retain the member 162 in raised position. Evidently, the disengagement of the contacts 159 and 160 de-energizes the clutch 20 and permits the element 40 and rotatable means in liaison therewith to be restored to their position of rest. It is readily understood that the action of the pin 110 and bell crank 111, which depends on a last rotation of the element 40, is to first release the carriage 87 to its position of rest, and then open the contacts 159 and 160, thereby limiting this last rotation of the element 40. By proper design of the pin 110 and inclined surface 121 cooperating therewith, the opening of the contacts 159 and 160 and corresponding de-energization of the clutch 20 are caused to occur after only a short rotation of the element 40. The movement of the device 5 corresponding to this last short rotation of the element 40 is thus also small and less in magnitude than that definite movement which the device 5 requires before it may transmit an electrical impulse, so that proper transmittal of a telephone number is not affected by this last rotation of the element 40. It is noted that the ratchet 95 and carriage 87 are displaced, by reason of the quick action of the lever 100 with the wheel 105, before the action of the pin 110 with the bell crank 111 takes place, this last displacement of the carriage 87 being useful for a purpose which will be understood in the later description.

Referring particularly to Figs. 4 and 5, the link 146 carries a foot 169 which lowers the switch member 162 from a raised position, thereby causing re-engagement of the contacts 159 and 160, when said link 146 is

caused to be moved downward against the force of the spring 155 by reason of a downward movement of the receiver hook 4, as by a positioning of the receiver 2 thereon upon a completion of a call. Thus, assuming the switch 135 to be closed, a removal of the receiver 2 to start a call closes the switch 134, thereby automatically rendering the motor 11 and the clutch 20 operative, so that an automatic actuation of the device 5 is immediately started. After a telephone number has been automatically dialed, said motor 11 and clutch 20 are rendered automatically inoperative, thereby stopping the movements of the apparatus described, by reason of the opening of the switch 135. When the receiver 2 is again positioned on the receiver hook 4 after the particular call has been made, the switch 135 is placed automatically in a normally closed position by the foot 169, so that the apparatus is adapted to automatically start functioning when the receiver 2 is again removed for making a succeeding call.

Another power control switch 189 (Fig. 2) serves to render the apparatus inoperative in case it is desired to dial the finger-wheel 5 manually, and is conveniently located on the base 6 for manual operation.

Referring to the wiring diagram, shown in Fig. 16, the motor 11 is placed in series with the control switches 134 and 135 by a conductor 190, said motor and switches being electrically connected to the switch 189 controlling the source of energy 191. One brush 80, in electrical connection with a terminal of the clutch 20 through the slip ring 74, is electrically connected by a conductor 84 to the conductor 190 and thus through the switches 134 and 135 to one side of the switch 189. The other brush 81, in electrical connection with the other terminal of the clutch 20 through the slip ring 75, is connected by a conductor 85 to the spring contact 60. The spring contact 59 cooperating with the contact 60, is electrically connected to the other side of the switch 189 through a suitable resistance 192.

Thus, when the switch 189 is closed, a closing of either of the switches 134 or 135, when the other is closed, renders both the motor 11 and the clutch 20 operative, and an opening of either of the switches 134 or 135, when the other is closed, renders both the motor 11 and the clutch 20 inoperative. Also, assuming all three switches 189, 134 and 135 to be closed, an opening of the contacts 59 and 60 by action of the plunger 64 de-energizes the clutch 20, but permits the motor 11 to continue revolving, so that, upon reclosing of the contacts 59 and 60 again by action of the plunger 64, the rotary movements of the element 40 and of the finger 46 actuating the device 5 are substantially instantaneously started.

In accordance with the invention, means are provided for automatically placing in succession a plurality of telephone number records 44 into operative position for cooperation with the apparatus described, for the purpose of calling a plurality of parties one after the other; means are provided for facilitating manual positioning of any of said telephone number records, out of rotation, in operative position for proper cooperation with the apparatus described.

Referring particularly to Figs. 4, 5, 6, and 7, the structure 51 comprises two containers or magazines 170 and 171, rectangular in cross-section, and preferably contiguous to one another. The structure 51 may be formed as a unit with a vertical partition 172 so positioned as to divide the structure 51 into two compartments forming the containers 170 and 171. The latter are made open at the top and closed at the bottom.

A telephone number record 44 is made for each telephone number which it is desired to transmit automatically. Referring to Fig. 14, these telephone number records, preferably made of metal, have legs 174 and 175 formed at extreme ends of the short edge on which the abutments 42 are formed, these legs 174 and 175 permitting the abutments 42 to be properly spaced with relation to the parts of the apparatus with which they function. The records 44 are preferably provided with indications 173a of the parties and their telephone numbers, which indications are affixed to the front faces of said records. If desired, tabs 173b may be so positioned respectively on the top edges of the records 44 that they may all be visible when the records are placed in stacked relation, manual removal of any particular record out of the stack being thus facilitated.

The container 170, serves to hold the records 44 in stacked relation with their legs 174 and 175 resting against the bottom thereof before automatic transmittal of their numbers, and the container 171 serves to store the records 44 after automatic transmittal of their numbers, the tabs 173b, if provided, being visible and permitting easy removal of any of the records from the respective containers. Both containers 170 and 171 have resilient means 178 (Fig. 7), holding the telephone number records in stacked and indexed relation against the front end of the containers. These resilient means 178 may each comprise a spring arrangement 176, operatively associated with lazy-tongs 177, one end of which may be secured to the back wall 179 of the structure 51 and the other end secured to a plate 180 bearing against the records 44. The record contiguous to the front end of the container 170 is in the plane of the carriage 87, and is transferred by the carriage 87 from the container 170 into the container 171 through a passage or slot 181 (Fig.

6), formed in the plane of the carriage 87 by spacing the partition 172 from the front end of the structure 51. This transfer is effected by cooperative action of the ends 87a and 87b of the carriage 87 with the adjacent long edge of said foremost record when the carriage is caused to be successively displaced, the abutments 42 of said record successively passing by the slot 83 formed in the front end of the structure 51. The front wall of the containers 170 and 171 are preferably provided with openings which expose to view the front face of the record to be or being transferred, so as to make known to the operator the party to be or being called.

Referring to Fig. 5, the bottom of the container 170 is in a plane above the plane of the bottom of the container 171, the records in the container 170 projecting above its open end. The bottom of the container 170 (Fig. 7) terminates a substantial distance from the front wall of the container so as to provide a slot 182 which is in the plane of the slot 181 and of the carriage 87. The forward end of the bottom of the container 170 carries a depending wall 184 which is spaced from the lower or depending portion 184a of the front wall of the container a distance equal to the width of the slot 182, the walls 184 and 184a being connected at their lower ends by a bottom section 183 so as to form a pocket or sub-container 188 into which the foremost records are successively projected through the slot 182 in a manner and by means herein-after described. The slot 83, hereinbefore referred to, is formed by cutting away the contiguous walls 184 and 184a of the pocket or sub-container 188 adjacent the partition 172. It is to be noted that the bottom section 183 of the sub-container is in horizontal alignment with the bottom of the container 171, so as to permit unobstructed passage of the successive foremost records from the sub-container 188 to the container 171 through the slot 181; and it is to be also noted that the successive foremost records are prevented by friction from dropping through the slot 182.

It now becomes apparent that the successive foremost records in the container 170, when lowered into the sub-container 188, are initially positioned for proper cooperation with the element 40 as well as with the carriage 87, in which position the leg 174 of a record is located within the slot 83.

Assuming the foremost record in the container 170 to be initially positioned for proper cooperation with the carriage 87 and with the element 40, an actuation of the receiver hook 4 to start a call starts the functioning of the apparatus, the carriage 87 displacing the leg 174 of said front record into the container 171 and displacing its first abutment 42 into the slot 83 for cooperation with the first rotation of the element 40. Abutments 42 of said front record are then successively

displaced into the slot 83, for cooperation with the element 40, while said front record is simultaneously being transferred into the container 171.

5 Upon complete transfer of a record by the carriage 87 into the container 171, the resilient mechanism 178 in the container 170 acts to displace the remaining records in the container 170 toward the front end of the latter, this forward displacement of the remaining records only taking place after the carriage 87 has been released to its normal position of rest. Thus, the resilient mechanism 178 in the container 170 serves to place the records in said container, one after the other, contiguous to its front end and in the plane of the carriage 87 and slot 182. To permit the telephone number records to be successively stored in the container 171, a resilient strip 185 bears against the records in said container 171, so as to cause them to be properly displaced a suitable distance toward the back end of the container 171 against the force of the resilient mechanism 178 in the container 171, after a record has completely passed the slot 181 and has thus been completely displaced into the container 171. The resilient strip 185 may be conveniently secured to the outer side of the container 171, and is so curved at its free end that, by reason of its yielding action, it permits transfer of a record between it and the preceding records which have been stored.

It is noted that a rotation of the element 40 causes a displacement of an abutment 42 which limits this same rotation of the element. Thus, after all of the abutments 42 of a record have successively limited the rotations of the element 40, the last abutment 42 is still in the slot 83. Consequently, two further rotations of the element 40 are needed to cause the carriage 87 to completely displace the record from the container 170 into the container 171 for storage in the latter, the first of these two after-employed rotations of the element displacing the last abutment 42 out of the slot 83 and the second displacing the leg 175 out of said slot 83. The first of these two after-employed rotations of the element 40 may be checked by the action of a projection 132, (Fig. 7), formed on the element 40, on the leg 175 of a record, said leg 175 being positioned in the slot 83 by reason of said first after-employed rotation of the element 40. Said projection 132 is formed prior to the projections 41 in the direction of advance of the element 40, so that the movement of the device 5 caused by this first after-employed rotation of the element 40 is less than the definite movement required for transmittal of an electrical impulse, proper transmittal of telephone numbers being thus unimpaired. The last after-employed rotation of the element 40, causing complete transfer of a record for storage in the con-

tainer 171, is checked by the demagnetization of the clutch 20, caused by the opening of the switch 135 as has already been explained. It is noted that this final rotation of the element 40 first causes the final displacement of the carriage 87, then the release of said carriage, and finally the opening of the switch 135. It is evident that, by making the leg 175 of a telephone number record of such small width as to be incorporated within the last abutment 42 of said record, only one after-employed rotation of the element 40 is then needed to store said record in the container 171. This single after-employed rotation of the element 40 may be checked by the demagnetization of the clutch 20 by reason of the opening of the switch 135.

Referring particularly to Figs. 1 and 4, the end of the link 146 is formed with a finger 186, which cooperates with the top edge of a front record in the container 170, initially held by friction in its upper position, in lowering said record to the bottom 183 of the sub-container 188, when the receiver hook 4 is actuated to end a call, thereby initially positioning said record for proper cooperation with the apparatus described. Thus, when the receiver hook 4 is again lifted to start a call, the apparatus automatically starts to dial the telephone number corresponding to the record which has been operatively positioned by the finger 186 at the end of the preceding call.

Thus, the apparatus described automatically transmits in succession the telephone numbers of various parties, for the purpose of calling these parties one after the other, with the only manual labor involved being the raising and lowering of the receiver 2 off and on the receiver hook 4, to start and end each call, all of the telephone number records provided for these various parties being successively transferred from the container 170 into the container 171 for storage therein. If it is desired to call a certain party out of rotation, its corresponding record may be manually removed from either stack of records in the containers 170 and 171, the front record in the container 170 is caused manually to slide upwardly out of the slot 182, manual pressure is exerted through the front opening of the container 170 on the stack of records in said container against the force of the resilient device 178, and the removed record placed ahead of the front record in the container 170.

Since the number of required actuations of a device 5 for transmittal of telephone numbers may vary, means are provided to adapt the apparatus for general use with relation to said variation in the number of required actuations of the device 5.

Referring to Fig. 14, the telephone number record shown is formed with seven abutments 42 causing seven transmittals of electrical

impulses by the device 5 for a complete transmittal of the particular telephone number corresponding to this record. The width of the latter, however, is such that its lower edge may accommodate a greater number of abutments, say nine. After the abutments 42 of the record shown have all successively cooperated with the element 40, further rotations of the element 40 are needed to cause the complete transfer of the record into the container 171 due to the presence of the edge portion 187 of the record, non-useful for transmittal of electrical impulses by the device 5. The edge portion 187 of a record may be utilized in limiting said further rotations of the element 40. The edge portion 187, by proper construction of the records 42 and of the apparatus described, may be formed in horizontal alinement with the bottom edges of the legs 174 and 175. Thus, the edge portion 187 cooperates with the projection 132 in checking the aforesaid needed rotations of the element 40 to transfer a record. These rotations of the element 40 are less in magnitude than the rotation which causes the device 5 to transmit an electrical impulse, so that proper transmittal of telephone numbers is not interfered with. When a record, constructed as shown in Fig. 14, is employed, the element 40 successively rotates seven times to actually transmit the telephone number, then rotates once to displace the last abutment 42 out of the slot 83, then successively rotates twice to displace the edge portion 187 out of the slot 83, then rotates once to displace the leg 175 out of the slot 83 and finally store the record in the container 171, this final rotation being checked by the opening of the power control switch 135.

From the above description, it is apparent that, by proper design of the apparatus described, telephone numbers requiring different numbers of actuations of the device 5 for transmittal of electrical impulses, may be automatically transmitted without altering any of the parts of said apparatus.

In accordance with the invention, the means for recording the telephone numbers dialed automatically, include a typewheel 194 (Fig. 1) longitudinally movable along, but fixedly rotatable with, the shaft 32 by means of a slot and key arrangement 195 (Figs. 1 and 8). The aforesaid foot 92, formed on the carriage 87, cooperates with a collar 196, fixed to the typewheel 194, in displacing the latter longitudinally along the shaft 32, when the carriage 87 is displaced. Secured to the bracket 86, at opposite edges thereof, are the aforesaid side-bracket 93 and the side bracket 197, both of said side-brackets being spaced from one another and set at right angles to the bracket 86. These brackets 93 and 197 carry fixed bearings 199 and 200 for mounting therein of the shaft 32, the typewheel 194

being movable partially within the space between said brackets 93 and 197. The bracket 86 is formed with a rectangular opening 201, as best seen in Fig. 8, so located as to permit proper movement of the typewheel 194, a portion of which extends through said opening. The purpose of this opening 201 will be understood in the later description. It is seen that successive rotations of the element 40 to actuate the device 5 impart corresponding rotations to the typewheel 194. The latter has type figures formed on its periphery, preferably corresponding to the figures usually associated with the openings 54 of a finger wheel 5. These type figures are so positioned that they cooperate with a printing mechanism, actuated at the instant that a projection 41 of the element 40 co-acts with an abutment 42 of a telephone number record 44, in printing on a record sheet 204 the figures corresponding to the successive actuations of the device 5. It is understood that the first few printed figures on the record sheet 204 given an indication of the telephone offices or exchanges to which the called parties are connected, the printed records on the sheet 204 thus giving a complete indication of the telephone numbers automatically transmitted.

In the embodiment of the invention shown in the drawings, the printed mechanism referred to comprises a hammer 202, (Fig. 2), operated by a solenoid mechanism 203 (Fig. 9) which is successively energized at the instant that abutting actions of projections 41 of the element 40 with abutments 42 of a telephone number record 44 take place. The paper ribbon 204 is operatively positioned between the hammer 202 and the typewheel 194, and is fed under tension therebetween in a direction perpendicular to the axis of the shaft 32 from the paper roll 205 (Figs. 1 and 8) to a take-up reel (not shown in the drawing). Said paper roll 205 is removably carried by a pin, supported parallelly to the axis of the shaft 32 by brackets 206 and 207. The latter may be fixed to the bracket 86. The paper 204 is at all times properly positioned with relation to the typewheel 194 and the hammer 202 by two pairs of cooperating rollers 209, 210, and 211, 212, (Fig. 8), placed respectively below and above the typewheel 194, the paper ribbon 204 being fed between the rollers of each pair and from pair 211, 212 to the take-up reel (not shown). These two pairs of rollers are rotatably mounted respectively on the supports 214 and 215, which may be secured to or integral with the bracket 86.

A typewriter ribbon 213 is operatively positioned between the paper ribbon 204 and the typewheel 194 perpendicularly to the edges of the paper ribbon 204, by means of two open slots 291 and 292 (Fig. 2), formed in the plates 197 and 93 respectively, said slots

291 and 292 permitting operative positioning and removal of the typewriter ribbon 213. The latter is led from a reel 294, (Fig. 2) rotatably mounted on a bearing support 297, fixed to or integral with the bracket 197 on its outer surface, through the slots 291 and 292, to a tension or take-up reel 296, (Figs. 2 and 10), rotatably mounted on a bearing support 298, fixed to or integral with the bracket 93 on its outer surface. Means, which will be later described, are provided for automatically displacing the paper ribbon 204 for proper recording thereon of successive telephone numbers and of the times at which the calls are started and ended; these means, as will be understood, also serve to properly displace the typewriter ribbon 203. Preferably, two small rollers 299 and 300 are provided for proper alinement of the ribbon 213 within the slots 291 and 292 and for cooperation with said ribbon 213 when it is caused to be displaced. These rollers may be rotatably mounted on suitable brackets, 303 and 303', fixed to or integral with the side brackets 93 and 197 respectively.

The width of the hammer 202 and of the paper 204 are such that the hammer 202 successively cooperates with the typewheel 194, as the latter is moved longitudinally along the shaft 32 by the carriage 87, in printing a record of a telephone number perpendicularly to the edges of the paper 204, as illustrated in Fig. 15, the paper 204 being held stationary when such recording takes place.

To the inner side of plate 197 is mounted the solenoid mechanism 203 (Fig. 9) comprising a solenoid 216, co-acting with a plunger 217, operating a bell crank 219, pivoted to the post 223. The latter carries a pivoted arm 220, which cooperates with the hammer 202 through a mechanism which will be presently described.

Referring to Figs. 2 and 9, a hammer supporting strip 221 is mounted parallel to the shaft 32 between the plates 93 and 197 and may be secured to the latter. Said strip 221 has two openings for slidably mounting therein of a pair of pins 222 and 224, fixed to the hammer 202 and to a connecting member 225, the latter carrying a cap 226 co-acting with the arm 220. The pins 222 and 224 are provided with springs 227 and 229, which normally hold the hammer 202 out of operative engagement with the paper ribbon 204.

Referring to Fig. 9, a spring 230 has one end connected to a post 231, fixed to the plate 197, and the other end to a pin 232, fixed to the bell-crank 219. The spring 230 cooperates with a post 234 also fixed to the plate 197 in retaining the mechanism in a normal position of rest. The pivoted arm 220 is adapted to be held against the pin 232 by means of a spring 235, which may be connected respectively to said arm 220 and

to the bell crank 219. Thus, an energization of the solenoid 216 causes the arm 220 to pass, in its travel, in cooperative engagement with the cap 226, thereby causing a movement of the hammer 202 on the paper 204 against the force of the springs 227 and 229. Immediately after passage of the arm 220 past the cap 226, the hammer 202 is restored to its normal position of rest, by reason of the springs 227 and 229; and upon de-energization of the solenoid 216, the arm 220 again travels past the cap 226 but without moving the latter by reason of its pivotal connection, the springs 227 and 229 exerting a greater force than the spring 235. A post 236, fixed to the plate 197, may cooperate with the bell crank 219 in limiting the inward movement of the plunger 217 and the operative movement of the crank 219.

From the above description, it is clear that both the recording movement and release of the hammer 202 occur during a very short interval of time, so that the hammer 202, when the solenoid 216 is energized by means which will be presently described, may properly record on the paper 204 at the instant the typewheel 194 reaches the end of its forward rotary movement, and that the de-energization of the solenoid 216 will not cause any recording action of the hammer 202.

Referring particularly to Fig. 3, means for successively energizing and de-energizing the solenoid 216, for successive recording actions of the hammer 202, include a spring contact 237, which may be held on the aforesaid insulating block 61. Said spring contact 237 cooperates with the aforesaid spring contact 59 in establishing and interrupting a circuit through the solenoid 216, by reason of the action of the plunger 64 and cap 65 attached thereto, the contact springs 59 and 237 being adapted to be held normally out of contact when the element 40 is in its normal position of rest. Said spring contact 237 may be provided with a terminal 237a for connection thereto of a lead-in wire 239. Referring to the wiring diagram (Fig. 16), the spring contact 237 is connected by the wire 239 to a terminal of the solenoid 216, the other terminal of which is connected by a wire 240 to the wire 84 leading to the control switches 134 and 135. A circuit is thus established and interrupted through the solenoid 216, when the clutch 20 is caused to be respectively de-energized and energized, by reason of the action of the mutually cooperating contact spring 59 on the contact springs 237 and 60.

It is now readily seen that, with the springs 59 and 237 normally spaced, a rotation limiting action of a projection 41 of the element 40 with an abutment 42 of a telephone number record 44 causes the plunger 64 to substantially simultaneously demag-

netize the clutch 20 and energize the solenoid 216, the hammer 202 then acting to record the figure corresponding to said rotation limiting action of a projection 41 with an abutment 42 at substantially the instant the rotary movement of the type-wheel 194 is correspondingly arrested. Upon the reverse rotation of the element 40, the solenoid 216 is still energized but does not cause any recording of figures. Upon the element 40 being restored to its position of rest, the solenoid 216 is de-energized by reason of the action of the plunger 64 retracting in the tubular portion of the shaft 32, thereby permitting the movable parts of the mechanism 203 to be restored to their normal position of rest, without causing any recording of figures by reason of the action of the pivoted arm 220, so that said mechanism 203 is replaced in condition to be again energized to properly record a figure corresponding to a succeeding rotation limiting action of a projection 41 with an abutment 42.

Since the rotary movements of the type-wheel 194 are exactly proportional to those of the element 40, the type figures on said wheel 194 may be so positioned that the aforesaid after-employed rotations of the element 40, required to properly transfer a telephone number record in the magazine 171 for storage and limited by the aforesaid projection 132 co-acting with an edge 187 and the leg 175 of said telephone number record, do not cause any recording of figures. It may be noted that the final rotation of the element 40 which is limited by the final demagnetization of the clutch 20, caused by an opening of the power control switch 135, does not result in an energization of the solenoid 216.

In accordance with the invention, means are provided for recording the times at which the receiver hook 4 is actuated to start and end a call, for the purpose of indicating the times at which calls are made and the duration of same.

Referring particularly to Figs. 1 and 2, typewheels 241, 242 and 244, having formed on their periphery figure types indicating hours, minutes, and seconds, respectively, are loosely carried by the shaft 32, so as to be rotatable relatively to said shaft. These wheels 241, 242 and 244 are operatively positioned with the aforesaid typewheel 194 within the space between the side-brackets 93 and 197 and extend through the aforesaid opening 201 formed through the bracket 86. To the wheels 241, 242 and 244 are fixedly secured, respectively, gears 245, 246 and 247 (see particularly Fig. 2). The latter serve to actuate their respective type-wheels by reason of a clock mechanism 249 (Fig. 8), (not shown in detail), in lison with said gears. The clock mechanism 249 may be conveniently secured to the back surface of the bracket 86,

the opening 201 permitting its connection with the gears 245, 246 and 247. The clock mechanism 249 is such that the type-wheels 241, 242 and 244 are caused to rotate continuously, and, preferably, typewheel 241 is caused to rotate once every twenty-four hours, typewheel 242 once every hour and typewheel 244 once every minute.

Referring to Figs. 2 and 8, the time type-wheels described are operatively positioned with relation to the paper ribbon 204, the type writer ribbon 213 and to a hammer 250 movably mounted on the aforesaid hammer supporting strip 221, the width of said hammer 250 being such that it will co-act at the same time with all three time type-wheels to properly produce time records on the paper 204. A pair of pins 251 and 252, fixed to the hammer 250, slidably engage corresponding openings formed in the strip 221. An intermediate pin 254, also secured to the hammer 250, projects through a corresponding opening formed in the strip 221, its projecting end being formed with a cap 255. Said pin 254 is provided with a spring 256, which normally retains the hammer 250 out of cooperative action with the time type-wheels, the aforesaid pins 251 and 252 preventing arcuate displacement of the hammer 250.

Referring to Fig. 8, the aforesaid cap 255 cooperates with a solenoid mechanism 203' which is identical to the solenoid mechanism 203 already described. This mechanism 203' may be conveniently mounted on the inner face of the aforesaid plate 93. For the purpose of brevity, the mechanism 203' will not be described, corresponding numerals, primed, being employed in connection with the mechanism 203' to indicate parts corresponding to identical parts of the mechanism 203. It may be well to note that the operation of the mechanism 203' is similar to that of the mechanism 203, to effect instantaneous recording movement and release of the hammer 250 and to prevent actuation of the hammer 250 when the solenoid 216' is de-energized.

Means for both energizing and de-energizing the solenoid 216' are provided to cause a movement of the hammer 250 on the paper 204 when the receiver hook 4 is either raised or lowered to start and end a call. Referring to Fig. 11, these means include a pair of spring contacts 257 and 259 which may be mounted on an insulating collar 260 fixed to the aforesaid tubular support 139. The contacts 257 and 259 extend within slots 261 and 262, formed through said support 134, but do not contact with any part of the support 134. A contact collar 264 is fixedly held on an insulating portion 265 of the aforesaid rod 136. Said collar 264 travels temporarily in contact with, but past the inner ends of, the contacts 257 and 259, thereby temporarily short-circuiting the same, during either an

upward or downward movement of the rod 136 caused by either a raising or a lowering of the receiver hook to start or end a call. The springs 257 and 259 slidably engage the insulating portion 265 of the rod 136 for any position of the latter except when in contact with the collar 264. The springs 257 and 259 may be provided with terminals 257a and 259a for connection thereto of lead-in wires. Referring to the wiring diagram (Fig. 16), one spring contact 257 is electrically connected to one side of the switch 189, and the other spring contact 259 is electrically connected through the solenoid 216' and the resistance 192 to the other side of the switch 189. From the above description, it is seen that the solenoid 216' is first energized to move the hammer 250 on the paper 204, and thereafter deenergized as the receiver hook 4 is raised to start a call, and that the solenoid 216' is first energized to move the hammer 250 on the paper 204, and thereafter deenergized, as the receiver hook 4 is lowered to end a call, the first movement of the hammer 250 being to record the time at which a call starts and the second movement of such hammer being to record the time at which such call is completed. The hammer 250, it is noted, is quick in its printing action, it being caused to recede substantially instantaneously after it has been tripped by the arm 220', so that proper time records are made in cooperation with the revolving type wheels 241, 242 and 244.

In the embodiment of the invention shown in the drawings, the recorded telephone numbers 266 (Fig. 15), are positioned on the paper 204 in horizontal alinement with the recorded times 267 at which the calls are started; and the recorded times 269 at which the calls are completed are positioned below the time records 267. Thus, the paper 204 is displaced twice during one operation of the apparatus described to make a call. One displacement is caused to occur after a record 269 is made of the time at which a call is ended, i. e. just before the receiver hook 4 has been completely moved to end a call, and the other displacement is caused to occur just after a telephone number has been recorded.

Referring particularly to Fig. 10, the shaft 141 has perpendicularly fixed thereto a crank 270 to the end of which is pivotally linked a rod 271. The latter extends through the base 6, is vertically and slidably mounted in a tubular support 272, fixed to or integral with the base 6, and may also be slidably disposed in a tubular guide 313, forming part of the bracket 303' which carries the aforesaid roller 300. The aforesaid cranks 140 and 270 (see Fig. 2) are so positioned relatively to the shaft 141 that a downward movement of the rod 136, by reason of a lowering of the receiver hook 4 to end a call, raises the rod 271.

A pawl 274 is resiliently connected to the

upper end of the rod 271. Said pawl 274 cooperates with a ratchet wheel 275, fixedly secured to the shaft 276 of the aforesaid roller 211 at one end thereof, in causing an arcuate displacement of said roller 211 when the rod 271 is caused to be moved to an upper position by reason of an actuation of the receiver hook 4 to end a call. Suitable means are provided for producing compression between the paper engaging portions of the rollers 211 and 212 so that the action of the pawl 274 and ratchet 275 causes arcuate displacement of both rollers 211 and 212 and thus a displacement of the paper 204. In the drawings these means comprise springs 277 acting on the ends of the shaft 278 of roller 312, said ends being held in the slots 279 formed in the two brackets 215 supporting the rollers 211 and 212.

The apparatus is so designed that during the movements of the rod 136 and of the rod 271 by reason of a lowering of the receiver hook 4 to end a call, the contact 264 (Fig. 11) comes in contact with the springs 257 and 259 before the pawl 274 engages the ratchet wheel 275. Thus, the solenoid 216' operating the time-record-hammer 250 is energized before a displacement of the paper 204 by the ratchet wheel 275 takes place. This and the quick action of the hammer 250 makes possible proper recording of the times at which the receiver hook 4 is being lowered to end calls made. Preferably, however, a dash-pot 280 (Fig. 13) is provided to slow the movements of the rods 136 and 271 when lowering the receiver hook 2 to end a call, the increased duration of the movements of the rod 136 and parts connected thereto when either starting or ending a call evidently not impairing proper operation of the apparatus described. This dash-pot 280 may be conveniently secured to the base 6, and is operated by the movable plunger 281, pivotally connected to the end of a crank 282, fixedly secured to the shaft 141.

It is noted that upon raising the receiver hook 4 to start a succeeding call, the rod 271 is moved to its lowermost position of rest, thereby disengaging the pawl 274 from its cooperating ratchet-wheel 275 so that the paper 204 may again be displaced when lowering the receiver hook 4 to end that call.

The means for causing displacement of the paper 204 just after a telephone number has been recorded include a foot 284 (Figs. 1 and 8), fixedly secured to the arm 111a of the bell crank 111. When the arm 111a is raised by reason of the last displacement of the carriage 87, this foot 284 acts to raise a vertical rod 285 slidably held in a vertical position by a support 286; the latter may be fixed to or made integral with the bracket 86. The lower end of the rod 285 seats against the foot 284 at all times, and a pawl 287, resiliently mounted on the upper end of the

rod, 285, cooperates with a ratchet-wheel 289, secured on the other end of the roller shaft 276 opposite to that carrying the ratchet wheel 275. Thus, when the arm 111a is raised, the pawl 287 produces arcuate displacements of the roller wheels 211, 212 and hence a displacement of the paper 204, it being noted that the raising of the arm 111a by reason of the action of the bell crank 111 with the pin 110 occurs after a telephone number has been automatically transmitted and recorded. A spring 290, located between a collar 293 fixed to the rod 285 and the lower end of the support 286, acts to restore the rod 285 to its lower-most position of rest, when the bell crank 111 has been restored to its lower-most position of rest by the final reverse rotation of the element 40 to its position of rest. This disengages the pawl 287 from its coacting ratchet-wheel 289 and properly positions it for again displacing the paper 204 after a succeeding telephone number has been transmitted and recorded.

From the above description it is readily seen that the paper 204 is already operatively positioned for proper recording thereon before the receiver hook 4 is raised to start a call. When a call is made, a time record is made of the time at which said receiver hook is raised; the telephone number is then transmitted and simultaneously recorded in alignment with said starting time record; the paper 204 is then displaced, before the driving power of the apparatus is interrupted; and the lowering of the receiver hook to end the call causes both a record to be made, below the starting time record, of the time at which the receiver hook is lowered, and also a displacement of the paper 204 to properly position it for recording thereon when the succeeding call is made.

Referring to Fig. 1, means for displacing the typewriter ribbon 203 include a bevel gear 301 fixed to the outer end of the roller shaft 276. A second bevel gear 302, meshing with the bevel gear 301, is fixed to a vertical shaft 304 rotatably mounted at its upper end in a bearing support 305 fixed to or integral with the bracket 86. The shaft 304 is also rotatably mounted at its lower end in a bearing support 314, which forms part of the aforesaid supporting bracket 303'. A gear 305 is fixedly secured to the shaft 304 and meshes with a gear 306 fixedly secured to the take-up reel 296. Thus, the take-up reel 296 is movable with the roller 211 by means of the train of gears 301, 302, 305 and 306, and the actions of the rods 271 and 285, producing displacements of the paper 204, also produce simultaneous displacements of the typewriter ribbon 213.

The principle of the invention has been described and exemplified by combinations of elements and mechanisms which are a satisfactory embodiment of the invention, but it is

understood that this embodiment is merely illustrative and that the invention may be carried out in other ways.

I claim:

1. For use in operative association with a telephone apparatus including a telephone, a switch to render the telephone operative to start a call and a device for manual transmittal of telephone numbers, an apparatus comprising driven means operative to move said device to automatically transmit a telephone number, driving means to automatically actuate said driven means, and means cooperating with said switch to automatically start said driving means operating upon moving the switch to start a call.

2. For use in operative association with a telephone having a finger-wheel for manual dialing of telephone numbers, a receiver and a receiver hook, an automatic telephone number transmitting apparatus comprising means to dial the finger-wheel and means co-operating with said receiver hook to automatically start and stop said first-mentioned means operating respectively upon raising the receiver off the hook to start a call and upon automatic dialing of the finger-wheel.

3. For use in operative association with a telephone apparatus including a telephone and a device for transmittal of telephone numbers, an apparatus comprising means operating said device to automatically transmit telephone numbers, and means cooperating with the first-mentioned means for recording the characters of the called telephone numbers as the latter are transmitted.

4. For use in operative association with a telephone apparatus including a telephone, a switch to render the telephone operative and inoperative to start and end a call and a device for manual transmittal of telephone numbers, an apparatus comprising means operating said device to automatically transmit a telephone number, means cooperating with the first mentioned means for recording the characters of the called telephone numbers as the latter are transmitted, and means co-operating with the first mentioned means for recording the time at which the switch is moved to start a call and the time at which the switch is moved to end a call.

5. An apparatus for attachment to a telephone having a device for manual transmittal of telephone numbers including a finger wheel, comprising means operating said device to transmit telephone numbers automatically, including an actuating finger adapted for quick connection to and disconnection from said finger wheel whereby said number-transmitting device may be rendered automatically operable, on the one hand, and conditioned, on the other hand, to permit manual transmittal of telephone numbers.

6. An apparatus for attachment to a telephone having a finger-wheel for manual

dialing of telephone numbers, comprising a mechanical finger cooperating with said finger-wheel, means for moving said finger to dial a telephone number automatically, and means for holding said finger normally out of engagement with the finger-wheel to permit manual operation of the latter.

7. An apparatus for attachment to a telephone having a device for transmittal of telephone numbers, comprising actuating means to successively operate said device to automatically transmit in succession the telephone numbers of a plurality of parties, selector devices corresponding to the telephone numbers of a plurality of parties and controlling the operation of said actuating means, and translating means for moving successive selector devices into controlling position upon the completion of successive party calls.

8. For use in operative association with a telephone having a switch to render the telephone operative and inoperative to start and end a call and a device for transmittal of telephone numbers, an apparatus comprising means to successively operate said device to automatically transmit a plurality of telephone numbers in succession and motor-actuated means controlled by said switch and co-operating with the first-mentioned means to transmit a number each time the switch is moved to start a call.

9. In combination with an impulse transmitting device, an apparatus for automatic operation of said device comprising a rotatable element having a series of projections, a record having abutments predeterminedly formed thereon to cooperate with corresponding projections of said element, means to displace said element and said record for successive cooperative actions of projections with abutments, and movable means connecting said element to said device.

10. For use in operative association with a telephone having a finger-wheel for manual dialing of telephone numbers, an automatic dialing apparatus comprising a rotatable element adapted to be held normally inoperative and having a series of projections, a record having abutments to cooperate with corresponding projections of said element, means to successively rotate said element from its normal inoperative position, means to displace the record the distance of an abutment for each successive rotation of the element, means to successively arrest the rotation of the element upon successive cooperative actions of projections with abutments, means to restore the element to its normally inoperative position after each rotation of the element and means in liason with said element to move said finger-wheel in accordance with the movements of said element.

11. For use in operative association with a telephone having a switch to render the tele-

phone operative and inoperative to start and end a call and a movable device for transmittal of telephone numbers, an apparatus for automatic operation of said device, comprising a rotatable element adapted to be held normally inoperative and having a series of projections, a record having abutments to cooperate with corresponding projections of said element, means to successively rotate said element from its normally inoperative position, means to displace the record the distance of an abutment for each rotation of the element, means to arrest the rotation of the element upon each cooperative action of a projection with an abutment, means to restore the element to its normal position of rest, means to impart movements to the device corresponding to the movements of the element, means automatically rendering the apparatus operative when actuating said switch to start a call, and means automatically rendering the apparatus inoperative after the device has been automatically operated to transmit a number.

12. For use in operative association with an impulse transmitting device, an apparatus for automatic operation of said device comprising a movable element having a series of projections, a record having abutments predeterminedly formed to cooperate with corresponding projections of said element, a container for said record before automatic transmittal of impulses, another container for storing said record after transmittal of impulses, means to progressively transfer said record from said first container into said second container and successively displace the element for successive cooperative actions of projections with abutments, and movable means connecting said element to said device.

13. For use in operative association with a telephone having a movable device for transmittal of telephone numbers, an apparatus for automatic transmittal of a plurality of telephone numbers comprising a movable element having a series of projections, a plurality of telephone number records each having abutments predeterminedly formed to cooperate with projections of said element to impart definite movements to said element, a container to store said records before automatic transmittal of their numbers, a second container to store said records after automatic transmittal of their numbers, means providing successive cooperative actions of the element with a record, means to transfer a record from said first container into said second container, means to place the records in said first container successively in operative position for cooperative action with the element and for transfer into said second container, and movable means connecting said element with the device.

14. For use in operative association with

a telephone having a movable device for transmittal of telephone numbers, an apparatus for automatic operation of said device comprising a movable element having a series of projections, a plurality of telephone number records, each having abutments predeterminedly formed to cooperate with projections of said element to impart definite movements to the element, a container for said records before automatic transmittal of their numbers, another container for storing said records after automatic transmittal of their numbers, means providing successive cooperative actions of a record with the element, means to transfer a record from said first container into said second container, means to place the records in said first container successively in an operative position for cooperative action with the element and for transfer into said second container, means permitting manual placement of any record in said operative position, and movable means connecting said element with said device.

15. For use in operative association with a telephone having a finger-wheel for transmittal of telephone numbers, an apparatus for automatic operation of said finger-wheel comprising a rotatable element having a normally inoperative position and having a series of projections, a telephone number record having abutments predeterminedly formed to cooperate with projections of said element, a motor, a magnetic clutch cooperating with said motor to produce rotation of said element, means displacing the record upon rotation of said element, means energizing the clutch when said element is in its normally inoperative position, means de-energizing the clutch when a projection cooperates with an abutment, means restoring said element to its normally inoperative position, means to impart the movements of the element to the finger-wheel and switching means automatically rendering the apparatus operative and inoperative.

16. In combination with a telephone having a finger-wheel for manual transmittal of telephone numbers, an automatic telephone number transmitting and recording apparatus comprising a rotatable element, movable means connecting said element to said finger-wheel, means for imparting to said element definite movements corresponding to the telephone number to be transmitted, a type-wheel for recording of telephone numbers, means for imparting movements to said type-wheel corresponding to the movements of said element, and means cooperating with said type-wheel for recording the telephone number corresponding to the movements of the type-wheel.

17. An apparatus for attachment to a telephone having a device for manual transmittal of telephone numbers, comprising means

operating said device to transmit telephone numbers automatically, means permitting the usual manual operation of said telephone including said transmittal device, and means whereby the apparatus may be attached to and detached from said telephone without altering any of the parts of said telephone including said transmittal device.

18. A telephone call apparatus including means for quickly attaching the same to and detaching it from an unaltered standard telephone having a device for manual transmittal of telephone numbers, actuating means adapted for operative connection with said device to transmit telephone numbers automatically and adapted to be detached from such device to permit the usual manual operation of said telephone including said transmittal device.

19. For use in operative association with a telephone having a finger wheel provided with a finger-wheel opening and adapted for rotation in dialing telephone numbers, an apparatus comprising a movable mechanical finger adapted to project into said opening and to cooperate with said finger wheel, and means for moving said mechanical finger to dial a telephone number automatically.

20. For use in operative association with a telephone having a finger wheel provided with a finger-wheel opening and adapted for rotation in dialing telephone numbers, an apparatus comprising a movable mechanical finger adapted to project into said opening and to cooperate with said finger wheel, means for moving said finger to dial a telephone number automatically, and selector means controlling the extent of movement of said finger in accordance with a selected telephone number.

21. The combination with a telephone having a device for transmitting telephone numbers, of actuating means for said device comprising an intermittently actuated operating member, selector means controlling the operation of said operating member in accordance with a selected telephone number, and selector positioning means for moving said selector means into successive controlling positions.

22. For use in operative association with a telephone apparatus including a telephone and a device for transmittal of telephone numbers, a switch to render the telephone operative and inoperative to start and end a call, an apparatus comprising means operating said device to automatically transmit a telephone number, and means cooperating with the first mentioned means for recording the time at which the switch is moved to start a call and the time at which the switch is moved to end a call.

23. An apparatus for attachment to a telephone having a device for transmitting telephone numbers, comprising automatically ac-

5 tuated means adapted for connection with
said device to transmit telephone numbers
automatically, and means whereby the appa-
ratus may be attached to and detached from
said telephone without altering any of the
parts of said telephone including said trans-
mittal device.

10 24. In combination, a telephone number
transmitting device, a motor driven actuator
for successively moving said device to prede-
termined positions, a selector characterized
according to a predetermined telephone num-
ber for successively limiting the extent of
movement of said actuator and said transmit-
ting device, and means for shifting said se-
lector to successive controlling positions to
render it successively effective in limiting the
extent of movements of said actuator and
said transmitting device.

15 20 In testimony whereof, I have affixed my
signature to this specification.

NATHAN WISE.

25

30

35

40

45

50

55

60

65