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Jan. 1, 1946. T. W. MacKENZIE 2,391,911

AUTOMATIC TELEPHONE DIALER

Filed Feb. 27, 1942 2 Sheets-Sheet 1

Fig. 1.

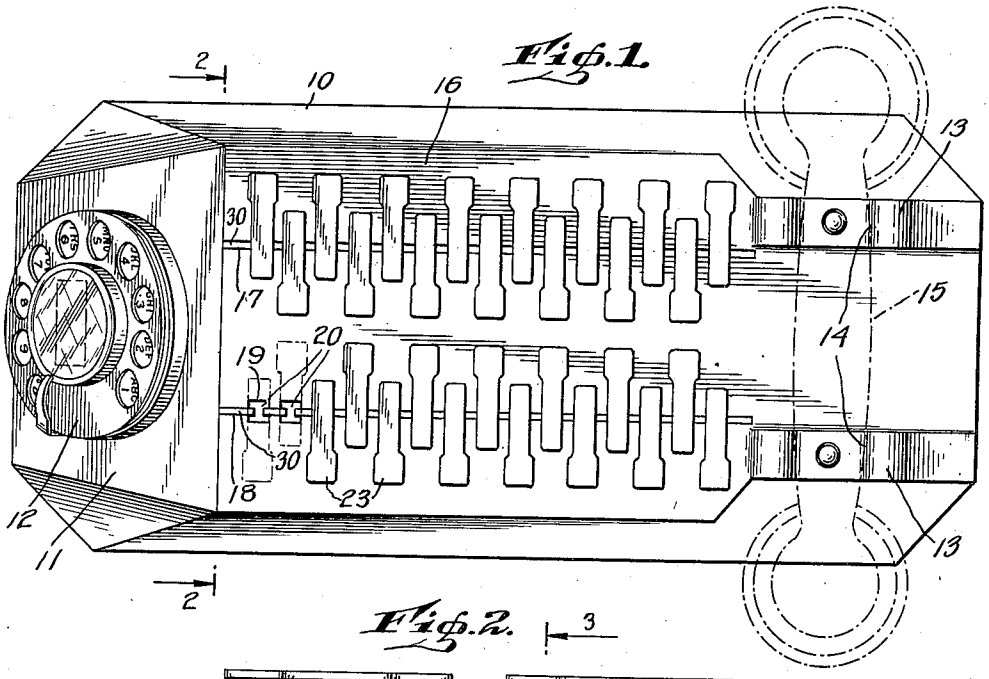


Fig. 2.

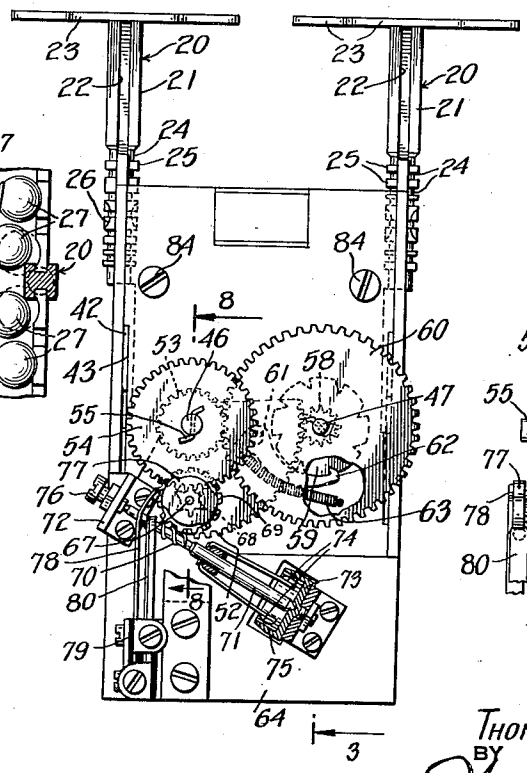


Fig. 7.

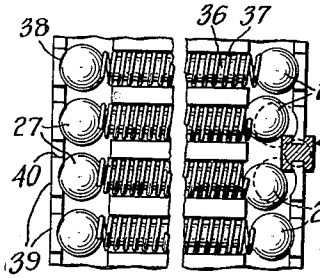
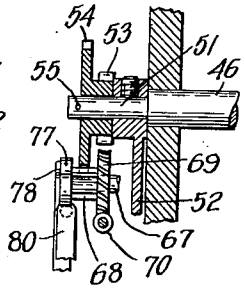


Fig. 8.



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AUTOMATIC TELEPHONE DIALER

Filed Feb. 27, 1942 2 Sheets-Sheet 2

Fig. 3.

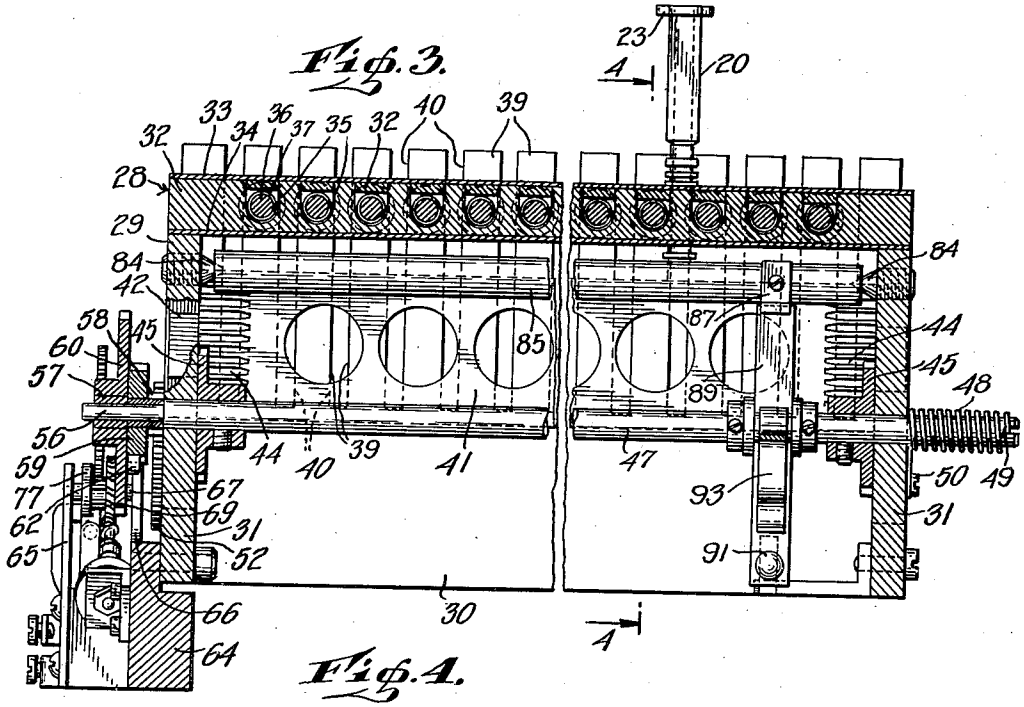


Fig. 4.

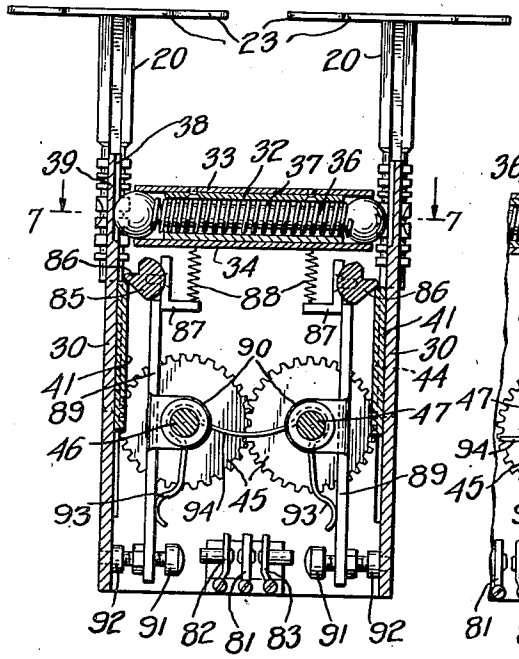


Fig. 5.

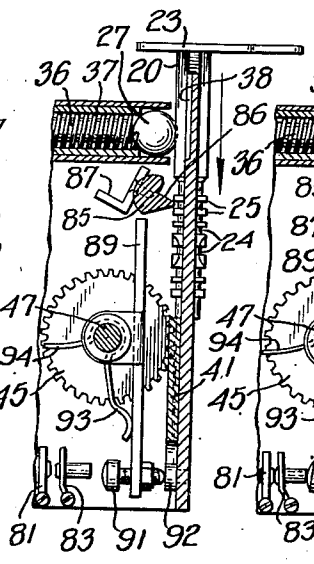
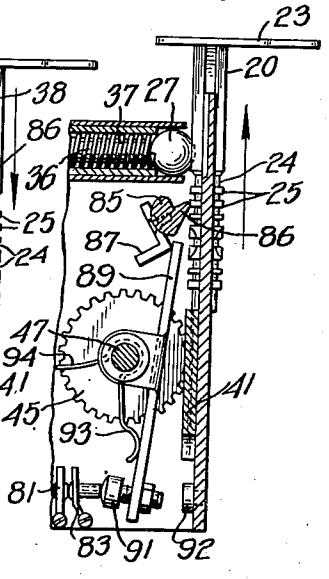


Fig. 6.



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AUTOMATIC TELEPHONE DIALER

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Application February 27, 1942, Serial No. 432,677

18 Claims. (Cl. 179—90)

This invention relates to dialers for use in automatically making telephone calls for normal inter-exchange usage within the range of a self-calling area as well as devices or mechanisms of this kind adapted for inter-department or house call systems. More particularly, the invention relates to an apparatus of this type and kind employing a relatively large number of key receiving tracks or channels in the casing or base of the telephone stand or on a switchboard adapted to normally support a corresponding number of keys each differently characterized so that the operation of each key will result in the automatic calling or dialing of the individual telephone number designated by the characterizations upon each key. The novel features of the invention will be best understood from the following description and annexed drawings, in which certain embodiments of the invention are disclosed, and in which the separate parts are designated by suitable reference characters in each of the views, and in which:

Fig. 1 is a plan view diagrammatically illustrating the general arrangement of a base showing a number of keys supported thereon.

Fig. 2 is a section on the line 2—2 of Fig. 1 omitting the casing structure and showing the operative mechanism of the automatic dialer.

Fig. 3 is a longitudinal section substantially on the line 3—3 of Fig. 2 with part of the construction broken away.

Fig. 4 is a cross section on the line 4—4 of Fig. 3 showing the keys in normal raised position.

Fig. 5 is a view showing part of the construction shown in Fig. 4 illustrating the key in a partially depressed position.

Fig. 6 is a view similar to Fig. 5 showing the key in its operation of returning to normal raised position.

Fig. 7 is a section substantially on the line 7—7 of Fig. 4 with part of the construction broken away, and

Fig. 8 is a partial section on the line 8—8 of Fig. 2.

While several types of automatic telephone call devices or apparatus are known in the art, and further some devices of this kind have been put into limited commercial uses, most of the apparatus of known constructions have been impractical, in that they have not been fool-proof, nor have they been simple and economical in construction, nor would they fit the many uses to render devices of the kind under consideration adaptable for general, commercial and private uses.

It is the purpose of my invention to provide an apparatus of the character described wherein a relatively large number of keys may be compactly arranged in close proximity to each other and yet wherein only a single key within a striking or operating area can be operated. In illustrating one adaptation of the invention, I have shown the possibility of arranging thirty keys on a single base which would be sufficient to care for the personal calls of any private individual or business executive, it being understood that each key will be separately identified or marked to designate the particular person, firm or corporation whose number is to be called.

I also provide an apparatus wherein all keys will have a standard construction adapting them for use on any apparatus, so that a key carried by an individual may be inserted in any machine by simply removing one of the present keys of the machine and replacing it by said carried key, whereby an individual may call his home, his office, or any other phone number depending entirely upon the number of keys which he may carry on his person. From the foregoing it will be apparent that all of the keys are interchangeable as to position, so that any desired arrangement of the keys may be had upon a given base or stand.

In addition to the foregoing, I provide an apparatus which is extremely simple and which requires the use of a minimum number of mechanical or electric parts. By reason of this simplicity in construction, the device also becomes substantially fool-proof in operation.

In Fig. 1 of the accompanying drawings, I have shown more or less diagrammatically one possible arrangement of a base or stand for carrying my invention into effect and in the drawings 10 represents an oblong casing having an upwardly inclined front wall 11, on which is arranged the usual and standard telephone dialer 12 which may be used to call individual numbers for which there is no special key. At the rear of the casing is two upwardly extending U-shaped supports 13 spaced transversely of the casing and in the channels 14 of which the conventional unit receiver and transmitter 15 is adapted to be supported as indicated in dot and dash lines, this unit being of the conventional and so called French type of phone. The unit 15 will control the telephone circuit as in the mounting of similar units of another conventional basis but as

this structure forms no particular part of the present invention, it is not shown in detail.

Arranged longitudinally of the upper surface 16 of the casing are elongated parallel apertures 17, 18 enlarged at longitudinally spaced intervals, as seen at 19, to receive a plurality of keys 20. In the construction shown, each key comprises a long rod 21 having grooves 22 at opposite sides thereof, and at the upper end of the key is a transverse finger piece or head 23 which, in mounting the keys on the base, may be extended in either of two sidewise directions in the staggered arrangement illustrated in Fig. 1. The keys 20 or the rod portions 21 thereof have at their lower ends longitudinally spaced annual recesses 24 which divide the key into a plurality of number calling sections 25, the longitudinal surface length of which will control the number to be called, as later more specifically described. Corner portions of the keys are also provided with recesses 26 which are employed to normally engage two or more spring pressed balls 27 in retaining the keys in predetermined raised position, and further to maintain the finger piece ends 23 of the keys all in the same plane.

Arranged within the casing 10 and readily detachable with respect thereto through the opened bottom of the casing, is the dialer unit 28, shown detached in Figs. 2, 3 and 4 of the drawings. This unit comprises a more or less box shaped frame 29 which is bounded by similar side plates 30, substantially similar end plates 31 and a top wall construction which comprises a rather heavy plate 32, faced by thinner top and bottom plates 33 and 34. The top wall construction or the plate 32 thereof has a series of transverse channels 35 in which are arranged plunger rods 36 having coil springs 37 mounted thereon. The plate 32 terminates short of the sides of the plates 33 and 34 to receive the balls 27 which engages the ends of the plungers 36, the springs 37 seating on the balls to normally urge them upon curved inner surfaces 38 formed on the upper portions of key supporting and guiding fingers 39.

The fingers 39 are formed of the side plates 30 by a series of vertical slits or apertures 40 which provide channels in which the keys are vertically moved, adjacent surfaces or edges of the fingers 39 seats in the channels 22 of the keys 20 to guide the same in their vertical movement in the dialer.

Supported on inner surfaces of the side walls 30 are key actuated plates or bars 41 having at the ends thereof outwardly projecting tongues 42 guided in vertical channels 43 formed in the end walls 31. Said ends of the bars 41, inwardly of the end walls 31, having vertically arranged rack teeth 44 engaged by similar gears 45 secured to end portions of shafts 46 and 47. The gears 45 mesh with each other so that operation of either bar 41 will operate to rotate both shafts 46 and 47.

The lower end of each key 20 rests upon the upper edge of the rack bars 41, so that in depressing any one of the keys, both bars will be depressed to automatically wind the dialer actuating springs 48, arranged upon one end of each of the shafts 46, 47, protruding through one of the end plates 31. One end 49 of each spring is keyed to respective shafts and the other end 50 is secured to the wall 31 and the arrangement will be such that the simultaneous rotation of both shafts 46, 47 will wind both springs.

Secured to the other end 51 of the shaft 46 is a gear segment 52. A combination pinion 53 and gear 54 is also rotatable on said end 51 of the shaft and held against displacement by a cutter or key pin 55.

On the corresponding end 56 of the shaft 47 is secured a bushing 57 to which is secured a pinion 58 and a tooth or sprocket wheel 59. Freely rotatable on the bushing 57 is a large gear 60. To the inner surface of the gear 60 is pivoted, as seen at 61, a pawl 62 normally supported in engagement with the wheel 59 by a spring 63.

The gear segment 52 meshes with the pinion 58 so that depression of either bar 41 by a key 20 will wind up the tooth wheel 59 against the tension of the springs 48 a predetermined degree. Upon releasing the key, the pawl engaging the wheel 59 will cause the gear 60 to be rotated as well as the combined pinion and gear 53 and 54, the gear 60 being in constant mesh with the pinion 53.

Arranged upon the end wall 31, below the gears and pinions described, is a block 64 having upwardly directed bearing plates 65 and 66 in which is supported a stub shaft 67. On this shaft is a pinion 68 meshing with the gear 54 and a worm gear 69 on the shaft 64 meshes with a worm 70 at one end of a governor shaft 71. The shaft 71 is supported in bearings 72 and 73, on the block 64, in the upward inclined direction clearly illustrated in Fig. 2. The weighted governor arms 74, which are secured to the shaft 71, operate in a cup-shaped housing 75 secured to the bearings 73. Means 76 is provided in the bar 72 for adjusting one end of the shaft 71 in order to provide a very sensitive and free rotation of the governor shaft as will be apparent.

On the shaft 67 is a circuit breaking disc 77 composed of non-conductor material, and operatively engaging this disc is a spring contact arm 78 arranged in insulated supports, as at 79, the other spring contact being indicated at 80. Both of these contacts are in the phone call circuit similar to the circuit controlled by the dialer 12, so that the impulses of making and breaking the circuit between the contacts 78 and 80 will govern the signal transmitted to the telephone system in calling a predetermined telephone number. At this time, it is well to mention that the impulses transmitted take place only when the circuit is closed to the contacts 78 and 80 which closure takes place by closing circuit through contacts 81 and 82 or 81 and 83, as later described.

For sensitive operation it will be understood that the shafts of the apparatus will have antifractional mountings, but as such structures are commonly known, they have been eliminated for the purpose of simplifying the illustration.

Rotatably mounted in the end plates 31, preferably in adjustable frictional cone-bearings 84, note Fig. 3, are dialer control rods 85 and as these rods are both of the same construction including the mechanisms directly coupled with and operated thereby, the brief description of one rod and its associated parts will apply to both. The rods are of the irregular cross sectional contour, illustrated in Fig. 4 of the drawings, that is to say, they are substantially semi-circular in cross section and have at one side outwardly projecting pawl like elongated flanges 86 arranged to engage all of the keys 20 at each side of the apparatus. Adjacent one end portion of each rod is secured an L-shaped plate 87 to which is coupled a spring 88 which normally supports the plate 87 upon the upper end of a switch actuating lever 89 pivoted on the shafts 46, 47, as seen at 90. Adjustably supported in the other end of

the lever is a headed screw or button 91 which also engages a stop 92 to maintain the lever in the perpendicular position, seen in Fig. 4, the lever being supported in this position by a flat spring 93. Each spring 93 in the construction shown is integrally joined through a cross head 94 the end portions of which are looped around the shaft 46, 47, note Fig. 4.

Considering Figs. 4–6 inclusive it will be apparent that normally when the keys 20 are in raised position, the flanges 86 are directed horizontally outward, as seen in Fig. 4. Thus upon the depression of one of the keys 20 at either side of the apparatus, the rod 85 will be partially rotated in the manner illustrated in Fig. 5 of the drawings disengaging the L-shaped plate 87 from the lever 89, thus leaving said lever in its neutral or inoperative position. In this downward stroke of the key, the shafts 46, 47 are rotated and the springs 48 wound up in the manner previously described. On completing the downward movement of the key and releasing the key, the key is then automatically moved upwardly, as illustrated in Fig. 6 of the drawings, and in this upward movement the pawl like flange 86 will travel over the surfaces 25 of the key and intermittently drop into the recesses 24 thereof, and while traveling over the surfaces 25, as illustrated in Fig. 6, the lever 89 will be moved into and maintained in position closing the circuit through contacts 81, 83 or in some instances the contacts 81 and 82. In this connection, it will be understood that the length of time that the circuit is maintained closed through the contacts will govern the number of impulses transmitting the call through the circuit breaker 77.

To illustrate somewhat clearer the function and operation of the transmission of a call in the upward movement of a key, it is pointed out that if a particular telephone number has its letters and numerals in the lower brackets, that is to say, involves the numerals 1, 2, 3 and the letters A–F, then the surfaces 25 will be relatively narrow, or speaking in terms of the length of the key, would be relatively short, whereas if the characters of a particular phone number are in the higher brackets, that is to say, including the numerals 8, 9, 0 and the letters T–Z, then the length of the surfaces 25 will be proportionately greater. For purposes of illustration, the keys diagonally shown in Fig. 2 of the drawings, have a combination of long and short surfaces 25 and each key will have seven of such surfaces particularly when these keys are operating in districts where the dialing of a complete telephone number requires seven distinct characters. Where the numbers of characters are increased or decreased, the apparatus will be proportionately revised. Considering Fig. 4 of the drawings, it will appear that in the normal position of all keys, sufficient clearance is provided at the lower ends of the keys to provide free action of the rods 85 in the manner illustrated in Figs. 5 and 6 when one of the keys in a given row of keys is actuated. Noting Fig. 7 of the drawings, it will also appear that when one key in one row is depressed, the unrecessed corner portions of the key will engage two adjacent balls 27 to move these balls from the dotted line position to the full line position of said figure. Thus adjacent keys will be locked against depression and adjacent keys of the opposite row will also be locked against depression in that the balls normally engaging these keys will be retained by the first named displaced balls against this displacing movement. In this way, simultaneous accidental operation of the keys is avoided. In other words, if two keys should be simultaneously engaged by an operator, these keys will be jammed by the balls against downward movement as there is insufficient clearance between adjacent balls to provide free downward movement of two adjacent keys. The operator will then note the error and properly depress one key. This structure is desirable from the standpoint of maintaining a close compiling of many keys within the minimum amount of space. While this is desirable on the base or stand of an independent telephone, it is further extremely desirable on a large switchboard controlling many key callable numbers.

It has been experienced that an automatic dialer, of the type and kind under consideration materially reduces the time factor in executing or completing the call of a telephone number, particularly as compared with the conventional dialer, such as indicated at 12. In this way, at a busy station when numerous calls are made through the day, considerable time is saved each day in executing the calls desired, not only from the standpoint of actually transmitting the call, but also from the standpoint of looking up a number to be called which has been materially simplified by simply placing the name of the party indicated on the key and instantaneously pressing that particular key.

Furthermore, from the standpoint of errors made in transmission of a call, which are bound to take place in the operation of the conventional dialer, such as indicated at 12, it will be apparent that the accuracy of the call key insures positive, accurate transmission of the number desired. It will also be apparent that by changing the ratio of keys employed for actuating the circuit maker and breaker and proportionately changing the length of the key and the length of the surfaces 25, the plunger stroke of the key may be increased or decreased. It is important, however, that sufficient clearance be provided between the surfaces 25, as for example in the spaces 24 to establish a definite and positive break in the circuit to the contacts 78 and 80. In other words, after the flange 86 has passed over one surface 25 it immediately drops into the next recess 24 and this operation continues throughout the upward movement of each key. It will be apparent that the circuit maker and breaker rods extend beyond the limits of end keys, note Fig. 3, so that the depression of any key throughout the length of the unit will not only actuate the associated rod 85 but also the associated rack bar 41. The engagement of the balls 27 with the recesses 26 of the keys serves to retain the keys against accidental displacement, should the base or stand be inverted in handling the same. From a standpoint of use where the subscriber does not require the use of all of the keys of the given base, the unused key channels can be used by customers by insertion of their keys in calling their own telephone numbers. In other instances where the subscriber has need for using a greater number of keys than can be supported on a minimum base, one key channel may always be maintained blank and a series of additional keys of the infrequently called numbers can be maintained in a supplemental holder conveniently maintained in a desk drawer, or if desired some way associated with the base of the telephone.

The apertures shown in the rack bars 41, note Fig. 3, are simply to lighten the structure of the bar and minimize the amount of spring motive

power necessary to raise the bar as well as the key employed to depress the same. It will also appear that by duplicating many of the parts of the complete dialer unit the numbers of different parts employed in the construction of the complete unit is materially minimized and the cost of production of the apparatus simplified.

It will be apparent that apparatus of the kind under consideration may be utilized as a circuit control medium adapted for other uses than simply transmitting telephone numbers. The keys inserted into the apparatus may control the operation of the apparatus or may control circuits for sending messages, or for operating circuits particularly where the complete operation is dependent upon two or more control surfaces or elements on the key inserted into the apparatus.

Having fully described my invention what I claim as new and desire to secure by Letters Patent, is:

1. A key actuated automatic telephone number calling device, comprising a frame, the frame having a plurality of key receiving channels arranged in predetermined alinement, means transmitting impulses to a telephone circuit in transmitting a predetermined telephone number, a switch controlling the circuit to said first named means, and a single switch operating element operatively engaging all of said alined keys supported in the channels of said frame and actuated by each depressed key in upward movement of said key in controlling movement of said switch into operative and inoperative positions in calling a number.

2. A key actuated automatic telephone number calling device, comprising a frame, the frame having a plurality of key receiving channels arranged in predetermined alinement, means transmitting impulses to a telephone circuit in transmitting a predetermined telephone number, a switch controlling the circuit to said first named means, a single switch operating element operatively engaging all of said alined keys supported in the channels of said frame and actuated by each depressed key in upward movement of said key in controlling movement of said switch into operative and inoperative positions in calling a number, and means operatively engaging all of the keys and actuated by any one of said keys supported in said channel for putting the first named means in operation.

3. A key actuated automatic telephone number calling device, comprising a frame, the frame having a plurality of key receiving channels arranged in predetermined alinement, means transmitting impulses to a telephone circuit in transmitting a predetermined telephone number, a switch controlling the circuit to said first named means, a single switch operating element operatively engaging all of said alined keys supported in the channels of said frame and actuated by each depressed key in upward movement of said key in controlling movement of said switch into operative and inoperative positions in calling a number, means operatively engaging all of the keys and actuated by any one of said keys supported in said channel for putting the first named means in operation and for raising depressed keys, and means supporting all of the keys in a predetermined normal position.

4. A key actuated automatic telephone number calling device, comprising a frame, the frame having a plurality of key receiving channels arranged in predetermined alinement, means transmitting impulses to a telephone circuit in transmitting a predetermined telephone number, a switch controlling the circuit to said first named means, a single switch operating element operatively engaging all of said alined keys supported in the channels of said frame and actuated by each depressed key in upward movement of said key in controlling movement of said switch into operative and inoperative positions in calling a number, means operatively engaging all of the keys and actuated by any one of said keys supported in said channel for putting the first named means in operation, means supporting all of the keys in a predetermined normal position, and said last named means including means for locking keys adjacent an operated key against inoperative movement.

5. A key actuated automatic telephone number calling device, comprising a frame, the frame having a plurality of key receiving channels arranged in predetermined alinement, a telephone number calling keys arranged in said channels to form an alined group and having call control elements spaced thereon to denote predetermined telephone numbers, means supporting said keys normally in inoperative position in the channels of said frame, a switch actuating member for controlling the circuit to an impulse transmitter of a telephone circuit, and one means arranged adjacent and operatively engaging all of said grouped keys and movable relatively to the elements thereof in controlling movement of said member into closed and open circuit positions and the time period of maintaining said member in closed circuit position.

6. A key actuated automatic telephone number calling device, comprising a frame, the frame having a plurality of key receiving channels arranged in predetermined alinement, telephone number call keys arranged in said channels to form an alined group and having call control elements spaced thereon to denote predetermined telephone numbers, means supporting said keys normally in inoperative position in the channels of said frame, a switch actuating member for controlling the circuit to an impulse transmitter of a telephone circuit, one means arranged adjacent and operatively engaging all of said grouped keys and movable relatively to the elements thereof in controlling movement of said member in closed and open circuit positions and the time period of maintaining said member in closed circuit position, and means actuated by each of the keys, in the movement thereof to automatically transmit a call, for putting said impulse transmitter in operation.

7. An automatic telephone dialer, comprising a unit, a base housing said unit, said base and unit having means forming a plurality of key receiving channels exposed through the base in predetermined arrangement and close proximity to each other, number calling keys adapted to be arranged in said channels to form an alined group of keys, said keys having upper finger piece ends arranged in predetermined spaced relationship to said base, the shanks of the keys having longitudinally spaced elements characterizing predetermined telephone numbers to be automatically called in the manual depression of the keys in the base, said unit having means transmitting call impulses in the telephone circuit, and one means in operative engagement with the elements of all of said grouped keys controlling impulses transmitted through the circuit in calling

the predetermined number characterized by the elements of the key depressed in said base.

8. An automatic telephone dialer, comprising a unit, a base housing said unit, said base and unit having means forming a plurality of key receiving channels exposed through the base in predetermined arrangement and close proximity to each other, number calling keys adapted to be arranged in said channels to form an alined group of keys, said keys having upper finger piece ends arranged in predetermined spaced relationship to said base, the shanks of the keys having longitudinally spaced elements characterizing predetermined telephone numbers to be automatically called in the manual depression of the keys in the base, said unit having means transmitting call impulses in the telephone circuit, one means in operative engagement with the elements of all of said grouped keys controlling impulses transmitted through the circuit in calling the predetermined number characterized by the elements of the key depressed in said base, and means in said unit supporting all of the keys in predetermined raised inoperative position in said base.

9. An automatic telephone dialer, comprising a unit, a base housing said unit, said base and unit having means forming a plurality of key receiving channels exposed through the base in predetermined arrangement and close proximity to each other, number calling keys adapted to be arranged in said channels to form an alined group of keys, said keys having upper finger piece ends arranged in predetermined spaced relationship to said base, the shanks of the keys having longitudinally spaced elements characterizing predetermined telephone numbers to be automatically called in the manual depression of the keys in the base, said unit having means transmitting call impulses in the telephone circuit, means in operative engagement with the elements of all of said keys controlling impulses transmitted through the circuit in calling the predetermined number characterized by the element of the key depressed in said base, said last named means comprising at least one switch operating member, and at least one oscillating rod cooperating with all of said grouped keys in said base and in operative engagement with said member.

10. An apparatus of the class described, comprising a frame, opposed walls of the frame having a plurality of key receiving channels arranged in close proximity to each other, a plurality of keys movable in said channels, means for guiding the keys in a predetermined position in the movement thereof in said channels, the keys having longitudinally spaced elements characterizing predetermined telephone numbers, rods pivotly supported in the frame adjacent said opposed walls, each rod having a part arranged thereon to operatively engage each of the keys supported in the channels of said walls, a rack bar slidably engaging each of said walls and operatively engaging all of the keys supported on said walls, means whereby depression of any one of the keys in its channel will correspondingly depress both of said rack bars, said last named means including means for winding spring motors, a circuit maker and breaker device actuated by said spring motors, and means in operative engagement with each of said rods for maintaining the circuit to said device closed in the movement of said part of one of said rods over the elements of a predetermined key.

11. An apparatus of the class described, comprising a frame, opposed walls of the frame having a plurality of key receiving channels arranged in close proximity to each other, a plurality of keys movable in said channels, means for guiding the keys in a predetermined position in the movement thereof in said channels, the keys having longitudinally spaced elements characterizing predetermined telephone numbers, rods pivotly supported in the frame adjacent said opposed walls, each rod having a part arranged thereon to operatively engage each of the keys supported in the channels of said walls, a rack bar slidably engaging each of said walls and operatively engaging all of the keys supported on said walls, means whereby depression of any one of the keys in its channel will correspondingly depress both of said rack bars, said last named means including means for winding spring motors, a circuit maker and breaker device actuated by said spring motors, means in operative engagement with each of said rods for maintaining the circuit to said device closed in the movement of said part of one of said rods over the elements of a predetermined key, said last named means comprising switch operating levers, and means supporting said levers normally in inoperative position.

12. An apparatus of the class described, comprising a frame, opposed walls of the frame having a plurality of key receiving channels arranged in close proximity to each other, a plurality of keys movable in said channels, means for guiding the keys in a predetermined position in the movement thereof in said channels, the keys having longitudinally spaced elements characterizing predetermined telephone numbers, rods pivotly supported in the frame adjacent said opposed walls, each rod having a part arranged thereon to operatively engage each of the keys supported in the channels of said walls, a rack bar slidably engaging each of said walls and operatively engaging all of the keys supported on said walls, means whereby depression of any one of the keys in its channel will correspondingly depress both of said rack bars, said last named means including means for winding spring motors, a circuit maker and breaker device actuated by said spring motors, means in operative engagement with each of said rods for maintaining the circuit to said device closed in the movement of said part of one of said rods over the elements of a predetermined key, said last named means comprising switch operating levers, means supporting said levers normally in inoperative position, and said motors actuating the rack bars to return a depressed key to normal projected position.

13. An apparatus of the class described, comprising a frame, opposed walls of the frame having a plurality of key receiving channels arranged in close proximity to each other, a plurality of keys movable in said channels, means for guiding the keys in a predetermined position in the movement thereof in said channels, the keys having longitudinally spaced elements characterizing predetermined telephone numbers, rods pivotly supported in the frame adjacent said opposed walls, each rod having a part arranged thereon to operatively engage each of the keys supported in the channels of said walls, a rack bar slidably engaging each of said walls and operatively engaging all of the keys supported on said walls, means whereby depression of any one of the keys in its channel will correspondingly depress both of said rack bars, said last named means including means for winding spring mo-

tors, a circuit maker and breaker device actuated by said spring motors, means in operative engagement with each of said rods for maintaining the circuit to said device closed in the movement of said part of one of said rods over the elements of a predetermined key, said last named means comprising switch operating levers, means supporting said levers normally in inoperative position, said motors actuating the rack bars to return a depressed key to normal projected position, and means providing free rotation of said rods with respect to keys supported in normal position in the operation of depressing one of said keys.

14. In a key actuated telephone dialer, means for supporting a plurality of keys in two opposed rows and in close proximity to each other in each row, means engaging all of the keys to maintain the same in predetermined inoperative position, and said last named means including means whereby in the operation of one of said keys in one row, adjacent keys of said row and of the opposed row will be automatically retained against operation.

15. A key actuated apparatus of the character described, means in the apparatus for supporting a plurality of keys in spaced relation to each other, keys arranged in an alined group in the first named means, each key having spaced control elements, means engaging the keys to support the same normally in inoperative position, and one means in the apparatus cooperating with the elements of all of said grouped keys in controlling predetermined characteristics of an electric circuit in the movement of individual keys in said apparatus.

16. In an automatic telephone number calling apparatus of the class described, the combination with means supporting a conventional disc dialer and receiver and transmitter means, of means for supporting a plurality of closely arranged keys on said first named means in two rows, a plurality of keys detachable with respect to the key supporting means, each of said keys having elements thereon characterizing a predetermined telephone number adapted to be automatically called by the operation of the key in said supporting means, each of said keys having a head adapted to be characterized to identify subscriber's phone number as represented by the elements on the key, means supporting all of the keys in inoperative position, and said last named means including means retaining keys of both rows adjacent a key put in operation to automatically call the telephone number characterized by such key.

17. An automatic telephone dialer, comprising two opposed rows of key receiving channels, call keys arranged in said channels in forming two rows of keys in the dialer, each key having spaced elements characterizing predetermined telephone numbers, a pivoted rod arranged along each row of keys to operatively engage the elements thereof means transmitting impulses to a telephone circuit, means involving a switch for actuating the last named means by either of said rods in the movement of the elements of one of said keys relatively to the rod, and means for actuating said key.

18. An automatic telephone dialer comprising a frame, opposed walls of the frame having longitudinally spaced key receiving channels, rack bars slidably engaging each of said walls, each bar operatively engaging keys supported in the channels of each wall, a swinging member extending longitudinally of each wall for operative engagement with all of the keys supported on each wall, a circuit maker and breaker device, and means in operative engagement with each of said members controlling operation of said circuit maker and breaker device in the operation of any of said keys to call a telephone number.

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