April 9, 1946. T. W. MacKENZIE 2,398,019

CALL KEY FOR AUTOMATIC TELEPHONE DIALERS

Filed Feb. 27, 1942

Fig. 1.

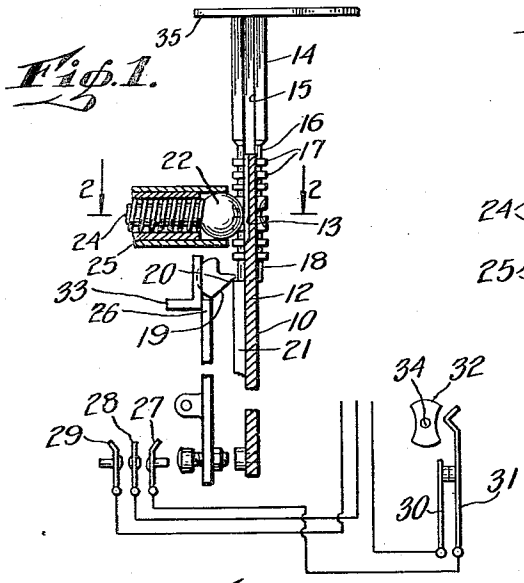


Fig. 2.

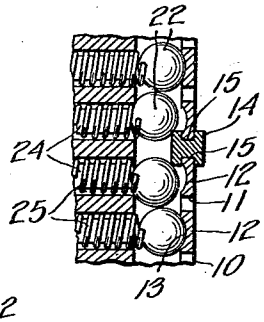


Fig. 3.

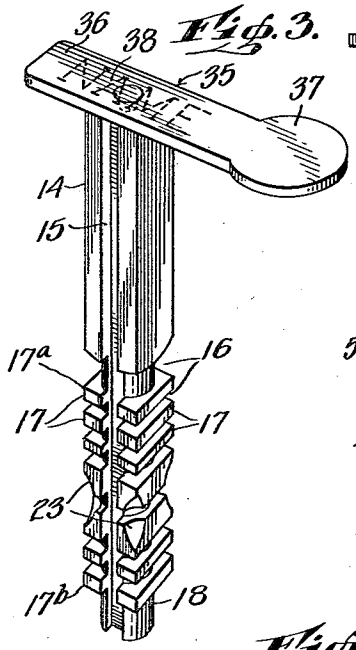


Fig. 4.

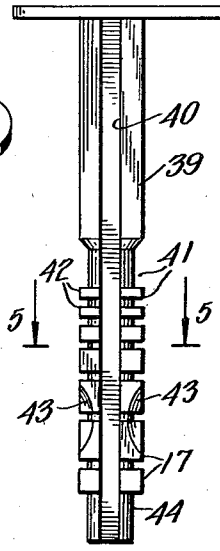


Fig. 5.

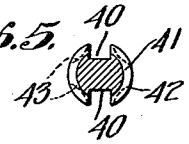
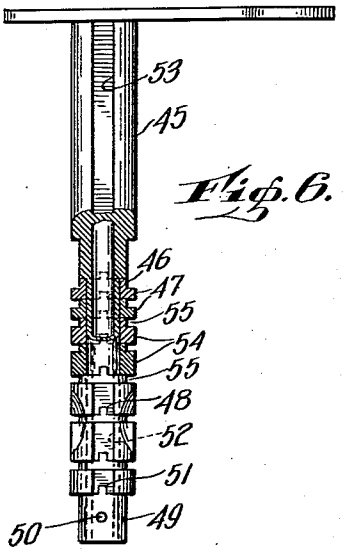


Fig. 6.



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Patented Apr. 9, 1946 2,398,019

UNITED STATES PATENT OFFICE

2,398,019

CALL KEY FOR AUTOMATIC TELEPHONE DIALERS

Thomas W. MacKenzie, Cranford, N. J.

Application February 27, 1942, Serial No. 432,676

5 Claims. (Cl. 179—90)

This invention relates to keys used in conjunction with automatic telephone dialers in calling a predetermined telephone number by the use of the key in the dialer apparatus. More particularly the invention relates to the structure of the type so as to adapt the keys for universal mounting in the apparatus. The novel features of the invention will be best understood from the following description and annexed drawing 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 side view of a key made according to my invention and also diagrammatically illustrating part of the mechanism in conjunction with which the key operates.

Fig. 2 is a partial section on the line 2—2 of Fig. 1.

Fig. 3 is a perspective view of the key shown in Fig. 1 detached and on an enlarged scale.

Fig. 4 is a view similar to Fig. 1 on a larger scale with part of the construction omitted and illustrating a modification.

Fig. 5 is a section on the line 5—5 of Fig. 4, and

Fig. 6 is a view similar to Fig. 4 with part of the construction shown in section and illustrating another modification.

Keys of the type and kind forming the subject matter of this invention are adaptable for use in automatic telephone call apparatus, such, for example, as the type and kind disclosed in a companion application filed by me of equal date herewith, namely February 27, 1942, and bearing Serial Number 432,677. These keys are either normally supported in the apparatus or manually interchangeable with different apparatus and utilized to automatically call any predetermined telephone number, the number being governed by the structure of the key; that is to say, the longitudinal length of successive call governing surfaces on the key.

While a standard of seven characters or digits is rather customary, which would require the use of a corresponding number of control surfaces on the key, it will also be apparent that an increase or decrease in the number of such surfaces may be used in adapting the invention to other types of call systems. This latter modification would be particularly adaptable for use where the telephone system is used in inter-department telephone systems or what might be termed private house units.

In Fig. 1 of the drawing I have shown a small portion of an automatic dialer such as disclosed in the companion application simply to illustrate one adaptation and use of the invention. In this figure, 10 represents one side wall of the frame of the dialer unit which is divided at its upper end, by a number of apertures 11, to form a series of vertically arranged fingers 12 having arched recesses 13 on inner surfaces of the upper ends thereof. The apertures 11 between the fingers 12 form channels for receiving keys 14 which are movable vertically on the wall 10. Opposed sides of the keys 14 have grooves 15 which receive the adjacent sides of the fingers 12 in retaining the keys in the channels and in guiding the keys in their vertical movement, note Fig. 2, of the drawing.

Aside from the formation of the grooves 15 the elongated shanks of the keys are rectangular or square in cross sectional contour except from the formation of annular recesses 16 at longitudinally spaced intervals on the lower end portion thereof. The recesses 16 divide the shank into longitudinally spaced call surfaces 17 at opposed sides of the key arranged at right angles to the grooved sides 15 thereof. The width of these surfaces 17, or rather the longitudinal length thereof with respect to the longitudinal plane of the key shank, vary to control and govern the particular telephone number to be called automatically by the operation of the key. In other words, some surfaces are relatively short, which would produce relatively thin washer-like elements on the shank of the key, and other surfaces are comparatively long producing correspondingly thick washer-like elements. The lower end of the shank of each key has a long reduced portion 18 which provides clearance for free rotary movement of a call transmitter rod 19 with respect to keys supported in raised positions particularly when the rod 19 or the flange 20 thereof is automatically operated over the surfaces 17 and dropping into the recesses 16. The lower end of the keys 14 terminate adjacent the upper end of a bar 21, arranged upon the inner surface of the frame 10, and moved downwardly thereover upon the depression of one of the keys 14. The remaining keys are retained in raised position by spring pressed balls 22 which seat in recesses 23 formed in corner portions of the key shank. These recesses 23 will not interfere with the surfaces 17 over which the flange 20 operates. In Fig. 2 of the drawing the key 14 is shown in a partially or fully depressed position, which operation displaces the balls 22 at each side of the key, and this serves to lock adjacent keys against

operation or depression on the frame side 10 and will also lock other keys of an opposed frame side through plungers 24 actuated by the balls 22 upon corresponding balls, not shown, at the other ends of said plungers as is taught in said companion application. The springs controlling the balls are indicated at 25 and are arranged around the plungers 24.

In Fig. 1 of the drawing is illustrated at 26 a switch operating lever which is adapted to close the circuit between contacts 27 and 28 and 29 in completing the circuit two spring contacts 30, 31 in controlling impulses transmitted to the system by intermittent making and breaking of the circuit between contacts 30, 31 through rotation of the insulated circuit breaker 32. The lever 26 is normally supported in inoperative position indicated in Fig. 1 of the drawing, but as the flange 20 of the rod 19 moves over the surface 17 in the upward movement of the key 14 the lever 26 is held in position closing the circuit through contacts 27 and 28 and 29 by a block or plate 33 on the rod 19 which operatively engages said lever. However, when the rod or flange 20 thereof drops into each recess 16 the lever 26 is released and circuit is broken through the said contacts, thus the impulses through the circuit breaking spring contacts 30, 31 is broken and these impulses are not transmitted over the telephone circuit.

At this point it is well to call attention to the fact that in the manual downward movement, or depression, of the keys 14 the surfaces 17 depress the flange 20 of the rod 19 and rock the same on the pivot thereof, throwing the plate 30 out of engagement with the lever 26, thus no movement is transmitted to the lever in this operation. Further, in the depression of the bar 21, a spring mechanism automatically is wound up which in turn transmits rotary movement to the shaft 34 of the circuit breaker 32 after the key has reached the limit of its downward movement and has been released. All mechanism controlling the details of these operations which are diagrammatically illustrated in the present drawing are clearly set forth in the companion application referred to and are here simply outlined to illustrate one use of the key construction.

The top of the key may have any suitable head 35. The one shown in the accompanying drawing has a short end portion 36 and a longer and enlarged end portion 37, the latter forming a finger piece. In arranging the keys in the key channels the ends 37 may be directed in opposed directions on adjacent keys, thus providing a compact arrangement of the keys in their supporting and operating channels and yet relatively large finger piece ends are provided. Any desired name may be stamped, painted, engraved or otherwise formed on the upper surface of the head 35 of the key as indicated at 38 in Fig. 3 of the drawing. This name would represent the name of the individual, firm, corporation, or subscriber whose telephone number is reproduced by the particular arrangement of the surfaces 17 on the key, reading from the surface 17*a* to the lower surface 17*b*. To give an illustration let us assume that the particular telephone number is BA–1–7923, as would normally be dialed with the conventional form of manually actuated dialer now in our common use. This number would automatically be called in the upward progress of the key 14 by dialing B in the travel of flange 20 over the top surface 17*a* and so forth until the numeral three is finally dialed by the travel of the flange 20 over the lower surface 17*b*. In other words, the length of time in which the flange 20 is held upon one of the surfaces 17 will govern the number of impulses transmitted by the circuit breaker, and these impulses of a given telephone number are interrupted by the dropping of the flange into the successive recesses 16. The above illustration is by no means to be regarded as an accurate illustration of the key as represented in Figs. 1 and 2 of the drawing, as the illustrations in the accompanying drawing are simply diagrammatic and are by no means made with the precision which is necessary in accurate formation of the recording surfaces 17.

In Fig. 4 of the drawing is shown a slight modification which consists simply in providing a key shank 39 which is round in cross sectional form rather than square or rectangular in form. Otherwise, the key is of the same general construction as the key shown in Fig. 3 and has the side grooves or channels 40 to engage the fingers 12, the recesses 41 similar to the recesses 16 and the surfaces 42 which are similar to the surfaces 17. At 43 are shown the semi-circular ball receiving recesses and at 44 is shown the clearance provided at the lower end of the key similar to the clearance 18 to provide free rotary movement of the rod 19.

In Fig. 6 of the drawing is shown another adaptation of the invention wherein the key shank 45 has a reduced end 46 on which is arranged a series of sleeves 47 keyed to each other as seen at 48, by a tongue of one sleeve entering a corresponding recess in the adjacent sleeve. At the lower end of the reduced portion 46 is a retaining collar 49 pinned in position as seen at 50 and keyed to the adjacent sleeve as seen at 51. The purpose of this construction is to maintain the sleeves all in predetermined position on the shank to align grooves 52 in opposed surfaces of the sleeves with the grooves 53 on opposed sides of the shank, these grooves 52 and 53 being similar to the grooves 40—15. Each sleeve has a large diameter surface 54 and a reduced neck which forms between adjacent sleeves recesses 55, the surfaces being equivalent to the surfaces 42 and 17.

With the construction shown in Fig. 6 of the drawing a single and standardized form of key shank can be produced and individual accurately formed call sleeves 47 can be produced and assembled in constructing on the key shank any desired telephone number. This construction is advantageous not only from the standpoint of simplifying the construction of the several parts but also from the standpoint of making a change in the number of a key when the subscriber's telephone number has been changed. This arrangement also makes it possible for large firms or corporations to acquire many duplicates of the different sizes of sleeves 47 and many blank key shanks to construct for themselves telephone numbers of new customers or clients as well as to care for changes in telephone numbers of customers and clients as they may be changed from time to time for any reason.

In the present drawing the keys have been illustrated as of duplicated construction, that is to say, the keys have the call control surfaces on two opposed sides of the key. This is not absolutely necessary, however, as a single surface is all that is necessary to provide an operative key, that is to say, the surface which is exposed to the flange 20 of the rod 19. However, in providing the dual surfaces, the key becomes in-

terchangeable as to position on either side of the dialer and with the finger piece end 37 extending in either of two directions.

It will also be apparent that the arrangement of the call surfaces, which may also be referred to as call control elements, on the key may be varied from the standpoint of the degree of travel of the key with respect to the circuit actuating member 19, all in proper relation with respect to the revolutions of the circuit breaker 32. At the same time it is desirable to minimize the travel of the key while at the same time simplifying the precision required in forming the respective surfaces.

From the foregoing it will appear that generally speaking it may be said that my improved key construction is divided into a plurality of circuit closing areas subdivided and spaced by circuit breaking areas, and while the length of the circuit closing areas will vary to transmit or automatically dial a predetermined telephone number the circuit breaking areas may be of a constant or standardized length.

While for descriptive purposes in illustrating one adaptation of the invention the key has been described as a means for automatically controlling a circuit to call a telephone number, a key of this type and kind may be utilized to control any circuit in sending signals of any type or kind or in completing circuits to predetermined devices or apparatus in controlling such devices or apparatus. More generally speaking, the key having the spaced control elements thereon, which operatively control an electric circuit or circuits, provides a quick and positive means for performing predetermined electrical operations or a series of such operations.

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

1. A key for calling a telephone number in actuation of an automatic telephone dialer, said key comprising an elongated key shank body, one end portion of said body having a plurality of longitudinally spaced control surfaces arranged on at least one side of said body, said side of the body having a plane surface at the other end portion thereof in alinement with the control surfaces and substantially equal in length and cross section to the first named end portion of said body to pass through common guides in a dialer, each of said control surfaces being of predetermined longitudinal length and collectively controlling predetermined telephone numbers to be automatically called by operation of said key in a dialer, means extending longitudinally of the key body and spaced with respect to said control surfaces for guiding said body in a predetermined path in the operative use thereof, and the first named end portion of the key body having circumferentially spaced key recesses.

2. A key for automatically calling telephone numbers, said key comprising an elongated body, one end portion of said body having longitudinally spaced recesses between which are longitudinally spaced control surfaces, said surfaces varying in longitudinal length to collectively control calling of a predetermined telephone number in the use of the key, the other end portion of said body being of a length substantially equal to the length of the first named end portion and having an outer surface in longitudinal alinement with said control surfaces, said last named end portion terminating in a flat finger piece head extending at substantially right angles to said body, said body being generally square in cross sectional form, said control surfaces being arranged on at least one side of said body, another side of said body having a groove extending substantially the full length of both end portions of said body, and two corner portions of the first named end portion of said body having recesses arranged on some of said control surfaces.

3. A key for automatically controlling an electric circuit, said key comprising an elongated shank body, one end portion of said body having on opposed surfaces thereof two similar sets of control elements spaced longitudinally of said end of said body, said elements presenting control surfaces of different lengths on each of said opposed sides of the key body, other opposed sides of said body substantially at right angles to the first named sides having grooves extending longitudinally thereof, said elements comprising independent members detachable with respect to said body, means for keying said elements together and to said body to maintain a predetermined alinement thereon.

4. A key for automatically controlling an electric circuit, said key comprising an elongated shank body, one end portion of said body having on opposed surfaces thereof two similar sets of control elements spaced longitudinally of said end of said body, said elements presenting control surfaces of different length on each of said opposed sides of the key body, other opposed sides of said body substantially at right angles to the first named sides having grooves extending longitudinally thereof, said elements comprising independent members detachable with respect to said body, means for keying said elements together to said body to maintain a predetermined alinement thereon, and the other end portion of said body having a flat finger piece head arranged at right angles to said body.

5. A key of the chaarcter described comprising an elongated rod, control elements arranged longitudinally of the rod with surfaces of said elements in common alinement, means spacing the elements on said rod, means extending longitudinally of the key for guiding the same in a predetermined path of movement in the use of said key to control an electric circuit, said elements comprising independent members detachable with respect to said rod, means on adjacent surfaces of said members for keying said members one with the other, and a key sleeve secured to said rod and engaging one of said elements for retaining said elements in common alinement.

THOMAS W. MacKENZIE.