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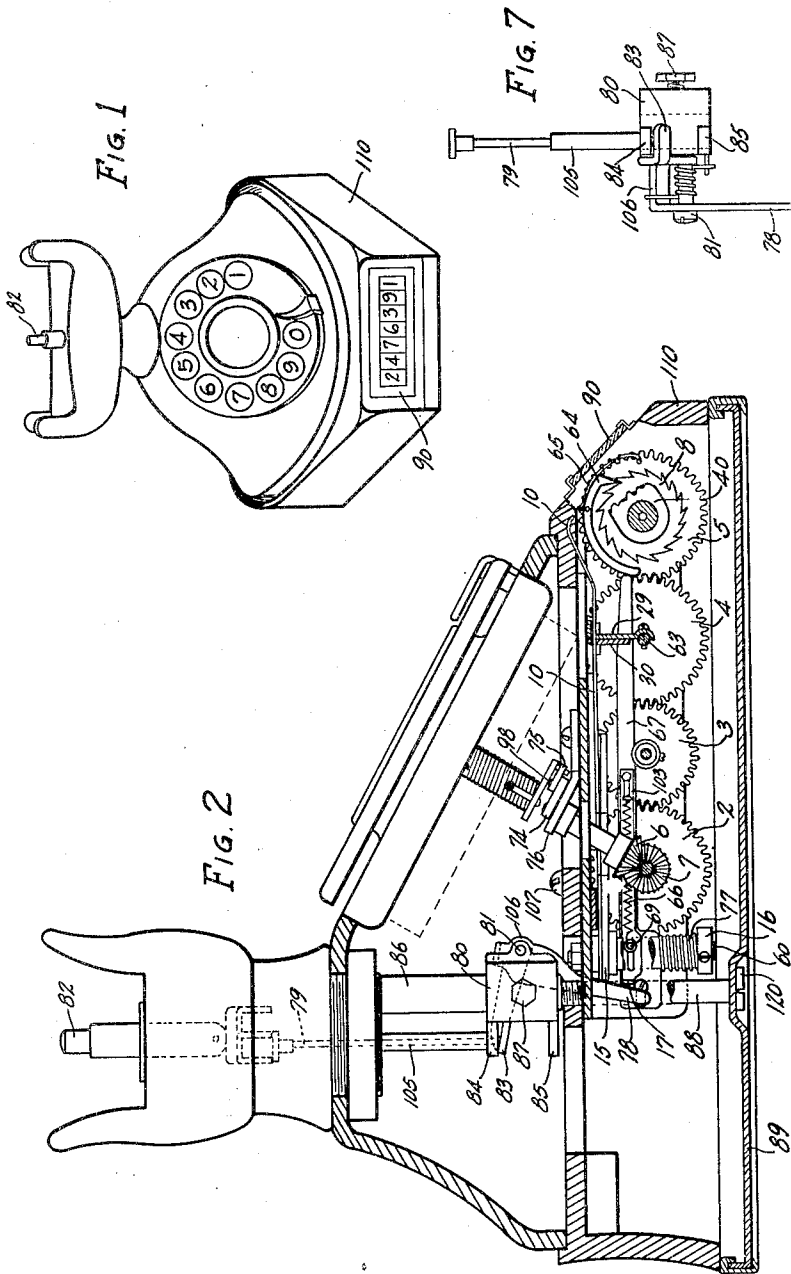
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2,040,646

INDICATING DEVICE

Filed April 11, 1934

2 Sheets-Sheet 1



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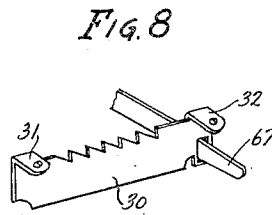
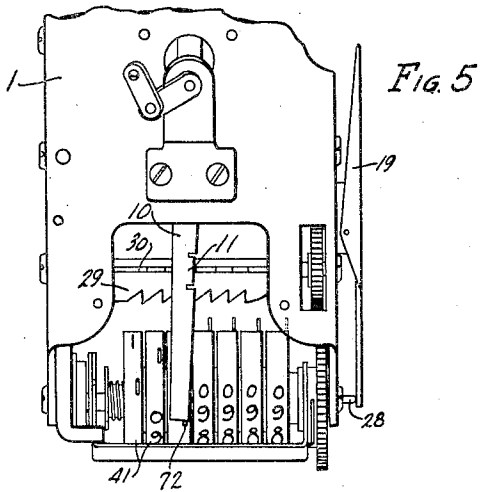
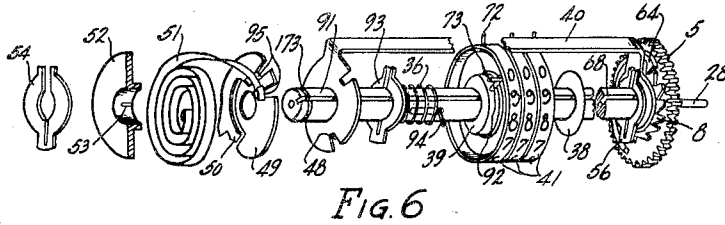
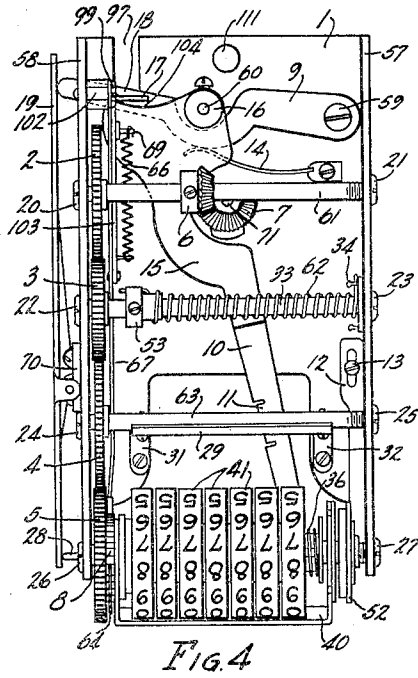
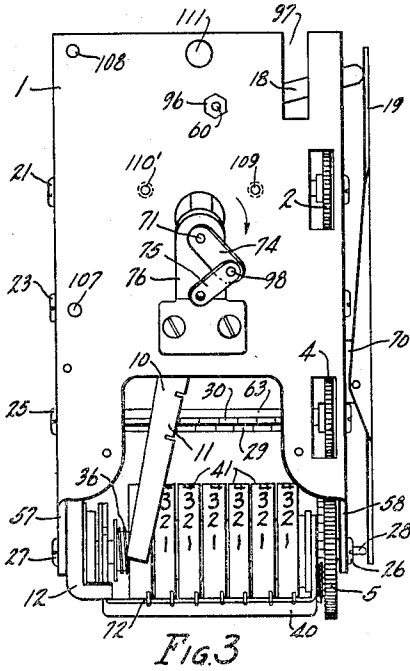
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INDICATING DEVICE

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2 Sheets-Sheet 2



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# UNITED STATES PATENT OFFICE

2,040,646

## INDICATING DEVICE

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Application April 11, 1934, Serial No. 720,030

12 Claims. (Cl. 179—90)

This invention relates in general to indicating devices, but more in particular to indicating devices suitable for use in indicating before a calling subscriber, of an automatic telephone system, the called number dialled by such subscriber.

An object of the invention is to provide an indicator or register of this type which is compact and which may be readily attached to and made a part of a telephone set of a commercially employed type.

Another object is to provide an indicating device which is directly placed under the influence of the subscriber's dial and which automatically and progressively brings into view indicia representing the respective settings of the calling subscriber's dial.

A still further object is to provide means for maintaining in view the indicia representing the number dialled until an initiated call has been terminated by the subscriber replacing his telephone upon its support.

There are a number of other objects not specifically mentioned, but which will appear from time to time as the description progresses.

The invention is illustrated in two sheets of drawings applied to a telephone set of the cradle type.

In the drawings, Fig. 1 is a view looking down on a cradle telephone set equipped with an assembly of the invention and showing the window through which the designations appear in accordance with those dialled; Fig. 2 is a side view of the set in elevation and partly in section; Fig. 3 is a top view of the indicating assembly as it appears in its normal position, but removed from the set; Fig. 5 is a partial view of the assembly as shown in Fig. 3, but shows the mechanism after two designations have been dialled and the dial operated a third time but not yet restored; Fig. 4 is a bottom view of the assembly as shown in Figs. 3 and 5; Fig. 6 is an exploded view in perspective of the indicia mechanism of the assembly, but with certain of the indicia members and other elements thereof in duplicate of those shown omitted for the sake of clarity; Fig. 7 shows a supporting block 80 employed in mechanically linking the telephone circuit switching button with the indicating mechanism to control its release; while Fig. 8 is a detail.

The indicia element units of the assembly are mounted on a drilled and slotted shaft 91 having a driving gear 5 secured on one end thereof in fixed relation thereto. The gear 5 has pivoted thereto a holding pawl 64 most clearly seen in Fig. 2, and which is pivoted with an associated

spring 65 for normally holding the pawl in engagement with a ratchet wheel 8.

The ratchet wheel 8 is secured in fixed relation to one end of a yoke member 40 and both are drilled to receive the shaft 91. The indicia element units 41 each comprises a shallow cup-like member with indicia distributed around its periphery. Each indicia element also has a restoring pin 72 protruding from its periphery. A pin 73 also extends from the inner side of the base of each element. This latter pin cooperates with a pin 92 in a spacing member 39. The pin 92 passes through the spacing member and into the slot running longitudinally in shaft 91.

In assembling the indicia units, the end of the yoke member 40 having the ratchet wheel 8 is first placed on the shaft 91. A spacing washer such as 39, but with no pin protruding therefrom, is next placed on the shaft 91. The next articles placed on the shaft 91, in the order named, are a fibre washer 38, an indicia carrying element 41, a second fibre washer such as 38, and a spacing member such as 39. When as many of these groups of articles are placed on the shaft as there are digits in the numbers or designations to be registered, the spring 36 is placed on the shaft 91 followed by the free end of the yoke member 40.

With the yoke member properly in place its ratchet wheel 8 will ride under the dog 64. The yoke is held against endwise movement on the shaft by placing the split washer 56 in a slot in shaft 91 like the slot 173 on the opposite end of the shaft 91. In like manner a split washer 93 is placed on the shaft 91 at a point between the spring 36 and the nearby end of the yoke member 40.

A friction removing pin 28, having a hole cut transversely through it near its one end, is now inserted into the gear end of the shaft 91 until the hole in pin 28 is in line with the elongated slot through shaft 91, clearly shown in Fig. 6. The spring 36 is now held in a compressed state and the pin 94 inserted through the slot of shaft 91 and the hole in the end of pin 28. Now, when the spring is released the pin 94 bears against the last of the spacing members 39 and thereby holds all indicia members snugly between their associated spacing and fibre washers, frictionally preventing their uncontrolled movement on the shaft 91.

In the next step in the assembly, a spring winding and holding member 49, having a pawl 50 and spring holding lugs 95, is placed on the shaft 91 with the pawl 50 in cooperative relation with notches 48 in the yoke member 40. The

spring 51, slightly wound up, now has its outer end hooked about the lugs 95 and its inner end is placed about the hub portion of member 52. The spring 51 with its inner end properly placed over the hub of member 52 extends inward through a slot 53. The spring is now placed about the shaft 91 with its inner end extending into the longitudinal channel in the shaft 91. The assembly just described is now held in place by a split washer 54. By rotation of the member 49 in a clockwise direction the spring 51 may be tensioned as desired, and will be so held by engagement of pawl 50 with one of three notches 48 in the yoke member 40.

With the inner end of spring 51 keyed to shaft 91 and with its outer end secured to the yoke 40 via member 49, the spring 51 rotates the ratchet wheel 8 on yoke 40 into engagement with the pawl 64. If this pawl is now moved free of the ratchet wheel 8 the yoke 40 will rotate and encounter the pin 72 of each indicia member, bringing them all into the position that they are shown in Figs. 3, 4 and 6. The indicia members are prevented from being advanced by yoke 40, beyond the position shown, by the pins 73 inside their cup-like surface encountering the pins 92 of their associated spacing members 39 which, as previously explained, are keyed to the shaft 91.

The actual indicia assembly just described may now be placed in the channel member or frame 1 in the position it is shown in Figs. 2, 3 and 4. The assembly is rotatably mounted between the channel members 57 and 58, by a bearing screw 27 threaded into member 57 and having a pin portion extending into the drilled opening in the end of shaft 91, and by a bearing screw 26 threaded into member 58 and drilled to receive the pin 28.

As previously stated, the spring 51, when released by the disengagement of pawl 64 from the ratchet wheel 8, causes yoke 40 to encounter the pins 72 of members 41 to restore them into the position shown in Figs. 3 and 4. In order to remove the strain on pins 72 and 73 which would otherwise occur when they are suddenly stopped by pins 73 encountering pins 92, an auxiliary stop member 12 is mounted in the base of the channel member 1 by a screw 13. This auxiliary member is adjustably held by the screw 13 and has its free end positioned to be encountered by the yoke 40 at the same time or just slightly before the yoke member 40 drives the pins 73 into engagement with their associated stopping pins 92.

A tension release control lever 9 is arranged in the end of the channel member opposite to the indicia indicating assembly and is normally held in the position shown by a spring 14. The free end of the lever 9 passes through a slot in the channel member 58 and engages an intermediately pivoted tension release operating lever 19. This latter lever is pivotally mounted on a support 70 secured to the channel member 58, and has its opposite end resting against the friction removing pin 28. By operation of the release control lever 9 against the spring 14 the lever 9 rotates lever 19, which in turn actuates the pin 28. The pin 28, as previously explained, through the medium of its pin 94 compresses spring 36 and in this manner releases the indicia carrying members from frictional engagement with each other.

At a point in member 1 near lever 9 is pivoted an escapement operating lever 15. This lever is

pivoted on a stud 60 and has a hub on which is wound a spring 77. The bottom end of the spring is in fixed relation to the lever, while the other end is secured to a collar 16. The spring is properly tensioned to tend to rotate the lever 15 in a clockwise direction, having reference to its disclosure in Fig. 4, and is held so tensioned by a holding screw passing through the collar 16 and engaging the stud 60. The lever 15, it will be observed, has two free ends. The one end extends transverse of the slot 97 in member 1. The other end has attached to it a leaf spring 10. This leaf spring at an intermediate point is formed into an escapement pawl 11, while its free end is normally in the path of the pin 72 of the first of the indicia members 41 to be operated.

A shaft 63, having a gear 4 fixed on one end thereof, is rotatably secured between the channel members 57 and 58 by appropriate bearing screws 25 and 24. The gear 4 is arranged to permanently mesh with the gear 5 of the indicia assembly.

Immediately below the shaft 63, having reference to Fig. 4, a bracket is secured to channel member 1 by extensions 31 and 32. This bracket is fully shown in Fig. 8 and has a row of escapement teeth 30, also visible in Figs. 2, 3 and 4. A similar set of escapement teeth 29, set slightly to the left of the teeth 30, having reference to Figs. 3 and 5, are secured to the shaft 63 in a manner clearly shown in Figs. 2 and 4.

The previously described arm 15 is held in the position in which it is shown in Figs. 3 and 4, by the engagement of its pawl 11 with the first of the teeth 29 and is held in a slightly advanced position by the first of the teeth 30 upon the initial movement of the teeth 29 away from the pawl by rotation of the shaft 63 into the position in which it is shown in Fig. 5. The first of the series of teeth 29, when they are rotated back to their initial position, encounters and lifts the pawl 11 clear of the first of the fixed teeth 30, thereby enabling the movement of the lever 15 and its spring 10 under tension of spring 77 until the free end of spring 10 clears the path of movement of the pin 72 of the first indicia member and enters the path of movement of the pin 72 of the second of the indicia members. The spring 10 is prevented from moving farther at this time by the pawl 11 encountering the second of the teeth 30.

It will be observed that, since the gear 4 on shaft 63 is in permanent mesh with the gear 5 on shaft 91 of the indicia assembly; and further since the indicia members 41 are held frictionally in fixed relation with shaft 91 they will rotate therewith unless prevented from doing so. It will be recalled that the free end of the leaf spring 10 is normally in the path of rotation of the pin 72 of the first of the indicia members to be set. Therefore this first indicia member is held stationary while the remaining ones are being rotated a distance dependent on the extent of rotation of shafts 63 and 91. Since the member 10 can only prevent movements in one direction of the indicia members, the one held stationary rotates with the remaining of the indicia members on their return movement. It will therefore be seen that consequent to a single rotation and restoration of shafts 63 and 91 the first of the indicia members is set to indicate the extent of rotation of the shafts 63 and 91.

Obviously, on each successive operation of shafts 63 and 91 the spring member 10 successively brings about the setting of the indicia members,

so that the respective designations may be observed as they are set up.

In order to gear the shafts 91 and 63 to the dial shaft of the telephone set intermediate equipment comprising shafts 62, 61 and 71 and their associated gears are employed. The shafts 62 and 61 are mounted between the channel members 57 and 58 in the same manner as is the shaft 63. The shafts 62 and 61 through the medium of their associated gears 3 and 2, respectively, are permanently linked to the shafts 63 and 91. The gears 5, 4 and 2 each have the same number of teeth, and therefore the intermediate gear 3 does not change the 1 to 1 ratio between the shafts 91, 63 and 61. A spring 33 is arranged on shaft 62 and has one end secured to a collar 53 in turn secured to the shaft 62. The other end of this spring hooks over one of the pins 34 in fixed relation to the channel member 57. The spring is normally lightly tensioned to tend to restore the respective shafts 91, 63, 62, 61 and 71 to their normal positions.

The shaft 71 is mounted in a bracket supported bearing in approximate axial alignment with the dial shaft of the calling device of the set when the channel member is properly located in the set. The shaft 61 is geared to the shaft 71 by a pair of bevel pinions 6 and 7. On the end of shaft 71 opposite to that carrying the pinion 7 is secured a bell crank 74 carrying a link member 75. The calling device dial shaft has its lower end provided with a bell crank 98 linking its shaft with shaft 71. It will be obvious, therefore, that any rotation of the telephone dial will be communicated to the described mechanism which will function to set up indications in accordance with the dial operations.

Attention is called to the fact that during the setting operation of the dial, during which its own spring is being wound up to furnish power for its restoring movement, the restoring spring 33 of the indicia mechanism is also being wound up. It will be seen, therefore, that the spring 33, which is effective during the restoring movement of the dial, relieves the spring of the calling device from the additional burden otherwise required to restore the indicia mechanism linked to it.

Secured to the inner side of channel member 58, as best shown in Figs. 2 and 4, is a compound release member 67. This member has slidably secured to it an operating member 103 slotted at each end and pinned in slidable relation to the main member 67. A spring 66 has one end hooked over the pin 69, fixed to member 67, and the other end over a hook formed from a portion of member 103. This spring therefore normally holds member 103 in the position, with respect to member 67, in which it is shown in Fig. 2. The end of member 103 adjacent the slot 97 in member 67 is bent to form an operating arm 17 for the compound release member. This arm is in bridge of the slot 97 as are also portions 18 and 104 of the levers 9 and 15, respectively.

The free end of member 67 passes through a guide slot in the fixed tooth member 30 as clearly shown in Fig. 8, and extends into operative relation to the pawl 64 on gear 5 while such gear is in its normal position. The movement of lever 67 to the right, having reference to Fig. 2, is effective to raise the pawl 64 clear of the ratchet wheel 8. The lever 67 is arranged for movement through the medium of the operating arm 17 of member 103. In this connection it may be explained that the tension of spring 66 is greater than that of the spring 65 associated with the pawl

64 and therefore, only after movement of the pawl clear of its ratchet and after the lever 67 has reached its limit of movement, does the arm 17 move member 103 with respect to the lever 67. The member 103 and spring 66, it will be seen, therefore, simply serve to give more leeway to their operation.

It will be appreciated that, while the various shafts of the indicia assembly as a whole are restored upon each restoration of the dial of the telephone set, the indicia members which have been rotated with respect to the shaft 91 are not restored at such time. This part of the restoration effecting the erasure of the designation representing the operations of the dial is accomplished by depressing a button 82 of the cradle member. This may be accomplished directly manually or may occur incidental to the replacing of the hand telephone in the cradle of the set.

The movement of button 82 is transmitted to the indicia mechanism by an assembly secured to the post 86 ordinarily only employed to hold a cover on the bottom of the base of the telephone set. The assembly referred to is shown in Fig. 7, and comprises a supporting block 80 which slides onto the post 86 and is held thereto by a screw 87. The block 80 is provided with two extended portions 84 and 85 between which one end, 83, of a double ended centrally pivoted lever 106 is arranged to operate. This double ended lever is supported on a post 81 threaded into the block 80. A lightly tensioned spring surrounds this post and normally holds the lever 106 in the position shown. The portion 84 of the block 80 is provided with an upwardly extending tubular member 105. A pin 79 extends through the member 105 and portion 84 and is supported by the end 83 of the lever 106. The top of pin 79 is provided with a head encountered by the mechanism of button 82 so that upon depression of 82 the pin 79 forces the end 83 of lever 106 into engagement with portion 85 of the block member.

The lever 106 in rotating to its alternate position moves its end 78 to the right, having reference to Fig. 2. The end 72 in moving to the right encounters the tension release control lever 9 at point 18, thereby operating the tension release operating lever 19 and in the manner previously described relieving the indicia members 41 from frictional engagement against free rotation on shaft 91.

The end 78 of the lever 106, an instant after encountering lever 9, encounters the arm 17 and, accordingly moves it and the attached lever 67, thereby removing the pawl 64 from engagement with its ratchet wheel 8. This latter operation then enables yoke 40 to rotate back to its initial position under tension of its restoring spring 51. The yoke 40, as previously explained, on its return movement encounters the pins 72 of the respective operated indicia members 41 and returns them to their normal position.

Finally the end 78 of lever 106 encounters extension 104 of lever 15 and in the further final movement restores its spring extension member 10 again in the path of the pin 72 of the first indicia member of the group.

All parts of the indicating equipment are now in their initial position in readiness for indicating the designations next set up by the calling device. Obviously, when the calling device is again to be operated the telephone is removed from the cradle and lever 106 again permits the levers formerly operated by it to be moved to their inactive positions by their respective springs

until the button 82 is subsequently depressed to clear registered designations.

The specific manner in which the indicating mechanism is secured is immaterial so long as it is firmly held in proper position with respect to the calling device and has its indicia members located so as to be readily observed. In the present disclosure the member or frame 1, supporting the various parts of the indicating mechanism has two aligning pins 107 and 108, which register with holes in the top of the housing 110 when the member is properly positioned therein. As will be observed from an inspection of Fig. 2 a screw 107 passing through the upper surface of 110 enters a threaded hole 109 in the member 1 and holds that mechanism in place. The base or housing 110 may be held to the telephone base in any desired manner, for example by screws passing through the top of member 110 into threaded holes arranged in the base of the telephone set. The bottom or cover 89 of the assembly is held to the housing by a screw 120 which passes through the cover 89, the hole 111 in channel member 1 and is threaded into the post 86.

Having described the invention, what is considered to be new and is desired to be protected by Letters Patent will be set forth in the following claims.

30 What is claimed is:

1. In an indicating mechanism, an assembly of disks, a shaft on which said disks are arranged to rotate, a spring for rotating said disks on said shaft, means normally holding said disks in light frictional engagement with each other, means for rotating said shaft and assembly as a unit, means for preventing the rotation of one of said disks during such rotation and for holding a different one during each subsequent rotation until all have had their positions on said shaft modified to indicate the respective distances of movement of said shaft, and means for removing the influence of said first means from said disks to enable their restoration by said spring.

2. In an indicating device, a group of disks having indicating designations thereon, a first means including a train of gears for repeatedly actuating said disks, a second means including a combined lever and pawl effective during the first of a series of operations of said disks for modifying the position of a first one of said disks with respect to the remaining of said disks, and a third means including ratchet teeth cooperative with said first and second means to progressively modify the positions of the remaining of the disks with respect to those previously operated.

3. In an indicating device, a group of members, a dial for driving said members, means normally associated with one of said members preventing its movement during the movement of said dial in one direction, means controlled by said dial for then associating said first means with a second one of said members so that movement of such member during a subsequent movement of the dial in one direction is prevented, and indicating designations on said members registering the extent of the respective movements of said dial.

4. In an indicating device, a shaft supporting a plurality of indicia members, mechanism normally holding said members in frictional engagement against free rotation on said shaft, means for repeatedly forwardly rotating and returning said shaft to its initial position, means for preventing movement of a different one of said mem-

bers on each forward rotation of said shaft until each of said members has been moved with respect thereto a distance determined by the distance of forward rotation of said shaft while such member was being held, means for restoring said members to their normal position with respect to said shaft, and means for holding said mechanism inoperative for the purpose set forth while said restoring means is functioning.

5. In an indicating device, a shaft, a plurality of indicia members rotatably mounted on said shaft, means normally preventing free movement of said shaft, means for variably setting and restoring said shaft, escapement controlled means advanced on each cycle of movement of said shaft to hold a different one of said indicia members during each setting of said shaft to modify their positions on said shaft and thereby set up indications in accordance with the successive movements of said shaft, normally inactive means for picking up and restoring said indicia members to their normal position with respect to said shaft, and means operated when the indication displayed is no longer desired for disabling said first means, restoring said escapement means, and for operating said normally inactive means.

6. In an indicating mechanism, a shaft, a plurality of indicia members on said shaft normally in a non-displaying position with respect thereto, means for rotating said shaft variable distances from a normal position, and for returning it to such normal position following each rotation thereof, means for securing a correspondingly relative movement between said shaft and a different one of said members each time said shaft is rotated from its normal position to arrange said members to display indicia representative of the respective distances of rotation of said shaft, said means on said shaft for subsequently rotating said members relative to said shaft back into their normal position.

7. In an indicating mechanism, a shaft, indicia members on said shaft arranged to rotate freely thereover, means for normally frictionally holding said members on said shaft under tension sufficient to insure the rotation of said members with said shaft unless otherwise prevented, spring driven means on said shaft normally cooperative with said members to hold them in a normal non-displaying position with respect to said shaft, means operated preceding a new setting of said indicia members for disabling said spring driven means, a member normally preventing the rotation of one of said indicia members during the rotation in one direction of said shaft to position such member on said shaft to indicate thereby the distance of rotation of said shaft, means for moving said member into a corresponding relation with another of said indicia members upon the return rotation of said shaft in preparation for the positioning of a second of said members consequent to a second rotation in one direction of said shaft, and means operable at will to disable said first means and again release said spring driven means to restore the actuated of said indicia members to their initial position with respect to said shaft.

8. In an indicating device, a shaft, a driving gear secured to said shaft, a plurality of indicia members on said shaft each having a frictional washer on each side thereof on said shaft and each also having adjacent to one of such frictional washers a spacing member keyed against rotation on said shaft, cooperating pins on each

such spacing member and its associated indicia member limiting the distance of rotation of the indicia members with respect to said shaft, a spring on said shaft frictionally holding said indicia and spacing members between said frictional washers and thereby preventing free movement of said indicia members with respect to said shaft, means for successively holding said indicia members against rotation with said shaft to position them in an indicating position relative to said shaft, means for thereafter compressing said spring to free said indicia members from frictional relation with said shaft, and means thereafter cooperative with said indicia members to restore them to their original position with respect to said shaft.

9. In a registering device, a plurality of indicia members, pins protruding from the periphery of the respective indicia members which, when the members are in non-indicating position, are in alignment with each other, an escapement member having its free end normally in a position cooperative with one of said members to prevent its movement in one direction of rotation, means for rotating the remaining of said members in such direction and for then restoring them to their initial position while advancing said one member to an indicating position depending on the extent of initial rotation of the remaining of said members, means operated coincident with the rotations of said members to permit said escapement member to move its free end to a position in the path of the pin of the next member preventing movement of the next one of said members so that upon a second cycle of operation the second of said members is advanced to an indication position depending on the extent of the second rotation of the first and other of said members, and means comprising a yoke member rotatable about said members into engagement with their pins to thereby restore said members to their initial position.

10. In combination with a driven member of a

calling device of the type commonly employed at the substation of an automatic telephone system; a mechanical contrivance, including a number of indicating members each operated during each operation of the calling device, and having means for preventing the operation of one of said members during a portion of each operation of the calling device whereby a setting of said members is obtained in accordance with the respective specific operations of said calling device.

11. In an indicating device, driving means including a shaft rotatable variable distances in accordance with the digits of a designation being registered, a plurality of indicating members on said shaft, means tending to rotate said members on said shaft, means normally preventing such rotation, and means for holding one of said members while said shaft is being rotated in one direction only and for holding a different one of said members against rotation with said shaft on each successive rotation of said shaft until they all have had their position on said shaft varied in accordance with the respective movements of said shaft whereby they effectively indicate the respective movements which have occurred.

12. In an automatic telephone desk set, a calling device, a number recording device cooperating with said calling device to indicate the digits dialled by said calling device, said recording device comprising a plurality of disks each having indicia thereon corresponding to the digits, means controlled by said calling device for rotating all of said disks each time a digit is dialled, a pawl and ratchet teeth mechanism operated each time said disks are rotated, said mechanism operated to engage a different disk for each digit dialled to modify the position of the disk with respect to the others in order to indicate the digit dialled after each operation of the calling device, and means for restoring said pawl and ratchet mechanism and all of said disks.

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