Oct. 25, 1932. W. GREENBERG 1,884,663

NUMBER INDICATOR AND REGISTER FOR AUTOMATIC TELEPHONES

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Fig. 1

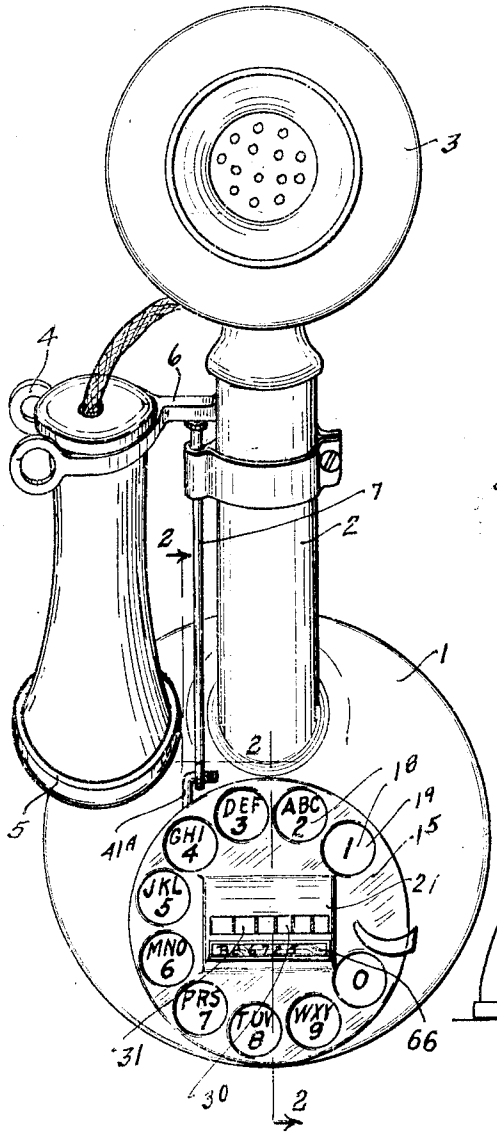


Fig. 11

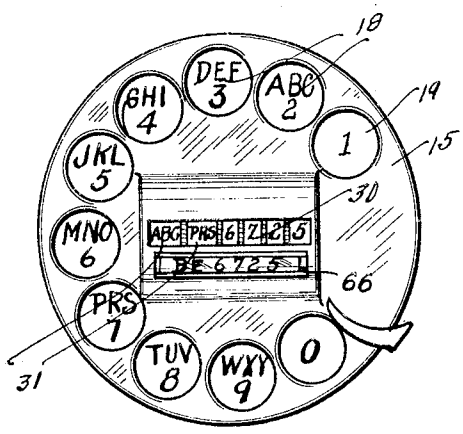
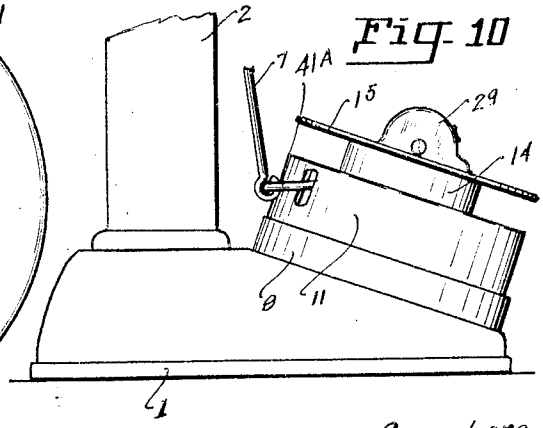


Fig. 10



William Greenberg
Inventor
Thomas Bilyeu
Attorney

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NUMBER INDICATOR AND REGISTER FOR AUTOMATIC TELEPHONES

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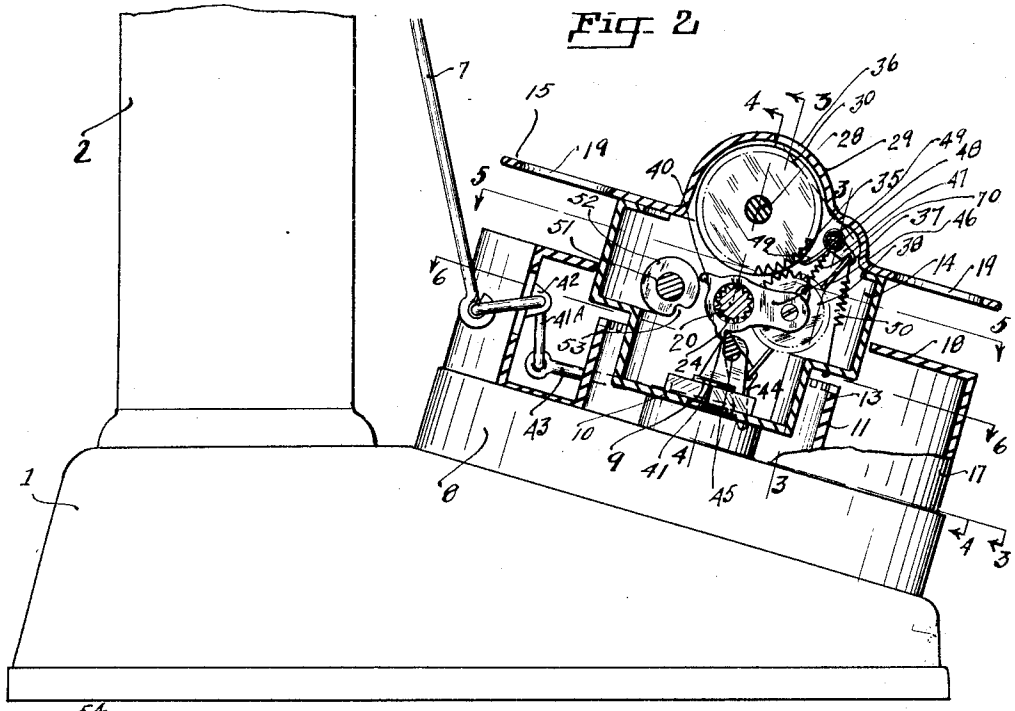
Fig. 2



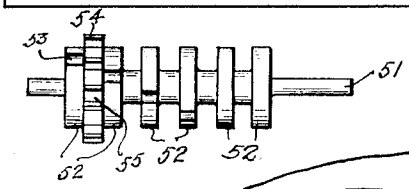


Fig. 13

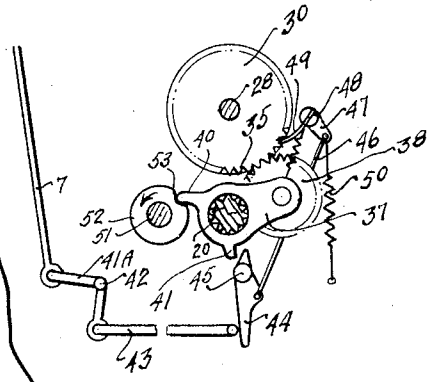


Fig. 12

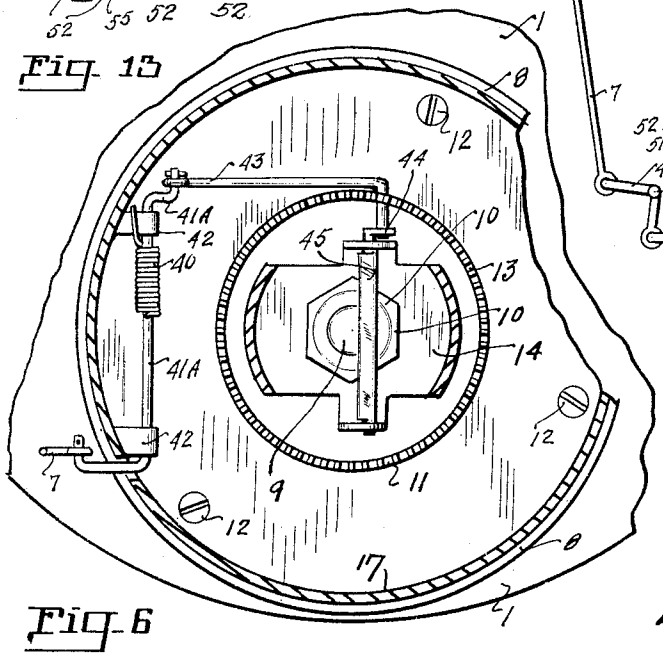


Fig. 6

William Greenberg
INVENTOR
BY Thomas Bilyeu
ATTORNEY

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Fig. 3

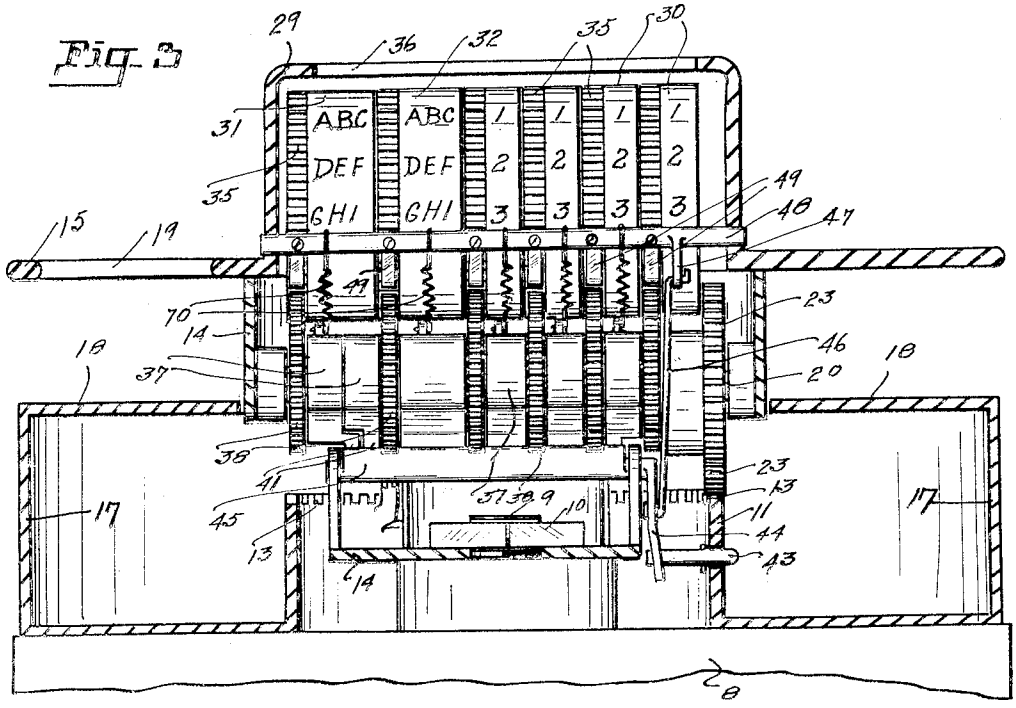
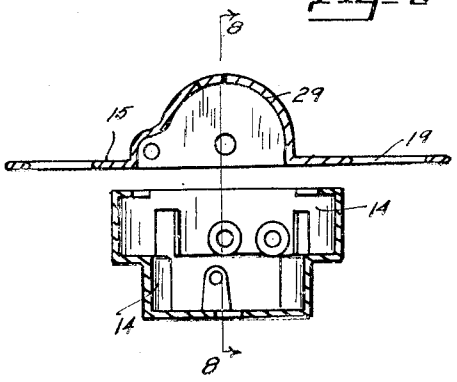


Fig. 9



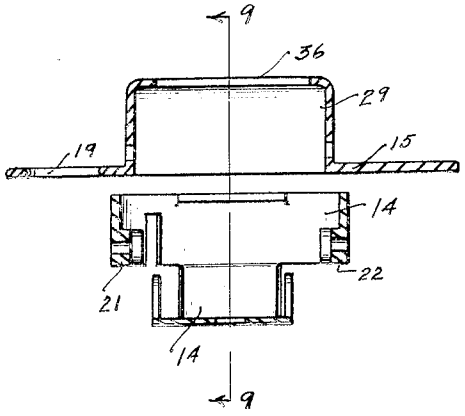


Fig. 8

William Greenberg
INVENTOR

BY Thomas Bilyeu

ATTORNEY

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Fig 4

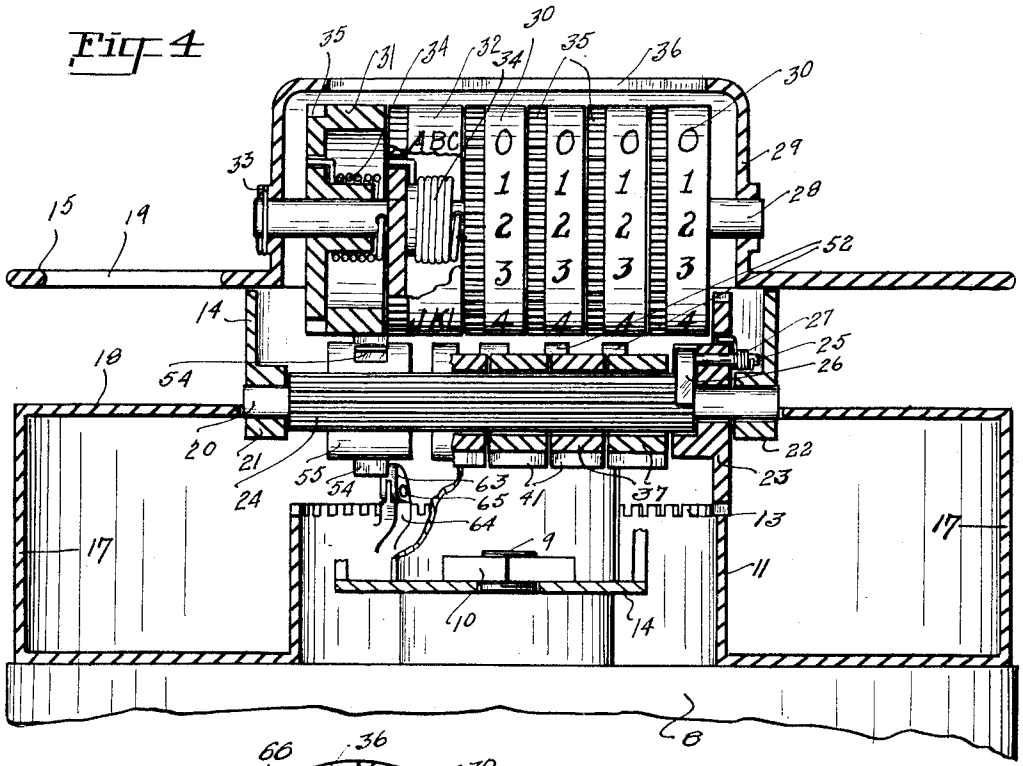

Fig 7

William Greenberg
Inventor
Thomas Bilyeu
Attorney

Oct. 25, 1932. W. GREENBERG 1,884,663

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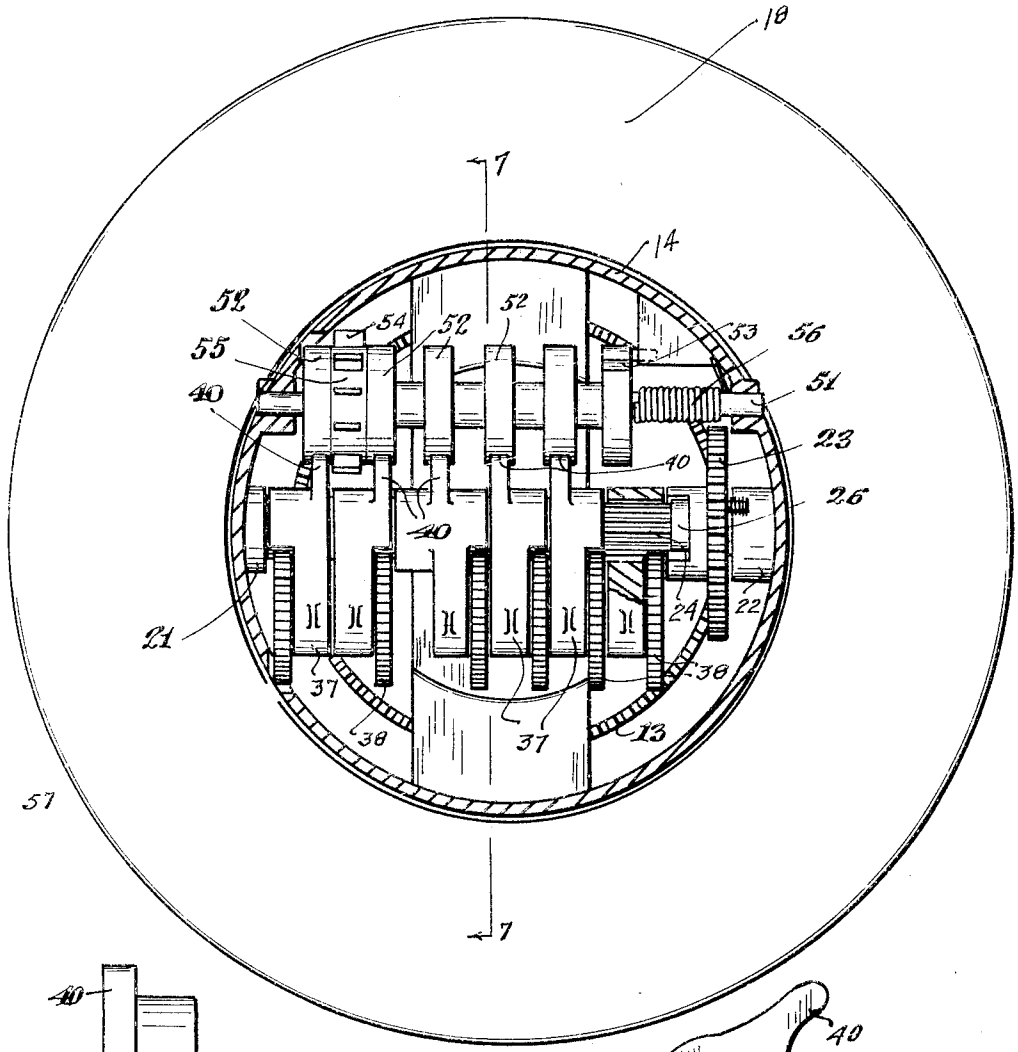
Fig. 5



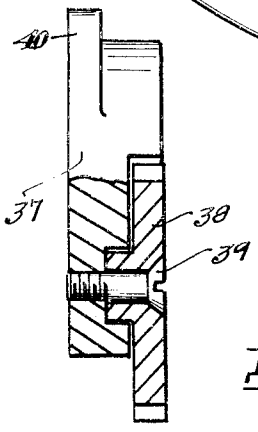


Fig. 14

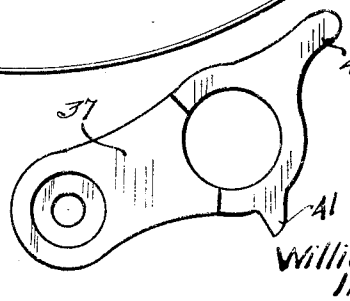


Fig. 15

William Greenberg
Inventor

Thomas Bilger
Attorney

Patented Oct. 25, 1932

1,884,663

UNITED STATES PATENT OFFICE

WILLIAM GREENBERG, OF PORTLAND, OREGON, ASSIGNOR TO ALTA GREENBERG, OF PORTLAND, OREGON

NUMBER INDICATOR AND REGISTER FOR AUTOMATIC TELEPHONES

Application filed February 17, 1930. Serial No. 429,134.

My invention is intended for use with automatic telephones and has for its primary object the indicating of the number dialed on an automatic telephone. Each letter and numeral of the dialed number is indicated upon a series of wheels having graduations disposed upon their outer periphery. The graduations can be seen through an opening that is disposed centrally of the dial mechanism of the automatic telephone. Means are disposed between the indicating mechanism and the telephone hook for releasing the wheels upon the completion of each cycle of operation in order that the wheels may return to their normal position.

I do not wish to be limited in the application of my device to telephonic service, as it may be used in conjunction with any instrument for any purpose where calls are to be made progressively within or upon the instrument. My device may be used upon any instrument used for progressively recording, and be made to indicate and register the numbers or letters recorded within the instrument, whether or not electric impulses are to be transmitted by the device. I do not, therefore, wish to be limited to applications to electrically operated devices, as it is equally applicable to mechanically operated machines.

The preferred embodiment of my invention consists of a casing attachable to the dialing or primary shaft of the automatic telephone to which a dialing head is normally attached. A primary and a secondary shaft are parallelly disposed within this casing and are adapted for maintaining the coacting mechanism thereupon. Upon the secondary shaft a pluraltiy of graduated wheels are disposed in spaced relation with each other. The first one of the wheels is adapted for indicating the prefixes of the number to be dialed and the remainder of the wheels are adapted for indicating the numerals of the number to be dialed. The mechanism within the casing is connected to and correlated with the mechanism of the ordinary automatic telephone so that as a number is dialed on an automatic telephone using my new and improved device, the automatic mechanism disposed within the base of the telephone instrument will transmit to the switchboard of the telephone system the number desired and at the same time the number dialed will be indicated centrally of the instrument consisting of the letter prefixes and the numerals and the number remains in visible position until the telephone receiver is placed upon the supporting hook. When the receiver is placed upon the hook the cycle of operation is completed and the wheels return to normal position.

A housing is detachably attached to the base of the telephone instrument which has an annular gear disposed upon its upper, outer periphery. A primary driving shaft is disposed within the housing parallelly to a secondary shaft upon which the graduated indicating wheels and a relatively long gear are disposed. The gear and the secondary shaft may be integrally formed. A pinion disposed upon the secondary shaft is in registerable engagement with the annular gear that is detachably attached to the telephone instrument.

A plurality of gears coact with gears associated with the graduated wheels and are progressively actuated so that the wheel having the initial prefix of the number to be dialed is actuated on the first partial rotation of the dial. On the second partial rotation of the dial, the wheel having the second prefix letter is actuated. On the third partial rotation of the dial, the wheel having the initial set of numerals is actuated, and as the dial is again partial rotated, the respective wheel is actuated until the number desired is clearly indicated.

A third shaft disposed within the housing that is parallelly disposed to the primary

and secondary shafts. This shaft has a plurality of timing cams disposed thereupon which are adapted for being locked in selected position by a link that locks a pawl in placed position progressively as the number to be indicated is dialed. The pawl is disposed upon the link.

Upon the completion of the dialing of the number desired, the graduated wheels are in position to indicate the number dialed and remain in that position until the receiving instrument of the telephone is placed upon the hook. When the receiver is placed upon the hook the cycle of operation is completed and the graduated wheels and all other mechanism within the housing are returned to normal starting position.

The primary object of my invention is to visually indicate to the telephone user the number as it is dialed in order to enable the user to know whether the desired number has been correctly dialed.

A further object of my invention consists in providing a complete assembly that may be placed upon an automatic telephone by the removal of a small part of the dialing mechanism of the present automatic telephone instrument and that may be used in precisely the same manner as the automatic telephone is now used.

A further object of my invention consists in providing an assembled unit that is easily attachable to any automatic telephone and which is adapted for indicating the number dialed clearly and visibly to the user of the instrument.

A further object of my invention consists in providing a simple mechanism placeable upon an automatic telephone that will indicate progressively the prefixes and/or numerals dialed so that in the event an error is made in dialing before the complete number has been dialed, the error will be indicated and disclosed to the user so that he will hang up the receiver and start over again before the complete number has been dialed.

With these and incidental objects in view, the invention consists in certain novel features of construction and combination of parts, the essential elements of which are set forth in the appended claims, and a preferred form of embodiment of which is hereinafter shown with reference to the drawings which accompany and form a part of this specification.

In the drawings:

Fig. 1 is a perspective, front view of an automatic telephone having one of my new and improved devices disposed thereupon.

Fig. 2 is a side view of the base of an automatic telephone illustrating, in cross sectional view, my new and improved device disposed upon the dialing shaft of an automatic telephone, the same being taken on line 2—2 of Fig. 1 looking in the direction indicated.

Fig. 3 is a sectional, front view of the assembled device, the same being taken on line 3—3 of Fig. 2, looking in the direction indicated.

Fig. 4 is a sectional, front view of the assembled device, the same being taken on line 4—4 of Fig. 2, looking in the direction indicated.

Fig. 5 is a sectional, plan view of the assembled device, the same being taken on line 5—5 of Fig. 2, looking in the direction indicated.

Fig. 6 is a sectional, plan view of the assembled device, the same being taken on line 6—6 of Fig. 2, looking in the direction indicated.

Fig. 7 is a sectional, end view of the assembled device, the same being taken on line 7—7 of Fig. 5 looking in the direction indicated.

Fig. 8 is a sectional, front view of the shield elements or housing of my assembled device. The shield elements are shown, spaced apart and devoid of any of the elements normally disposed therein. This view is taken on line 8—8 of Fig. 9, looking in the direction indicated.

Fig. 9 is a sectional, side view of the housing illustrated in Fig. 8, the same being taken on line 9—9 of Fig. 8, looking in the direction indicated.

Fig. 10 is a fragmentary, side view of an automatic telephone illustrating one of my new and improved devices disposed therein.

Fig. 11 is a top, plan view of one of my new and improved automatic telephone dials. In this view I have illustrated a completed call and indicating the same upon the graduated wheels disposed central of the automatic instrument.

Fig. 12 is a diagrammatical layout, in end view, of the associated elements that are disposed within my new and improved device and illustrating the same as being progressively actuated.

Fig. 13 is a plan view of the cam shaft shown removed from the assembled device.

Fig. 14 is a front view, partially in section, of the actuating cam link and illustrating, in sectional view, the gear that is removably and rotatably secured thereto.

Fig. 15 is a side view of the mechanism illustrated in Fig. 14, excepting the gear, the same being taken on line 15—15 of Fig. 14, looking in the direction indicated.

Like reference characters refer to like parts throughout the several views.

1 is the base of an automatic telephone and 2 is the column upwardly extending therefrom. The transmitting head 3 is attached to the column. The telephone hook 4 extends from the column 2, and the receiving instrument 5 is shown disposed upon the hook and maintaining the telephone in inoperative position.

In Fig. 1 I have illustrated an automatic

telephone having one of my new and improved devices disposed thereon. In this view the telephone and its attachments is shown in normal starting position. When the receiver is on the hook the arm 6 of the hook is in registerable engagement with the release shaft 7 and when in this position the shaft 7 is depressed. The primary function of shaft 7 is to return the wheels of my device to their normal starting position and place the whole mechanism in proper condition for the next cycle of operation which begins with the removal of the receiver from the hook.

My new and improved assembly is disposed upon the housing 8 which is a part of the base of the automatic telephone. The transmitting mechanism of the automatic telephone is disposed within housing 8. The assembly is detachably attached to the dialing shaft 9 of the automatic telephone by any suitable fastening means, as by a nut 10. A housing that is composed of portions 11 and 17 is removably secured to the housing 8 by any suitable fastening means, as by screws 12. An annular gear rack 13 is disposed upon the periphery of portion 11 and made integral therewith. A second housing 14 is detachably attached to the dialing shaft 9 and the dial plate 15 is detachably attached to the housing 14. As the dial plate is rotated the housing 14 is also rotated.

The letters and numerals associated with an automatic telephone are disposed upon the face of the portion 17. The letters and numerals are in direct alignment with the finger openings 19 disposed within the dial plate 15. A primary shaft 20 is rotatably journaled within hubs 21 and 22 that are disposed upon the oppositely disposed sides of the housing 14.

A pinion 23 is rotatably disposed upon one end of the shaft 20 and is in registerable engagement with the rack 13 disposed upon the portion 11.

A gear 24 is fixedly disposed upon and extends throughout the greater length of shaft 20. A pin 25 is disposed within the hub of the pinion 23 and a pawl 26 is fixedly positioned upon the pin 25. A spring 27 normally maintains the pawl in engagement with the teeth of the gear 24. The pawl 26 engages the teeth of the gear 24 as the dial plate is rotated and rides over the teeth as the dial automatically returns to its normal position. A secondary shaft 28 is fixedly journaled within the housing 29 that is superposed upon the housing 14 and is disposed in spaced relation and parallel to the primary shaft 20. The upper housing 29 is formed to permit the rotation of graduated indicating wheels 30 therein which are rotatably disposed upon the shaft 28. The wheels 31 and 32 have the prefix indications disposed upon the outer periphery thereof.

These prefixes are arranged in groups exactly like the groups of prefixes disposed on face 18 on the dial of the standard automatic telephone, each group being composed of three letters. Each of the remainder of the graduated wheels disposed upon the shaft 28 have numeral graduations disposed upon their outer periphery from 1 to 0 progressively. The shaft 28 is fixedly positioned within the housing 29 and is held in place by any suitable fastening means, as by a locking pin 33. Each of the indicating wheels disposed upon the shaft has a spring 34 that is secured to the shaft 28 and the respective wheel and which is adapted for returning the wheel to normal position when they are released. Each of the wheels has a gear 35 disposed upon one side its outer periphery. A slot 36 is disposed through the upper surface of the housing 29 through which a portion of the outer peripheries of the graduated wheels may be seen.

A plurality of arms 37 are rockably journaled in spaced relation upon the gear 24 and a toothed gear 38 is removably and rotatably secured to each of the arms 37 by a countersunk journal pin 39. Locking lugs 40 and 41 are disposed upon one end of each of the arms 37. Each of the gears 38 coact with and are in intimate engagement at all times with the gear 24. The gears 38 are also in direct alignment and adapted to coact with the gears 35, but the gears 38 and 35 are normally maintained out of engagement with each other.

As heretofore stated, when the receiver is supported upon the hook 4 the release shaft 7 is depressed and, when the shaft is in this position each of the gears 38 are out of intimate engagement with the gears 35. When the receiver is removed from the hook the shaft 7 is raised through the action of a reacting element, as a spring 40 and as the shaft 7 is raised a bell crank 41A is rotated. The bell crank 41A is pivotally supported upon supporting bearings 42. A link 43 which is connected to one end of the bell crank 41A is in registerable alignment with the cam arm 44. The cam arm 44 is fixedly secured to the cam shaft 45 and when the receiver is upon the supporting hook of the telephone instrument, the cam shaft 45 is moved into such position by the cam arm 44 as to place the gears 38 out of engagement with the gears 35. This is accomplished because the cam arm 44 is out of contact with lugs 41 of the arms 37 as well as the pawls 49 being out of contact with the gears 35 since these pawls are indirectly associated with the cam arm 44 by structure to be described forthwith.

A link 46 connects the cam arm 44 with the arm 47 which is fixedly secured to a shaft 48 rotatably journaled within the housing 29. A plurality of pawls 49 are secured in spaced relation to the shaft 48 and are in direct alignment with gears 35.

A plurality of springs 70 are secured to the shaft 48 and these springs are adapted to maintain the pawls 49 in intimate contact with the gears 35. These springs are also secured to arms 37 and are also adapted to normally maintain the lugs 41 out of contact with the cam arm 44 of shaft 45. A spring 50 is attached to arm 47 and to the housing 14 and also maintains the arm 47 so that the pawls are normally in contact with the gears 35 and the cam arm 44 so that it is out of engagement with the lugs 41.

Cam shaft 51 is rotatably journaled within the housing 14. The cam shaft 51 has a plurality of cams 52 disposed in spaced relation thereon that are adapted for coacting with the lugs 40 disposed upon the arms 37. A recess 53 is disposed within the outer periphery of each of the cams 52. There are as many cams disposed upon the cam shaft as there are indicating graduated wheels disposed on shaft 28. The recesses are progressively disposed upon the cams and are adapted for permitting the lugs 40 disposed upon the arm 37 to enter therein, and once a lug of the arm is made to engage a recess, the arm is held in fixed position until the cam shaft is rotated by the next actuation of the dial plate until the next lug of the arm in the progression is made to engage the recess disposed within the adjacent cam when the previously engaged arm is released as the pregression occurs. Teeth 54 are disposed upon the outer periphery of the annular disc 55 that is disposed between two cams upon the cam shaft 51. The construction of the cam shaft, the cams, and the disc is clearly illustrated in Fig. 13.

A reacting element, as a spring 56, is spirally disposed about the cam shaft 51 and is adapted to return the cam shaft and the associated cam elements to initial starting position upon the completion of the cycle of operation. The cycle of operation is completed by hanging the receiver upon the hook which disengages the lugs 40 from the cams and permits the reacting element 56 to return the cam shaft to initial starting position.

A pawl 63 is hingedly disposed upon a lug 64 which is supported upon the inner wall of the portion 11 by a supporting pin 65. The pawl 63 is in direct alignment with the teeth 54 disposed upon the annular disc 55. The teeth are spaced apart about the disc the same distance that the recesses disposed within each of the cams 52 are spaced and the purpose of the pawl 63 is to hinder the returning of the cam shaft 51 to its normal starting position at each progressive rotation of the cam shaft.

I provide a recess 66 at a convenient place upon the housing 29 into which a card having the telephone number of the user of the instrument may be placed.

Modus operandi

Having described the invention in detail, its operation is as follows:

Fig. 1 shows the outward appearance of my device in relation to an automatic telephone and more particularly shows the position of the shaft 7 when the receiver 5 is resting on the hook 4. When the shaft 7 is in the position as shown in Fig. 1, the spring 40 is tensioned and the cam arm 41A and its connected elements place the indicating mechanism out of engagement with the dialing mechanism.

The required motive power for actuating the indicating mechanism is obtained by the pinion 23 riding upon the rack 13. The pinion rides freely about the shaft 20 and in order to transmit its rotational movement to the gear 24, which is in intimate contact with shafts 20, a pawl 26 secured to the pinion is adapted to ride in intimate contact with the gear 24 and to prevent the transmission of rotation from the pinion to the shaft 20 in more than one direction.

Each indicating wheel has a gear on one side and a spring, which is adapted to normally maintain each wheel in starting position. It is essential that rotational power be transmitted to these indicating wheels progressively starting from left to right. This is accomplished in a manner herewith outlined. A plurality of arms are rockably disposed upon the gear 24 and each of these arms has a gear 38 rotatably secured thereto and which are at all times, in intimate contact with the teeth of the gear 24. These gears 38 are in direct alignment with the gears disposed upon the indicating wheels, but cannot coact with them without other devices being actuated. As long as gears 38 are prevented from coacting with gears 35, no indications will be shown through the slot 36 of the housing 29. There are as many arms 37 and gears 38 as there are indicating wheels and gears 35. Each of the arms 37 has a pair of lugs 40 and 41. One of these lugs is adapted to contact cam shaft 45 and the other of these lugs is adapted to contact one of the cams secured to cam shaft 51. There are as many cams as there are indicating wheels, and each of these cams has a recess within its outer periphery. These recesses are progressively disposed within the cams from left to right. The cam shaft 51 has a spring 56 which is adapted to return the cam shaft to its normal starting position. The annular disc 55 secured to the cam shaft has as many teeth upon its outer periphery as there are recesses within the cams and these teeth are spaced apart the same distance as the recesses are spaced.

When the receiver is removed from the telephone hook, the cam shaft 45 is rotated so that its cam surface contacts with the lugs

41 of each of the arms 37 and places the lugs 40 in intimate contact with the cams 52. There are a number of springs that have one of their ends secured to the free end of the arms 37 and the other of their ends secured to shaft 48, which has a number of pawls that contact with the gears of the indicating wheels. These springs normally maintain the pawls in intimate contact with the gears of the indicating wheels and normally maintain the free end of each of the arms 37 under tension.

The dialing mechanism and the indicating mechanism are synchronized to operate in timed relationship so that as the dialing plate is rotated a predetermined distance which depends, of course, upon the specific number which is desired to be dialed, the gears 38 which are in direct alignment with gears 35 will be placed into engagement with the proper gear when each lug 40 falls into its respective recess, and the gears 38 will remain in contact with the gears 35 until cam shaft 45 is rotated and disengaged from the lugs 41. This can only be accomplished by hanging up the receiver upon the hook and consequently pushing the shaft 7 downward. The cam shaft 51 is prevented from returning at the completion of each dialing operation by the coacting of the teeth 54 with the pawl 63, which is fixedly secured to the portion 11 of the stationary housing. It is only when the receiver is placed upon the hook that the cam shaft 51 is permitted to return to its normal position and that the indicating wheels are permitted to return to their normal position.

While the form of mechanism herein shown and described is admirably adapted to fulfill the object primarily stated, it is to be understood that it is not intended to confine the invention to the one form of embodiment herein shown and described, as it is susceptible of embodiment in various forms, all coming within the scope of the claims which follow:

What I claim is:

1. In a device of the class described, in combination with an automatic telephone, a housing attachable to the base of the telephone instrument, an annular gear disposed with the upper edge of the housing, a housing attachable to the dialing shaft of the automatic telephone, a shaft having an elongated gear disposed thereupon disposed across the housing and journaled relative thereto, a gear disposed upon the shaft and adapted for coacting with the annular gear and for being rotated thereby when the dialing is being made, a pawl carried by the gear that is adapted to coact with the elongated gear and to drive the same when the gear is rotated in one direction, a plurality of arms rockably disposed upon the elongated gear, a journal pin carried by the arm and a gear journaled relative to the arm and the journal pin, a cam shaft having coacting camming surfaces adapted for being engaged with the one end of the arm and for being manipulated thereby at predetermined times, means being provided for limiting engagement of one arm and one cam at a time, an indicating wheel supporting shaft disposed within the upper part of the housing, graduated wheels disposed upon the shaft, each wheel having an independent reacting element for normally maintaining the wheels in a nonregisterable position, means for rotating one of the wheels progressively at each dialing of the telephone, and an automatic release for each of the associated elements and for returning the same to normal position when the telephone receiver is placed upon the supporting hook.

2. In a device of the class described, in combination with an automatic telephone, the combination of a housing attachable to the base of the telephone, an annular gear associated with the housing, a second housing attachable to the dialing shaft of the automatic telephone, a driving shaft journaled relative to the housing attached to the dial shaft, a gear attached to the shaft and adapted for coacting with the gear associated with the annular gear housing, and an elongated gear associated longitudinally of the shaft and adapted for being rotated in one direction only when the gear is driven by the annular gear, a plurality of spaced arms rockably disposed upon the elongated gear, means for rocking the arms about their support, a plurality of graduated wheels rotatably disposed upon a common shaft, reacting elements for normally maintaining the graduated wheels in starting position and means for rotating each of the graduated wheels independently and for rotating the wheels, progressively, an amount represented by the amount of dialing distance rotated in a dialing operation of the automatic telephone.

3. In a device of the class described, in combination with an automatic telephone, of a housing having an annular gear associated therewith attachable to the base of the telephone, a second housing attachable to the dial shaft of the automatic telephone, means associated with the respective housings and coacting with the annular gear for indicating and registering central of the telephone dial the number dialed as the dial occurs and means associated with the hook of the receiver for clearing the dialed number when the telephone receiver is placed upon the receiving hook.

4. In a device of the class described, in combination with an automatic telephone instrument, of a housing detachably attachable to the base of the automatic telephone, a second housing attachable to the dialing shaft of an automatic telephone, a surface having

the indicating letters and numerals imprinted thereupon fixedly positioned to the first mentioned housing, a dial attachable to the second housing and rotatably disposed relative to the indicated surface, means disposed within the second housing for indicating and registering therethrough the number dialed, as dialed, and means for releasing the dialed number, when the receiver of the telephone is placed upon the hook.

5. In a device of the class described, in combination with an automatic telephone, a stationary housing secured to the base of the telephone and a rotatable housing secured to the dialing shaft of the telephone, graduated wheels disposed upon a common shaft, the first two of the wheels having graduations of groups of letters disposed upon their faces, the remainder of the wheels having graduations of numerals disposed thereupon, automatic means disposed within the rotatable housing for the progressive rotation of the wheels, one at a time, means for locking each of the wheels at the maximum point rotated and means for releasing each of the wheels when the telephone receiver is hung upon the receiving hook.

6. In a device of the class described, the combination with an automatic telephone, a housing fixedly secured to the base of the telephone, an annular gear disposed within the housing, a second housing fixedly secured to the dial shaft of the telephone, means associated with and disposed within the second housing and coacting with the annular gear for visually indicating and registering the prefixes and numerals of the number being dialed, and means associated with the first mentioned means for clearing the prefixes and numerals.

7. In a device of the class described, in combination with an automatic telephone, a housing fixedly secured to the base of the telephone, an annular gear disposed within the housing, a second housing fixedly secured to the dial shaft of the telephone, indicating and registering mechanism associated with both housings and coacting with the annular gear for automatically indicating and registering the number that has been dialed, means for imparting rotational movement from the dial shaft to the indicating and registering mechanism, and means associated with the indicating mechanism for automatically returning the indicating and registering mechanism to its starting position.

8. In a device of the class described, in combination with an automatic telephone, a housing secured to the base of the telephone, a second housing secured to the dial shaft of the telephone, means associated with both housings for selecting the prefixes and numerals of the number being called, automatic means for progressively indicating and registering each of the characters, selected during the dialing operations, means for retaining these characters until the completion of the call over the telephone, means for transferring rotational movement from the dial shaft to the means for progressively indicating and registering each of the characters, and means for automatically returning the indicating and registering means to its starting position at the completion of a telephone call.

WILLIAM GREENBERG.