

June 24, 1941.

C. D. RICHARD

2,246,697

TELEPHONE CALL TRANSMITTER

Filed March 29, 1939

3 Sheets-Sheet 1

FIG. 1

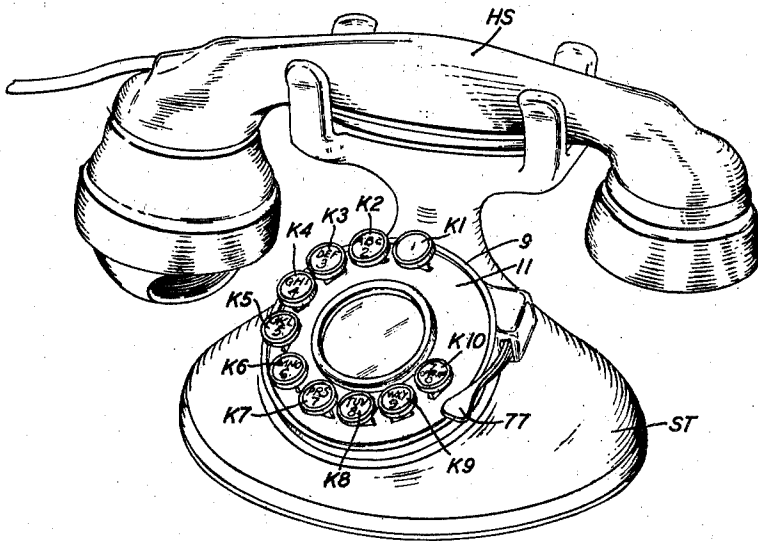


FIG. 2

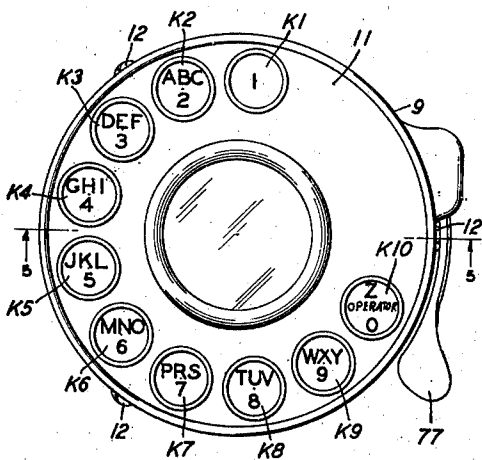
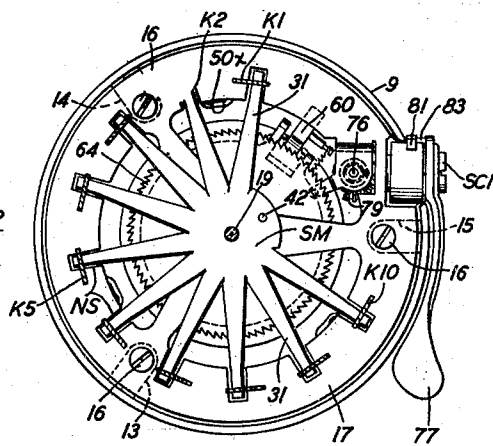


FIG. 3



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FIG. 4

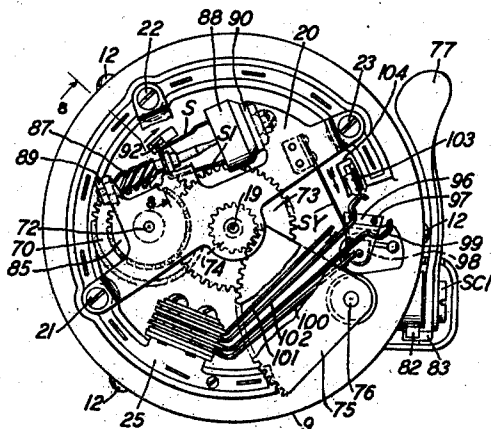


FIG. 6

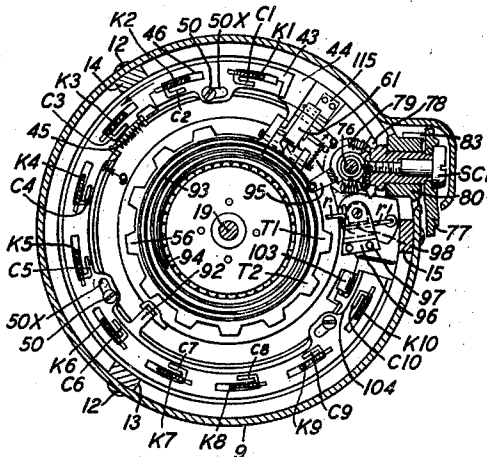


FIG. 5

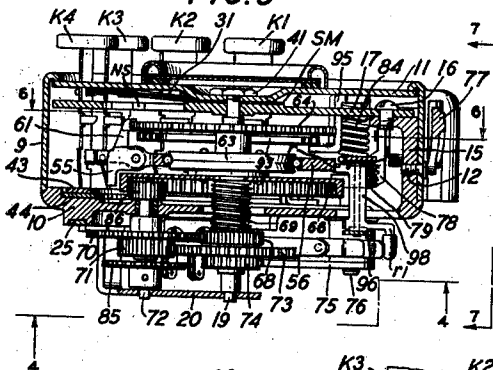


FIG. 7

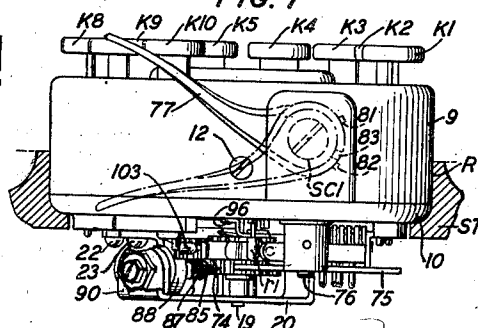


FIG. 8

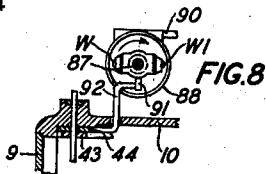
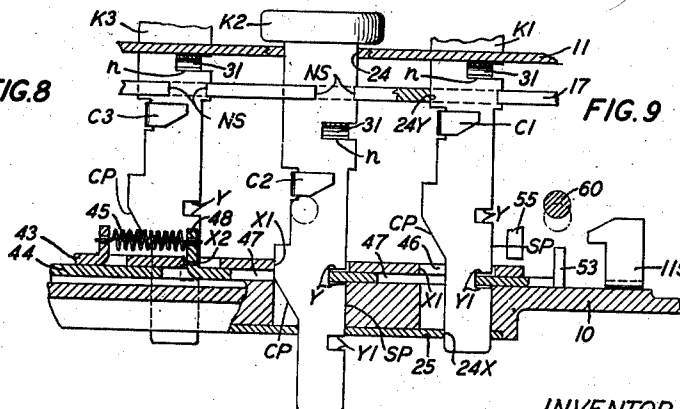


FIG. 9



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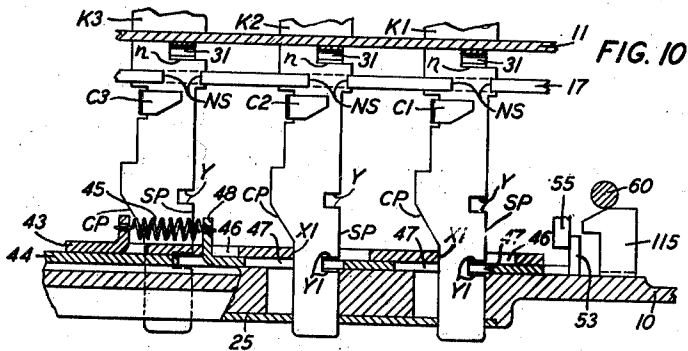


FIG. 10

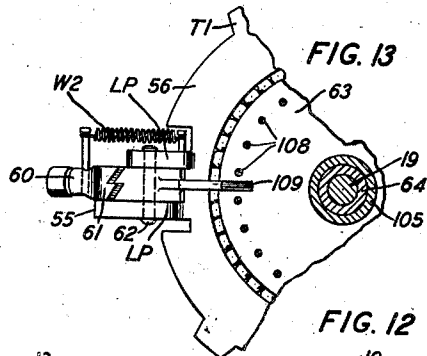


FIG. 11

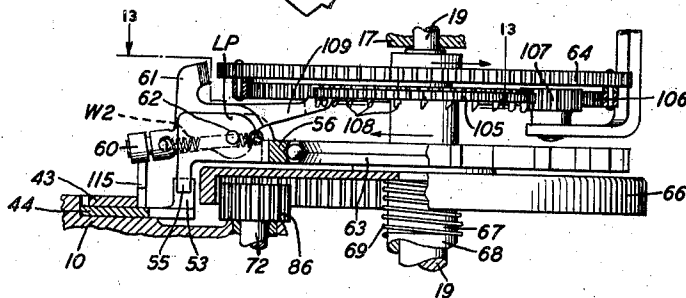


FIG. 12

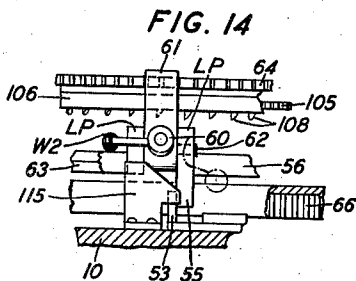


FIG. 13

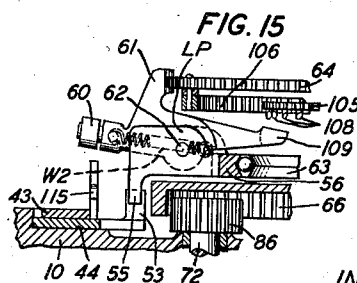


FIG. 14

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2,246,697

TELEPHONE CALL TRANSMITTER

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Application March 29, 1939, Serial No. 264,699

12 Claims. (Cl. 179—30)

This invention relates to telephone call transmitters of the key-controlled type.

The object of the invention is to improve the operation and construction of such call transmitters.

A feature of this invention consists in the provision of a key-operated call transmitter; which will be efficient and simple in operation and which is of a size to mount on the standard substation cradle set.

In accordance with this invention, numbered key members disposed equidistant from each other in a circular row are moved manually against the tension of retractile springs in position wherein camming elements carried by these keys cooperate with one element of a clutching mechanism for variably limiting the angular motion of a pulsing cam for opening normally closed contact springs a number of times corresponding to the number or position of the operated digit key in the row, the pulsing cam being connected to a gearing mechanism, the operation of which is effected by a motor spring tensioned by a handle lever prior to the operation of the selected key. Means is provided for locking the depressed key in the operated position, while locking the other keys in their non-operated position so as to prevent these keys from being depressed during the operation of the pulsing cam in response to the operation of the succeeding key. Means is provided for returning the pulsing cam to normal position following the transmission of each train of pulses, and the operation of the clutch element by the depressed key, while means operated by the pulsing cam during its return movement to normal position unlocks all the keys so as to permit their manual operation following each digit transmitting operation and the return of the operated key to normal under the tension of its own retractile spring.

Other novel features and advantages of the invention will appear from the following description and by the claims appended thereto, reference being had to the accompanying drawings in which:

Fig. 1 is a perspective view of the call transmitter of the invention shown mounted on the stand of a telephone handset;

Fig. 2 is a top view;

Fig. 3 is a top view shown with the casing housing the transmitter mechanism removed, the keys being shown in sections;

Fig. 4 is a rear assembly view;

Fig. 5 is a vertical sectional view taken on line 5—5 of Fig. 2;

Fig. 6 is a horizontal sectional view taken on line 6—6 of Fig. 5;

Fig. 7 is an assembly view looking in the direction indicated by the arrow 7—7 of Fig. 5;

Fig. 8 is a detail view showing the governor locking mechanism;

Fig. 9 is an enlarged partial view of the key locking mechanism showing a number of operating parts in the section taken on line 9—9 of Fig. 6, one of the keys being shown in the operated position;

Fig. 10 is a view similar to that of Fig. 9 showing the keys and their locking mechanism in normal position;

Fig. 11 is an enlarged view of the driving clutch mechanism;

Fig. 12 is a partial view enlarged showing a modification of the mechanism for returning the pulsing cam to normal position;

Fig. 13 is a detail view looking in the direction indicated by the arrows 13—13 of Fig. 12;

Fig. 14 is a detail view showing the pulsing cam clutch control mechanism in normal engaged position; and

Fig. 15 is a side view of Fig. 14.

In the call transmitter of the invention, as shown in Figs. 5 and 7, a base 10 cooperates with a cover plate 11 and a drum-shaped member 9 to form a casing for housing the transmitter mechanism which will be hereinafter described in detail, such casing being of a diameter to be fitted into a recess formed in the desk stand ST of a standard telephone handset ST as shown in Figs. 1 and 7.

The base 10 is formed with three upright arms 13, 14 and 15 shown in Figs. 3, 5 and 6 to which the drum 9 is secured by a number of screws 12, the arms 13, 14 and 15 serving as spacer members for a disc member 17 secured thereon by a number of screws 16. The disc 17 and the cover plate 11 are each provided with a centrally disposed opening for receiving the upper end of a vertically disposed shaft 19 while the other end of this shaft is journaled in a bracket 20 shown in Figs. 4, 5 and 7 secured to the underside of base 10 by screws 21, 22 and 23, shaft 19 being provided at its top disposed end with a screw threaded portion for receiving a nut 41 used for clamping a spider-shaped member SM between the disc 17 and cover plate 11 while affording securing means for preventing rotary movement of this shaft.

The cover plate 11 and the disc 17 are each provided with a series of ten equally spaced rectangular openings 24, 24Y best seen in Figs.

3 and 9 disposed in a circular row and in vertical alignment relative to a series of ten rectangularly shaped openings 24X in a ring 25 to serve as guides for a corresponding number of digit key members K1, K2, K3, K4, K5, K6, K7, K8, K9, and K10, the ring 25 being held securely between the under side of mounting plate 10 and the arms of bracket 20 by screws 21, 22 and 23 above mentioned.

The key members K1, K2, K3, etc., are held in their normal non-operating position, as shown in Figs. 1, 5, 7, 10 and by keys K1, and K3 in Fig. 9, by the spider-shaped member SM formed of ten similarly shaped retractile spring arms 31 engaging the notches n in the keys K1, K2, K3, etc., while the disc 17 is provided with radially disposed notches NS shown in Figs. 3, 5, 9 and 10 for permitting the passing of the spring arms 31 below the under surface of the disc upon the movement of the key members from normal non-operated position as indicated by keys K1 and K3 to the position indicated by key K2 in Fig. 9, a pin 42 shown in Fig. 3 which extends through an opening in the spider-shaped member SM and through the disc 17, being provided for readily locating the arms 31 in the notches n of disc 17.

On mounting plate 10 and in superposed relation thereto there is mounted the open rings 43 and 44 best seen in Figs. 5, 6, 8, 9 and 10 which are movable relative to each other and both relative to the base 10. These rings are interconnected by a spring 45 tensioned by the movement of ring 43 as imparted by the operation of any one of the key members K1, K2, K3, etc., in a manner and for a purpose which will be hereinafter described in detail.

The rings 43 and 44 are each provided with ten rectangularly shaped slots 45 and 47, respectively, through which the keys K1, K2, K3, etc., extend. The movement of ring 44 relative to ring 43 under the tension of spring 45 is limited by a lug 48 formed with ring 44 and a stop afforded by the edge X2 of a slot in ring 43 into which the lug 48 extends for hooking one end of spring 45 as shown in Figs. 9 and 10, the rings 43 and 44 being held in adjusted position on the base 10 by shoulder screws 50 shown in Fig. 6, extending through the slots 50X in the ring 43 and engaging threaded holes in the base 10.

Ring 44 as shown in Figs. 5, 6, 9 and 10 is provided with an upwardly extending lug 53, disposed in engageable relation with a lug 55 carried by an impulse wheel 56, the movement of which toward normal non-operated positions in a manner which will be hereinafter described in detail is effective to impart a small angular movement to ring 44 for disengaging it from the notches Y and Y1 of the key members K1, K2, K3, etc., as the case may be, against the tension of spring 45 for releasing the depressed key as key 2, for example, in Fig. 9 for permitting its return movement to normal position under the tension of its retractile spring 31 and unlocking the non-operated keys K1, K3, etc., for permitting their operation following each digit transmitting operation. The operation of ring 43 as for tensioning the spring 45 which in turn moves the ring 44 into the notches Y and Y1 of key members K1, K2, K3, etc., is effected by the movement of any one of these key members from normal to operated position due to the cam portion CP of any one of these keys engaging the adjacently disposed edges X1 of slots 46 in ring 43 while the ring 44 is being held

against rotary movement by the portions SP of the keys, thus causing the automatic movement of ring 43 for locking the depressed key in the operated position and locking the other keys in their non-operated position.

The key members K1, K2, K3, etc., are each formed with similarly disposed camming portions C1, C2, C3, C4, C5, C6, C7, C8, C9 and C10, respectively, provided for engaging the arm 60 of pawl 61 when these keys are moved in the operated position as shown by key K2 in Fig. 9. The pawl 61 is pivoted on a pin 62 carried by two radially extending lug portions LP formed with the pulsing cam 56, this cam being rotatably mounted on a disc 63 in the manner of a ball bearing as shown in Figs. 5, 6, 12, 13, 14 and 15.

The pawl 61 extends upwardly for normally engaging a clutch element in the form of a ratchet wheel 64 while a spring W2 having one end secured to a pin carried by the pulsing cam 56 and its other end to a pin carried by arm 60, best seen in Fig. 13, holds the pawl 61 out and in engaged relation with the ratchet wheel 64 as the case may be in the manner of a well-known toggle mechanism. The ratchet wheel 64 as shown in Fig. 5 is secured to one end of the hub of disc 63. This hub and the ratchet wheel 64 carried thereby in turn are mounted for rotary movement on the shaft 19 as a unit with an internal gear 66 which is secured to a shoulder portion formed with the disc 63. The internal gear 66, as shown in Figs. 5 and 11, is formed with a hub portion 67 cooperating with the hub of a pinion 68 and a coil spring 69 to form a friction clutch provided for rotating the gear 66, the ratchet wheel 64 and the pulsing cam 56 through the engagement of pawl 61 with ratchet wheel 64.

The rotation of pinion 68 is effected by a gear 73 secured to the hub of a pinion 71 in turn mounted for rotary movement on a shaft 72. This shaft is journaled at one end in a bearing in the base 10 and its other end in the bracket 20. Pinion 71 is driven by a gear 73, securely mounted on the hub of a pinion 74 in turn mounted for rotary movement on the shaft 19 and a gear sector 75 which is securely mounted on the lower disposed end of a spindle 76 operatively engages the pinion 74 for rotating it upon a movement of a handle lever 77 through angle gears 78 and 79, as shown in Figs. 3, 5 and 6. Lever 77 is held securely on the hub of gear 78 by a screw SC1 while gear 79 is keyed on the top disposed end of spindle 76. The hub of gear 78 is rotatably mounted in a bearing portion 80 formed with the base 10 and two projections 81 and 82 shown in Figs. 3 and 7 carried by bearing portion 80 cooperate with a lug 83 carried by the handle 77 for limiting the angular movement of this handle and thereby the tension of motor spring 84, one end of this spring being hooked to the hub of pinion 19 and its other end to the disc 17.

The speed ratio of pinion 74, gear 73, pinion 71, gear 79 and clutch pinion 68 is of the order of eight turns of pinion 68 for each movement of gear sector 75 and that of the handle lever 77, but it is to be noted that the movement of handle 77 as for tensioning of the motor spring 84, the clutch pinion 68 is rotated in a direction so as to unwind the clutch spring 69 so that the internal gear 66 and the ratchet wheel 64 are not operated. On one end of shaft 72 is mounted a worm gear 85 and carries at its other end a pinion 86 meshing with the internal

gear 66. A worm 87, shown in Figs. 4 and 7, meshes with worm gear 85 for rotating a speed governor consisting of spring members S—S1 having the weights W—W1 rotating in a drum 88. The worm 87 as shown in Figs. 4, 7 and 8 is journaled at both ends in lugs 89 and 90 formed with the bracket 20 and carries a radially disposed pin 91 best seen in Fig. 8 engaging an arm 92 formed with ring 44 when this spring is in normal non-operated position for preventing the rotation of the governor shaft 87 and thereby that of the gear mechanism under tension of motor spring 84. The ring 44 is returned and normally held in the non-operated position due to the arm 55 carried by impulse wheel 56 engaging the arm 53 of this ring under the tension of a spiral retractile spring 93 shown in Figs. 5 and 6 having its inner disposed convolution hooked to a pin 94 carried by impulse cam 56 and its outer convolution to the free end of an arm 95 secured to the under side of disc 17. A bracket 96 shown in Figs. 4, 5 and 6 is secured to the base 10 as by rivets 97 and on it is pivotally mounted a pawl-like member 98 having a projection *r* disposed in engageable relation with the teeth of pulsing cam 56 under the tension of a spring SY normally resting on a flat surface formed on one of the bearing portions of this pawl and a second projection R1 carried by pawl 98 is provided with an insulating bushing for operatively engaging the normally closed contact springs 99 and 100 upon the rotation of the cam 56 in a counter-clockwise direction.

The pulsing springs 99 and 100 are mounted in a pile-up arrangement with the shunting springs 101 and 102. The shunting springs 101 and 102 are normally held open by a stud 103 carried by the ring 44 extending through an opening 104 in the base 10 as shown in Figs. 4 and 6 but are tensioned to close upon the movement of ring 44 as effected by the operation of one of the keys K1, K2, etc., that is, during the operation of the pulsing mechanism for a purpose well known in the automatic telephone art.

In the modification shown in Figs. 12, 13, 14 and 15, a gear 105 is rotatably mounted on the sleeve or hub of ratchet wheel 64. This gear is driven in the direction indicated by the arrow in Fig. 12 by a pinion 107 in turn engaging an internal gear 108 secured to the under side of ratchet wheel 64. The gear 105 is provided with a series of clutch teeth 109 spaced corresponding to the pitch of the teeth of pulsing cam 56. These clutch teeth are provided for engaging an arm 109 formed with pawl 61 when this pawl is moved from the position shown in Fig. 15 to the position shown in Fig. 12 as effected by the engagement of arm 60 of this pawl with one of the cams C1, C2, C3, etc., of keys K1, K2, K3, etc., for returning the cam 56 to normal under the tension of motor spring 84.

In a typical example of operation, the manually operable lever 77 is moved from its non-operated position shown in Figs. 1 and 7 to the position shown in dotted line for tensioning the motor spring 84 through the rotation of spindle 76. The movement of this spindle and that of gear sector 75 keyed thereon is effective to rotate the clutch pinion 68, Figs. 5 and 11, a number of turns determined by the speed ratio between the gear sector 75, the pinion 74, the gear 73 secured thereto, the pinion 71 and gear 70, meshing with clutch pinion 68 which is rotated in a direction so as to tend to unwind the clutch spring 69 with the result that the rotation of pinion 68 is in-

effective to rotate the internal gear 66 and ratchet wheel 64. The gearing mechanism above described is prevented from rotating under the tension of motor spring 84 upon the release of the handle lever 77 by the operator, due to the arm 92 of ring 44 engaging the pin 91 carried by governor shaft 87 as shown in Figs. 4 and 8. The operation of any one of the keys as key K2, for example, from the position shown in Figs. 1, 5, 7 and 10 to the position shown in Fig. 9 against the tension of its retractile spring 31 is effective to impart a small angular movement to ring 43 through the camming portion CP of this key for tensioning the spring 45 due to ring 44 being held by the portion SP of this key until ring 44, under the tension of spring 45, engages the notch Y of key K2 and the notches Y1 of the non-operated key K1, K3, K4, etc., for locking the latter in the non-operated position and simultaneously the depressed key K2 in the operated position. The movement of ring 44 under the tension of spring 45 is effective to move the arm 92 carried thereby out of engagement from the pin 91 of governor shaft 87 so as to permit the rotation of this shaft as effected by the movement of the gear sector 75 under tension of motor spring 84. The rotation of pinion 68 now in a direction so as to wind the clutch spring 69 around the hub of pinion 68 and the hub of internal gear 66 is effective to rotate the unit gear 66 and ratchet wheel 64 thus formed, and the impulse cam 56 through the engagement of pawl 61 with the ratchet wheel 64, an angular distance wherein the arm 60 of the pawl 61 engages the cam portion C2 of the operated key K2 for moving this pawl out of engagement from the ratchet wheel 64, thus permitting the return movement of cam 56 to normal under the tension of its retractile spring 93. The movement of impulse cam 56 from normal shown in Fig. 6 to the point wherein the arm 60 of pawl 61 engages the cam portion C2 of key K2 is effective to successively operate the pulsing pawl 98 through its engagement with the teeth T1 and T2 of cam 56 thereby opening the pulsing contacts 99 and 100 for transmitting two pulses, that is, the digit 2.

Upon the return movement of impulse cam 56 to normal under the tension of its retractile spring 93, or through the operation of the mechanism shown in Figs. 12, 13, 14 and 15, above described, the arm 60 of pawl 61 engages the cam 115 secured to the base 10, as shown in Figs. 9 and 10, to cause the reengaging of pawl 61 with the ratchet wheel 64 while the arm 55 of cam 56 engages the arm 53 of ring 44 for imparting a small rotary movement to this ring for disengaging it from the notch Y of the depressed key K2 and from the notches Y1 of the non-operated keys, thus releasing the operated key K2 which is returned to normal position under the tension of its retractile spring 31 and permitting the operation of any one of the keys K1, K2, K3, etc., as above described in connection with key K2. The insulated arm 103, Figs. 4, 6 and 7, carried by ring 44 opens the shunting contacts 101 and 102 while the arm 92 carried by this ring is positioned in the path of pin 91 of governor shaft 87 for preventing further rotation of the gearing mechanism under the tension of the motor spring 84 thus preparing the transmitter for a subsequent digit transmitting operation.

In the operation of the modification shown in Figs. 12, 13, 14 and 15, the function of arm 109 carried by pawl 61 is to engage the clutch pins

108 of gear 105 following its pivotal movement as effected by the cam portions C1, C2, C3, etc., of keys K1, K2, K3, etc., such engagement being effective to return the impulse cam 56 to normal non-operated position where the arm 60 of this pawl is caused to engage the stationary cam 115, reengaging the pawl 61 with the ratchet wheel 34, while the engagement of arm 55, carried by cam 56 with lug 53 of ring 44, operates this ring for opening the shunting contacts 101 and 102 and to position the arm 92 of ring 44 in the path of pin 91 on governor shaft 87 for preventing further operation of the gear mechanism, and the transmitter, as above described, is now ready for a subsequent digit transmitting operation.

What is claimed is:

1. In a call transmitter, a set of manually operable key members disposed in a row, a motor and a pulsing mechanism operated by said motor from normal for sending a number of pulses corresponding to the position of the operated key member relative to the other key members in said row.

2. In a call transmitter, a set of operable key members, a motor, a pulsing mechanism actuated by said motor, said mechanism having means cooperating with means positioned by the operation of one of said key members for controlling the extent of operation of said mechanism and means for holding the last-mentioned key in the operated position during the operation of said mechanism.

3. In a call transmitter, a set of numbered key members disposed in a row, a motor, a pulsing mechanism actuated by said motor, said mechanism having means cooperating with means positioned by the operation of one of said key members for controlling the operation of said mechanism for transmitting a number of pulses corresponding to the position of the operated key in said row, means for locking the last-mentioned key in the operated position, and means actuated by said mechanism for unlocking the operated key following the transmitting of said pulses.

4. In a call transmitter, a set of manually operable key members, representing digits disposed in a row, a motor, a pulsing mechanism actuated by said motor from normal to a position determined by the operation of one of said key members in said row for transmitting a number of pulses corresponding to the digit represented by the operated key, means for locking the last-mentioned key in the operated position, means operated by said mechanism following the transmitting of said pulses for unlocking the operated key, and means operable automatically for returning said key to normal following the unlocking of said operated key.

5. In a call transmitter, a set of digit key members disposed in spaced relation to each other in a circular row, a pulsing cam rotatable in position concentric to said key members in said row, a gearing mechanism having a clutch element, a motor for actuating said mechanism, a clutch element carried by said cam and normally operatively engaging the first-mentioned clutch element, a speed governor actuated by said gearing mechanism for controlling the rate of operation of said cam, means positioned by the operation of one of said key members for disengaging the first-mentioned clutch element for arresting the movement of said cam, a pair of normally closed contacts, means actuated by said cam for open-

ing said contacts a number of times corresponding to the digit of said operated key in said row, means for returning said cam to normal following the operation of said contacts, and means actuated by the return movement of said cam to normal for engaging means carried by said governor for stopping the operation of said motor.

6. In a call transmitter, a set of numbered key members arranged in a circular row, a gearing mechanism having a ratchet wheel disposed for rotary movement in position concentric to said key members in said row, a pulsing cam, a pawl pivoted on said pulsing cam, means for yieldably holding said pawl in engaged relation with said ratchet wheel, a motor spring for actuating said mechanism, manually operable means for tensioning said spring, means for normally holding said mechanism against movement under the tension of said motor spring, means operable upon the movement of one of said keys for actuating the second-mentioned means for releasing said mechanism for actuating said cam in one direction, means conditioned by the movement of said operated key for moving said pawl out of engaged relation from said ratchet wheel, means for returning said cam to normal unoperated position following the disengagement of said pawl from said ratchet wheel, a set of contacts, and means actuated by the movement of said cam for actuating said contacts a number of times corresponding to the number of said operated key.

7. In a call transmitter, a set of key members disposed in a row, a motor spring, a handle lever for tensioning said spring, a gearing mechanism actuated by said spring, a ratchet wheel actuated by said mechanism, a pulsing cam, a pawl normally operatively connecting said cam to said ratchet wheel, means set by the operation of one of said key members to cause the operation of said pawl for disconnecting said pulsing cam from said ratchet wheel for limiting the movement of said cam, a speed governor geared to said mechanism for controlling the rate of movement of said cam, a pair of contacts, and means actuated by said cam for actuating said contacts a number of times corresponding to the position of the operated key in said row.

8. In a call transmitter, a set of numbered key members, means operable for locking one of said key members in the operated position, and simultaneously locking the other keys in their non-operated positions, a pulsing cam, a ratchet wheel and a pawl carried by said pulsing cam normally engaging said ratchet wheel, motor means for rotating said ratchet wheel for actuating said cam, means positioned by the operation of one of said key members for moving said pawl out of engagement from said ratchet wheel for stopping the movement of said cam, a pair of contacts actuated by the movement of said cam, means operable automatically for returning said cam to normal following the operation of said contacts, means actuated by the return movement of said cam to normal for unlocking all of said keys, a retracting spring for returning the operated key to normal and a device actuated by the operation of the last-mentioned means for stopping the operation of said motor means.

9. In a call transmitter, a base, having spacer members formed therewith, a disc member secured to said spacer members, a set of key members mounted for longitudinal movement in said disc and said base, a bracket secured to said disc, a shaft secured at one end to said disc and having its other end engaging said bracket, a sleeve

mounted for rotary movement on said shaft, a gear wheel secured to one end of said sleeve, a ratchet wheel secured to the other end of said sleeve, said sleeve having a disc portion, a pulsing cam mounted for rotary movement on said disc portion, a pawl carried by said pulsing cam normally engaging said ratchet wheel, a motor spring, a handle lever for tensioning said spring, a gearing mechanism actuated by said motor spring for rotating said ratchet wheel and said pulsing cam, means positioned by the operation of one of said key members for operating said pawl for disconnecting said cam from said ratchet wheel for limiting the movement of said cam, contacts actuated by the rotation of said cam for sending a number of pulses corresponding to the numerical value of the operated key, means for returning said cams to normal following the operation of said contacts and means automatically operable upon the return movement of said cam to normal for returning the operated key to normal.

10. In a call transmitter a pulsing mechanism, motor means for actuating said mechanism, and a set of key members disposed in a progressive ordinal order and movable independently a simi-

lar distance from normal positions in positions for determining the extent of movement of said mechanism for transmitting pulses corresponding to the ordinal position of each of said keys in said row.

11. A call transmitter in which the extent of movement of a pulsing mechanism as effected by the operation of a constant speed motor is determined by a plurality of means automatically operable for connecting and disconnecting the pulsing mechanism from the motor, the point of operation of the disconnecting means being variably defined by the position of an operated key in a set of keys disposed in a row.

12. A call transmitter in which the operation of a key in a row of keys is effective to stop the operation of a pulsing cam driven by a motor from a normal position for sending a number of pulses corresponding to that key, said pulsing cam being returned to normal following its pulsing operation by the movement of said motor, with means automatically operable for stopping the operation of said motor when said cam has reached its normal position.

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