

Sept. 14, 1943.

H. W. GOFF

2,329,466

CALL TRANSMITTER

Filed Dec. 17, 1940

6 Sheets-Sheet 1

FIG. 1

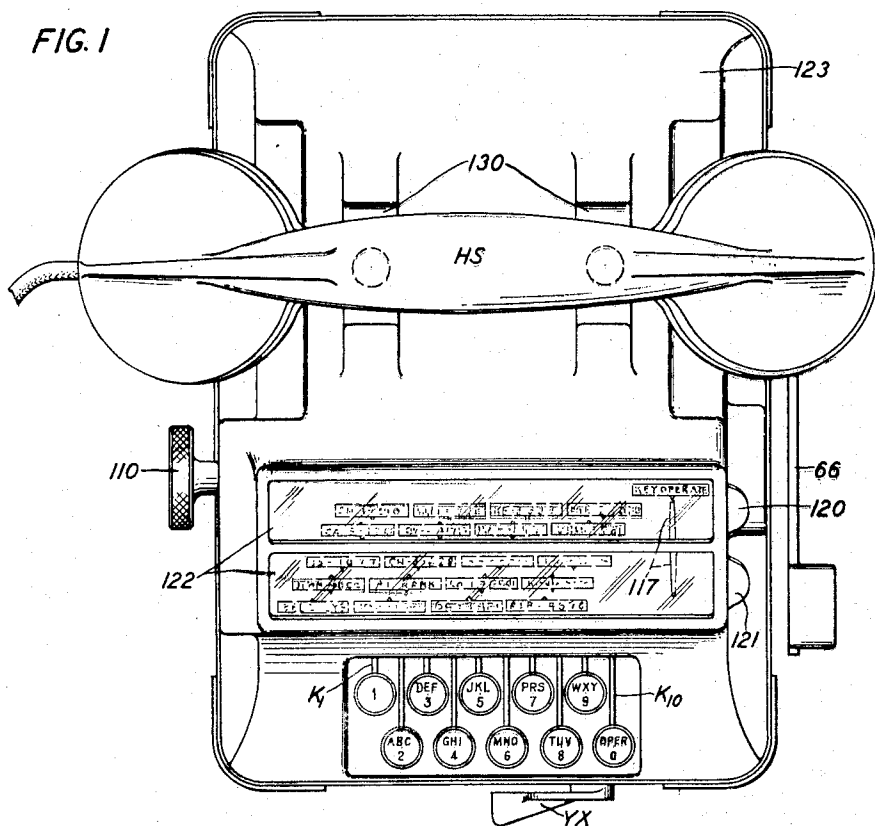
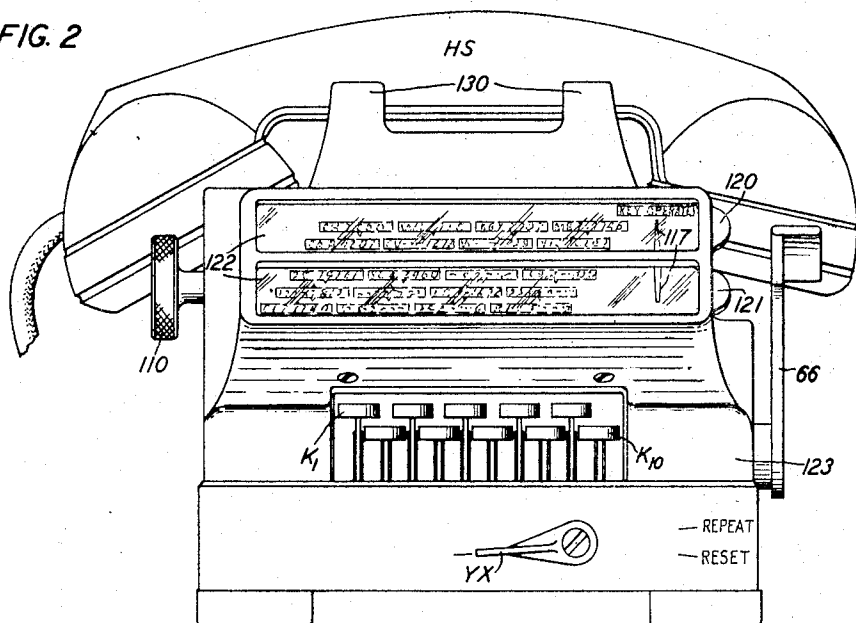


FIG. 2



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FIG. 3

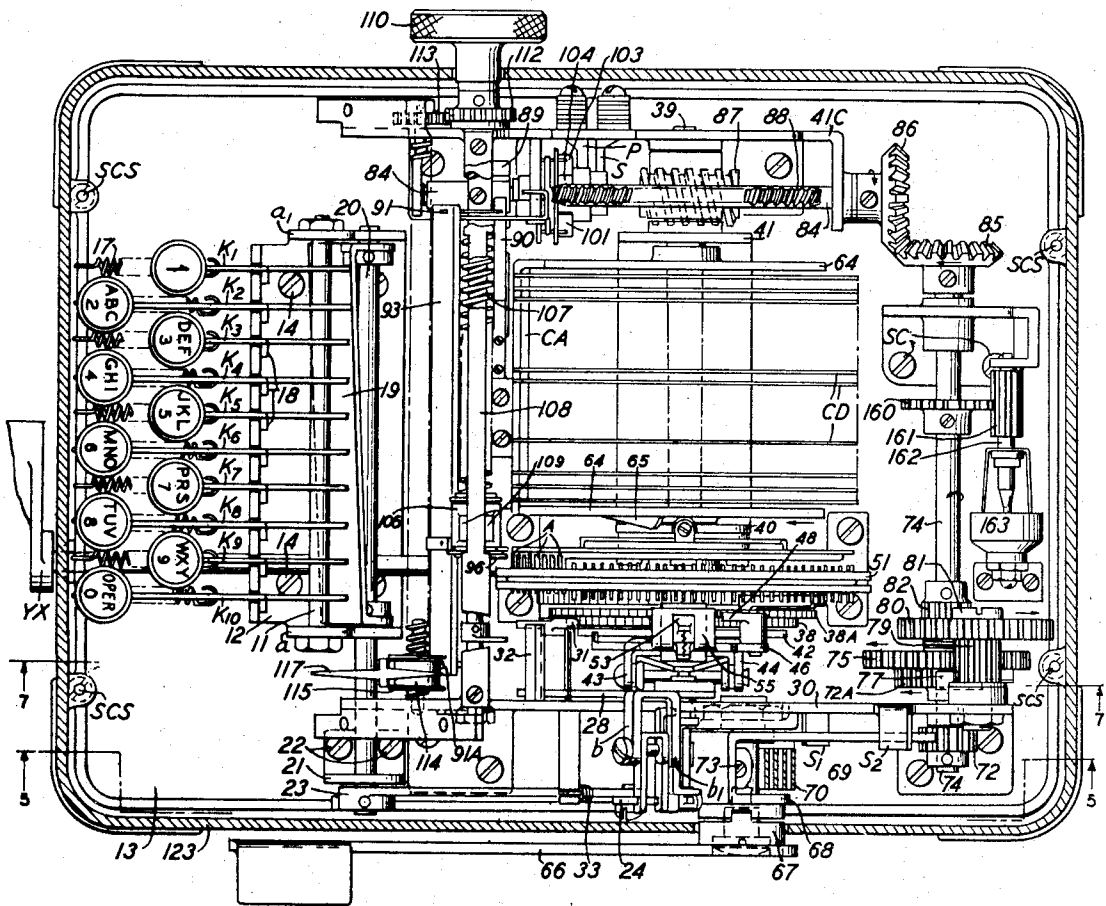
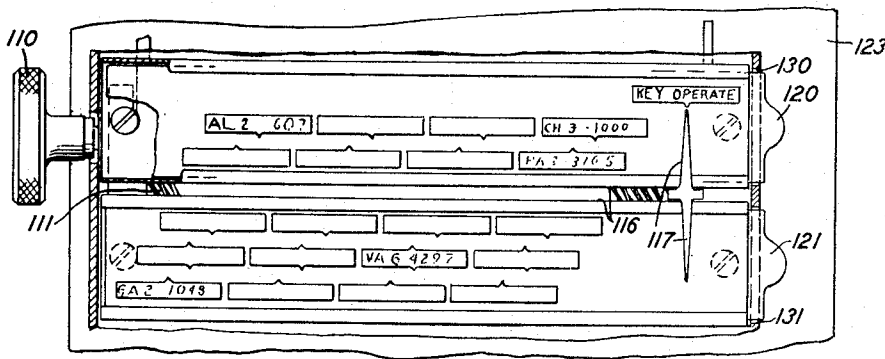


FIG. 4



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FIG. 5

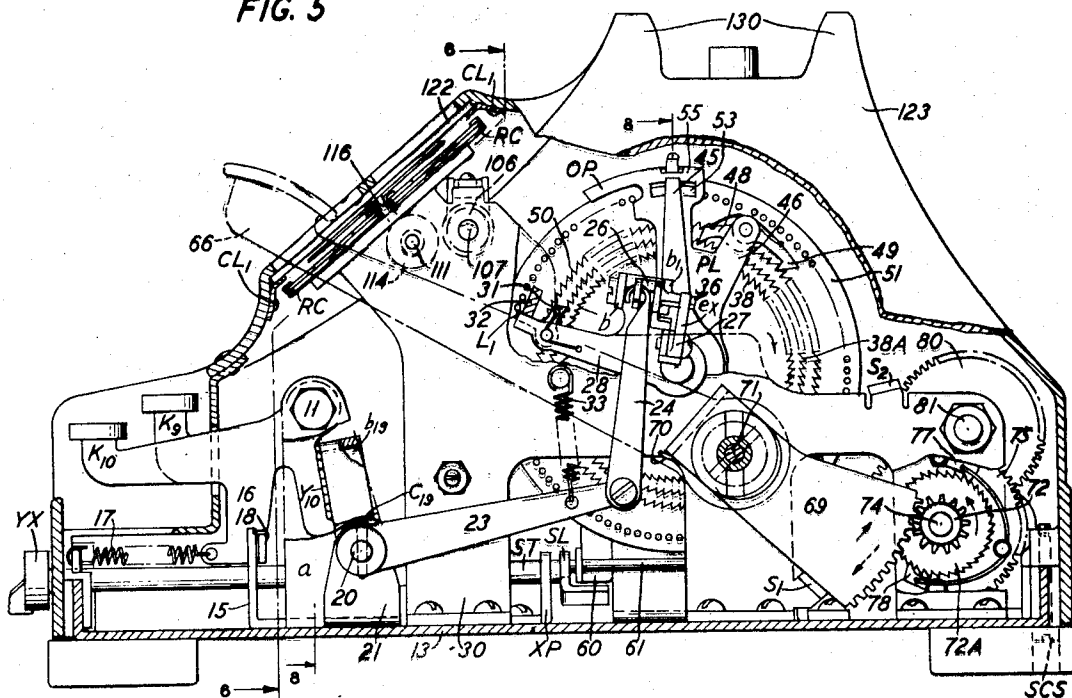
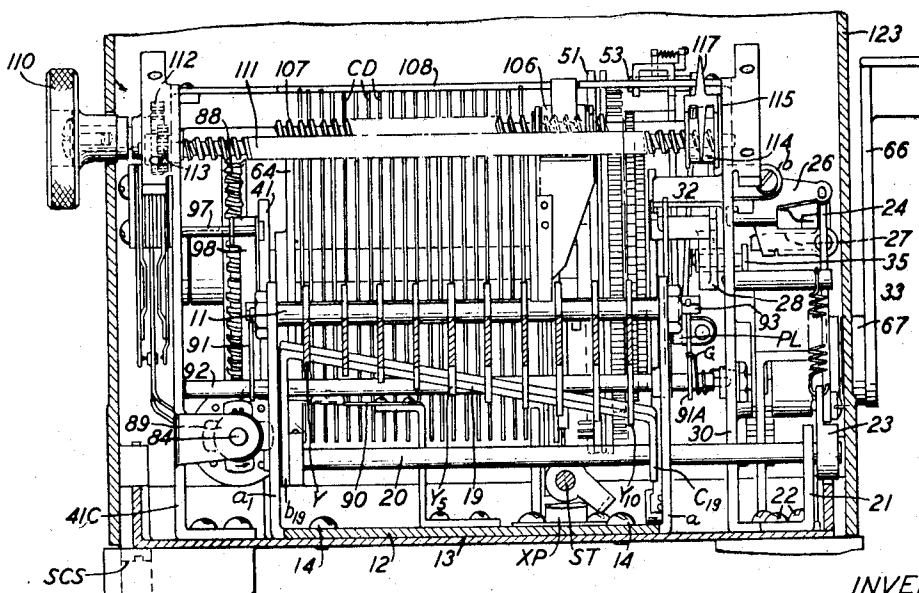


FIG. 6



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FIG. 7

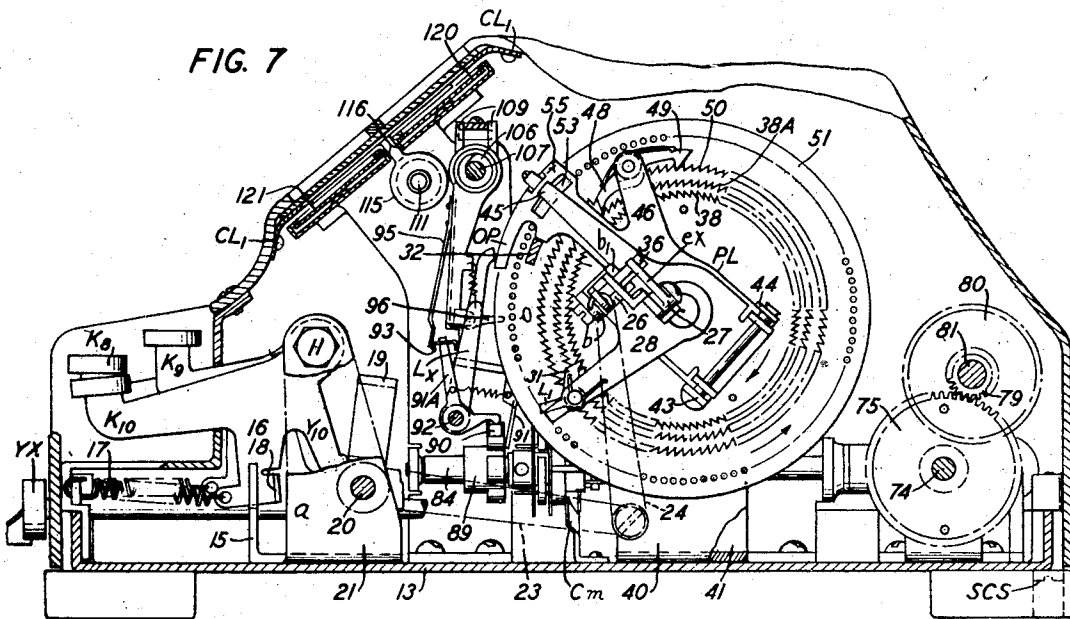


FIG. 9

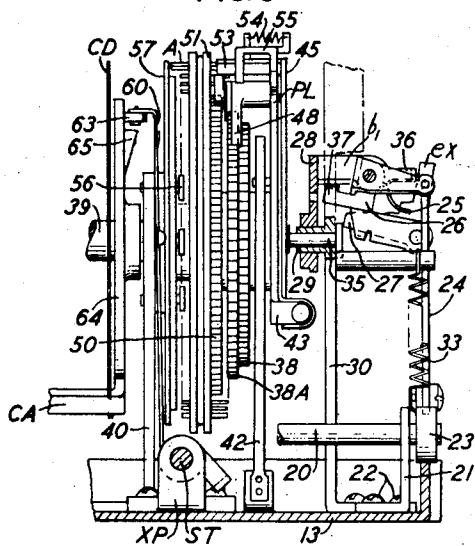
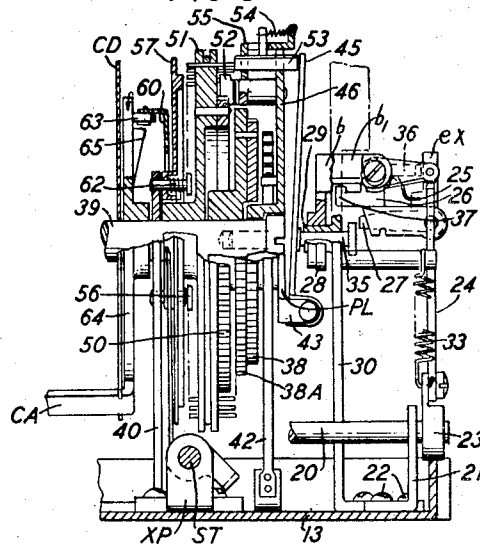


FIG. 8



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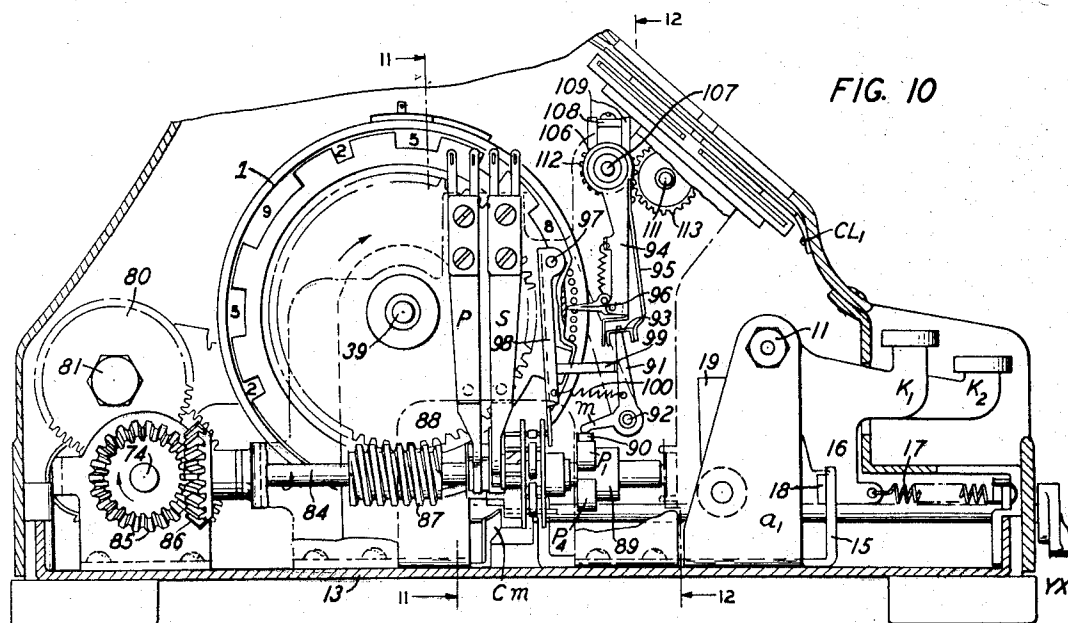


FIG. 11

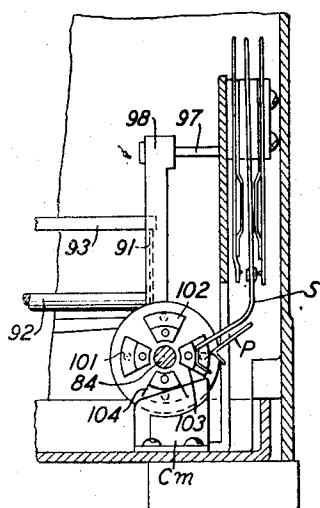


FIG. 12

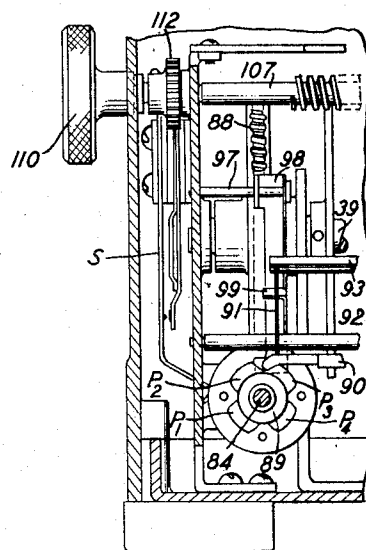
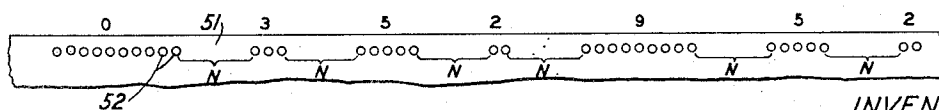


FIG. 13



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FIG. 14

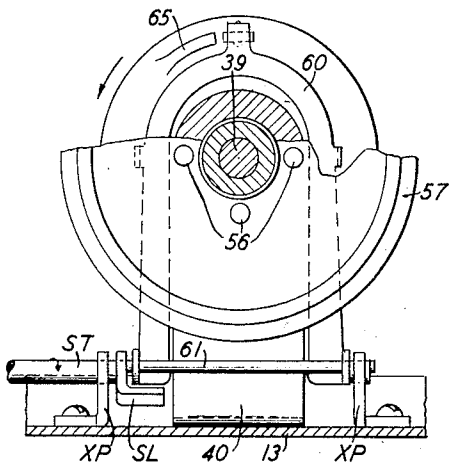


FIG. 15A

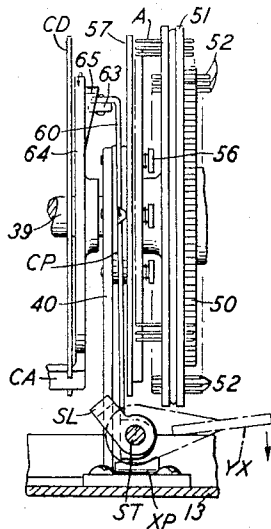


FIG. 15B

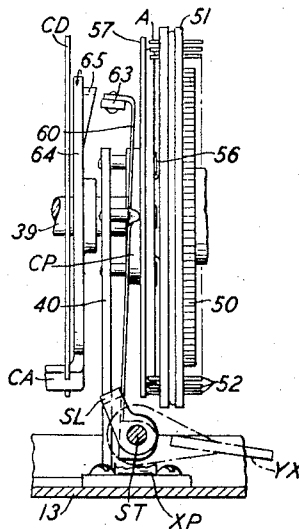


FIG. 16

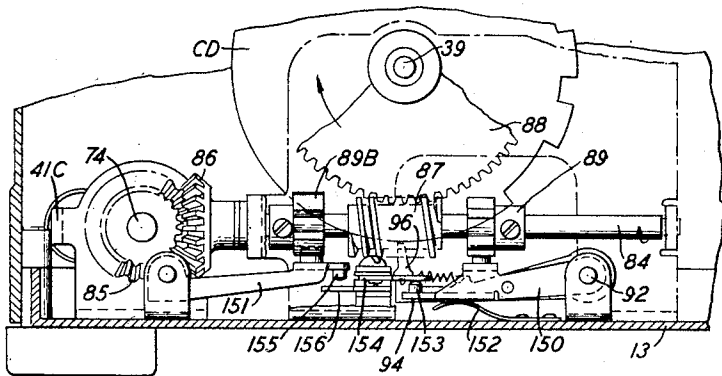
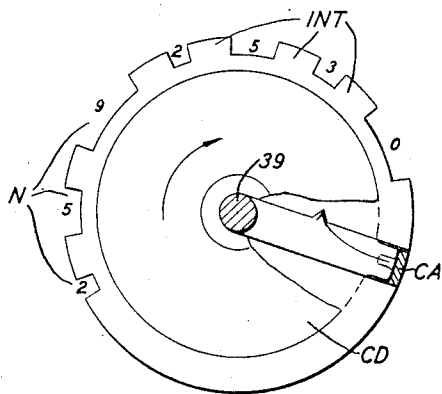


FIG. 17



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UNITED STATES PATENT OFFICE

2,329,466

CALL TRANSMITTER

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Application December 17, 1940, Serial No. 370,452

8 Claims. (Cl. 179-90)

This invention relates to telephone call transmitter devices.

The object of the invention is to combine a call transmitter of the repertory dial type with a call transmitter of the key-controlled type in a single unit using a common pulsing mechanism.

In the drawings:

Fig. 1 is a plan view showing the pointer in position for the transmitting of a call set by the operation of the keys;

Fig. 2 is a front view;

Fig. 3 is a top assembly view of the call transmitter operating mechanism shown with the casing in section;

Fig. 4 is a partial front view showing the cards on which the names of the subscribers are printed for indicating, in cooperation with the pointer, the operation of one of the code elements comprised in the repertory mechanism, the pointer being shown in position associating the pulsing mechanism with the key-controlled digit setting mechanism;

Fig. 5 is a right side view shown with portions of the casing cut away on line 5-5 of Fig. 3;

Fig. 6 is a vertical cross-sectional view taken on line 6-6 of Fig. 5;

Fig. 7 is a right side view showing a number of operating parts in section taken on line 7-7 of Fig. 3;

Fig. 8 is a partial view of the key-controlled call setting mechanism shown in normal non-operated position, a number of operating parts being shown partly in section;

Fig. 9 is a partial view of the key-controlled call setting mechanism shown with a number of parts in their operated positions;

Fig. 10 is a partial left side view showing the pulsing mechanism in the operated position with the base and the casing shown in section;

Fig. 11 is a partial view showing the pulsing and shunting springs in operative relation with the cams actuated by the test pawl operating mechanism, a member of operating parts being shown in section taken on line 11-11 of Fig. 10;

Fig. 12 is a partial view showing the star-wheel and the mechanism operating the test pole, a number of operating parts being shown in section taken on line 12-12 of Fig. 10;

Fig. 13 is a developed view of the wheel supporting the digit defining element, a number of groups of digit defining elements being shown operated so as to form the interdigit spaces between the digit defining elements forming the telephone call designation to be transmitted;

Fig. 14 is a detail view showing the digit defin-

ing elements resetting mechanism in position for resetting such elements following the transmission of the call;

Fig. 15A is a side view thereof showing a number of digit defining elements in the operated position and the resetting mechanism positioned for the repeating of a call;

Fig. 15B is a view showing the digit defining elements in reset position as effected by the manual operation of a handle placed at the front of the casing housing the transmitter operating mechanism;

Fig. 16 is a modification of the pulsing mechanism; and

Fig. 17 is a view of one of the code elements used in connection with the repertory mechanism shown in adjusted position on its supporting shaft.

In the call transmitter of the invention, a plurality of key members $K_1, K_2, K_3, K_4, K_5, K_6, K_7, K_8, K_9$ and K_{10} are pivoted on a common shaft 11 shown in Figs. 3, 5, 6 and 7 journaled in the upright extending arms a and a_1 of a U-shaped support 12 secured to a base 13 by a plurality of screws 14. The keys K_1, K_2 , etc., are provided with downwardly extending arms 16, best seen in Figs. 5, 7 and 10, engaging a comb element 15 serving for holding the keys K_1, K_2 , etc., in spaced relation to each other and at predetermined engaging points along a bar 19 provided for a purpose which will be hereinafter described in detail, retractile springs 17 being provided for normally holding the keys K_1, K_2 , etc., in normal non-operated position as defined by stops afforded by lug members 18 formed with the arms 16 of the keys abutting against the comb element 15.

The keys K_1, K_2 , etc., are provided with arms $Y, Y_2, Y_3, Y_4, Y_5, Y_6, Y_7, Y_8, Y_9$ and Y_{10} of different lengths disposed in engageable relation with the bar 19 having arms such as b_{19} and c_{19} secured to a shaft 20, the bar 19 being disposed at an angle relative to the length of shaft 20 to form in cooperation with the arms Y, Y_2 and Y_3 , etc., of the key members K_1, K_2, K_3 , etc., a differential mechanism for imparting angular movements to shaft 20 which are proportional to the numerical values of the keys to perform a function which will be hereinafter described in detail.

The shaft 20 is journaled on the arms a and a_1 of U-shaped support 12 and on the upright extending support 21 secured to the base 13 by a number of screws 22 and to one end of shaft 20 is securely mounted a lever member 23 best seen in Figs. 3, 5, 6, 8 and 9 to the free end of which is pivoted one end of a connecting rod 24, while the

other end of this rod connects with the arm portion of a yoke-like shaped member 26 pivotally mounted at the free end of laterally extending arms b and b_1 formed with a lever 28, best seen in Figs. 3, 5, 7, 8 and 9, in turn mounted for pivotal reciprocating movement on a bearing or hub 29 laterally extending from an upright supporting member or flange 30 secured to the base 13, while the yoke member 26 serves for pivotally mounting a spring pressed pawl 27 in engageable relation with a plunger 35 mounted in the hub 29. The pivotal movement of the yoke 26, and thereby the movement of pawl 27 as for actuating the plunger 35, is limited upon the downward movement of connecting rod 24 as effected by the operation of the key members K_1, K_2, K_3 , etc., by an arm 37 formed with the yoke 26, abutting against the arm b of lever 28 and upon the upward movement of connecting rod 24 as effected by the tension of a retractile spring 33 by an extension ex of pawl 27 abutting against a projection 36 of arm b_1 best seen in Figs. 7, 8 and 9 on which the yoke 26 is pivoted, the spring 33 having one of its ends hooked to the arm 23 and its other end to a stud st laterally extending from supporting flange 30.

Lever 28 is held in normal position against the tension of retractile spring 33 by a lug 32, best seen in Figs. 3, 5, 6 and 7, while a spring-pressed pawl 31 mounted at the free end of lever 28 is normally held disengaged from the teeth of ratchet wheel 38 due to the engagement of a lug L_1 carried by this pawl with the stop lug 32 and the tension of spring 33 holding this lever against the stop 32.

According to the mechanism above described, the operation of any one of the key members, as K_{10} for example, from its normal position shown in Fig. 5 to its operated position shown in Fig. 7 is effective to impart an angular movement to the shaft 20 and lever 23 carried thereby through the engagement of its arm Y_{10} with the bar 19, while the movement of lever 23 is in turn effective to impart a pivotal movement to the yoke 26, the extent of which is determined as above described by the arm 37 of this yoke engaging the arm b of lever 28 on which this yoke is pivotally mounted.

The pivotal movement of yoke 26 from the position shown in Fig. 8 to the position shown in Fig. 9 is effective to move the pawl 27 for imparting a longitudinal movement to the plunger 35 to a point wherein the pawl 27 is caused to slip over this plunger for releasing it and thereby permitting its return movement in a manner and for a purpose which will be hereinafter described in detail, while the continued movement of lever 23 following the operation of plunger 35 is effective to impart a pivotal movement to lever 28, on hub 29, which movement causes the pawl 31 carried thereby to fall on the ratchet wheel 38 and ineffectively move over a number of teeth thereof corresponding to the numerical values of the operated keys, i. e., ten teeth plus a number of teeth corresponding to an interdigit space as INT in the code disc CD shown in Fig. 17 or the interdigit spaces N between groups of digit defining elements as indicated diagrammatically in Fig. 13, thus rotating this ratchet wheel in a direction indicated by the arrow shown in Figs. 5 and 7 upon the return movement of lever 28 to normal under the tension of retractile spring 33 when the pawl 31 is again disengaged from the ratchet wheel 38 and the lever 28 arrested by its engagement with the stop lug 32 while the

pawl 27 is caused to reengage the plunger 35 as shown in Fig. 8 by the tension of its own retractile spring.

A shaft 39 is supported by upright supports 40 and 41 and by a supporting flange 41c best seen in Figs. 3 and 7 and on the right disposed end of this shaft in position concentric to plunger 35 is mounted for free rotation thereon a plate PL having an arcuated lug portion OP normally engaging the free end of a lever LX securely mounted on a shaft 92 to perform a function which will be hereinafter described in detail and on shaft 39 adjacent the plate PL are mounted the ratchet wheels 38 and 38a secured to each other for rotation as a unit, the wheel 38 being as above described engaged by the pawl 31 carried by the lever 28.

The plate PL is formed with two laterally extending lug portions 43 and 44 for pivotally mounting an arm 45 in operative relation with the plunger 35 while an arm 46, best seen in Figs. 5, 7, 8 and 9 formed with this plate, is provided for pivotally mounting the spring-pressed pawls 48 and 49, the pawl 48 engaging the ratchet wheel 38a while pawl 49 engages a ratchet wheel 50, the latter being secured to a wheel 51 keyed to the shaft 39 to which a plurality of code discs as CD shown in Fig. 13 are mounted there being one hundred and twenty teeth formed with each ratchet wheel 38, 38a and 50, respectively.

On wheel 51, at the periphery thereof, is mounted a plurality of longitudinally movable digit defining elements in the form of pins 52 which may be moved from normal position shown in Fig. 8 to operated position shown at A in Figs. 9 and 15a for controlling the operation of the pulsing mechanism which is of the type described in Patent 2,036,037, issued to H. W. Goff, March 31, 1936. The longitudinal movement of the pins 52 as for setting a call by the operation of key member K_1, K_2, K_3 , etc., is effected by a plunger member 53 of rectangular cross-section slidably mounted in a guide 55 formed at the free end of plate PL and shown in Figs. 3, 5, 6, 7, 8 and 9; while a retractile spring 54 is provided for returning this plunger to normal position following each operation of arm 45 as effected by plunger 35, the width of plunger 53 being equal to the width of the interdigit portion INT of code disc CD in turn equal to five pins 52 in wheel 51 for moving such groups of pins collectively in response to each key depressed in the setting of a call designation to form the so-called interdigit spaces between each of the groups of pins 52 which remain unoperated and which like the notches N in the code disc CD form the digits of the telephone call designation to be transmitted.

The plate PL is held in normal position against the stop lug 32 by a retractile spring 42 and is moved step by step for positioning the plunger 53 in operative relation with the pins 52 depending upon the operation of the key members K_1, K_2, K_3 , etc., through the rotation of ratchet wheel 38 by pawl 31 and the consequent rotation of ratchet wheel 38a engaging the pawl 48 carried by the arm 46 of plate PL while a pawl 49, also pivoted on arm 46 of plate PL, engages the ratchet wheel 50 secured to the wheel 51 for holding the plate PL in its advanced position against the tension of its retractile spring 42.

The upright member 40 is provided with a plurality of laterally extending studs 56, best seen in Figs. 8, 9, 14, 15A and 15B, on which is slidably mounted a disc 57, having a hub portion CP

engaged by a forked lever 60. This lever is pivoted on the crank pin 61 of a shaft ST journaled in an upwardly extending support XP while a handle YX, shown in Figs. 1, 2, 3 and 7, is provided for manually rotating this shaft for imparting an up and down and an angular movement to the forked lever 60 to perform functions which will be hereinafter described in detail, coil springs 62 on stud 56 being provided for normally holding the disc 57 in spaced relation with the pin 52 and thereby the forked lever 60 in position wherein the roller 63 carried thereby rests against a disc 64 keyed to the shaft 39 and having a cam portion 65 provided for normally engaging the roller 63 for imparting the pivotal movement to forked lever 60 and thereby a sliding movement to the disc 57 on stud 56 for returning the operated pins 52 in normal position shown in Fig. 8, following each turn of the shaft 39 and wheel 51, that is, following each call transmitting operation.

The turning of handle YX from the position shown in Fig. 2 to the position marked REPEAT, the movement of shaft ST and the crank pin 61 is effective to impart a downward movement to the forked lever 60 for moving it from the position shown in Fig. 14 to the position shown in Fig. 15A for positioning the roller 63 out of the path of cam 65 so that the disc 57 is not operated and the pins 52 are not returned to normal following the complete turn of shaft 39 and that of wheel 51, thus permitting repeating a call set by the operation of the key members by the simple operation of a handle 66 as for tensioning a motor spring 70 in a manner which will be hereinafter described in detail, while the movement of shaft ST by the operation of handle YX from the position marked REPEAT to the position marked RESET is effective to move a lever SL secured to the shaft ST from the position shown in Fig. 15A to the position shown in Fig. 15B for imparting a pivotal movement to the forked lever 60 which in turn imparts a sliding movement to the disc 57 on stud 56 and against the tension of retractile springs 62 for returning the operated pins 52 to normal position.

A cross-bar CA shown in Figs. 3, 8, 9, 15A and 15B is formed integrally with the discs 64 both secured to the shaft 39 and serve for keying the code discs CD to this shaft while affording means for readily aligning these code discs in a common starting position relative to a test pawl 96, best seen in Figs. 3, 7 and 10, the function of which will be hereinafter described in detail.

The shaft 39, the code discs CD and the wheel 51 keyed on this shaft are rotated by a motor spring mechanism comprising the handle lever 66 shown in Figs. 1, 2, 3, 5 and 6 having a clutch element 67, best seen in Fig. 3, engaged with its complement clutch element 68 formed with a gear sector 69. The movement of handle 66 and that of gear sector 69 from its normal position against the stop S₁ to its operated position against the stop S₂, best seen in Figs. 3 and 5, is effective to tension the motor spring 70, the latter having one of its ends hooked on the gear sector 69 and its other end secured to the gear sector supporting spindle 71, the latter extending laterally from the supporting flange 30. The gear sector 69 meshes with a pinion 72, shown in Figs. 3 and 5, mounted for free rotary movement with a ratchet wheel 72a as a unit on a shaft 74 journaled in flange 30 and on an upright support 75 secured to the base 13 by a number of screws SC. A gear 75 also mounted for free rotation on shaft 74 is

provided with two spring-pressed pawls 77 and 78 shown in Figs. 3 and 5 engaging the ratchet wheel 72a so that the return movement of handle 66 and that of gear sector 69 under the tension of motor spring 70 is effective to rotate the gear 75 through the engagement of pawls 77 and 78 with the ratchet wheel 72a. The rotary movement of gear 75 is transmitted to the shaft 74 through a pinion 79 mounted for rotation with a gear 80 as a unit on a spindle 81 laterally extending from the supporting flange 30 while the gear 18 meshes with a pinion 82 keyed on the shaft 74. The angular movement of gear sector 69 as defined by stops S₁ and S₂ being such, relative to the speed ratio of pinion 72, gears 75 and 80, and pinions 79 and 82, as to impart to shaft 74 under the tension of motor spring 70 thirty turns for each operation of the handle 66.

On shaft 74 is securely mounted a gear 160 engaging a pinion 161 carried by the spindle 162 of a centrifugal speed governor 163 shown in Fig. 3 provided for controlling the operation of the pulsing mechanism when operating under the tension of motor spring 70. Shaft 74 is operatively connected to a second shaft 84 as shown in Figs. 3, 6, 7 and 10 by the meter gears 85 and 86 and on shaft 84 is keyed a worm 87 disposed in engagement with a worm wheel 88 keyed to the shaft 39 on which the code discs CD are mounted. The speed ratio between the worm 87 and worm wheel 88 being of the order of 30 to 1 so chosen for a purpose which will be hereinafter described in detail.

On shaft 84 is mounted a wheel 89, best seen in Fig. 12, of the type disclosed in Patent 2,036,037 above mentioned having four cam portions P₁, P₂, P₃, P₄ engaged by a spring-pressed lever member 90, seen in Figs. 3, 6, 7 and 10, and on this lever rests one arm *m* of an angular-shaped lever 91A, the other arm of which serves in cooperation with a similar arm 91a shown in Figs. 3, 6, 7 and 10 for mounting a bar 93 of inverted U-shaped cross-section in parallel relation to shaft 39. Levers 91 and 91a are keyed to a shaft 92 journaled in upright supporting flanges 30 and 41c, while a retractile spring G, coiled around shaft 92, holds the arm *m* of angular lever 91 in operative relation with the arm 19 resting on the cam wheel 89.

According to this mechanism the bar 93 is reciprocated once for each cam P₁, P₂, P₃ and P₄, of wheel 89 or 4×30=120 reciprocating movements for each turn of code disc CD and once for each pin 52 mounted on wheel 51 keyed on shaft 39. The reciprocating movement of bar 93 is imparted to a downwardly extending lever member 94, best seen in Fig. 10, held in operative relation with the bar 93 by a spring 95 and to the free end of lever 94 is mounted the test pawl 96. On a spindle 97 is pivotally mounted another downwardly extending arm 98 shown in Figs. 6, 7, 10, 11 and 12, having a projection 99 formed therewith abutting against the upward extending arm of angular lever 91 under the tension of a spring 100, best seen in Fig. 10, for imparting reciprocating movement to an arm 98 in phase with the operation of test pawl 96 as effected by the rotation of cam wheel 89 for moving combined segmental members 101, 102, 103 and 104 of insulating material in position for actuating pulsing and shunting contacts P and S, respectively, under control of the pins 52, which may be set by the operation of the key members K₁, K₂, K₃, etc., or that of code disc CD in the manner described in the above-mentioned

patent; a stationary cam *cm*, best seen in Figs. 7, 10 and 11, being provided for returning each segment 101, 102, 103 and 104 to normal position following the operation of spring P and S.

The arm 94 carrying the test pawl 96 is mounted for free pivotal reciprocating movement on a nut 106, Figs. 3, 5, 6 and 10, engaging a lead screw 107. This lead screw is journaled on the top portion of upright members 30 and 41c while the nut 106 is formed with two lug portions 109 straddling a bar 108 securely mounted on the upright supporting members 30 and 41c so as to prevent the rotation of the nut 106 during the rotation of lead screws 107 and thereby causing the movement of arm 94 and the test pawl 96 carried thereby in selective operative relation with the code discs CD on shaft 39 or the digit defining elements 52 on wheel 51.

A second lead screw 111 shown in Figs. 3, 5, 6, 7 and 10 journaled in supporting flanges 30 and 41c is operatively connected to lead screw 107 by gears 112, 113, respectively, and on lead screw 111 is mounted a nut 114 having a yoke shaped member 115 secured thereto and extending between rails 116, best seen in Figs. 4, 5 and 7, forming receptacles for cards 120 and 121 on which subscribers' names having the telephone designations represented by the code discs CD are inserted and on the card 120 in addition to subscribers' names are printed, as shown in Figs. 1 and 2, the words "Key operated" in registry with which the pointer or index 117 carried by the yoke 115 is moved for associating the test pawl 96 with the digit defining elements 52 on wheel 51, the rotation of lead screws 107 and 111 being effected by a manually operable knob 110 secured to one end of lead screw 107.

A glass window 122 is clamped to the underside of the front end of casing 123, as shown by clips CL₁ shown in Figs. 5, 7 and 10 in superposed relation to the cards 120 and 121 which are removable from their receptacles 116 through openings 130 and 131, shown in Fig. 4, while the casing 123 is secured to the base 13 by a plurality of screws SCS, shown in Figs. 3, 5, 6 and 7, such casing having projections 130 forming a cradle serving for receiving the telephone handset HS, shown in Figs. 1 and 2.

In the modification of the pulsing mechanism, as shown in Fig. 16, the shaft 84 carries two quadruple cams 89 and 89b disposed angularly from each other on this shaft an angular distance of 45 degrees, while a lever 151 which is pivoted on lugs extending from the base 13 is disposed for operation by the rotation of cam 89b and another lever 150 secured to a shaft 82 is disposed for operation by the rotation of cam 89. On shaft 82, which is journaled on lugs extending from the base 13, is secured a lever 94 to which the test pawl 96 is mounted for cooperation with any one of the code discs CD or with the digit defining elements 52 as the case may be. A spring 152 normally holds the lever 150 in operating relation with the cam wheel 89 and thereby the test pawl 96 in coacting relation with the code disc CD, which may be selected while lever 94 is provided at its free end with a stud 153 of insulating material disposed in engageable relation with a contact spring 154. Similarly, the lever 151 is provided at its free end with a stud 155 of insulating material disposed in engageable relation with a contact spring 156, the insulating studs 153 and 155 being such as to permit the closure of the contact springs 154 and 156 when the lever 150 rides over one of the

points of cam 89 while the lever 151 is engaged between two of the cam points of cam 89b.

According to the pulsing mechanism of the invention due to the contact springs 94 and 156 being caused to alternately move away and toward each other simultaneously with the consequent quick closure and opening of the springs, as effected by the operation of cam 89 and 89b under control of the test pawl 96 and code discs CD, or under control of this test pawl and the digit defining elements 52 on wheel 51, a high degree of accuracy in the transmitting of pulses is obtained.

In a typical call, setting and transmitting operation of a telephone call designation by the operation of the key members K₁, K₂, K₃, etc., supposing that it is desired to establish a talking connection with the subscriber having the call designation 0352952 for example, the manual operation of knob 110 is effective to move the index 117 in registry with the mark "Key operated" printed on the card 120 while positioning the test pawl 96 in cooperating relation with the digit elements 52 which may be moved from normal position, shown in Fig. 8, to the position shown at A in Figs. 3 and 9, by the operation of the key members K₁, K₂, K₃, etc. The operation of key K₁₀, the first digit of the telephone call designation 0352952 above mentioned, is effective to impart a rocking movement to the bar 19 for pivoting the shaft 20 and thereby imparting a movement to the arm 23 against the resistance of retractile spring 23. The downward movement of arm 23 and that of connecting rod 24 is effective to impart a pivotal movement to yoke 26 for moving the plunger 35 through its engagement with the pawl 27 from the position shown in Fig. 8 to the position shown in Fig. 9 wherein the pawl 27 is caused to slip over this plunger for permitting its return movement to normal during the continued operation of the key and that of lever 28 which is operated upon the engagement of arm 37 of the yoke with the arm b of lever 28, the angular movement of this lever from its normal position against the stop lug 32, Fig. 7, being equal to fifteen teeth of ratchet wheel 38 with which the pawl 31 carried by this lever engages.

The pivotal movement of the yoke 26 and the consequent longitudinal movement of plunger 35 is effective to impart a pivotal movement to arm 45 for moving the plunger 53 mounted at the free end of plate PL for moving a group of pins 52 from the position shown in Fig. 8 to the position shown in Fig. 9, that is, in engageable relation with the test pawl 96, the width of plunger 53 being as above described equal to five pins 52 on wheel 51.

The return movement of key K₁₀ as effected by the tension of retractile spring 33 acting on lever 23 is effective to return the yoke 26 from the position shown in Fig. 9 to the position shown in Fig. 8 and returns the lever 28 to normal upon the engagement of arm ex of pawl 27 with the lug 36 extending from the arm b₁ of lever 28, the return movement of lever 28 being effective to rotate the ratchet wheels 38 and 38a which are mounted for free rotation as a unit on shaft 39 and the rotation of these wheels is imparted to the plate PL through the engagement of pawl 48 with the ratchet wheel 38a.

The plate PL and the arm 45 pivoted thereon are now in the position shown in Fig. 5 and the lever 28 in normal position against the stop lug 32 with the pawl 31 disengaged from ratchet

wheel 38 and the key K_{10} returned to normal position, shown in Fig. 5, by the tension of its own retractile spring 17 with the plate PL held in such operated position against the tension of its retractile spring 42 through the engagement of pawl 49 with the ratchet wheel 50 secured to the digit defining elements supporting wheel 51 now in normal position. The operation of key K_3 , the second digit of the telephone call designation above mentioned is effective to operate the yoke 26 for imparting a pivotal movement to arm 45 for actuating the plunger and thereby moving a second group of pins 52 in engageable relation with the test pawl 96 and imparts an angular movement to lever 28 which is proportional to the numerical value of the key, i. e., equal to eight teeth of ratchet wheel 38, five of which are moved by the plunger 53 to form the interdigit space between the digits 10 and 3 or between any other train of pulses comprised in a given call designation, the pawl 49 in cooperation with ratchet wheel 50 holding the plate PL in each advanced position against the tension of its retractile spring 42 above mentioned.

Upon the complete setting of the call designation 0352952, as shown diagrammatically in Fig. 13, which is effected in the manner described in connection with the operation of key members K_{10} and K_3 , the operation of handle 66 and that of the gear sector 69 from the position against the stop S_1 to abutting relation against the stop S_2 , best seen in Fig. 5, is effective to rotate pinion 72 and the ratchet wheel 72a one turn while tensioning the motor spring 70 which upon the release of handle 66 by the operator is effective to rotate the shaft 74 through the engagement of pawls 77 and 78 carried by gear 75 with the ratchet wheel 72a. The rotation of shaft 74 as effected by the gear train which comprises the gear 75 in engagement with pinion 79 which is mounted for rotation with the gear 80 and the engagement of this gear with pinion 82, keyed to the shaft 84, the speed ratio being as above described thirty turns of shaft 74 for each turn of pinion 72 as imparted by the gear sector 69 in its movement from stops S_1 to S_2 .

The rotation of shaft 74 is imparted to shaft 84 by the meter gears 85 and 86 and to shaft 39 in the direction indicated by the arrow in Fig. 10 by the worm 87 and the worm gear 88 having thirty teeth so as to make a complete turn for each operation of the handle 66. The rotation of shaft 84 and the four-point cam wheel 89 keyed thereon is effective to impart pivotal reciprocating movement to the bar 93 and thereby to the lever 94 and test pawl 96 at a rate of one reciprocating movement for each and in phase with the pins 52 in the wheel 51, that is, 120. Upon the rotation of shaft 39 and the passing of the five pins which have been set by the operation of key K_{10} in the path of test pawl 96, the reciprocating movement of this pawl and, therefore, that of lever 98 connected thereto is prevented and the insulating segments 101, 102, 103 and 104 are rotated in a path ineffective relative to pulsing and shunting contacts P and S, respectively. However, upon the passing of the first pin of the ten pin group representing the digit 10 in registry with the test pawl 96, this pawl is permitted to move according to the movement of the cam wheel 89 to cause the pivotal movement of lever 98 for moving one of the insulating cam segments 101, 102, 103 and 104 as the case may be in the path of the pulsing contact P and shunting contact S for operating

them, and the operation of the test pawl 96 is repeated for each pin in the digit 10 until the first and the succeeding pins of the interdigit group which have been set by the operation of key K_3 pass in registry with the test pawl 96 for preventing its operation and this operation is repeated for each succeeding digit and interdigit period in the transmitting of the call as in this example 0352952, by the operation of pulsing and shunting springs P and S as above mentioned.

In the transmitting of a telephone call designation having seven digits as for example 0352952, it is to be noted that the number of pins used for setting such a call designation is thirty-six pins for the digits of the call designation plus thirty-five for the interdigit pins making a total of seventy-one pins out of a total of one hundred and twenty pins in the wheel 51 so that the movement of the test pawl 96 must be prevented immediately following the transmitting of the last digit, i. e., 2 as in the call designation 0352952. According to the present invention, the plate PL which, as above described, is held in each advanced position during the setting of the call against the tension of its retractile spring 42 when the wheel 51 is in normal position, the rotation of this wheel as effected by the tension of spring 70 causes the return movement of plate PL to a point wherein the projection OP engages with the end of lever LX secured to shaft 92 for holding the test pawl 96 from operation by the cam wheel 89, the engagement of projection OP with lever LX being timed to occur immediately following the last pulse of the digit transmitted and the call transmitter is now ready for a subsequent call setting and transmitting operation by the setting of the key members K_1 , K_2 , K_3 , etc., followed by the manual operation of handle lever 66.

If it is desired to transmit a telephone call designation by the use of the code discs CD which have been formed as shown in Fig. 17, for example, the knob 110 is rotated for moving the pointer 117 in registry with the name of the called subscriber, the movement of knob 110 and pointer 117 actuated thereby being effective to position the test pawl 96 in operative relation with the code discs CD formed to represent the call designation corresponding to the name indicated by pointer 117. Under this condition the operation of handle 66 is effective to tension the motor spring 68 for actuating the pulsing spring P and the shunting spring S under control of the code discs selected in a manner similar to that described in the patent above mentioned.

It is understood that minor changes may be made in the combined repertory and key-controlled call transmitter mechanism of the invention without departing from the scope of the invention.

What is claimed is:

1. A call transmitter comprising a plurality of code discs, a set of key members, digit defining elements set by the operation of said key members, a pulsing mechanism, and manually operable means for operatively associating said pulsing mechanism with said discs selectively and said digit defining elements for transmitting calls either according to the operation of the selected code discs or according to the digit elements set by the operation of said key members.

2. A call transmitter comprising a plurality of code discs, a wheel having longitudinally movable digit defining elements, a common pulsing mech-

anism having a member manually movable in operative relation with said wheel and said discs selectively, said digit defining elements being normally positioned on said wheel for permitting the operation of said member, and a set of key members operable for moving groups of said digit defining elements in position for controlling the operations of said mechanism for transmitting a call by the operation of said pulsing mechanism following its selection relative to said code discs and said elements by said manually movable member.

3. In a call transmitter, a shaft, a plurality of code discs and a wheel keyed to said shaft, a plurality of digit defining elements disposed in a row on said wheel, a pulsing mechanism geared to said shaft, said mechanism having a test pawl, a manually operable knob for moving said test pawl in operative relation with said digit defining elements in said row and said code discs selectively, a set of key members for moving groups of said digit defining elements in operative relation with said test pawl for negating predetermined operation thereof, and motor means for actuating said shaft for sending a call according to the selected position of said test pawl relative to said code discs and said elements.

4. In a call transmitter, a rotatable shaft, a plurality of code discs, and a wheel keyed to said shaft, said wheel having a plurality of movable digit defining elements mounted thereon, a contact, an actuating mechanism for said contact having a test pawl, a set of key members for moving said elements in position for setting a call, and manually operable means for operatively associating said test pawl with said code discs and the elements set by the operation of said key on members selectively for transmitting series of pulses according to the call set by the operation of said key members and the selective operation of said manually operable means upon the rotation of said shaft.

5. In a call transmitter, a base, a set of key members, a shaft mounted for rotary reciprocating movement on said base, a bar secured to said shaft at an angle relative to the length thereof, said key members having arm portions of different lengths operatively engaging said bar for imparting angular movements to said shaft corresponding to the numerical value of said key members, a lever carried by said shaft, a pair of supports secured to said base, another shaft mounted for unidirectional movement on said supports, a wheel secured to said shaft at one end thereof, a plurality of longitudinally movable pins disposed in a circular row on said wheel, an upright support having a bearing portion, a plate pivoted on said shaft movable in a plane parallel to said wheel and having a plunger disposed in engageable relation with said pins, another plunger mounted in said bearing portion, an arm pivoted at one end of said plate and having its other end disposed in engageable relation with the plunger carried by said plate, said arm being disposed for operations by the movement of the plunger in said bearing portion, another arm mounted for pivotal movement on said bearing, a yoke pivotally mounted on the last-mentioned arm, a rod operatively connecting the first-mentioned arm to said yoke, and a pawl carried by said yoke for moving the second-mentioned plunger for operating the second-mentioned arm for changing the position of a number of said pins on said wheel group by

group for setting a call comprising a plurality of digits upon the successive operation of said key members.

6. In a call transmitter a pulsing cam, a contact operable by the movement of said cam, a rotatable shaft, a plurality of code discs and a wheel supported by said shaft, a plurality of digit defining elements mounted on said wheel, a test pawl, manually operable means for moving said test pawl in coacting relation with said wheel and said code disc selectively, a mechanism for imparting a pivotal reciprocating movement to said test pawl in each of said selective coacting relations, one reciprocating movement for each of said pins on said wheel, said digit defining elements being normally positioned in a path out of coacting relation from said test pawl, a mechanism actuated by said test pawl to cause the operations of said contact by said cam, a set of key members operable for positioning groups of said digit defining elements in coacting relation with said test pawl for setting a call, an index member, name cards, a manually operable mechanism for moving said index on said name cards for indicating the selected position of said test pawl relative to said code discs and said wheel and motor means for actuating said shaft for transmitting such call.

7. In a call transmitter, a pulsing mechanism having a test pawl, a shaft geared to said mechanism, a cam and a wheel keyed on said shaft, a plurality of pins mounted on said wheel and movable longitudinally for association with said test pawl, a set of numbered key members operable for moving groups of said pins in such association for controlling the operation of said pulsing mechanism upon the rotation of said shaft, a pair of supports for said shaft, one of said supports having projections extending perpendicularly thereof, a disc mounted for sliding movement on said projections and disposed for engaging said pins, said disc having a collar portion, a crank shaft, a forked lever having one end pivoted on said crank shaft and engaging the collar portion of said disc, a roller mounted at the free end of said forked lever and normally positioned for engaging said cam upon a movement of the latter for returning said pins to normal position through the operation of said disc, following the transmission of the call set by the operation of said key member, a handle for rotating said crank shaft for moving said roller out of engagement from said cam to render the movement of the latter ineffective relative to said disc for permitting repeating said call, the movement of said handle in another position resetting said pins in normal position independently of said cam.

8. In a call transmitter, a pulsing, contact, a test pawl, a rotatable shaft, a wheel, actuating means for imparting pivotal reciprocating movement to said test pawl, a ratchet wheel keyed on said shaft, a plurality of operable digit defining elements mounted on said wheel, a mechanism for moving said elements in coacting position with said test pawl for controlling the operation of said contact, said mechanism comprising a set of key members, a pivoted shaft, a bar and an arm secured to said shaft, said key members having means cooperating with said bar for imparting angular movements to said arm proportional to the numerical values of said key members, an upright support having a bearing, another arm mounted for pivotal movement on said bearing, a yoke pivoted on the second-

mentioned arm, a rod operatively connecting the first-mentioned arm and said yoke for imparting movement to said yoke and to said second-mentioned arm upon the operation of each of said key members, a pair of ratchet wheels mounted for rotation as a unit on said rotatable shaft, said second-mentioned arm having a pawl engaging one of said wheels, a plate mounted on said rotatable shaft having a pawl engaging the other ratchet wheel of said unit whereby the movement of said second-mentioned arm is imparted to said plate, another pawl carried by

5 said plate engaging the first-mentioned ratchet for holding said plate in each advanced position relative to said wheel, a plunger carried by said plate positioned relative to a number of said elements upon each operation of said plate, a mechanism actuated by the pivotal movement of said yoke for moving said elements in coacting relation with said test pawl for setting a call, and retractile spring for returning said plate to normal position during the transmitting operation of such call.

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