Oct. 18, 1938. C. D. RICHARD 2,133,475

CALL TRANSMITTER

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FIG. 1

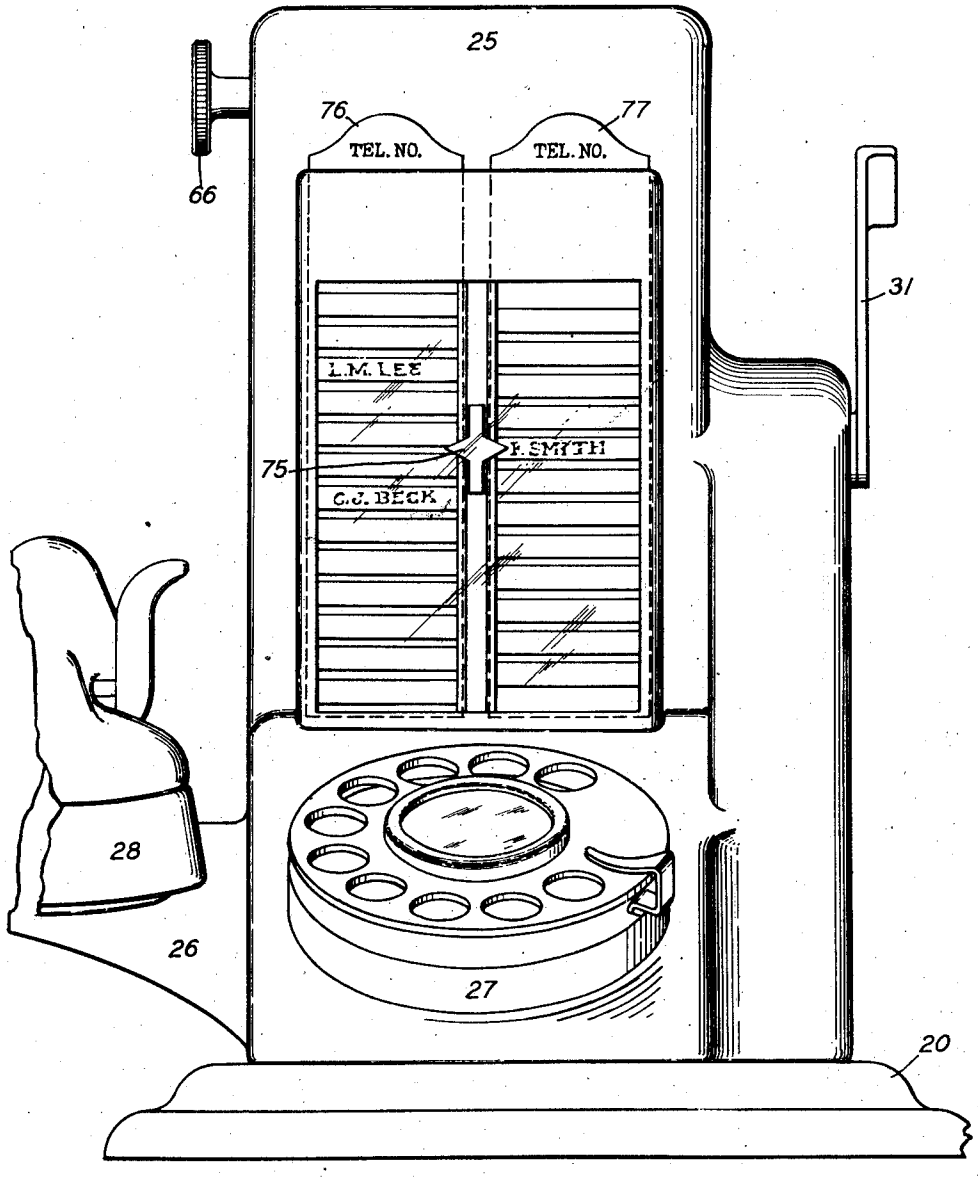

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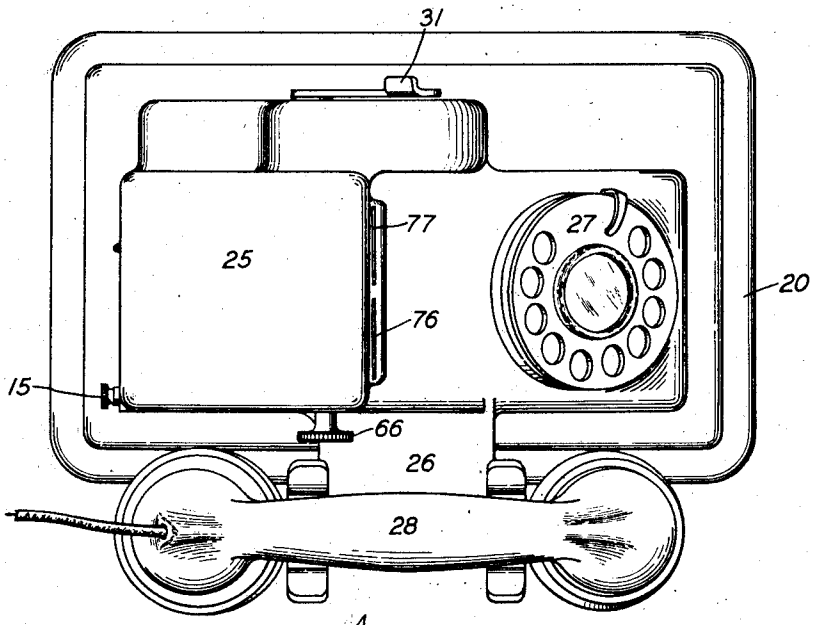
FIG. 2



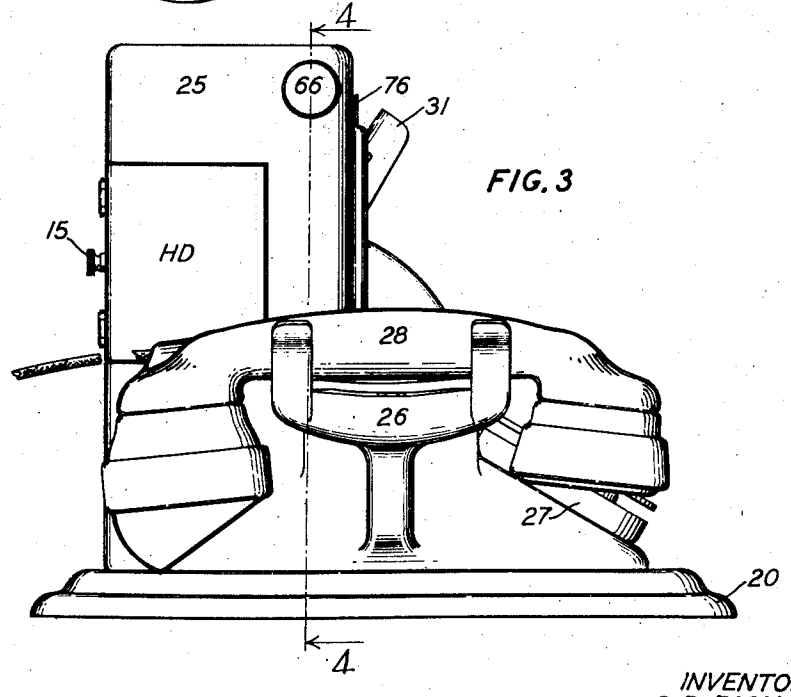


FIG. 3

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FIG. 4

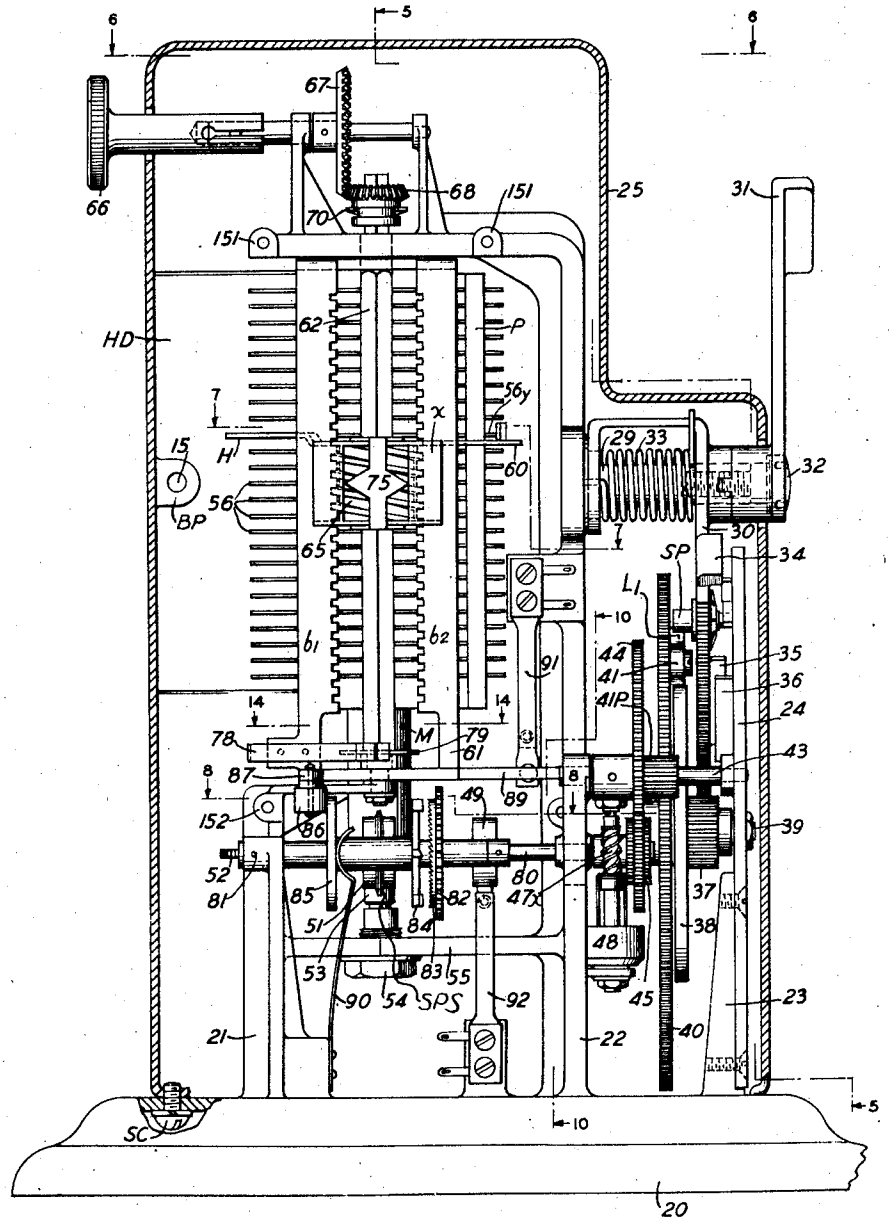

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FIG. 5

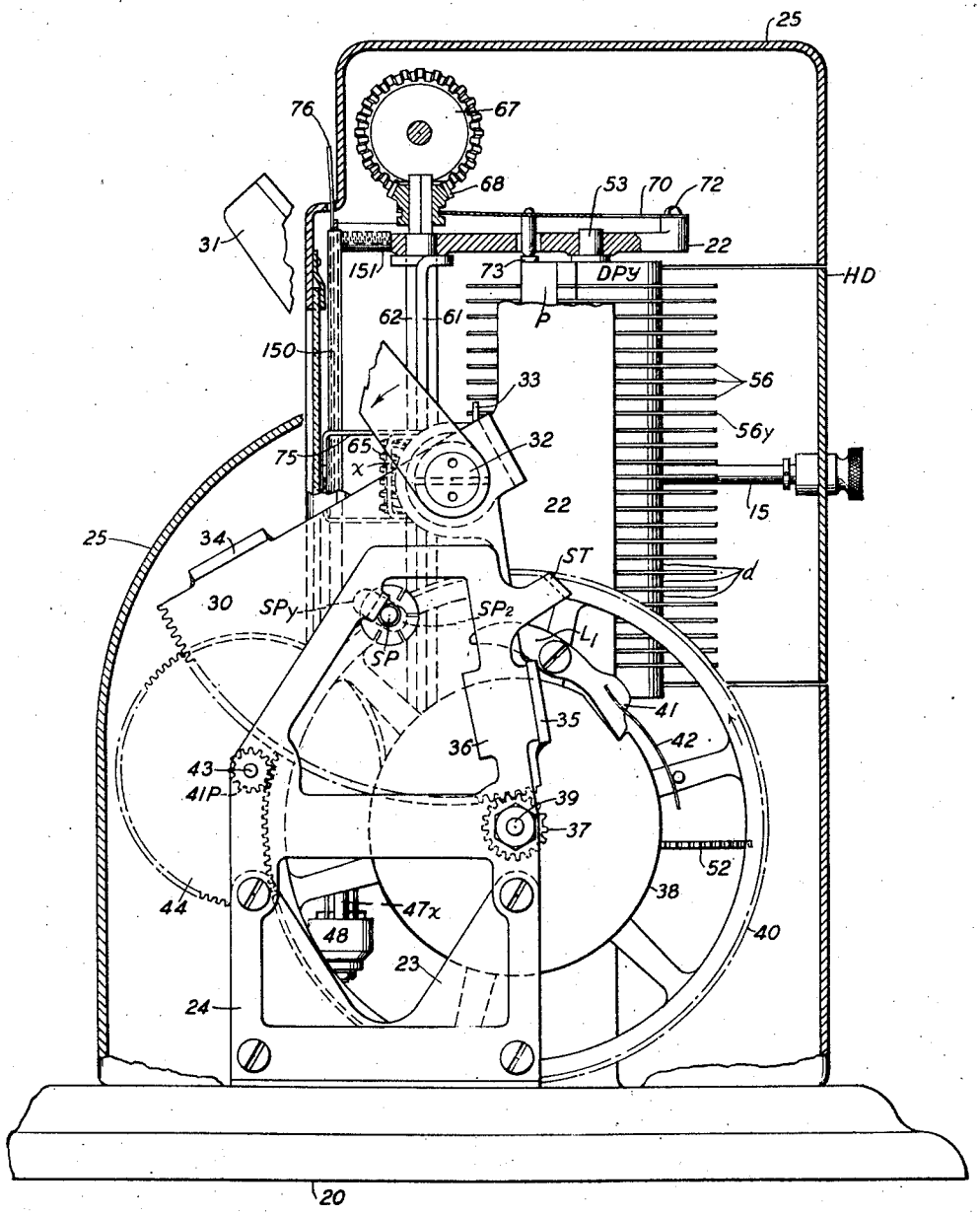

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FIG. 6

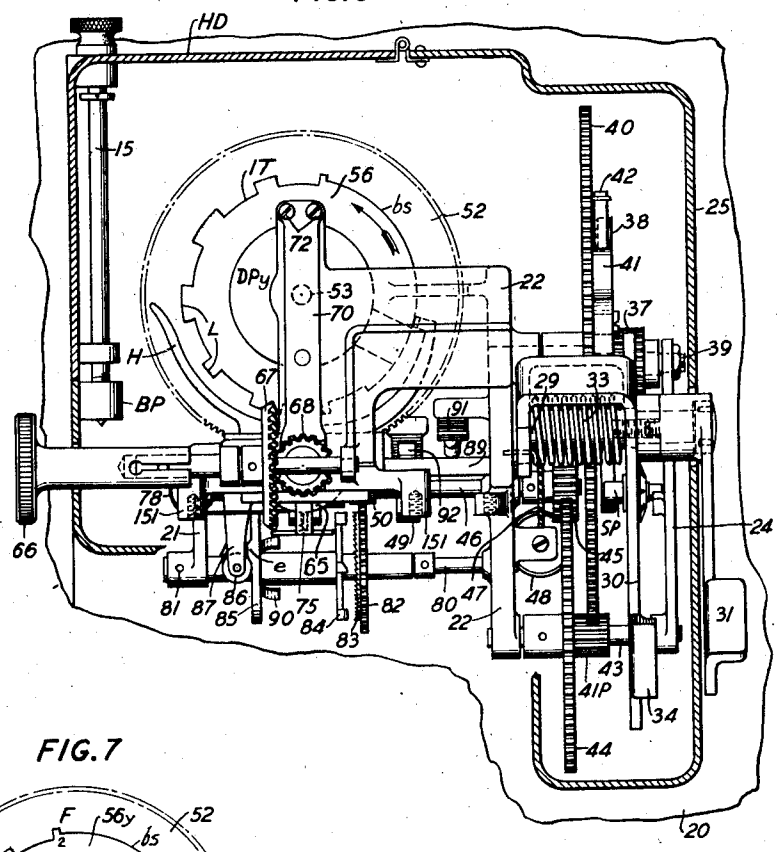

FIG. 7

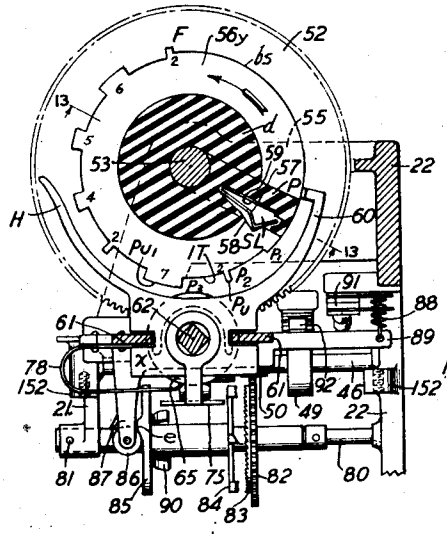

FIG. 8

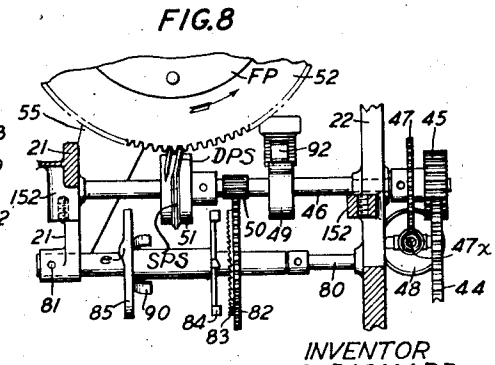

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FIG. 9

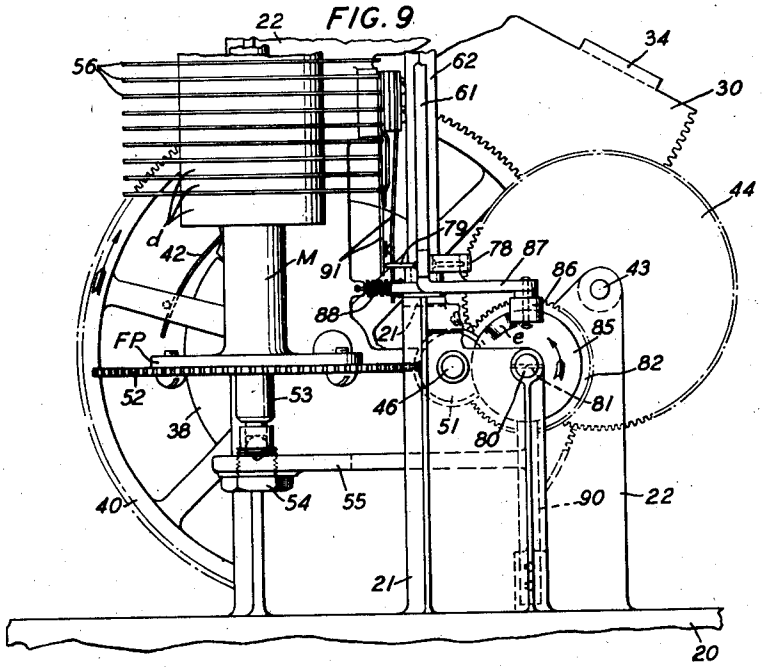

FIG. 10

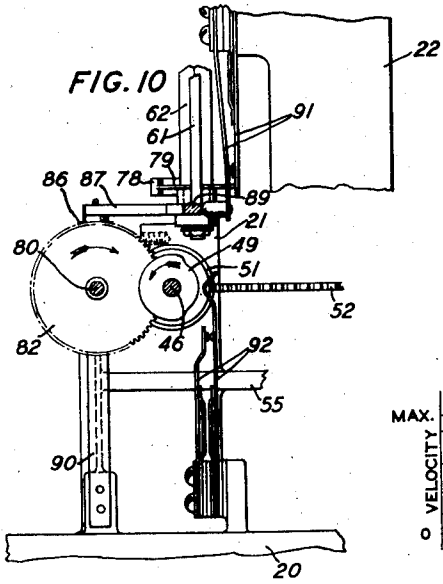

FIG. 11

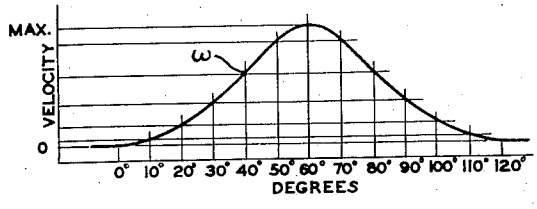

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FIG. 12

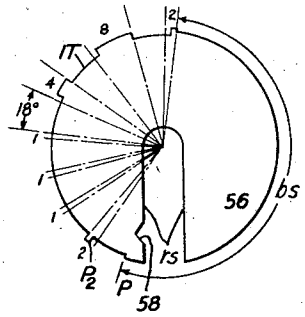


FIG. 13

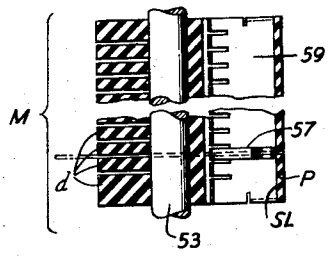


FIG. 14

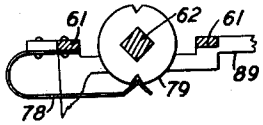


FIG. 15

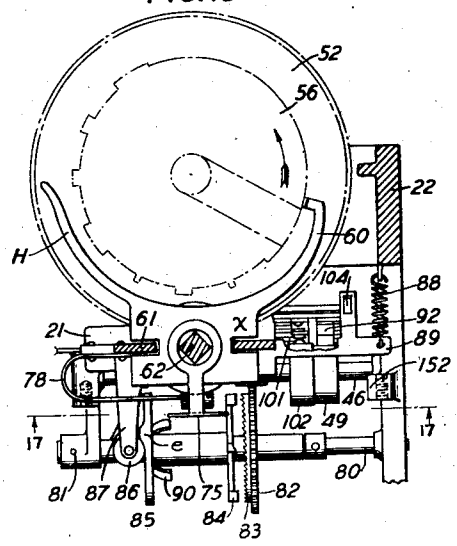


FIG. 16

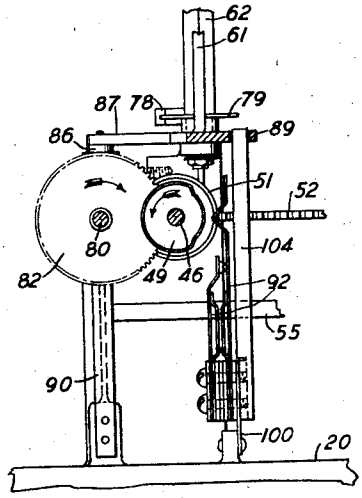


FIG. 17

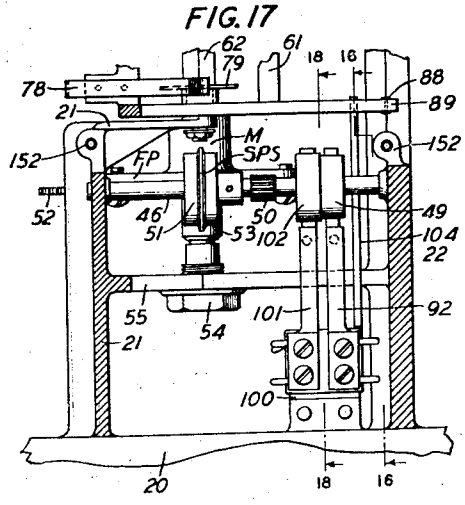
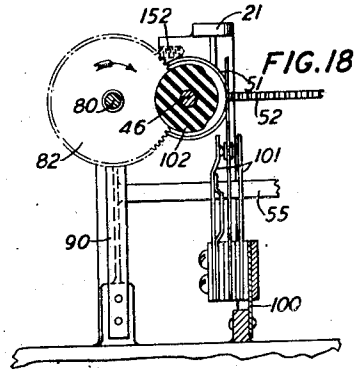


FIG. 18



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Patented Oct. 18, 1938 2,133,475

UNITED STATES PATENT OFFICE

2,133,475

CALL TRANSMITTER

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Application April 30, 1935, Serial No. 18,985

15 Claims. (Cl. 179—90)

This invenion relates to call transmitter devices and has particular reference to that type of call transmitter generally known as repertory dials used in certain telephone systems, for example, for establishing talking connections.

In such repertory dial devices an indicator member is moved in selected position with respect to call designation elements, which cooperate with a pulsing mechanism for transmitting series of impulses as determined by the character of the element selected, such designation elements being, as is well-known, formed by cutting teeth at the periphery of a metallic plate or disc as to provide as many positions as the sum of the impulses necessary to form the required number of digits as contained in a telephone number plus as many positions as are required to form the so-called interdigit spaces.

In practice it has been found that in order to take care of the largest telephone number together with the necessary interdigit spaces, 120 teeth or positions were required at the periphery of the discs, such positions being each equal to an angular distance of 3 degrees of the disc and therefore equal to an impulse as effected by a pulsing mechanism with the discs and the pulsing mechanism operating continuously at different but related rates of speed.

In the manufacture of the discs, the support and associated operating parts in such devices, it has been found impracticable or impossible at even great expense to hold the measurement of these parts sufficiently close to obtain an accurate alignment of the discs on their supporting spindle, or to manufacture this spindle without a certain amount of eccentricity and a certain deviation in the alignment of the spindle with respect to the selective movement of the selector member of the discs, with the result that a deviation of as much as 2 degrees occurs in the alignment of the discs. Under this condition, since each tooth of the discs is equal to an angular distance of 3 degrees and therefore equal to one pulse, a number of code discs are too far advanced or retarded with respect to the operation of the impulse mechanism which results in the so-called clipping or mutilation of the impulses and the consequent faulty operation of the exchange switches and thereby the establishment of wrong telephone connections.

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

According to the invention, a plurality of code elements in the form of discs having notches and ridge portions disposed at their periphery to form substation designations are removably mounted on a vertically disposed spindle with means in the form of a variably advancing and stopping wheel for actuating the spindle and the discs carried thereby in timed relation with respect to the operation of an impulse mechanism as to hold the discs stationary and thereby a selecting arm operatively associated therewith in adjusted position thereon during the pulsing cycles of such mechanism, and to advance the discs to other positions during the non-pulsing cycles of this mechanism with the result that a portion of a ridge or position of even a few seconds angular distance appearing in registry with the selecting arm will be sufficient to maintain this arm in adjusted position during the sending of a complete pulse as represented by that position and thereby permitting the proper operation of the impulse transmitter and the exchange switches. Automatically operable means is provided for counting off the number of interdigit positions of each notch and tripping the selecting arm from these notches for causing the sending of the first pulse of each digit to be transmitted while the arm is being held in its operated position by the ridge at the periphery of the code disc with which it is associated. Motor means with a clutch control mechanism is provided for actuating the spindle and the impulse mechanism with means for preventing the selective movement of the arm during the operation of the transmitter and means set by the selecting movement of the arm for indicating the call designation to be transmitted.

Other features 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 front elevation view;

Fig. 2 is a top view;

Fig. 3 is a side view;

Fig. 4 is an assembly view showing the casing in section taken on line 5—5 of Fig. 3;

Fig. 5 is a side assembly view showing the casing and a number of operating parts in section;

Fig. 6 is a top assembly view showing the casing in section taken on line 6—6 of Fig. 4;

Fig. 7 is a cross-sectional view taken on line 7—7 of Fig. 4;

Fig. 8 is a partial assembly view showing the operating mechanism for the code elements the frame being shown in section taken on line 8—8 of Fig. 4;

Fig. 9 is a partial assembly view showing the

mounting for the code elements and its actuating mechanism;

Fig. 10 is a partial assembly view showing a number of operating parts in section taken on line 10—10 of Fig. 4 showing the impulse mechanism and the impulse shunting mechanism;

Fig. 11 is a curve showing the speed variation of the driving wheel used for actuating the code elements;

Fig. 12 is a detail view of a code element;

Fig. 13 is a longitudinal sectional view of the support for the code elements taken on line 13—13 of Fig. 7;

Fig. 14 is a detail view showing the centering mechanism for the index taken on line 14—14 of Fig. 4;

Fig. 15 is a view similar to Fig. 7 showing modification of the shunt and impulse operating mechanism;

Fig. 16 is a side view of Fig. 15;

Fig. 17 is a cross-sectional view taken on line 17—17 of Fig. 15; and

Fig. 18 is a cross-sectional view taken on line 18—18 of Fig. 17.

The base 20 as shown in Figs. 4, 5 and 9 is formed with a plurality of upright brackets 21, 22 and 23, the latter serving to secure as by ordinary screws the upright support or flange 24, and provision is made on the base 20 for receiving a casing 25 which is securely held thereon by a number of screws SC shown in Fig. 4. Casing 25 is formed with a bracket 26 shown in Figs. 1, 2 and 3 for supporting a telephone handset 28 and an extension for mounting a call transmitter 27 of the finger wheel type for use under a condition which will be hereinafter described in detail. Casing 25 is provided with a hinged door HD provided for permitting the removal and insertion of the so-called code elements from the casing without exposing other operating parts of the transmitter, this door being locked in its closed position by a screw 15 shown in Figs. 2, 3, 4, 5 and 6, engaging the lug portion BP of the casing.

The upright bracket 22 is formed with a laterally extending spindle portion 29 for pivotally mounting a gear sector 30 and a handle lever 31, the latter having lug portions as shown in Figs. 4 and 6 engaging correspondingly shaped notched portions in the hub of gear sector 30 for actuating it upon a movement of the handle 31 and a screw 32 is provided for preventing the lateral movement of the gear sector 30 and handle 31 on their supporting spindle 29. A helical spring 33 which is tensioned by the movement of gear sector 30 within the limits defined by stops 34 and 35 engaging the sides of a stop portion 36 laterally extending from the upright flange 24 as shown in Figs. 4 and 5.

The gear sector 30 meshes with a pinion 37 secured on the hub portion of a one-tooth disc 38 loosely mounted on a shaft 39. This shaft is journaled at one end in upright 24 and its other end in upright 22 and on this shaft is securely mounted a gear 40 provided with a pawl 41 shown in Figs. 4, 5 and 6 for normally engaging the tooth in the disc 38 under the tension of a spring 42, so that the return movement of gear sector 30 to normal under the action of motor spring 33 is effective to rotate the gear 40 in the direction indicated by the arrows in Figs. 5 and 9, the gear ratio of sector 30 and pinion 37 being such as to impart two turns to disc 38 for an angular movement of 72 degrees of sector 30 as defined by the stops 34 and 35 of this sector and the stop 36 of upright 24 above described, the pawl 41 being prevented from engaging the disc 38 at the completion of its first turn during the manual operation of gear sector 30 by a shiftable pin SP mounted in the slot SPY in gear sector 30.

The gear 40 meshes with a pinion 41P, shown in Figs. 4, 5 and 6 formed on a shaft 43 journaled in uprights 22 and 24 and on this shaft is securely mounted a gear 44. This gear, in turn, engages a pinion 45 secured at one end of a shaft 46 journaled in uprights 21 and 22, the gear ratio from sector 30 to pinion 45 being such as to impart 120 revolutions to shaft 46 for a 72 degree angular movement of gear sector 30.

On shaft 46 is securely mounted a worm gear 47 meshing with a worm 47X of a centrifugal governor 48 provided for controlling the speed of shaft 46 upon the tension of motor spring 33. Shaft 46 carries a pulsing cam 49 of insulating material, a pinion 50 and a wheel 51, the latter having a ridge formed of a stopping portion SPS and a driving portion DPS which extends 120 degrees of the periphery of that wheel as to intermittently actuate a gear 52 one tooth for each turn of shaft 46 at a variable angular velocity as shown diagrammatically by the line ω in Fig. 11 which will be hereinafter described in detail. The gear 52, as shown in Figs. 8 and 9, is secured to the underside of a flange portion FP of a die cast mounting M which may be made of light gravity material such as metallic magnesium, aluminum or phenol plastic material and in the central portion of this mounting is anchored a shaft 53 journaled at its lower end in a bushing in the form of a screw 54 engaging a cross or bridge piece 55 formed with the upright supports 21 and 22 and at its upper end in a bushing portion formed with the lateral portion of upright 22 as shown in Figs. 5 and 6.

Mounting M is formed with a series of spaced disc portions *d* and a projection *p* shown in Figs. 5, 7 and 13 which is disposed parallel to the axis of shaft 53 and connecting with all the disc portions *d* at that point. The disc portions *d* serve to hold the code elements 56 perpendicularly to supporting shaft 53 while their projection *p* is made to fit the radial slots RS of code elements 56 as shown in Figs. 7 and 15 for keying them on the mounting M. The projection *p* of the mounting M is provided with a longitudinal slot SL for receiving a metallic strip 59 formed with a plurality of spring members such as 57 bent at their free ends for engaging the V-shaped notches 58 of the elements 56 for yieldably holding them in adjusted concentric relation with their supporting shaft 53, the spring portions 57 of strip 59 permitting the removal or insertion of the code elements 56 on the shaft 53 without affecting the adjusted position of adjacently disposed elements.

The code elements 56 as shown in Fig. 7 for example are formed at their peripheries with notches such as IT of equal length or positioned as defined by the movement of gear 52 forming the so-called interdigit spaces, a number of ridges as P_u, P_{ul} of different length forming the so-called pulsing portions in this example forming call 2,724,562 and a blank space *bs* called the neutral non-pulsing portion, the radius of such neutral portion being half the difference between the radii of the interdigit spaces and the peripheral edges of the ridges or pulsing portions.

The rotation of driving wheel 51 through the operation of the gear mechanism above described is effective to rotate the shaft 53 and the

code elements 56 carried thereby in the direction indicated by the arrow in Figs. 6, 7 and 8 for controlling the pivotal movement to a frame 61 as will be hereinafter described in detail. The frame 61 is pivotally mounted on a shaft 62 which is journaled at its upper end in the lateral projection of upright 22 and at its lower end in the lateral projection of upright 21 as shown in Figs. 4, 9 and 10.

The shaft 62 is provided with a portion of square cross-section for mounting a worm 65 shown in Figs. 4, 5, 6 and 7 engaging the gear rack portions of bars b_1 and b_2 of frame 61 and engages a U-shaped bracket x slidably mounted on the bars b_1 and b_2 for moving it and the arm 60 carried thereby in operative relation with any one of the code elements 56 upon the rotation of shaft 62 as effected by a manually operable knob 66 actuating the gears 67 and 68 when these gears are in engaged relation, that is, when the code elements 56 are in normal unoperated position as shown in Figs. 4, 5, 6 and 7. The gear 68 is slidably mounted on the top end portion of shaft 62 and is moved out of engaged relation from the gear 67 by a spring 70 having one of its ends secured to upright 22 by screws 72. This spring is released by a cam portion 73 formed with the topmost disposed disc portions DPy of mounting M when the shaft 53 and the code elements 56 carried thereby are moved a small angular distance from their normal position at the beginning of a code transmitting operation. The disengagement of pinion 68 from gear 67 under the tension of spring 70, as above described, effectively prevents the movement of arm 60 to another selected position during the operation of the transmitter and thereby preventing the establishment of a wrong telephone connection.

An index member 75 which is mounted on the U-shaped bracket x cooperates with cards 76 and 77 shown in Figs. 1, 2, 3 and 5 for indicating the position of the arm 60 with respect to code element selected and thereby the code or number to be transmitted. Cards 76 and 77 are independently removable from mounting frame 150 which is secured on upright brackets 21 and 22 as at 151 and 152 as shown in Figs. 4, 6, 7, 8 and 17, these cards being removable from the outside of casing 25 and therefore without exposing the operating parts of the transmitter.

On uprights 21 and 22 is mounted a shaft 80 which is held from rotation thereon by a pin 81 and on this shaft is loosely mounted a gear 82 which meshes with pinion 50. Gear 82 is provided with a clutch element 83 for engaging a clutch element 84 under conditions that will be hereinafter described in detail and on the hub portion of clutch element 84 is mounted a disc member 85 having a cam element e provided for engaging an arm 87 formed integrally with the frame 61 for pivoting this frame in position wherein the arm 60 of the U-shaped bracket x is moved on the periphery of the digit defining portions of elements 56, the swinging movement of frame 61 being effective to simultaneously disengage an arm 89 carried thereby from a pair of shunting contact members 91 shown in Figs. 4, 7, 9 and 10 for permitting the opening of such contact members upon the passing of the digit portions of the code elements in registry with the arm 60 for sending sets of impulses according to the formation of these portions. It is to be noted, however, that when arm 60 is on the neutral nonpulsing portion bs and interdigit portions IT, as shown in Figs. 6 and 7, the contact members 91 are closed and the clutch elements 83 and 84 are not engaged so that the operation of the impulse cam 49 and that of the impulse contacts 92 shown in Figs. 4, 6, 7, 8 and 10 are negatived due to the closure of the shunting spring 91.

The gear 52 is provided with 120 teeth so that the mounting M and the code elements 56 carried thereby will be rotated one complete turn for each return movement of gear sector 30 or 120 turns of shaft 46, each intermittent movement of the code elements being therefore equal as above described to an angular distance of 3 degrees and equal to a complete turn of pulsing cam 49, but it is to be noted that each movement of gear 52 and the pivotal movement of frame 61 as imparted by the camming disc 85 and the retractile spring 88 at the end of each digit or set of impulses transmitted are effected during the closed period of the impulse contacts 92.

The code element shown in Fig. 12, for example, is formed to represent the call number 2,111,482 and due to the pivotal movement of frame 61 under control of camming disc 85 the digit 2 reading in a clockwise direction appears as a ridge equal to 3 degrees and the numerals or digits 1 do not appear as ridges at the periphery of the code element, digit 4 equals 12 degrees, digit 8 equals 21 degrees and again digit 2 equals 3 degrees.

The digits as above described are separated by the interdigit spaces IT, each of which is equal to an angular distance of 18 degrees or six positions of gear 52 as effected by wheel 51 and each of these inter-digit spaces is equal to the gear ratio between pinion 50 and gear 82, thus operating the camming disc 85 one complete turn upon the engagement of clutch elements 83 and 84 for causing the pivotal movement of frame 61 and thereby causing digit 1 and, as the case may be, the first pulse of each digit greater than one to be transmitted.

In the modification shown in Figs. 15, 16, 17 and 18 the impulse springs 92 are mounted in a pile-up arrangement on a leaf spring 100 also serving for mounting the so-called off-normal springs 101 while serving as a pivot for permitting the movement of these contacts out of engageable relation with their respective cam 49 and 102 during the passing of the interdigit spaces and the neutral portion of the code element selected, such movement being effected through the operation of arm 89 of frame 61 engaging an upward extending lever member 104 also secured to the leaf spring 100.

A typical operation of the transmitter is as follows: The rotation of knob 66 is effective to move the sliding bracket x and the arm 60 carried thereby in operable relation with one of the code elements, for example, disc 56y shown in Figs. 4, 5 and 6 and thereby position the index 75 in registry with the corresponding code number which may be inscribed on one of the cards 76 and 77, the movement of knob 66 being imparted to sliding bracket x through the gears 67 and 68, the shaft 62 and worm 65 engaging the toothed portions of bars b_1 and b_2 of frame 61.

The arm 60 is normally held against the peripheral portion bs of the selected disc 56y by the tension of spring 88 shown in Figs. 7, 9 and 15 hooked on the arm 89 of pivotal frame 61 and to the upright 22 thus causing the arm 89 to hold the shunting contact 91 closed. The clutch elements 83 and 84 are disengaged where the cam-

ming disc 85 is in its normal position as shown in Figs. 4, 6, 7, 8 and 9 under the tension of spring 90. The handle member 31 is then moved in the direction indicated by the arrow for imparting an angular distance of 72 degrees to gear sector 30 as defined by the stops 34 and 36, for rotating the pinion 37 and the one tooth disc 38 carried thereby two turns while tensioning the motor spring 33. The shiftable pin SP, upon an angular movement of 36 degrees of gear sector 30 and therefore one turn of disc 38, momentarily engages the lug portion L_1 of pawl 41 as to prevent its engagement with the disc 38 so that the accidental return movement of sector 30 to normal from this point will have no effect on the gear 40. Upon the continued movement of gear sector 30 to the completion of the two turns of disc 38 the pawl 41 is freed from the pin SP and engages the tooth of the disc 38. The pin SP upon reaching the stop ST is moved to the other end of slot SPY shown in Fig. 5 out of the path of lug L_1 of pawl 41 so that the pin SP has no effect on pawl 41 during the return movement of gear sector 30 and disc 39 to normal position.

The movement of gear 40 actuates the shaft 46 one-hundred and twenty turns through the pinion 41P, the gear 44 and the pinion 45 on shaft 46. The normally closed impulse springs 92 are operated once for each turn of cam 49 while the gear 52 together with the code elements actuated thereby are operated an angular distance of 3 degrees for each turn of driving wheel 51 or a complete turn for each one-hundred and twenty turns of shaft 46. It is to be noted, however, that the movement of driving wheel 51 is imparted to gear 52 only during the closing period of contact 92 and that this gear and the code elements carried thereby are at rest during the opening period of contact 92 as effected by the impulse cam 49, the velocity variation of gear 52 for each 10 degrees angular movement of driving wheel 51 being indicated diagrammatically by line ω in Fig. 11, which shows that the mounting M is started and stopped at a minimum velocity as to obtain a more uniform operation of governor 48 while preventing wear of the operating parts and rendering the operation of the transmitter practically noiseless.

The movement of gear 52 and the code elements as above described; that is, from their normal position shown in Fig. 7 to the point P_1 wherein the arm 60 engages the first interdigit portion IT under the tension of spring 88, the pivotal movement of frame 61 thus imparted is effective to move the clutch elements 84 in engaged relation with clutch element 83 against the tension of spring 90 due to the engagement of arm 87 with the camming disc 85. The movement of gear 50 is imparted to gear 82 and due to their 6 to 1 ratio, will rotate the disc 85 a complete turn during six continuous turns of shaft 46 or six teeth of gear 52 and therefore 18 degrees of code disc 56, that is, the length of each interdigit space IT as indicated by P_2. The passing of cam portion *e* of disc 85 against the arm 87 causes a pivotal movement of frame 61 for opening the contact 91 and thus rendering the operation of contact 92 effective for transmitting one pulse and moves the arm 60 wherein the pulsing portion PU upon a subsequent 3 degree angular movement of code disc 56Y registers with this arm for holding it in its operated position for the sending of another impulse as to transmit digit No. 2. Upon a complete turn of disc 85 from the position shown in Fig. 7 the clutch element 84 is automatically disengaged from the clutch element 83 through the tension of spring 90 and the disc 85 remains at rest in the position shown in Fig. 7. In a third movement or step of code element 56Y from the point P_2, the arm 60 is moved again on the surface of the interdigit space IT and thereby causes the reengagement of clutch elements 84 and 83 for operating the camming disc 85 one turn while the disc 56Y is moved six teeth to position the point P_3 of this disc adjacent the end of arm 60. The passing of cam portion E of disc 85 in registry with the arm 87 is effective to cause the pivotal movement of frame 61 and thereby moves the arm 60 out of the path of pulsing portion P_{u1} and causes the opening of shunting contact 91 to permit the sending of the first impulse of this digit through the operation of contact 92 by the cam 49 as above described, and the continued movement of disc 56Y positions the pulsing portion P_{u1} in registry with the arm 60 for holding it in the operated position and the shunting contact 91 opens for permitting the sending of a number of impulses according to the operation of pulsing cam 49 and the angular distance of pulsing operation P_{u1}, which in this case equal six pulses which added to the first pulse as effected by the pivotal movement of frame 61 under control of camming disc 85 form digit 7, this cycle of operation being continued to the point F where the pivotal movement of frame 61 positions the arm 60 on the neutral portion *bs* of such a radius as not to permit this frame to pivot far enough to cause the engagement of clutch elements 84 and 83 or to open the shunting contact 91, with the result that the code elements and the impulse contact are operating ineffectively from the point F to the normal position shown in Fig. 7, where the stop 34 of gear sector 30 engages the stop 36 and the cam 73 on disc DP*y* of mounting M engages the spring 70 for moving the gears 67 and 68 in engaged relation, thus preparing the transmitter for a subsequent operation.

In forming the code element or disc shown in Fig. 12 for transmitting telephone number 2,111,482, it is to be noted that the digit 2 is equal to a portion P_2 of three degrees and that the digits 1, 1 and 1 do not appear at the periphery of the disc since the first pulse of the digits or digit 1 is effected by the operation of camming disc 85. By operating the code elements intermittently, that is, holding them stationary during the operation of the pulsing contact, effectively prevents the clipping or mutilation of the pulses due to the disalignment of the code elements, since any portion of a ridge is sufficient to hold the arm 60 in its operated position during the corresponding operating movement of the pulsing cam.

The removal of the code elements 56 from their mounting is effected by the operation of the handle member H formed with the sliding bracket *x*, the operation of this arm being effective to impart a pivotal movement to frame 61 and thereby move the arm 60 toward the projection *p* of mounting M for unlocking the selected code disc from its retaining spring 57, the door HD of housing 25 permitting the removal or insertion of the code discs without exposing the operating parts of the transmitter.

The control of pawl 41 which permits the movement of gear 40 two turns during the effective movement of gear sector 30 makes possible the use of a minimum number of gears for operating

the shaft 46 at the required speed and makes possible the use of a low tension motor spring and correspondingly facilitates the manual operation of handle lever 31.

Th finger wheel dial 27 is provided for effecting telephone calls in the ordinary manner whenever the code designation desired does not appear on the cards 76 and 77. However, the handset 28 is used in cooperation with both the finger wheel dial 27 and the transmitter of the invention.

Other features and advantages of the invention will appear from the following appended claims.

What is claimed is:

1. In a call transmitter, a spindle, a plurality of code elements mounted on said spindle, an independently operated impulse mechanism, means operatively associated with said elements for controlling the operation of said mechanism and means comprising a wheel having a ridge at its periphery formed with a worm driving portion and a stopping portion for actuating said spindle intermittently in timed relation with said mechanism.

2. In a call transmitter, a spindle, a plurality of code elements removably mounted on said spindle, an independently operating impulse mechanism, a gear train, means defining a continuously rotatable worm-like member operated by said gear train for actuating said spindle intermittently in timed relation with said impulse mechanism, and means responsive to the character of said code elements for controlling the operation of said impulse mechanism.

3. In a call transmitter, a spindle, a plurality of code elements keyed on said spindle, a mechanism for intermittently actuating said spindle, said mechanism comprising a gear wheel carried by said spindle, a wheel disposed at right angles to said gear wheel and having a ridge at its periphery formed with a worm driving portion and a stopping portion engaging said gear wheel, and motor means operatively connected to the second mentioned wheel.

4. In a call transmitter, a plurality of code elements, an arm, means for moving said arm in operative relation with said elements selectively, an impulse mechanism, means for actuating said elements, and clutching means operated by the movement of said arm and cooperating with said elements for negativing a predetermined operation of said mechanism for sending a call according to the character of the selected element.

5. In a call transmitter, a code element, a member operated by said element, a shunting contact operated by said member, clutching means operating in conjunction with said element for controlling the operation of said member, and motor means for actuating said element and said means.

6. In a call transmitter, a code element, a member operated by said element, means including a clutch and a camming device cooperating with said element for actuating said member, a pulsing mechanism, a shunting spring controlled by said member for negativing a predetermined operation of said mechanism for transmitting a call according to the conjoint operation of said element and said means.

7. In a call transmitter, a plurality of code elements, a mounting for said elements, a shaft for said mounting, a spindle disposed parallelly to said shaft, a frame pivotally mounted on said spindle, an arm slidably mounted on said frame, manually operable means for rotating said spindle for moving said arm in operable relation with said elements selectively, spring means for yieldably holding said arm in operative relation with the selected element, a camming mechanism cooperating with said element for controlling the movement of said arm, an impulse mechanism, a shunting contact, means operable according to the movement of said arm for controlling operation of said contact for negativing predetermined operation of said mechanism for transmitting a call according to the element selected and a clutching mechanism associated with said operable means and operating automatically upon the movement of said shaft for preventing selective movement of said arm with respect to said elements.

8. In a call transmitter, a plurality of code elements, a mounting for said elements, a movable frame, a member slidably mounted on said frame, a manually operable gearing mechanism for moving said member in operative relation with said elements selectively, a normally closed shunting contact operated by the movement of said frame, means for yieldably holding said member in operative relation with the selected element, an impulse mechanism, a motor spring, a manually operable lever member for tensioning said spring, a gear train movable under the tension of said motor spring for actuating said pulsing mechanism, a combined advancing and stopping wheel operatively connected to said motor spring for operating said mounting in timed relation with respect to the movement of said impulse mechanism for negativing a number of operations of said impulse mechanism for transmitting a call according to the character of the code element selected.

9. In a call transmitter, a rotatable mounting, a plurality of code elements carried by said mounting, a plurality of operable contacts controlled by said elements, a motor spring, a gearing mechanism actuated by said motor spring, a handle for tensioning said spring, for operating said elements and said contacts, said mechanism including a gear sector, a ratchet wheel, a pinion rotated two turns by the operation of said gear sector for rotating said wheel, a gear mounted adjacent to said wheel, a pawl carried by said gear normally engaging said ratchet wheel, a shiftable member carried by said sector movable in position for engaging said pawl for preventing its engagement with said ratchet wheel upon the first turn of the latter and in another position movable away from said pawl and a governor for controlling the operation of said elements.

10. In a call transmitter, a plurality of code elements in the form of discs, a mounting for rotating said discs, an impulse contact, a shunting contact, a mechanism controlled by the operation of said elements for actuating said shunting contact, said mechanism including a spindle, a frame pivotally mounted on said spindle and having gear rack portions, a member slidably mounted on said frame having an arm, a worm rotated by the movement of said spindle and engaging said rack portions, a gearing mechanism, a knob for actuating said mechanism for rotating said spindle for moving said arm in operative relation with said elements selectively, and means released by the movement of said mounting for disengaging said gears from each other upon a predetermined movement of said mounting for preventing the selective operation of said arm during the operation of the transmitter, and a pulsing mechanism operable conjointly with the

operation of said shunting contact for transmitting a call according to the character of the element selected.

11. In a call transmitter, a plurality of operable code elements, contacts controlled by the operation of said elements, a manually operable mechanism for selectively associating said elements with said contacts, said mechanism comprising a rotatable spindle, a frame pivoted on said spindle having gear rack portions, a worm slidably mounted on said spindle and engaging the rack portion of said frame, an index operated by the axial movement of said worm, a mounting frame for said spindle, a card holder secured to said mounting frame, a housing, and cards slidably mounted in said holder and cooperating with said index for indicating the position of said manually operable mechanism with respect to said elements, said cards being removable from said holder through openings in said housing without exposing the operating parts of the transmitter.

12. In a call transmitter, a plurality of operable code elements, a mounting of said elements, resilient means for yieldably holding said elements in adjusted position on said mounting, a contact operating mechanism, means for operatively and selectively associating said mechanism with said elements, and manually operable means positioned by the selecting movement of the first-mentioned means for removing the selected element from its mounting.

13. In a call transmitter, a plurality of operable code elements, a mounting for said elements, resilient means for yieldably holding said elements in adjusted position on said mounting, a contact operating mechanism having means movable in selected position with respect to said elements, and manually operable means positioned by the selective movement of the second mentioned means for removing the selected element from said mounting against the action of said resilient means.

14. In a call transmitter, a base, a plurality of code elements, a mounting for said elements rotatably mounted on said base, means for yieldably holding said elements on said mounting in spaced relation to each other, a contact operating mechanism, means for operatively associating said mechanism with said elements selectively, a manually operable member positioned by the selective movement of the second mentioned means for removing the selected element from said mounting, against the action of said yieldable means, a housing for said transmitter secured to said base and a hinged door carried by said housing for permitting the removal and insertion of said code elements from said mounting and said housing without exposing other operating parts of the transmitter.

15. In a call transmitter, a plurality of code elements, a mounting for said elements, a driving mechanism for said elements, said mechanism comprising a gear wheel carried by said mounting, a wheel movable in a plane at right angles to said gear and having a ridge at its periphery forming a driving portion of variable velocity and a stopping portion engaging said gear wheel.

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