

Dec. 22, 1942.

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2,306,068

CALL TRANSMITTER

Filed Dec. 4, 1940

2 Sheets-Sheet 1

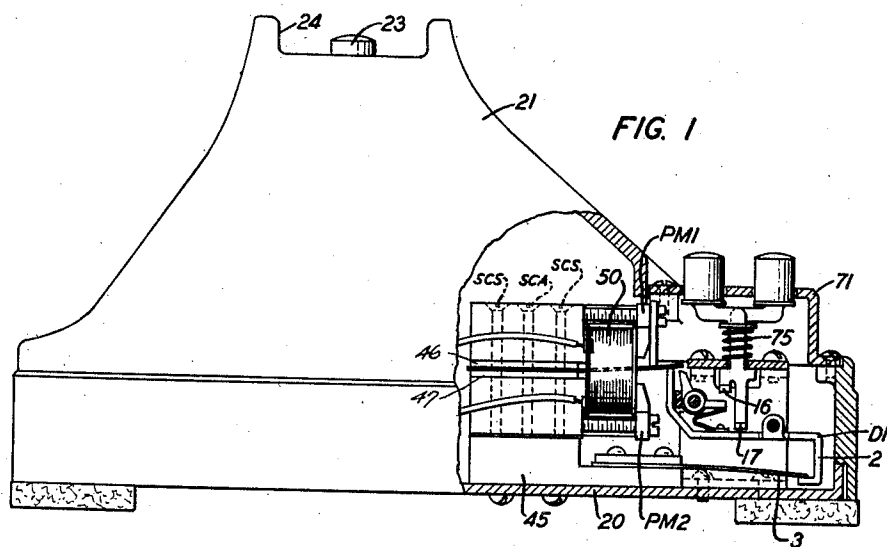
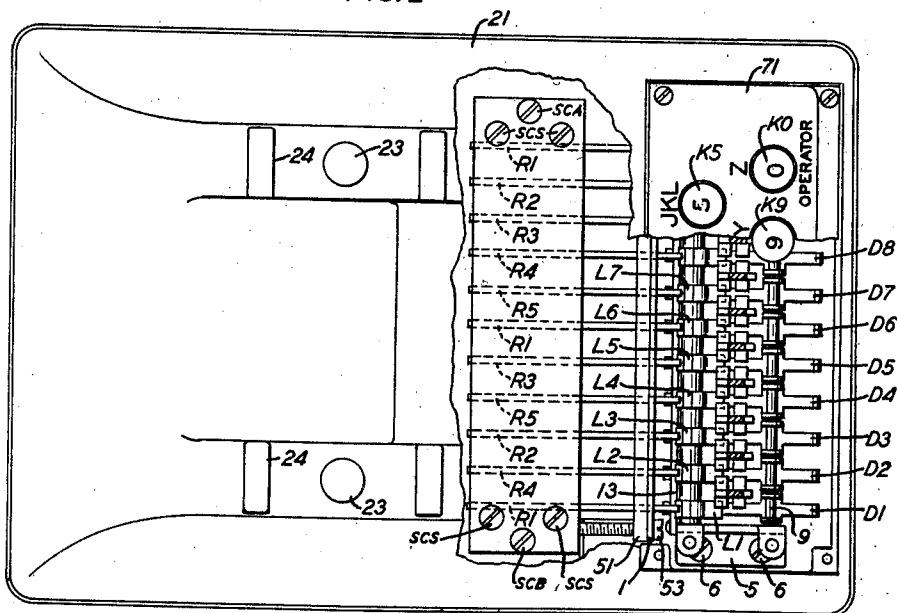


FIG. 2



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FIG. 4

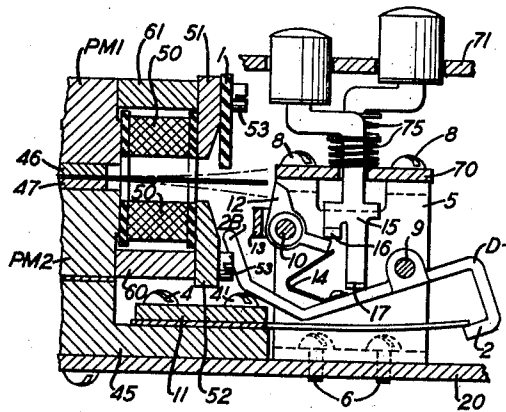
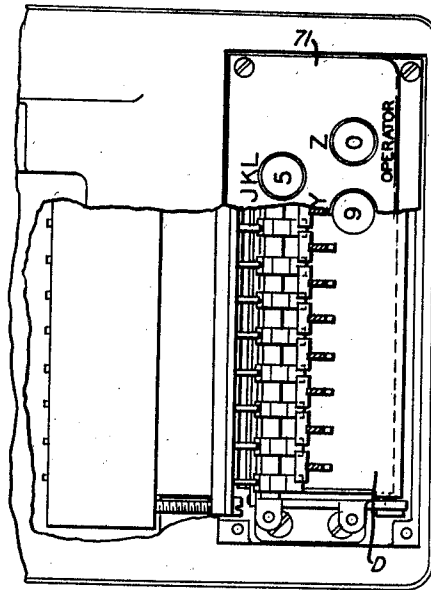


FIG. 6



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UNITED STATES PATENT OFFICE

2,306,068

CALL TRANSMITTER

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Application December 4, 1940, Serial No. 368,438

6 Claims. (Cl. 179-90)

This invention relates to call transmitters of the type used in automatic telephone systems for controlling the operation of switches for establishing talking connections.

The object of the invention is to provide a call transmitter of the type above referred to, which will be simple to operate, positive in operation, and which will effect a material reduction in the time of transmitting any given telephone designation as compared to call transmitters now in use.

According to the invention, a set of manually operable key members numbered to represent digits is provided for operating in combination a number of vibrating reeds extending through the coil of an electromagnetic device connected to the telephone line. These reeds form part of the electromagnetic device and are tuned to different frequencies for generating alternating currents of these frequencies in the telephone line to which the coil is connected and to thereby energize electrical filter devices placed at the exchange for selectively operating electromagnets which, in turn, control the operation of associated switches for establishing telephone connections corresponding to the digit key members which have been operated.

More specifically, a feature of the invention resides in the plucking mechanism by which the keys pluck the reeds directly instead of through an intermediate set of code bars as is the present practice, thus eliminating the code bars and allowing a more compact mechanism. In order to do this, the call transmitter of my invention uses a reed bank of eleven instead of five reeds, the same being arranged so that digit code can be produced by plucking pairs of adjacent reeds. The reeds normally are deflected against a stop by suitable damping bars which are held against the reeds by non-linear springs of the convex strip type. In one embodiment of the invention, each reed has an individual latch. When a key is pressed, the plunger first depresses two adjacent damping bars which allows the two reeds to rest on their latches, they, however, still being in a deflected position. Further movement of the key causes the two latches to be operated whereby the reeds slip off the latches and vibrate, the variations produced thereby in the magnetic field induce the corresponding alternating voltages in the pick-up coil. When the key is released, the damping bars press the reeds against the stop and the latch springs move the latches into their normal positions. The non-linear springs pro-

vide a break-through action, which limits the possibility of partial operation of the keys.

Other 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 side view of the call transmitter of the invention disposed within a telephone instrument casing with a portion of the casing cut away.

Fig. 2 is a top assembly view with top key plate (which is shown in its entirety in Fig. 7) partially cut away to expose the disposition of reed assembly;

Fig. 3 is a side view of the call transmitter similar to Fig. 1 but showing the relation of the various parts of the mechanism when a numerical key is partially operated;

Fig. 4 is a side view similar to Fig. 3 but showing the relation of the various parts of the mechanism when a numerical key is fully operated;

Fig. 5 is a side view similar to Fig. 1 of a modification of the invention;

Fig. 6 is a top view similar to Fig. 2 of said modification; and

Fig. 7 is a view of the key plate.

In order to simplify the description of the invention, the same is disclosed for inclusion within the telephone instrument housing shown and described in Patent 2,147,710 granted to R. F. Mallina on February 21, 1939, and reference is made thereto for a complete description of such parts of the apparatus which are either omitted or partially described herein. It is understood, however, that the invention is not limited for application to telephone instrument housings of the kind described in the above-identified patent, it being readily evident to anyone skilled in the art that the same may be easily adapted for use with other and different types of station equipment or may be used separately and independently of any station equipment whatever.

Referring now to Figs. 1 to 4, inclusive, in which identical designations refer to identical parts in all the figures, the base plate 20 cooperates with the casing 21 to form a housing for the call transmitter mechanism and a cradle portion 24 for the telephone handset (not shown), the casing 21 being secured to the base 20 in the manner shown in the above-identified patent.

On the base plate 20 is also mounted ordinary switchhook springs (not shown) for operation by plungers 23 upon placing the handset in the cradle portion 24 of the casing 21, and a ringing device is mounted on a supporting frame there-

within which, in turn, is secured to the plate 20 also in the manner shown in the above-identified patent.

On the base plate 20 is mounted a support 45 upon which are mounted in superposed relation to each other, the rectangularly shaped permanent magnets PM1 and PM2 between which the eleven vibrating reeds R1—R1 and the plates 46 and 47 are clamped by screws SCS while the magnet and reed assembly thus formed is held on the support 45 by screws SCA and SCB, the plates 46 and 47 having their front edges formed diagonally to clamp different lengths of reeds in order to obtain different vibrating periods. On the front of the pole-piece 51 is located the damper plate 1 which is coextensive with the length of the pole-piece aligned therewith and secured thereto by screws 53. The pole-piece 52 is not provided with a damper plate and, therefore, the lower screws 53 merely secure the pole-piece to the magnet.

The eleven reeds R1—R1 in which identically designated reeds have identical periods, extend through an oblong-shaped opening of a coil 50 for movement adjacent the pole-pieces 51 and 52 which serve, in cooperation with the screws 53, spacer members 60 and 61 and damper plate 1 of magnetic material, for clamping the coil 50 on the front faces of magnets PM1 and PM2, the terminal wires (not shown) of the coil being brought to the rear of the transmitter in any suitable manner.

Two U-members 5 are provided as a key support to the top of which is mounted the key plate 70 secured thereto by screws 3. The members 5 are clamped to the base plate 20 by screws 6 and are provided with aligned apertures through which is supported the damper rod 9 and the latch bar 10.

The free ends of the eleven reeds R1—R1 are disposed normally to rest on damping bars D1—D11 of which one is provided for each reed and which are pivotally supported upon rod 9. One end of each of these bars has a downwardly extending hooked portion 2 the inner end of which engages the outer end of the correlated non-linear spring 3 clamped by screws 4 and 4' and clamping plate 11 to the lower shelf of support 45, while the other end is formed into upwardly extending bent portions 2A and 2B to allow the bar to clear the clamping plate 11 when operated in the manner described hereinafter.

Aligned beneath each reed is a latch member such as L1 pivotally supported upon latch bar 10 and yieldably held with its vertical arm 12 against the latch stop bar 13 by the spring 14 which is anchored at one end to the associated damper bar such as D1 and has its other end engaged under the horizontal arm of the latch member.

Each key K1, K2, K3, etc., consists of a cylindrically shaped button secured at the upper end of an offset plunger 15 having its lower end formed with a cross-member 17 which, when the key is normal, just clears the two damping bars such as D1 and D2 oppositely disposed on either side of the plunger. The left cross-piece of the plunger is provided with a horizontal bar 16 which is sufficiently long to engage the horizontal arms of two adjacent latch bars such as L1 and L2 disposed on either side of the plunger and, when the key is depressed sufficiently for the plunger 15 to engage the damping bars D1, there is still a slight clearance between the lower face of the bar 16 and the upper faces of the horizontal arms of the latch members. The keys are guided in their downward and upward movement by a face plate 71 engaging the cylindrically shaped buttons and a plate 70

engaging the plunger portions of the keys, said last-mentioned plate being secured to the two U-members 5 by the screws 8 as previously mentioned.

The keys are held in their non-operated position by compression springs 75 each having one of its ends abutting against the under-side of the offset portion of the key plunger and its other end abutting the top surface of guiding plate 70.

In the operation of the invention, it may be assumed that the eleven reeds R1—R1 are so disposed in relation to the keys K1—K0 that the depression of the keys in the order given below will result in the plucking of the paired reeds indicated to produce the two frequencies identified by the subscripts to the reed designations. These frequencies, according to the following signal code, characterize the digit indicated by the key subscripts:

Keys	Reed plucked	Digit designated
K1	R1, R4	1
K2	R2, R5	2
K3	R1, R3	3
K4	R4, R5	4
K5	R2, R3	5
K6	R2, R4	6
K7	R3, R5	7
K8	R1, R5	8
K9	R3, R4	9
K0	R1, R2	0

The reeds R1—R1 are normally deflected against the lower edge of the damper plate 1 by the corresponding damping bars D1—D11, under the tension of springs 3 and the vertical stop arms 12 of the corresponding latch members L1—L11 are held against the stop bar 13 by the springs 14. When a key is depressed, the lower member 17 at the end of plunger 15 depresses two adjacent damping bars which allows the two reeds to rest on their respective latches as disclosed in Fig. 3. Further movement of the key, as disclosed in Fig. 4, will cause the ends of the upper cross-piece 16 attached to this plunger 15 to engage the horizontal arms of the two associated latches whereby the latches are given a clockwise turn which causes the two reeds to slip off the arms 12 of the latches. The reeds then vibrate and the variations in the flux induce corresponding alternating current voltages in the coil 50.

When the key is released, the damping bars press the reeds against the stop 1 and the latch springs 14 move the latches into normal position. The non-linear springs 3 provide a breakthrough action that limits the possibility of partial operation of the keys.

In the modification of the invention shown in Figs. 5 and 6, one damping bar D and one non-linear spring 3 are used for all the reeds instead of one bar and spring for each reed. The damping bar may be a solid plate having the rectangular portion D, the upwardly bent portion 7 and the depending stud 18 which rests on the convex surface of the spring which, in turn, is held in position by the two stops 22 and 23 and suitable anchors 24 and 25 (nearer one, 25, not shown) in the base 20. In the modified form of the invention the key plungers do not need a lower cross-piece 17 for engaging two oppositely disposed dampers, inasmuch as the downward movement of any plunger will engage but the one damping plate.

In operation, the movement of any key plunger swings the damping plate counter-clockwise from the support 9, presses against spring 3 and

thus causes all the reeds to come to rest in their respective latch arms 12. Since any one key plunger, in its further movement, controls but the two latches disposed oppositely on either side of the plunger cross-piece 16, only the two associated reeds will leave their respective positions of rest on their associated latches and start vibrating to produce the desired frequencies. The release of the key will cause the damping bar D to assume its normal position, being driven there- to by the tension of the spring 3.

While I have described my invention and the means for utilizing the same in connection with one specific embodiment thereof, it is to be understood that various other applications and embodiments thereof may be made by those skilled in the art without departing from the spirit of the invention as defined within the scope of the appended claims.

What is claimed is:

1. In a call transmitter, a plurality of operable digit key members, a plurality of pretensioned reeds arranged in pairs, each one of said key members being operatively associated with a different one of each of said pairs of reeds, and means responsive to the operation of any one of said key members to cause the operation of its associated pair of reeds for setting them into vibration.

2. In a call transmitter, a plurality of operable digit key members, a plurality of reeds arranged in pairs, each one of said key members being operatively associated with a different one of said pairs of reeds, a pivoted bar for each of said reeds, each of said bars being normally disposed to hold the associated reed under tension, and means responsive to the operation of any one of said key members for operating two of said bars whereby the associated pair of reeds are released from tension and set into vibration.

3. In a call transmitter, a plurality of operable digit key members, a plurality of reeds arranged in pairs, each one of said key members being operatively associated with a different one of each of said pairs of reeds, a pivoted bar for all of said reeds, said bar being normally disposed to hold all of said reeds under tension, means responsive to the operation of any one of said digit key members for operating said bar to release the tension on said reeds, and other means responsive to the operation of said digit key mem-

ber for setting its pair of associated reeds into vibration.

4. In a call transmitter, a plurality of operable digit key members, a plurality of reeds arranged in pairs, each one of said key members being operatively associated with a different one of each of said pairs of reeds, a plurality of means normally holding all of said reeds in pretensioned positions, and means responsive to the operation of any key member for actuating two of said means whereby the pair of reeds associated with said operated key member is set in vibration.

5. In a call transmitter, a plurality of operable digit key members, a plurality of reeds disposed in groups of two, one reed on each side of each of said key members, a plurality of bars normally holding said reeds in pretensioned position and operably controllable in sets of two by each of said digit key members, a pivoted latch intermediate each reed and bar, and a spring intermediate each latch and bar whereby the partial depression of any key member operates the associated set of two bars to release the correlated reeds from their pretensioned position and whereby the full depression of said digit key member operates the associated latches to pluck the associated reeds, said spring intermediate each operated latch and bar serving to restore the associated latch to its normal position upon the restoration of said operated key member.

6. In a call transmitter, a magnet, a plurality of operable digit key members, a plurality of reeds disposed in groups of two, one on either side of each of said key members, a stop member for each reed disposed upon said magnet in vertical alignment with the associated reed, a bar for each reed, said bars being actuatable in groups of two by each of said key members, each of said bars being normally disposed to hold the associated reed in a pretensioned position against the associated stop member, and a pivoted latch for each reed disposed in vertical alignment thereunder, whereby a partial depression of a key member operates two bars to release the two associated reeds from their pretensioned position against their stop members and whereby a full depression of said key member operates the two latches correlated with said operated two bars to pluck the associated reeds into vibratory action.

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