Feb. 13, 1940. H. M. BASCOM 2,190,307

DESIGNATION TRANSMITTER

Filed Aug. 31, 1937 3 Sheets-Sheet 1

FIG. 1

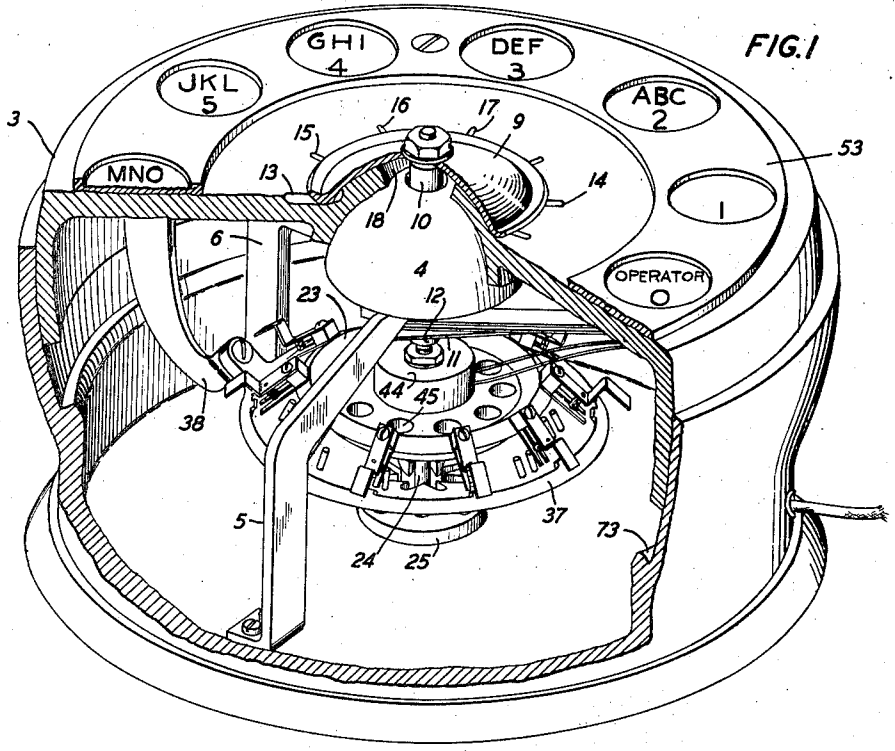
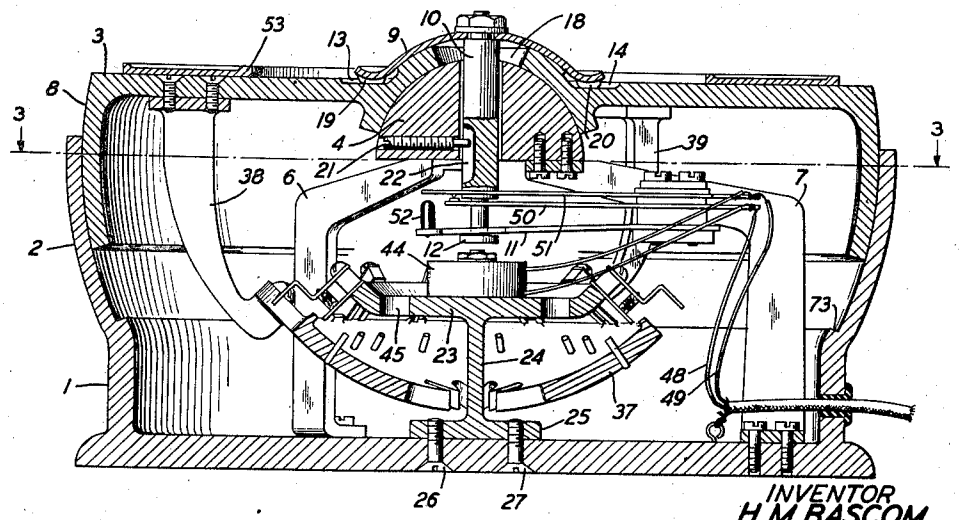


FIG. 2



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DESIGNATION TRANSMITTER

Filed Aug. 31, 1937 3 Sheets-Sheet 2

FIG. 3

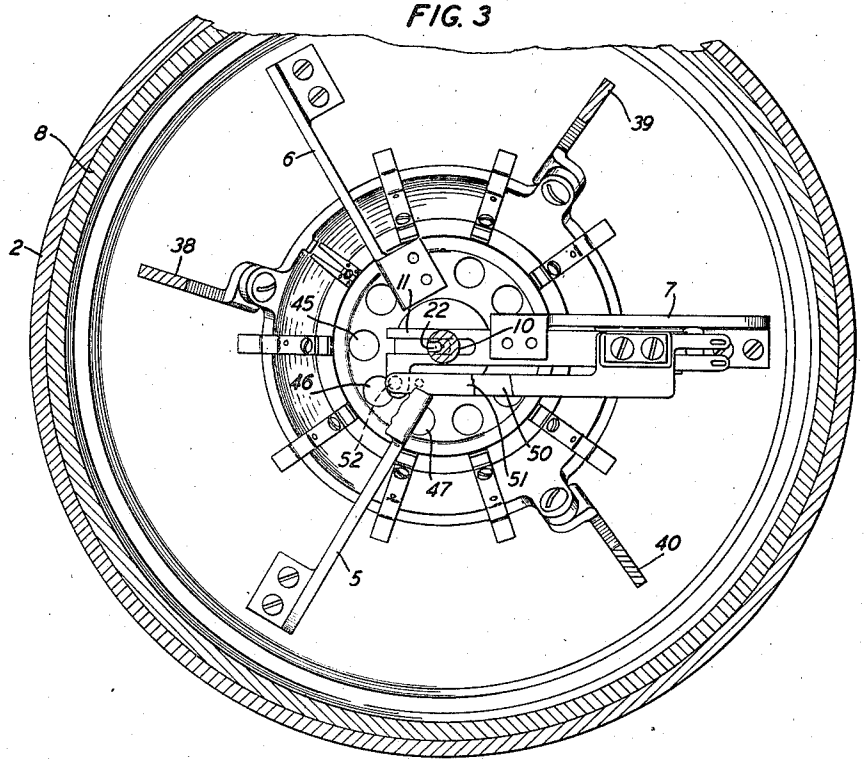
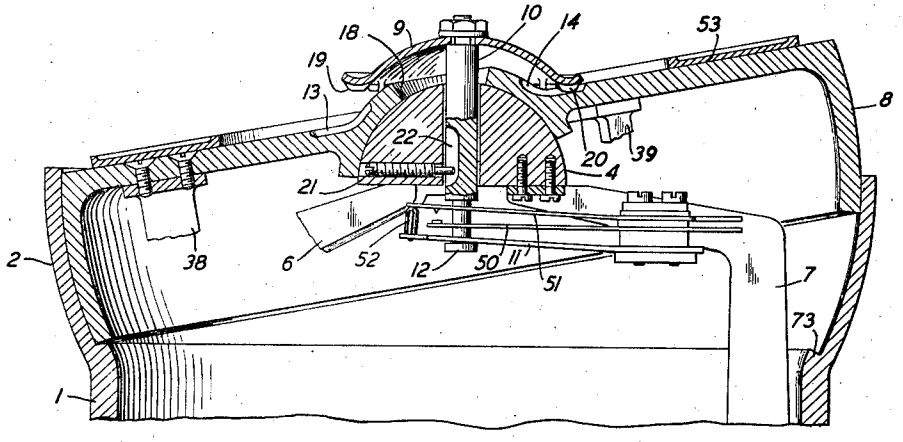


FIG. 4



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DESIGNATION TRANSMITTER

Filed Aug. 31, 1937 3 Sheets-Sheet 3

FIG. 5

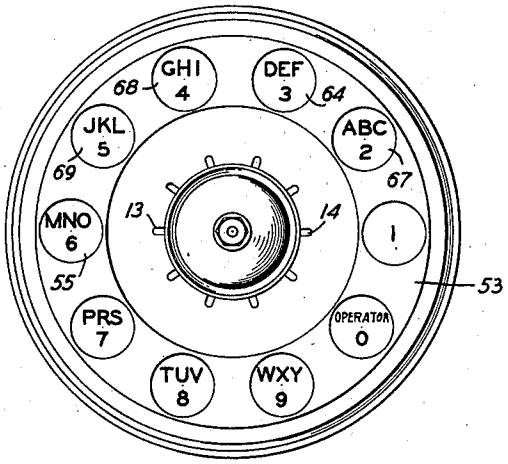


FIG. 8

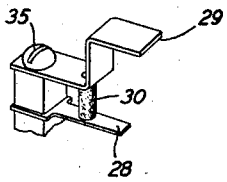


FIG. 6

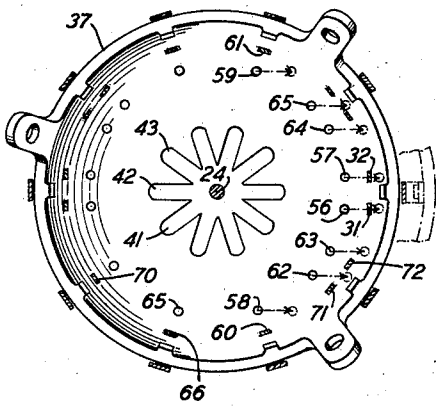


FIG. 9

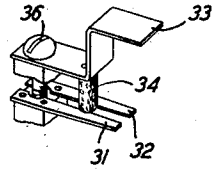
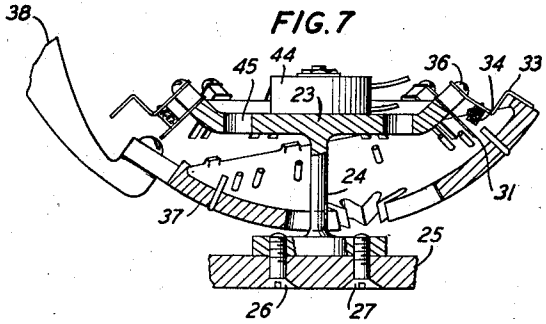


FIG. 7



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Patented Feb. 13, 1940 2,190,307

UNITED STATES PATENT OFFICE

2,190,307

DESIGNATION TRANSMITTER

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Application August 31, 1937, Serial No. 161,750

6 Claims. (Cl. 179—90)

This invention relates to designation transmitters and particularly to those used in automatic telephone systems.

The objects of the invention are to reduce the efforts required by subscribers and operators in transmitting telephone designations; to simplify the sending operations and the equipment required for transmitting such designations; to minimize the time required for these operations; and in general to improve the construction and operation of devices of this character.

Numerous efforts have been made in the past to simplify the operations involved in transmitting telephone numbers. In many of these the rotary impulse sending mechanism, so commonly used in telephone practice, is replaced by structures using keys and key operated levers. It has also been proposed heretofore to transmit telephone numbers by means of alternating currents of different frequencies in lieu of the usual method of transmitting series of direct current impulses.

In accordance with the present invention improvements are obtained in transmitting devices by dispensing with rotating dials and providing for the transmission of telephone designations by means of currents of different characters, such as alternating currents of different frequencies. And a feature of the invention is a transmitter comprising an operating member pivotally mounted and resiliently held in a normal position from which it may be tilted in any one of a number of directions when manual pressure is applied thereto by the operator, the tilting movements of the operating member in the different directions causing the transmission of currents representing the different parts of the wanted telephone designation. In the structure chosen to illustrate the invention the tilting movements of the operating member cause the selective plucking of vibrating reeds, which in turn cause the generation of electric currents of different frequencies characterizing the telephone designation to be transmitted.

Another feature of the invention is a transmitter having an operating member pivoted for tilting movement and carrying a series of designation marks on the surface thereof, and in which the operating member is provided with radial slots corresponding to the several designation marks and serving to guide the tilted operating member to insure that the reeds corresponding to the selected designation mark will be plucked to the exclusion of all other reeds.

Another feature of the invention is a transmitter of the character above described including a microphone for receiving the tones produced by the vibrating reeds and converting them into currents of corresponding frequencies for transmission over the telephone line, in which the microphone is normally short-circuited by contact springs, and in which each tilting movement of the operating member serves to open said springs to remove the short circuit from said microphone.

The foregoing and other features of the invention will be described more fully in detail in the following specification and will also be set forth in the claims appended thereto.

In the drawings accompanying the specification:

Fig. 1 is an enlarged perspective view, with certain parts broken away, of a designation transmitter including the features of this invention;

Fig. 2 is a vertical cross-sectional view of the transmitter of Fig. 1, showing details of the internal construction;

Fig. 3 is a horizontal cross-sectional view taken along the line 3—3 indicated in Fig. 2;

Fig. 4 is a view similar to the one of Fig. 2, except that the operating member is illustrated in one of its operative positions;

Fig. 5 is a top view, drawn on a reduced scale, illustrating the designation characters;

Fig. 6 is a top view showing the guide and operating plate of the transmitter in its normal position, as seen in Fig. 2;

Fig. 7 is a side view, partly in section, showing the guide and operating plate of Fig. 6 in one of its operative positions; and

Figs. 8 and 9 are detailed perspective views of the vibratory reeds and their associated damping members.

In the specific embodiment chosen herein for illustrating the invention vibratory reeds are arranged singly and in pairs in the successive designation selecting positions of the transmitter, and it may be assumed that these reeds when plucked produce sound waves of as many different frequencies or combinations of frequencies as there are operative positions for the device. It should be understood, however, that the particular arrangement and combinations of the vibratory reeds illustrated and described may be modified without departing from the scope of the invention, that various modifications of the detailed construction and operation of the device will also suggest themselves and will likewise come within the scope of the invention.

Referring particularly to the drawings, the

movable and other cooperating parts of the transmitter are contained within the cup-shaped housing member 1. The housing member 1 has a spherically-shaped upper portion 2 which serves as a guide and bearing surface for the operating member 3. The cup-shaped operating member 3 is inverted and supported by a semi-spherical stationary bearing member 4, which in turn is supported by brackets 5, 6 and 7. These brackets are secured to the bottom plate of the housing 1, and the bearing member 4 is secured to the upper ends of the brackets by means of screws as seen in Fig. 2 and Fig. 4. The central portion of the operating member 3 is provided with a spherical inner surface which engages the spherical stationary support 4 to enable a universal tilting movement of the operating member 3. The lateral surface 8 of the operating member 3 has a spherical shape similar to that of the internal surface of the stationary part 2, these surfaces serving to guide the operating member 3 in its relative movement with respect to the stationary housing 1.

The operating member 3 is maintained in its normal position, with the upper flat surface thereof occupying a horizontal plane, by means of a resiliently-held cap 9. The cap 9 is secured to a pin 10, which rests loosely in an opening extending vertically through the bearing member 4, and which is constantly urged in a downward direction by the restoring spring 11. For this purpose the restoring spring 11 has a slot in the end thereof which engages the shoulder 12 on the lower end of the pin 10. The outer periphery of the retaining cap 9 is provided with a series of detents which rest within corresponding slots in the upper surface of the operating member 3. In Fig. 2 two of these detents 19 and 20 are seen to be resting in their corresponding slots 13 and 14. The other detents, which are not visible in Figs. 1 and 2, are likewise resting in their respective slots 15, 16, 17, etc. The central bearing portion of the operating member 3 has a circular opening 18 therein, through which the pin 10 extends, and which is sufficient in diameter to permit the operating member 3 to tilt to its fully operated position in any direction without interference from the pin 10. The purpose of the detents on the retaining cap 9 is to prevent the operating member 3 from becoming displaced with respect to the stationary housing 1 by rotating in a horizontal plane either while the operating member 3 is in its normal position or while it is being tilted to any one of its operated positions. The retaining cap is held rigidly against any rotary movement in a horizontal plane by the pin 10, which in turn is prevented from any rotary displacement by means of a set screw 21 in the stationary bearing member 4, the inner end of said set screw entering a vertical slot 22 in the side of the pin 10. When the operating member 3 is in its normal horizontal position all of the detents on the retaining cap 9 rest in their corresponding slots, and the member 3 is held firmly against any horizontal rotary displacement.

When the member 3 is tilted to one of its operated positions, as seen in Fig. 4, it forces the cap 9 and the pin 10 to which the cap is secured upwardly against the tension of the restoring spring 11. Since the cap 9 is maintained in a substantially horizontal position by the pin 10 when the member 3 is tilted, the slots on the low side of the member 3 become disengaged from their detents, but at least one of the detents, such as the detent 20 on the high side of the operating member 3, remains in engagement with its associated slot to prevent any inadvertent horizontal displacement of the member 3 with respect to the stationary housing of the transmitter. Vertical movement of the pin 10 within the bearing member 4 is permitted by the slot 22, but the screw 21 holds the pin 10 against any rotary displacement.

The vibratory reeds which produce the tones of different frequencies when the operating member 3 is tilted are mounted on the reed supporting table 23, which in turn is supported by a post 24, terminating in a pedestal 25, secured to the bottom plate of the housing member 1 by screws 26 and 27. The outer periphery of the table 23 is flanged upwardly at a suitable angle, and the vibratory reed units are secured at spaced intervals around this flanged periphery. Some of these units, such as the one shown in Fig. 8, consist each of a single vibratory spring 28, a damper spring 29 and a damper 30, of some non-vibratory material, which normally engages the reed 28. Other ones of these reed units, such as the one illustrated in Fig. 9, have two vibratory reeds each, 31 and 32, a damper spring 33 and a damper 34 which normally engages both reeds 31 and 32. The reed units are secured by screws 35, 36, etc., to the supporting table 23 as seen in Figs. 1, 2, 3 and 7. There are ten of these units spaced around the periphery of the table 23 in positions which correspond to designation markings on the upper surface of the transmitter.

The vibratory reeds, which are mounted as above explained around the periphery of the supporting table 23, are plucked by means of a circular series of pins located on the upper surface of the operating plate 37. The plate 37 is rigidly secured to the inner surface of the operating member 3 by means of the brackets 38, 39 and 40. The said pins are located in the plate 37 in such a manner that the movement of the operating member 3 in a direction corresponding to a particular designation causes the plucking of the reeds representing such designation to the exclusion of all other reeds. The relative locations of the vibratory reeds and of the pins which pluck these reeds are illustrated best in Fig. 6 of the drawings. The operating plate 37 is provided with a series of radial notches 41, 42, 43, etc., there being one of these notches for each of the ten operative positions of the device. When the operating member 3 and the attached operating plate 37 are in their normal positions, the radial notches in the plate 37 occupy the positions shown in Figs. 1, 2 and 6 relative to the post 24. When, however, the member 3 and the plate 37 are advanced to an operative position, the teeth defining the corresponding radial slot in the plate 37 embrace the post 24, which serves as a guide to insure the correct movement of the plucking pins with respect to the vibratory reeds. This guiding function of the radial slots and the stationary guide post 24 insures that only the pin or pins which correspond to the operated position of the device will pluck their associated reeds and that none of the adjacent pins will be effective in plucking its associated reed.

The tones produced by the vibrating reeds are detected by a microphone button 44 which is mounted on the upper surface of the table 23. The table 23 is provided with a series of openings 45, 46, 47, etc., to permit the sound waves to pass freely to the microphone 44. The electrical terminals of the microphone are extended

to the exterior of the instrument by conductors 48 and 49. The terminals of the microphone 44 are normally short-circuited by the closed contact springs 50 and 51. These springs are insulated from each other and mounted on the bracket 7 together with the retaining spring 11. Whenever the operating member 3 is tilted to pluck the vibratory reeds, the upward movement of the pin 10 flexes the retaining spring 11 upwardly, and the insulating post 52 engages the spring 51 and separates it from the spring 50. This opens the short circuit around the terminals of the microphone 44 and renders the microphone effective to translate the sound waves that are produced at this time by the plucked reeds.

The person operating the designation transmitter is guided by means of a designation plate 53 secured to the upper horizontal surface of the operating member 3. The plate 53 is provided with a series of ten circular depressions containing the usual designation numerals and letters and such other designation characters as may be desirable. These designation markings are arranged to correspond with the location of the vibratory reeds and the associated plucking pins within the device. The designation strip is illustrated in Fig. 5 of the drawings.

The operation of the designation transmitter will now be described. For this purpose assume that the calling party wishes to call a line the directory designation of which is ME—2345. To send the first designation character M, he selects the depression 55 containing this character and presses the operating member 3 down at that point. The operating member 3 tilts in response to the pressure and assumes the position illustrated in Figs. 4 and 7. The downward movement of the operating member 3 in any direction is limited by the engagement of the lower rim of the member 3 with the annular shoulder 73 formed in the wall of the housing member 1. As the tilting action takes place the pins 56 and 57, which lie on the opposite end of the diameter including the designation depression 55, move against and then beyond the associated reeds 31 and 32, setting these reeds in vibration. As the operating member assumes its fully operated position the plate 37, which tilts therewith, engages the damping spring 33 and flexes it to withdraw the damper 34 from contact with the reeds 31 and 32, leaving them free to vibrate. In this position of the plate 37 the pins 56 and 57 occupy the positions illustrated by the dotted lines in Fig. 6, and also shown in Fig. 7, where they do not interfere with the vibration of the reeds 31 and 32. Since all other pins on the plate 37 move in directions parallel to the movement of pins 56 and 57, they do not pluck their associated reeds. All pins on the left side of the vertical diameter as viewed in Fig. 6 move directly away from their reeds and do not of course interfere with them. The pins 58 and 59 move in the direction of the arrows and, therefore, clear their associated reeds 60 and 61 by wide margins. The other two sets of pins 62, 63 and 64, 65 also move in the direction of the arrows indicated in the drawings and, therefore, pass their associated reeds without plucking them. The direction of the movement of the pins is accurately defined by the stationary guide post 24, which is embraced by the slot 42 soon after the tilting movement of the plate 37 begins.

The vibrating reeds 31 and 32 produce sounds of the two corresponding frequencies, and these sound waves excite the microphone 44, which is energized by any suitable source of current to which the conductors 48 and 49 are connected. The contact springs 50 and 51 being open at this time by reason of the upward movement of the pin 10, the alternating currents produced by the microphone 44 are transmitted over the conductors 48 and 49 to the receiving mechanism at the central office or at any other desired location. At the receiving mechanism these alternating currents are selected and serve to cause the registration of a record identifying the designation character M.

When the calling party releases the operating member 3, the restoring spring 11, acting on the pin 10 and cap 9, rotates the operating member 3 back to its normal horizontal position. This causes the return of the damper 34 into contact with the vibrating reeds 31 and 32, and these reeds cease to produce sound waves.

Next the calling party selects the designation opening 64 containing the desired character E and depresses the operating member 3 at that point. This time the pin 65 sets in vibration the single reed 66, and a sound of corresponding frequency energizes the transmitter 44 to cause the transmission over the line of an alternating current of like frequency. In a similar manner the calling party tilts the operating member 3 to transmit currents representing the numerical characters 2, 3, 4 and 5, which occur respectively in the designation openings 67, 64, 68 and 69. From an inspection of Fig. 6 it will be seen that these four manipulations of the operating member 3 cause the plucking of reed 70 for the digit 2, the plucking of reed 66 for the digit 3, the plucking of reed 60 for the digit 4, and the plucking of reeds 71 and 72 for the digit 5.

What is claimed is:

1. A designation transmitter comprising a stationary cup-shaped housing member, a universal bearing secured to said housing member, an inverted cup-shaped operating member mounted on said bearing for universal movement within said housing member, and means actuated by the movement of said operating member for producing currents characterizing designations.

2. In a designation transmitter, a circular operating member having designation marks around the periphery thereof, pivotal means for supporting said operating member in a normal position from which it may be tilted in any direction, resilient means for restoring and holding the operating member in its normal position, and means responsive to the different tilting movements of said operating member for transmitting electric currents representing the parts of a telephone designation.

3. The combination in a designation transmitter of a circular operating member, a bearing member supporting said operating member for universal tilting movements, resilient means for retaining said operating member in its normal position on said bearing member, vibratory elements for producing sound representative of telephone designations, and a spherical shaped member secured to said operating member and actuated by the tilting movements thereof for selectively plucking said vibratory elements.

4. The combination in a designation transmitter of a circular operating member, a bearing member supporting said operating member for universal tilting movements, resilient means for retaining said operating member in its normal position on said bearing member, vibratory elements for producing sounds representative of

telephone designations, a spherical shaped member responsive to the tilting movements of said operating member for selectively plucking said vibratory elements, said spherical shaped member having radial slots therein, and a stationary guide post coacting with said slots to guide said operating member in its tilting movements.

5. The combination in a designation transmitter of an operating member, a spherical shaped bearing member supporting said operating member for universal tilting movements, a resilient means for retaining said operating member in its normal position on said bearing member, vibrating members for producing sounds representative of telephone designations, and means actuated by the tilting movement of said operating member for selectively operating said vibrating members.

6. The combination in a designation transmitter of a cup-shaped housing member, a universal bearing support secured to said housing member, an inverted cup-shaped operating member mounted on said bearing for tilting movement in any of a plurality of directions, vibratory elements mounted within said housing member and actuated in response to the tilting movement of said operating member to produce sound tones of different frequencies, a transmitter mounted within said housing member for receiving said sound tones and for converting them into electric currents of corresponding frequencies, a set of circuit-making contacts for controlling the effectiveness of said transmitter, and a contact operating element passing through said bearing support and movable in response to the movement of said operating member in any direction to actuate said circuit contacts.

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