June 1, 1943. H. H. BEIZER ET AL 2,320,401

ELECTRICAL PULSE CONTROLLING MEANS

Filed May 31, 1939

Fig. 1.

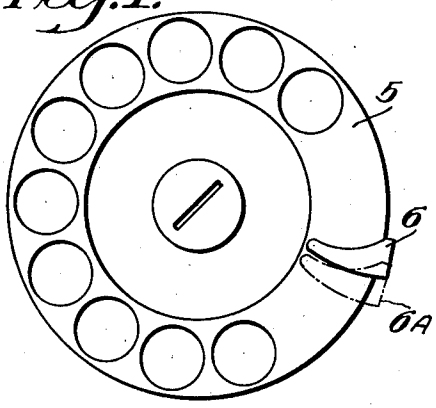


Fig. 2.

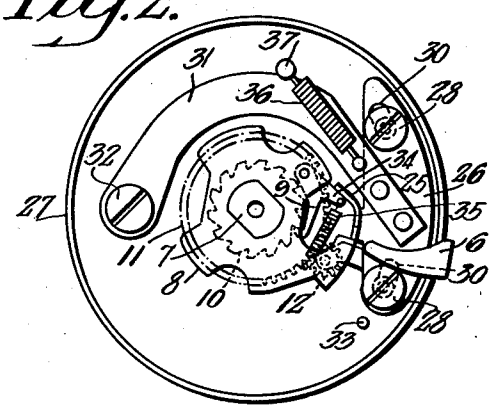


Fig. 3.

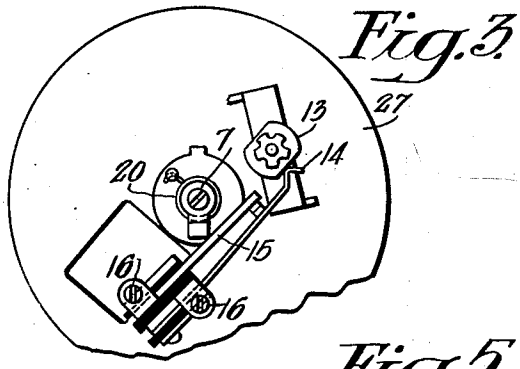


Fig. 4.

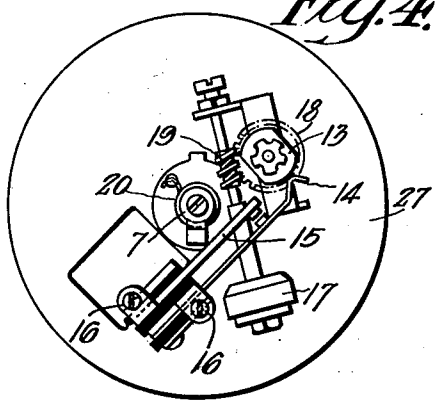


Fig. 5.

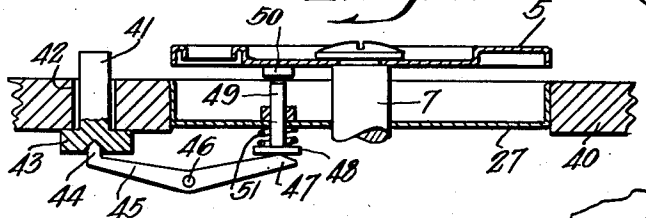


Fig. 6.

Inventors
Harold H. Beizer
& Lewis H. Davis
By
Attorney

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ELECTRICAL PULSE CONTROLLING MEANS

Harold H. Beizer, Camden, and Lewis H. Davis, Haddonfield, N. J., assignors to Radio Corporation of America, a corporation of Delaware

Application May 31, 1939, Serial No. 276,581

5 Claims. (Cl. 177—380)

The present invention relates to electrical pulse controlling means of the telephone dial type for use in connection with remote control systems for radio apparatus and the like, wherein the function to be controlled is selected by electrical impulses produced by operation of the electrical pulse controlling means.

The usual telephone dial mechanism represents one well known form of electrical pulse controlling means, and a preferred mechanism for which the present invention is particularly adapted. As is well known the usual dial mechanism includes electrical contacts adapted to be opened or closed in sequence a predetermined number of times for any operation, dependent upon the displacements of a rotatable finger plate which returns to a position of rest following each operation. In this type of dialing mechanism, the pulsing contacts may be arranged either to be open or to be closed in the position of rest.

In the remote control of apparatus responsive to electrical impulses, it has been found desirable to provide certain pulses of longer time duration than the normal dialing pulses ordinarily provided by such mechanism, and this has been found to be desirable particularly in connection with the remote control of radio receiving and transmitting apparatus, for example, when the remote control of tuning and of another function such as volume of signal output must be effected through the same controlling medium.

It is, therefore, a primary object of the present invention to provide an improved electrical pulse producing or controlling means which may be adjusted instantly and conveniently to alter the relative time duration of the electrical pulses to provide differing control functions through a single control circuit connected therewith.

It is also an object of the present invention to provide an improved electrical pulse producing or controlling means provided with a manually operable stop element in conjunction with a pulse controlling element for controlling the duration of at least one of the pulses in a predetermined sequence.

It is a still further object of the present invention to provide in an electrical pulse producing or controlling mechanism of the telephone dial type, a movable dial stop having the added function of delaying the return of the dialing mechanism to a position of rest, in conjunction with pulsing contacts, to maintain such contacts in a position to prolong one of the controlling pulses after a selected number of pulses are made.

While the use of a movable dial stop in connection with the telephone type dial electrical pulsing mechanism is at present preferred for establishing a difference in the time duration of certain of the electrical pulses, it is an object of the present invention to provide other forms of associated mechanical means for the movable element of a device of the character referred to to prevent the return of the movable element to a position of rest thereby to maintain a prolongation of one controlling impulse over a desired time interval.

It is also an object of the present invention to provide, in conjunction with electrical pulse producing or controlling means, an electrical circuit controlling means for extending the duration of at least one electrical pulse after a selected number of pulses are made.

It may also be considered to be an object of the present invention to provide an improved electrical impulse producing means for selecting and producing a predetermined number of electrical pulses and for controlling the duration of one of said pulses thereby to select the duration of differing control functions for the tuning and volume control of radio apparatus.

The invention will, however, be better understood from the following description when considered in connection with the accompanying drawing and its scope will be pointed out in the appended claims.

In the drawing, Figure 1 is a top view, substantially full size, of a telephone dial type of electrical pulse producing and controlling means embodying the invention;

Figure 2 is a similar view of the device of Fig. 1 with the cover or dial removed;

Figures 3 and 4 are bottom views of the device of Figs. 1 and 2, showing differing positions of operation of the pulse controlling mechanism;

Figure 5 is a view in cross section and on the same scale as the preceding figures, showing a modification of the pulse controlling mechanism; and

Figure 6 is a fragmentary view of the bottom of the mechanism of Figs. 1 to 4, inclusive, showing a modification of the contact means, in connection with a schematic circuit diagram of an oscillator for producing electrical waves, the mechanism shown being an embodiment of the invention for operation through the medium of electrical circuits.

Referring to Figs. 1 to 4, inclusive, 5 is a mov-

able controlling element for selecting a predetermined number of electrical impulses to be produced or controlled and in the present example is in the form of a telephone dial having the usual ten digit or finger openings for movement against an associated stop bar 6 for setting up the desired number of impulses in the usual manner.

The dial is secured to a rotatable shaft 7 which is suitably shaped at the upper end to position the dial. The shaft is secured to a rotatable frame 8 carrying a ratchet pawl 9 which may be moved by the dial 5 a number of notches about a ratchet member 10 which is coaxial with and connected to a gear 11 which drives a pinion 12 on the shaft of which is mounted a two-lobed cam 13 on the bottom of the mechanism. The last named is a "Bakelite" disc flattened on two sides as shown and engages the free end of a spring contact member 14 associated with a fixed contact member 15. The contacts are suitably insulated and provided with terminals 16 to which electrical connection may be made. The device is also provided with a friction governor 17 driven from the cam shaft through a pinion 18 and a worm gear 19.

Movement of the ratchet pawl and dial plate 5 serves to wind up a spring 20 which furnishes the energy for the return movement of the dial to the position of rest or the home position. The home position may be such that the cam 13 engages the contact member 14 on a lobe or on a flat side to provide either an open circuit or a closed circuit condition. In the present example, it is assumed that at the position of rest, the contacts 14 and 15 are to be maintained in the open circuit condition as shown in Fig. 4. As dialing mechanisms for producing electrical pulses are well known and understood, further description of the construction of the dialing portion of the mechanism is believed to be unnecessary, except in connection with the following description of the pulse duration and selective function controlling elements.

The moving portion of the pulsing mechanism is brought to rest by a suitable stop means provided in the present example by a metallic finger 25 connected with the stop bar 6. The stop bar is connected with the stop finger 25 through a movable plate member 26 lying in the bottom of the dial case 27 and maintained in position by two guide screws 28 but being movable on a radius about a pivot screw 32 for which movement slots 30 are provided about the screws 28.

The plate member 26 is riveted to one end of a curved arm 31 which is pivoted at the other end to move about an axis provided by a pivot screw 32 located in the casing, off center of the dial, and diametrically opposite the member 26. The range of movement of the bar 26 on the slots 30 is established by a stop pin 33 against which one end of the bar 6 engages when the bar is moved to a position as shown by the dotted lines 6A in Fig. 1. This movement is sufficient to move the stop finger a distance corresponding to an opening or a closing movement of the electrical contacts so that when the stop bar 6 for the dial 5 is moved to the position 6A, the return movement of the dial mechanism is retarded by an amount sufficient to maintain the contacts in a pulsing position, that is, in a different position from normal or that established by the position of rest. In the present example, this corresponds to maintaining the contacts closed as shown in Fig. 3, with the contact member 14 lying against a flat side of the cam member.

As shown in Fig. 2, it has been found convenient and effective to provide the stop finger 25 in engagement with an arm 34 of the ratchet pawl 9 to which the ratchet spring 35 is connected, the two members providing meeting surfaces which are substantially parallel to establish a definite stop.

The arm 31 is connected with a retracting spring 36 which is anchored to the casing 27 by a second stop pin 37. The spring 36 causes the stop bar 6, the sliding plate 26 and the stop finger 25 to the normal positions shown in Fig. 2, when the bar 6 is released during the manual operation of the device.

The movable stop bar 6 is permitted to move to the position 6a by an amount only sufficient to provide a desired control of the contacts without permitting the ratchet pawl to move a sufficient distance to engage a succeeding ratchet tooth. Therefore, the use of a movable stop bar in no way interferes with the normal operation of the mechanism for transmitting a series of controlling electrical pulses in a normal manner, while at the same time, the arrangement permits easy and rapid adjustment of the mechanism for producing a difference in the time duration of one pulse. That is, in the present example, it permits the last pulse or a single pulse to be maintained for as long a time duration as the stop bar 6 is held in the position 6a following the dialing of a number.

In this manner, the dial may be moved, for example, for either digit 1 or 2, with the stop bar 6 held in the position 6a following release of the dial in either case, until a desired condition of volume increase or volume decrease is provided in a remotely located radio receiving apparatus. Normal dialing operations for the remaining dial figures permits tuning to a corresponding number of preselected signals or broadcasting stations. However, as the arrangement of control circuits responsive to controlling impulses for the purpose mentioned are known and understood, and since the same do not constitute a portion of the present invention, the same are not illustrated herein.

In addition to the movable stop bar means for retaining the selector dial in a position removed from the position of rest, thereby to actuate controlling contacts to provide a prolonged signal pulse, other means may be provided for retaining the dial in the same or different positions for the same purpose or to alter the relative time duration of the electrical pulses provided by the mechanism. One example of such additional means is shown in Fig. 5, to which attention is now directed, and in which like parts, as in Figs. 1 to 4, bear the same reference numerals.

Referring to Fig. 5, the dial casing 27 is shown mounted in a supporting base 40 of a remote control unit with the dial member 5 and shaft 7 in their relative positions. The remainder of the dial mechanism is the same as shown in Figs. 1 to 4, and accordingly is not illustrated for the sake of simplifying the figure.

The stop means for detaining the dial member 5 is of the push button type, comprising one or more push button members as shown at 41, projecting upwardly through an opening 42 in the base member 40 and having a flange 43 for limiting the upward movement of the button. The button is seated on a pivot member 44 forming one end of a lever 45, which moves about a pivot

shaft 46, and engages at its opposite end 47 with the head end 48 of a plunger 49 passing through the casing 27 and having an inner end positioned to engage a stop lug 50 carried by the dial member 5. The plunger 49 is normally held out of engagement with the lug 50 and the lever and push button mechanism is maintained in a normal position as shown, by the biasing action of a coil spring 51 compressed between the head 48 of the plunger and the casing 27.

The stop lug 50 or a series of such stop lugs are positioned on the dial member so that in the rotary return movement of said dial member, the plunger 49 of each button engages a certain stop lug 50, when said button is depressed, in any desired predetermined position. This arrangement may, therefore, be utilized to effect prolonged engagement of the operating contacts and may thus function in much the same manner as the movable stop bar 6 to prevent the complete return of the dial member to the home position and therefore to extend the time duration of any pulse or the last impulse by depressing a stop button after dialing a desired number and holding the button depressed the desired length of time. It may thus be used in conjunction with the movable stop bar to further modify the dial movement and the production of pulses or it may be utilized to effect the same result in case a fixed stop bar is desired on the mechanism.

A prolonged impulse preceding or following a series of dialed pulses may be provided by electrical circuit means and may be made to occur at any desired point in the movement of the dial member. Contact means for effecting such an arrangement is shown in Fig. 6, to which attention is now directed and wherein a portion of the dial mechanism of Figs. 1 to 4, inclusive, is shown provided with additional contact means comprising a fixed contact member 55 and a movable contact member 56 having terminals 57 and 58, respectively, and being suitably insulated and mounted on the dial mechanism in the manner shown, to permit the movable contact member 56 to be engaged by a rotating cam element 59 carried by the rotary dial shaft 7.

In the present example, the cam member 59 is positioned to effect a closing movement of the contact member 56 when the dial mechanism is in the position of rest or the home position, as shown. This arrangement provides means for closing a circuit only when the dial mechanism is in the position of rest or normal position.

By connecting the contacts 55 and 56 in shunt with the main pulsing contacts 14 and 15 through a push button switch indicated at 60, the push button switch may be operated to provide impulses of any duration or a single prolonged impulse when the dial mechanism reaches the normal or home position, and this circuit arrangement may be utilized to control any pulsing system or circuit, as desired.

By way of example, the dial mechanism shown in Fig. 6 may provide pulse control of an oscillation or signal generator in a circuit in which the main pulsing contacts 16 are connected in the anode circuit 62 of an oscillator tube 63, between a feedback or anode section 64 of a main tuning inductance and the oscillator anode 65. The feedback section is connected to a power supply lead 66 and the opposite power supply lead indicated at 67 is connected with the cathode 68. A potential drop producing or ballast resistor 69 is provided between the cathode and the supply lead 66.

The grid circuit of the oscillator includes the control grid 70 connected to cathode through a suitable grid resistor 71 and coupled to the main tuning circuit through the usual grid capacitor 72. The main tuning inductance includes the feedback section 64 and a grid section 73. The two sections of the main tuning inductance in series are shunted by a variable tuning capacitor 74.

It will be noted that with this arrangement, the power supply circuit, comprising the leads 66 and 67, is included between the two portions of the tuning inductance 64 and 73, with the filament 68 and filament ballast resistor 69 connected serially across the line so that the line impedance shunted by the impedance of the series connected filament and resistor are included in the tuned oscillator circuit, thereby providing effective coupling between the oscillator circuit and the supply line for the transmission of oscillations along the line to distant remotely controlled apparatus (not shown).

The oscillator system shown may be included in the same control unit with the dial mechanism and when connected with a suitable source of power supply, either A. C. or D. C., responds to the operation of the dial mechanism and produces a signal impulse at a frequency determined by the tuning of the circuit 64—73—74, each time the plate circuit is closed by the contacts 14 and 15.

In the normal or home position of the dial mechanism, in the embodiment shown, the auxiliary contacts 55 and 56 are closed and being connected in series with a push button switch 60 across the contacts 14 and 15 in the manner indicated in the circuit diagram, a prolonged impulse may be transmitted when the dial mechanism is in or reaches this position, by holding the switch 60 closed.

In the embodiments of the invention shown in Figs. 1 to 4 and in Fig. 5, mechanical means for altering the position of the dial stop or for shifting the position of the dial stop thereby to control the relative duration of certain of the pulses or the duration of a pulse before or after a selected number of pulses are made, while in the embodiment shown in Fig. 6, circuit means for effecting the above results electrically and likewise provide push button control of the relative time duration of certain of the pulses controlled by the mechanism. Either arrangement may be used in conjunction with the movable stop bar control means disclosed in Figs. 1 to 4, inclusive.

We claim as our invention:

1. The combination with an electrical pulse-producing mechanism of the telephone dial type, comprising a rotary dial member having a normal position of rest and a finger stop bar associated with said dial member, of means providing a limited range of movement of said stop bar in the direction of the dialing movement of the mechanism, spring means connected with said stop bar for biasing said bar in the opposite direction to a predetermined normal position of rest, and means connected with said stop bar for engaging the pulse-producing mechanism when the stop bar is moved through said range of movement in the first named direction to withhold said mechanism from said first named position of rest, thereby to control the time duration of an electrical pulse produced thereby.

2. The combination with an electrical pulse-producing mechanism comprising a rotary dial

member and a mechanical finger stop bar associated with the face of the dial member, of a pulse-producing mechanism connected with said dial member, including operating contacts for an electrical circuit, means providing movement of said stop bar in the direction of and in response to manual operation of the dial member against said stop bar, means for limiting the movement of said stop bar to a predetermined retracted position, and means for preventing completion of a return movement of said dial member when said stop bar is held in said retracted position.

3. The combination with an electrical pulse-producing mechanism of the telephone dial type, of a dial stop movable in the direction of dialing movement of said mechanism, and means connected with said dial stop for delaying the operation of said mechanism in response to movement of said dial stop in said direction, thereby to control the time duration of an electrical pulse produced thereby, said means comprising a pivot arm for said dial stop, a retracting spring for said arm for biasing said dial stop to a predetermined normal position, a rotary member carried by said pulse-producing mechanism and a finger on said dial stop for engaging said rotary member.

4. The combination with an electrical pulse-producing mechanism of the telephone dial type having a dialing mechanism and pulsing contacts operable thereby, of a dial stop for said mechanism resiliently movable in the direction of dialing movement of said dial, means responsive to movement of said dial stop in said last named direction and operatively associated with said mechanism for delaying the return of said mechanism to a position of rest, thereby to alter the normal operation of said pulsing contacts, means for limiting the movement of said dial stop between a normal position and a retracted position, a rotary member carried by said dialing mechanism, and a controlling finger for said member connected with said dial stop and adapted to engage said rotary member in either position of the dial stop.

5. The combination with an electrical pulse-producing mechanism of the telephone dial type having a dialing mechanism and pulsing contacts operable thereby, of a dial stop for said mechanism resiliently movable in the direction of dialing movement of said dial, means responsive to movement of said dial stop in said last named direction and operatively associated with said mechanism for delaying the return of said mechanism to a position of rest, thereby to alter the normal operation of said pulsing contacts, means providing additional contacts associated with said mechanism and operable thereby at the position of rest, and means including a selector switch for connecting said additional contacts with said pulsing contacts.

HAROLD H. BEIZER.
LEWIS H. DAVIS.