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2,288,019

TIME CONTROLLED RADIO TUNING SYSTEM

Filed March 1, 1941

2 Sheets-Sheet 1

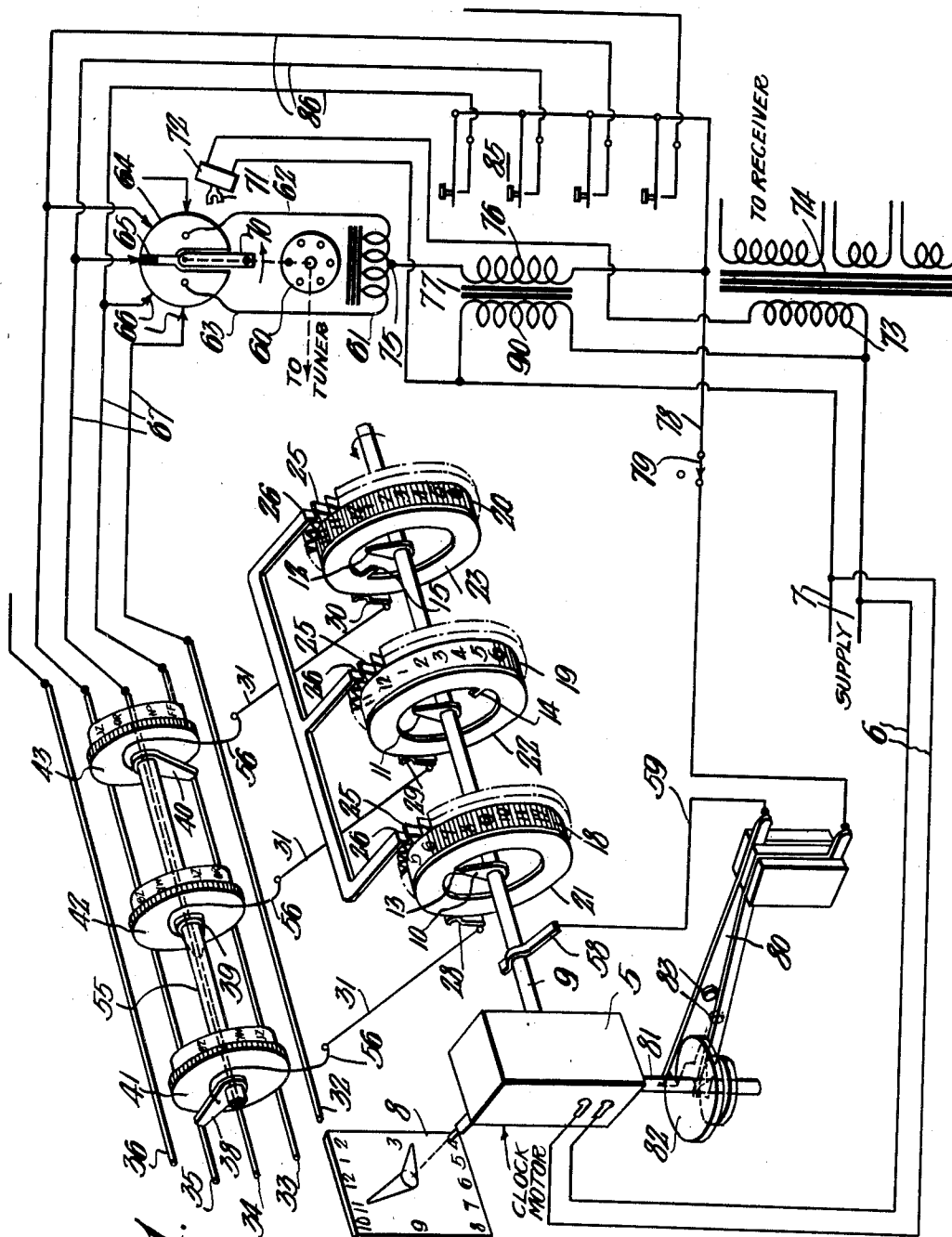


Fig. 1.

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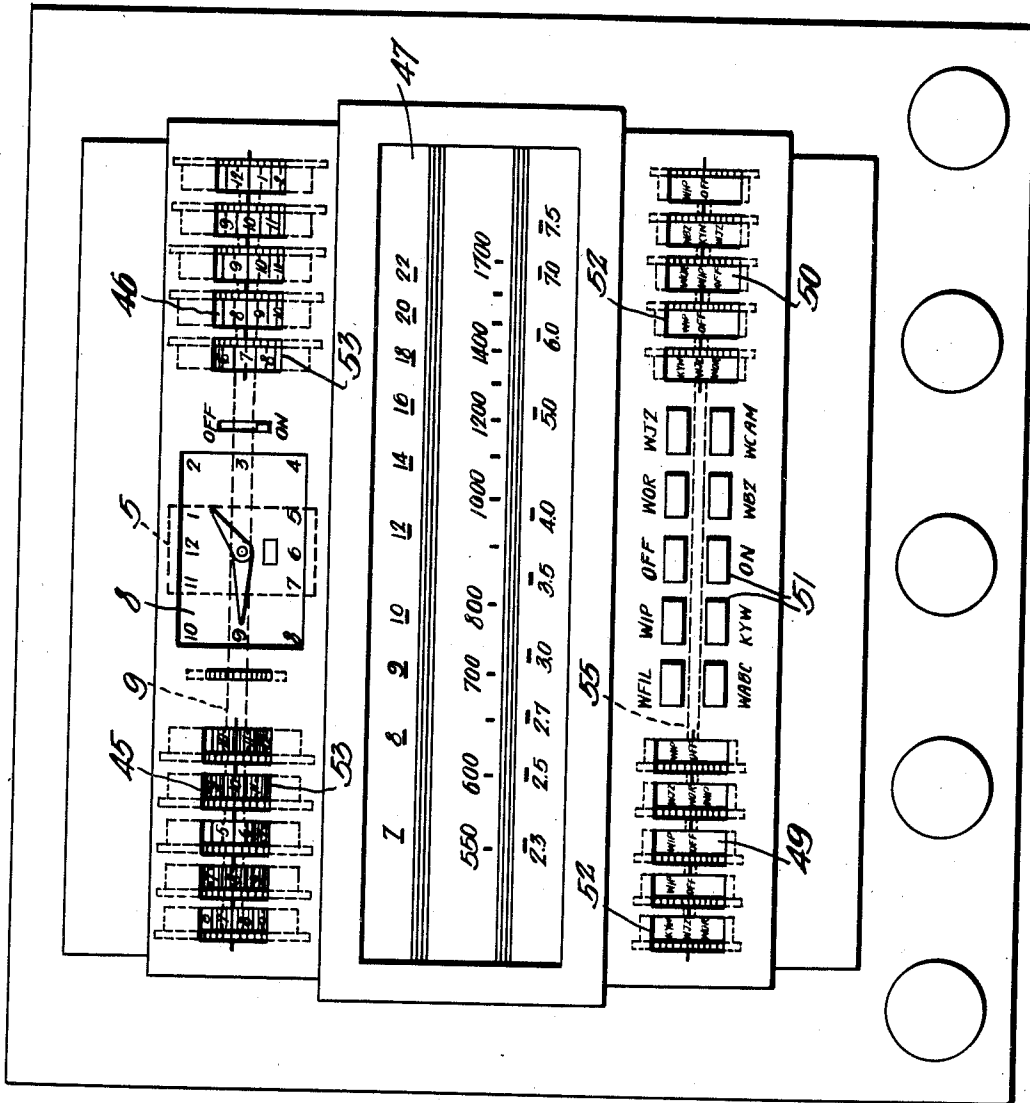


Fig. 2.

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TIME CONTROLLED RADIO TUNING SYSTEM

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6 Claims. (Cl. 250—40)

This invention relates to time-controlled radio tuning systems for program selection at predetermined times from different stations over an extended period, such as one day or one week. Heretofore, complicated construction and operation, and cost and size considerations have practically prevented any extensive commercial use of such systems.

It is an object of this invention to provide an improved time preselection radio tuning system for setting up a program sequence involving a plurality of different stations over an extended period of time, which is simplified in construction and operation, and within commercially practical limits regarding cost and size.

The invention is particularly adapted for use in radio receivers and provides a simplified and flexible time preselection tuning control system having few parts arranged to be included in a radio chassis or control panel.

It is also an object of this invention to provide an improved time control system adapted for preselection tuning and similar control functions in radio apparatus and the like, in which the selected operations or tuning functions and the various desired times of operation corresponding thereto may be established by manually adjustable means without the aid of instruments, and changed at will at any time without interfering with operations in progress.

It is a further object of this invention to provide a time preselection control system for radio tuning control and the like, having a plurality of time selector and station selector elements, and means for utilizing said elements in pairs interchangeably for the control of one or more of the operations or tuning functions over a predetermined period of time, and without the inherent inflexibility of adjustment of certain known time preselection control systems.

It is another object of this invention to provide means in a time preselection control system of the character described, for additionally energizing and deenergizing electrical apparatus such as a controlled receiving system, at predetermined and readily changeable times over an extended and predetermined period.

The invention provides for predetermined and timed operation of a plurality of control circuits as for tuning radio receiving systems and the like to any one of a plurality of receiving channels or stations at different times during a period, such as twenty-four hours, and deenergizing and energizing the receiving system in accordance with the reception requirements,

In a present preferred embodiment of the invention, the station selector elements and tuning control means associated therewith are paired each with one of a corresponding number of time selector elements, comprising time controlled, synchronously driven electrical contacts and selector contact elements relatively movable manually with respect to the first contacts for timing adjustment.

This provides for energizing selectively any one of a plurality of tuning control circuits for adjusting the receiving system for the reception of signals in each of a plurality of preselected signal channels, while the time selector means provide for setting up the operations at predetermined short time intervals throughout an extended period of time, such as twenty-four hours.

It is a further object of the invention to provide a simplified, low cost construction, in a time preselection control system of this character which may be mounted in a relatively small place on the panel front of a radio receiving system or the like.

It is an object of the invention, to provide an improved time preselection tuning control system for radio receivers adapted for mounting in association with a radio tuning dial on a panel within limited dimensions and without interfering with the normal functioning of the apparatus in the receiving system.

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

In the drawings, Figure 1 is a schematic circuit diagram in conjunction with a schematic representation of a portion of the adjustable control elements in a time preselection tuning control system embodying the invention, and

Figure 2 is the front view of a full size panel layout of a radio receiver embodying the apparatus and circuit of Fig. 1 in its preferred arrangement.

Referring to Fig. 1, suitable positive timing control means, such as an electric clock motor 5 of the synchronous alternating current type supplied with energy through leads 6 from alternating current supply circuit 7, is arranged to operate a clock 8 and is suitably geared to drive a timing shaft 9 at a constant speed to provide one revolution thereof over a desired period of time, such as twenty-four hours, and in the present example this may be assumed to make one revolution per day.

The timing shaft 9 is provided with and drives synchronously a plurality of contact elements of which three are shown at 10, 11 and 12. The contacts are arranged to engage once during rotation through one revolution each with a co-operating adjustable contact, as indicated at 13, 14 and 15. The latter contacts are arranged to be adjusted about the circular path of movement of the corresponding contacts 10, 11 and 12 from one position to another in steps corresponding to a minimum time interval which may elapse for a given adjustment or setting of the apparatus.

In the present example, for radio receiver tuning to preselected stations this time interval is preferably fifteen minutes and, accordingly, the stationary contacts may be adjusted to any one of ninety-six positions about the path of movement of the synchronously driven contacts 10, 11 and 12 for a full period of time, such as 24 hours. Obviously, other time intervals may be provided for greater or less periods of time over which the apparatus is to provide preselection timing control.

However, because of mechanical considerations and restrictions, the fineness of adjustment for a large number of positions must be considered in order that the apparatus may easily be preset, while at the same time the size of the presetting means is maintained within practical limits. In the present example, this is provided by connecting the contacts 13, 14 and 15 each with a rotary time drum as indicated at 18, 19 and 20, the contacts being insulated from the drum and being provided with an annular contact element as indicated at 21, 22 and 23, respectively.

It should be understood that the contacts 10, 11 and 12 may be arranged for manual adjustment and the contacts 13, 14 and 15 may be arranged for time controlled movement, although the present arrangement is preferred. In any case, however, the one contact of each set or pair is driven by suitable timing means at a constant speed to provide one revolution over a predetermined time interval and the several time controlled contacts are interconnected as shown for synchronous movement.

The manually adjustable contacts are then arranged for meeting the synchronously driven time control contacts at some point in their path of movement during the predetermined time interval.

In order to facilitate adjustment of the time setting of the system, the drums 18, 19 and 20 are provided with serrations or teeth as indicated at 25, which are engaged by spring-pressed detent means 26. The teeth are spaced to provide adjustment for the drums and contacts carried thereby to definite positions corresponding to equal time intervals such as the fifteen minute periods hereinbefore referred to. The drums are also provided with suitable time indicating indicia preferably arranged to indicate day and night as shown on the dials of the drums 18, 19 and 20.

Each of the contact rings 21, 22 and 23 is provided with a suitable electrical connection comprising a brush as indicated at 28, 29 and 30 having bus bar connections 31 with the station selector means with which each time selector drum is paired.

The station selector means is preferably of the selector switch type, and in the present example for the operation and control of motor driven preselection tuning means, comprises a plurality

of contact bars 32, 33, 34, 35 and 36 representing any suitable number of connections for a desired number of stations or signal channels to be received under time control. The bars shown represent a portion of the usual number, such as eight. The bars are so arranged in spaced parallel relation to each other that they may be engaged by rotary contact arms 38, 39 and 40 connected with the bus bars 31.

The arms 38, 39 and 40 are carried by station selector drums 41, 42 and 43 which may be placed on the panel of the apparatus in paired relation to the drums 18, 19 and 20, respectively. For example, by referring to Fig. 2, the time drums may be placed in a row and in two groups as indicated at 45 and 46 on the upper panel front above the tuning dial 47 and on either side of the clock 8 while the station selector drums may be placed in a row and in two groups 49 and 50 on either side of the usual push button tuning buttons 51.

It will be noted that the drums project through windows 52 and 53 in the panel front for edgewise manual adjustment and that they may be closely grouped along the width of the panel so that, as in the present example, a total of ten pairs of control elements may be provided within the length of the usual tuning dial.

The timing or clock motor 5 is also indicated together with the timing shaft 9. A similar shaft 55 is provided for the station or channel selector drums in a switching arrangement as shown in Fig. 1, which, like the time selector drum arrangement, is adapted to provide a plurality of selector drums in a limited lateral space.

It will be appreciated that in Fig. 1 three widely spaced drums are shown in each case for the purpose of illustrating the invention more readily and for simplifying the drawings. From an inspection of Fig. 2 it will be seen that the number of drums or pairs of drums that may be provided is limited only by the desired lateral extension of the panel arrangement of the apparatus and that a considerably greater number of pairs of drums may be provided in a reasonably small panel space.

The station selector switch means is so arranged that the arms 38, 39 and 40 may be rotated by manual operation of the drums to any number of selected positions, each corresponding to a different control lead of which only five are shown in Fig. 1, although it should be understood that any suitable number may readily be provided, depending upon the number of channels or stations for which time control is desired. Normally this may be not more than twelve for any one geographical location and such switching arrangement is easily provided in rear of the panel with suitable spacing between the positions and without crowding the panel opening. Connection is made to the arms 38, 39 and 40 by suitable flexible leads 56 since the arms are not rotated through a complete circle in any case.

A common electrical connection is made to the synchronously driven contacts 10, 11 and 12, in this case through a brush 58 engaging the timing shaft 9 which may be insulated. The brush is connected in turn to a supply lead 59 in circuit with the tuning means which, in the present example, is a motor 60.

The motor is provided with an operating winding 61 having reversing leads 62 and 63 connected with a commutator device 64 having an insulated segment 65 and peripheral contacts 66 connected through leads 67 with the contact bars 32-36 of the station selector means. The com-

mutator device and motor circuit shown is commonly used and represents any suitable motor driven tuning control means or the like.

The commutator device 54 rotates in response to tuning operation by the motor. In the present example this device is provided with an arm 70 which engages a toggle arm 71 for a power switch 72 connected in the supply circuit for the receiver. In the present example it is connected in circuit between the supply lead 7 and the primary 73 of the power transformer 74 of the receiver to deenergize the receiver when the arm 70 is rotated in the direction of the arrow to engage the toggle 71 and operate the switch 72. In the present example, this occurs when the motor receives current through the selector switch bar 32. The switch arms 38—40 may also be moved to a position following the position corresponding to the bar 32 for a neutral position in which the circuits are open.

The motor circuit is completed from a tap 75 between the reversing windings through a secondary 76 of a supply transformer 77, thence to a supply lead 78 and through a switch 79 to the lead 59. A timing switch 80 is connected between the lead 59 and the switch 79 causing the circuit to be closed for a brief period of time at the end of each fifteen minutes, the time of closure being sufficient to permit the motor means to operate the tuner. In this case a shaft 81 is provided in connection with the clock motor 5 and carries a time arrangement or cam 82 for permitting the contacts at 83 to close momentarily every fifteen minutes. Preferably, the contacts are closed a few seconds before, during and a few seconds after the exact fifteen minute interval or quarter hour.

Manual tuning is also provided by the push button switches indicated at 85, which provide a connection through leads 86 to the contacts 66 on the selector-commutator 64.

The primary 90 of the transformer 77 is connected to the supply leads 7 so that secondary 76 is at all times energized for operating the tuning system and the power switch 72 for the receiver.

In the operation of the system, the arrangement shown is highly flexible. Any pair of selector means may be chosen to control any signal channel at any time. For example, if a program from WJZ is desired at ten o'clock in the morning, any one of the time selector drums may be turned to the desired time setting. The corresponding station selector, to which it is connected, is then rotated or moved to the WJZ position thus connecting in circuit the control lead through which the motor tuning means is caused to operate and stop at WJZ. This setting as to time or station for the particular pair of control elements may be changed at any time. Any pair of interconnected time and station selectors may be used for the same or other stations. A typical set up is illustrated in Fig. 2.

From an inspection of Fig. 1 it will be seen that the time selector contact is manually adjusted to a position in spaced time relation to or in advance of the time controlled moving contact by the number of fifteen-minute intervals between the time at which the adjustment is made and the time at which the tuning operation is desired. This is facilitated by connecting the moving contacts permanently in synchronism with the clock so that the clock and the dial reading of the several drums coincide at the instant of operation of the contacts. Since the

contacts are closed over a relatively long period the fifteen-minute timing contacts serve to establish the operation of the tuning means exactly on the fifteen-minute interval.

When the contacts of the time selector means close, current is conducted from the low voltage secondary 76 through the lead 78 and switch 79, the timing switch 80 and contacts 83, thence through the lead 59 and the contact 58 to the timing shaft 9. The current then flows through the time selector contacts such as the contacts 10 and 13 to the ring 21, thence through the contact 28 and bus bar connection 31 to the lead 56 and the arm 33, thereby energizing the bus bar 35 as shown and the corresponding contact 66 on the commutator controller which causes the insulating segment 65 to be moved thereto, whereupon the motor is deenergized, tuning then being established for the selected station.

From an inspection of the circuit of Fig. 1 and the panel layout of Fig. 2 it will be seen that each station selector may be adjusted for operating the tuning to any desired one of a group of pre-selected stations or the power switch may be actuated, by adjustment of any of the several station selector dials, and that for each dial the exact time of operation may be set up by rotating the drum to the desired hour of the day or night. If the receiver is turned off by operation of the switch 72 the same will be energized when the motor tuning means operates to move to the selected station. Therefore, the receiver may be turned off and may remain off until a desired station at a desired time is to be tuned in.

While the invention has been described in connection with a specific type of tuning or motor control circuit, it is obvious that it may be utilized to advantage in connection with other tuning control circuits. In any case, however, means are provided for energizing a number of selectable control channels or circuits through one of several selectable pairs of contacts one contact of each pair being driven by a timing means with others of the several pairs, and the other contact of each pair being manually adjustable to any one of a plurality of preselected positions in advance of the first contact by a predetermined number of time intervals into which the total period over which the control is effective is divided.

It will be appreciated that the lengthening of the time intervals and the lengthening of the total period is limited by the physical size of the control means which should be as small as possible in order to minimize the space requirements on an operating panel of a receiver or other apparatus. It has been found that the time selector drums 18, 19 and 20 and the station selector drums 41, 42 and 43 may be made substantially $2\frac{1}{2}$ inches in diameter and about $\frac{1}{4}$ inch in thickness for use in connection with the usual radio receiver panel without reducing the time coverage or station selection required for practical operation of the system.

We claim as our invention:

1. In a time preselection control system, a plurality of control circuits, a plurality of control circuit selector switch means therefor each having a common input connection, means providing a plurality of synchronously driven time controlled movable contacts, a manually adjustable contact associated with each of said synchronously driven contacts, means for moving said adjustable contacts relative to said synchronous-

ly driven contacts by a predetermined number of unitary time intervals, and means providing a circuit from each of said adjustable contacts to the input connection of one of said switch means, whereby said contacts and switch means operate in pairs to provide selection and time operation of said control circuits.

2. In a time preselection control system, a plurality of control circuits, a plurality of movable selector switch elements therefor each having a common input connection, means for rotating and positioning said elements individually to a plurality of predetermined switching positions, means providing a plurality of synchronously driven time controlled contact elements movable in predetermined circular paths, a manually adjustable contact element associated with each of said synchronously driven contacts for effective contact therewith, means for moving said last named contacts in advance of said synchronously driven contacts by a predetermined number of unitary time intervals, and means providing a circuit from each of said adjustable contacts to one of said switch elements, whereby said contacts and switch elements operate in pairs to provide selection and time operation of said control circuits.

3. In a time-controlled preselection tuning system, the combination of control circuit selector switch means comprising a row of individual operating elements, means for moving said elements individually to each of a plurality of predetermined switching positions, means providing a plurality of synchronously driven time controlled contact elements, a manually adjustable contact element associated with each of said timing contact elements, means comprising a second row of individual operating elements for moving said adjustable contact elements in spaced time relation to said timing contacts for engagement with said last-named contacts at predetermined adjustable time intervals, and means providing a circuit from each of said adjustable contact elements to one of said selector switch means in pairs.

4. In a time-controlled preselection tuning system, the combination of a plurality of tuning control selector switch means including a row of individual operating elements therefor, a timing shaft, means for causing said shaft to rotate one revolution in a predetermined time interval, a plurality of spaced rotary contact elements carried by said shaft, an adjustable contact element associated with each of said rotary contact elements, means for adjusting each of said adjustable contact elements along the

path of movement of the associated rotary contact element in predetermined spaced time relation thereto, a circuit lead connecting one of said contact elements with said selector switch means, and tuning control circuits connected with said synchronously driven timing contacts and with said selector switch means including means providing a source of operating current therefor.

5. The combination with a radio signalling apparatus including a panel and a dial, of a time-controlled shaft mounted in the rear of the panel, a plurality of annular manually adjustable dial members surrounding said shaft in close spaced relation to each other and each having a peripheral portion extending through the panel, a contact carried by each of said members, a plurality of synchronously driven time controlled contacts mounted on said shaft and movable through one revolution in a predetermined time interval, means for moving said first-named contacts in spaced relation to said timing contacts by an angular distance corresponding to a unitary fractional portion of said time interval, a selector switch connected with each of said adjustable contact elements, a plurality of tuning control circuits connected with said selected switches in parallel, a plurality of operating drums for said selector switches mounted in spaced coaxial relation to each other in said panel, and means for connecting each of said selector switches with one of said manually adjustable contact elements.

6. In a time preselection control system, the combination with a plurality of control circuits and a common return circuit lead therefor, of selector switch means for said control circuits comprising a plurality of switch elements having contact means connected with said control circuits and having a movable selector contact, means providing a row of individual operating elements one for each of said selector contacts, means providing a plurality of synchronously driven timing contacts, means providing a corresponding number of manually adjustable contact elements one associated with each of said timing contacts, means comprising a second row of individual operating elements in spaced relation to said first row of operating elements for moving said last-named contact elements to engage the timing contacts at predetermined time intervals, and means for determining the length of said time intervals including indicia on said operating elements.

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