Dec. 16, 1947. F. H. OWENS 2,432,540

PROGRAM PRESELECTING TIME CONTROL APPARATUS

Filed Dec. 27, 1943 2 Sheets-Sheet 1

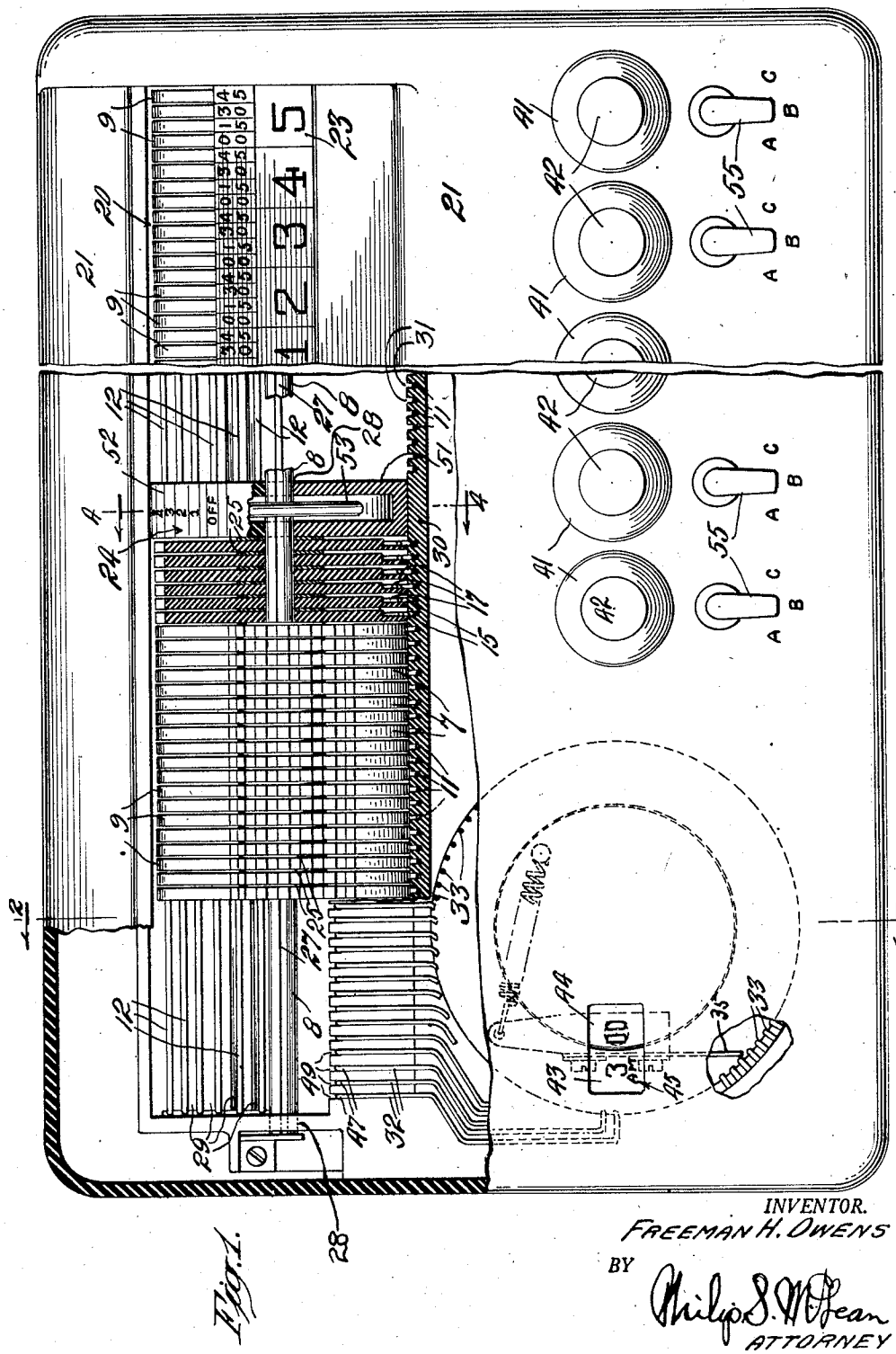


Fig. 1.

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Fig. 3.

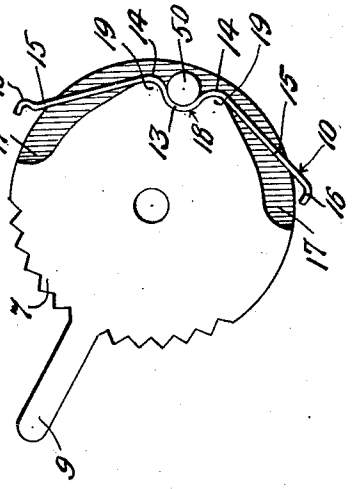


Fig. 4.

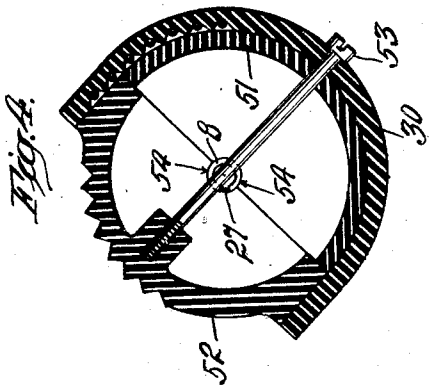
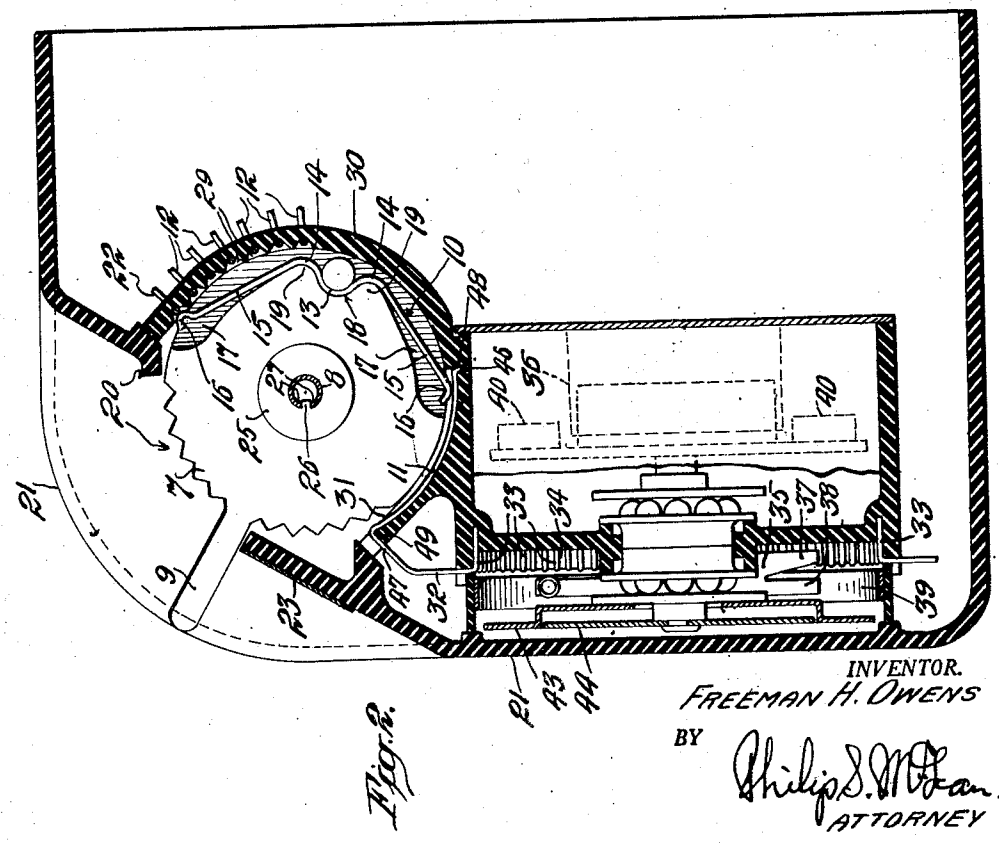


Fig. 2.



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Patented Dec. 16, 1947

2,432,540

UNITED STATES PATENT OFFICE

2,432,540

PROGRAM PRESELECTING TIME CONTROL APPARATUS

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Application December 27, 1943, Serial No. 515,853

15 Claims. (Cl. 200—37)

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The invention here disclosed relates to apparatus for preselecting desired programs or timed sequences and is a continuation-in-part of inventions covered in copending patent applications Ser. No. 397,504, filed June 10, 1941, Patent No. 2,337,568, dated December 28, 1943; Ser. No. 450,449, filed July 10, 1942; Ser. No. 465,155, filed November 10. 1942; and Ser. No. 520,693, filed February 1, 1944.

Special objects of the present invention are to provide station or feature selecting time switches which, while occupying small space as a group will be readily distinguished individually and be readily selected and operated to predetermine a program or sequence of timed features; which while of simple and inexpensive construction will be of rugged design and not liable to get out of order and which will be of such nature as to be readily assembled and combined with the radio or other apparatus with which it is to be used.

Other desirable objects attained by the invention will appear in the course of the following specification.

The novel features and combinations through which the purposes of the invention are attained are set forth in the following specification, broadly covered in the claims and illustrated by way of practical example in the accompanying drawings. Actual physical structure may be modified and changed in various ways all within the true spirit and broad scope of the invention and for that reason, the illustrated form is to be considered primarily for purposes of disclosure and not necessarily by way of limitation, the actual scope of the invention being as hereinafter broadly defined and claimed.

Fig. 1 in the drawings is a broken part sectional front elevation of a present embodiment of the invention.

Fig. 2 is a vertical sectional view as on substantially the plane of line 2—2 of Fig. 1.

Fig. 3 is a side elevation of one of the switch keys.

Fig. 4 is a cross-sectional view on substantially the plane of line 4—4 of Fig. 1.

In the present disclosure, the invention is illustrated as applied to the control of a radio receiver. Accordingly, the various time switches serve to set the apparatus for bringing in different radio stations or for shutting off the receiver or for effecting other desired operations at the particular times indicated by such switches.

The individual switches are shown as comprising disc-like members 7, journalled in side-by-side relation on a fixed supporting shaft 8, and

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having exposed finger levers 9, at the front and carrying arched spring contacts 10, at the back, each slidingly engaging at one end a time contact 11, and selectively engageable at the opposite end with one of the station or special feature representing bus wires 12.

The spring contacts 10, may be made of lengths of wire bent at the center to form a locating loop 13, and oppositely projecting reversely curved bearing loops 14, at opposite sides of the same. This provides the reversely extending spring arm portions 15, and these are shown bent back upon themselves and as terminating in sharply angled end portions 16, for engagement with the stationary contact elements 11 and 12. The spring wire brushes thus provided are shown as symmetrically formed, so as to be reversible end-for-end.

The brushes are located and held in the discs or key levers by being disposed in grooves 17, in the rearward peripheral portions of such levers, said grooves being deep enough to accommodate and permit free spring action and narrow enough to confine the arched wires in the edgewise disposed relation illustrated. Specifically these locating and holding grooves are shown as each having a deep central portion 18, to accommodate the center loop 13, and rounded bearing shoulders 19, at opposite sides of the same to serve as fulcrums for the rounded root portions 14 of the spring arms 15. Thus located, the spring wires are held in their seats under the spring tension generated by engagement of the opposite ends of the wires with the time contacts and bus wires respectively.

In the particular organization illustrated, the finger levers 9, project up through a slot 20, in the upper front portion of a cabinet 21, and which slot is wide enough to admit of the rotary movement necessary to carry the brush contacts into and out of engagement with the several bus contacts. In the illustration, there are seven of the latter, six of the conductors 12, used for instance for different radio stations and the seventh conductor, 22, used for shutting the receiver off. In all this range of movement, the lower forward ends 16, of the spring brushes ride over the time contacts 11, which are shown curved to the approximate arc of travel of such ends.

In front of the keys and below the levers 9, the cabinet is shown as carrying a scale or chart 23, identifying the individual keys as to time. A radio station or feature identifying scale is indicated at 24, showing the several positions of the switch fingers necessary to bring in such stations or special features.

The pivotally mounted keys are properly segregated so that one will not be affected by the adjustment of an adjoining key, by means consisting in the illustration, of thin spacing washers **25**, interposed between adjoining keys and held non-rotatably on the supporting shaft **8**, by lugs **26**, engaged in a groove **27**, in the shaft.

The entire bank of keys may be handled as a single unit or as shown in the illustration, in two unit sections, with the mounting shaft **8**, of each such section adapted to seat at opposite ends in end grooves **28**, provided to receive the same in opposing end wall portions of the casing.

The bus wires **12** and **22**, are shown as seated in longitudinally extending V-shaped grooves **29**, in a curved insulating support **30**, extending about the back of the keys and the curved time contacts **11**, are shown as seated in transversely extending V-shaped grooves **31**, in the front lower portion of this same insulating support.

Suitable connections are extended from the station selecting bus wires to the necessary radio or other parts, for example, as indicated in co-pending patent application Ser. 465,155 first identified. Similarly, connections are extended from the time contacts **11**, to corresponding time contacts under control of appropriate time clock mechanism. The latter may be similar to that disclosed in the co-pending patent application last mentioned, or more particularly, like that disclosed in patent application Ser. No. 520,693, where the time contacts, such as **11**, are formed wires, extended as indicated at **32**, to terminal portions **33**, grouped circularly in an annular support **34**, about a rotating brush **35**, driven from the clock motor **36**. This brush is shown as having one branch **37**, positioned to engage the successive time contacts **33**, and another branch **38**, positioned to ride the current supply ring **39**.

In the illustration, the distributor brush **35**, makes one complete revolution each twenty-four hours and the contacts **33**, are spaced to be successively engaged for each fifteen minute interval, the present usual broadcast period. The time clock also operates an accurate timing rotary switch **40**, like that in patent application Ser, No. 465,155, for closing the control circuit at the end of each fifteen minute interval, thus to close the circuit just previously set up by engagement of the brush with the contact **33**, corresponding to the existing time.

The control circuits are not illustrated but they may be similar to those disclosed in the co-pending patent applications referred to and may include station selecting tuners such as represented at **41**, volume controls **42**, and or other related devices, such as the wave band selecting switches indicated at **55**, and particularly described in patent application 465,155.

The clock mechanism may vary, but is here shown as including a rotary twenty-four hour clock dial **43**, and cooperating fifteen minute dial **44**, conjointly visible through window **45**, in the front of the cabinet.

The combined distributor contacts **33**, and time contacts **11**, with intermediate connecting portions **32**, may in each case be a single length of insulated wire having bared end portions for engagement by the rotating brush of the clock and the sliding brush of the cooperating time key. The longitudinally extended contact portions **11**, may be secured in their positioning grooves **31**, by cement or be retained under spring tension imposed by seating these curved portions in such

grooves and passing angled end portions **46**, **47**, through appropriate securing openings **48**, **49**, provided in the insulating support **30**. The bus wires or rods **12** and **22**, may be similarly formed and held in place.

The rotary movement of the keys provides a smooth easy action and the angled ends of the spring brushes engaging the longtitudinally extending conductors and the walls of the grooves in which they are seated, serve to retain the keys in the various angular relations to which they may be adjusted. The parts are combined in a particularly compact space saving relation, enabling the unit to be quite small and to be readily combined with or be built into a small radio cabinet. The parts are of simple design, readily manufactured and easily assembled. The wires forming the time contacts with intermediate connecting portions may be readily bent over suitable forms or jigs and the wires forming the spring brushes may be readily produced in suitable bending dies.

The time keys may be stamped or molded in suitable insulating material and to facilitate both molding and assembling operations, they may be formed as indicated in Fig. 3, that is, with the brush receiving groove **17**, formed entirely in one face of the key and with a lug or post portion **50**, opposite the center depression **18**, to act as a confiner for the spring brush. With this construction, the spring brushes can be mounted by simply laying them in the open-sided slots, with the arched portions engaged in back of the posts **50**. When assembled on the mounting shaft the closed side of one key will be opposed to the open side of the adjoining key, so that the brushes can not escape from their mountings.

The pivot shaft or shafts for the keys may be made up as indicated in Figs. 1 and 2 of sheet metal rolled transversely into cylindrical form, but with the edges left spaced to provide the keyway for the spacing discs.

With the time keys arranged in two gangs or sections as in the present disclosure, a center bearing may be provided for the two shaft sections **8**, this being shown in Fig. 4, as comprising the complemental inner and outer half sections **51**, **52**, held in place by a long screw **53**, extending from the back through the insulating support **30**. In this construction, the back section **51**, carries at the opposite sides, seats **54**, for the inner ends of the shaft sections and the outer member **52**, serves as an ornamental cap piece holding the shafts in place and forming a spacer between the two banks of keys. The ornamental effect is carried out further by grooving the top of the cap piece in line with the grooving of the keys and by providing the station indicator scale **24** on this piece.

The volume control knobs or buttons **42**, in addition to the rotary movement for volume control adjustments, may have an in and out movement, so as to serve as manuals for arbitrarily effecting closing of the station selecting or feature controlling switches. These switches as disclosed in copending patent applications Ser. Nos. 397,504, 450,449, 465,155 and 499,295, may be of the self-opening type and adapted to be closed in each instance, either by one of these manuals or by an electromagnet in a circuit which can be set up by any one of the station selecting time keys. Thus the station selecting or turning the set off or on, or other functions may be arbitrarily effected at any time, through the medium of the manuals, or be automatically effected according

to a preselected schedule or program. In either case, the function controlling switch which is closed either by a magnet under a predetermined time schedule or by hand operation of a manual, is held in its closed position and any previously held switch is automatically released, by interlocking mechanism, such as disclosed in the applications mentioned and comprising usually a universal latch bar biased into a holding position and adapted to be engaged by rocking levers forming parts of the control switches, to release any previously held lever and to catch and hold the switch lever which is then effecting such movement of the universal latch bar.

The time clock **36**, is indicated only in a very general way, since a standard clock movement may be used, modified as disclosed in copending case Ser. No. 520,693 to operate the accurate fifteen minute timer switch and the rotary distributor switch.

The members **51**, **52**, which act as a stationary intermediate spacer between the two banks of keys and support the inner ends of the shafts carrying said keys overlie the longitudinally extending station bus wires and hence may serve to positively hold the intermediate portions of those wires in their V-shaped grooves. The back portions of the members may be shaped to enter these grooves and bear upon the wires or a filler or fillers for holding the wires in place may be inserted and be held in place by the two half sections. The fastening screw which comes through the back locates these half sections accurately in position between the two banks of keys.

What is claimed is:

1. Program preselecting time control mechanism, comprising longitudinally extended relatively insulated time contacts spaced apart in side-by-side relation, relatively insulated spaced function selecting contacts disposed across one end of said time contacts and extended to stand in opposition to substantially the full group of said time contacts, brush members movable in the direction of longitudinal extent of said time contacts and having each a terminal portion to engage any one of said function selecting contacts and a terminal portion to slidingly engage some point in the longitudinal extent of one of said time contacts, rotatably mounted keys for shifting said brush members into engagement with different ones of said function selecting contacts, said pivotally mounted keys being disposed in side-by-side relation over said longitudinally extended time contacts and having narrow slots in the backs of the same and said brush members comprising arched spring wires having intermediate portions disposed within and positioned by said narrow grooves and protruding end portions forming the terminal portions engageable with the contacts before mentioned.

2. Program preselecting time control mechanism, comprising an insulating support having spaced longitudinally extending grooves and spaced transversely extending grooves opposite said longitudinally extending grooves, conductors positioned in said two sets of grooves, keys pivotally mounted over and substantially in line with said transversely extending grooves, and arched spring brushes carried by said keys and each engageable at one end with a conductor in one of said transverse grooves and at the opposite end with the different ones of the conductors seated in said longitudinal grooves.

3. Program preselecting time control mechanism, comprising an insulating support having spaced longitudinally extending grooves and spaced transversely extending grooves opposite said longitudinally extending grooves, conductors positioned in said two sets of grooves, keys pivotally mounted over and substantially in line with said transversely extending grooves, arched spring brushes carried by said keys and each engageable at one end with a conductor in one of said transverse grooves and at the opposite end with the different ones of the conductors seated in said longitudinal grooves, said insulating support being of arcuate formation approximating the arc of adjustment of said pivotally mounted keys and said brushes being of arched spring formation to yieldingly engage said conductors.

4. Program preselecting time control mechanism, comprising an insulating support having spaced longitudinally extending grooves and spaced transversely extending grooves opposite said longitudinally extending grooves, conductors positioned in said two sets of grooves, keys pivotally mounted over and substantially in line with said transversely extending grooves, arched spring brushes carried by said keys and each engageable at one end with a conductor in one of said transverse grooves and at the opposite end with the different ones of the conductors seated in said longitudinal grooves, a common pivotal support for said keys and spacers keyed on said support between said keys.

5. Program preselecting time control mechanism, comprising an insulating support having spaced longitudinally extending grooves and spaced transversely extending grooves opposite said longitudinally extending grooves, conductors positioned in said two sets of grooves, keys pivotally mounted over and substantially in line with said transversely extending grooves, arched spring brushes carried by said keys and each engageable at one end with a conductor in one of said transverse grooves and at the opposite end with the different ones of the conductors seated in said longitudinal grooves, said longitudinally extending grooves being substantially V-shaped in cross-section and the ends of the spring brushes engaging in said grooves being abruptly angled to yieldingly retain the keys in the position of angular adjustment.

6. Program preselecting time control mechanism, comprising an insulating support having spaced longitudinally extending grooves and spaced transversely extending grooves opposite said longitudinally extending grooves, conductors positioned in said two sets of grooves, keys pivotally mounted over and substantially in line with said transversely extending grooves, arched spring brushes carried by said keys and each engageable at one end with a conductor in one of said transverse grooves and at the opposite end with the different ones of the conductors seated in said longitudinal grooves, the conductors disposed in said transverse grooves being curved substantially to the arc of travel of the brushes engaging therewith.

7. Program preselecting time control mechanism, comprising an insulating support having spaced longitudinally extending grooves and spaced transversely extending grooves opposite said longitudinally extending grooves, conductors positioned in said two sets of grooves, keys pivotally mounted over and substantially in line with said transversely extending grooves, arched spring brushes carried by said keys and each engageable at one end with a conductor in one of said transverse grooves and at the opposite

end with the different ones of the conductors seated in said longitudinal grooves, said brushes being of arched spring wire having arched portions of the same yieldingly retained in the keys.

8. Program preselecting time control mechanism, comprising an insulating support having spaced longitudinally extending grooves and spaced transversely extending grooves opposite said longitudinally extending grooves, conductors positioned in said two sets of grooves, keys pivotally mounted over and substantially in line with said transversely extending grooves, arched spring brushes carried by said keys and each engageable at one end with a conductor in one of said transverse grooves and at the opposite end with the different ones of the conductors seated in said longitudinal grooves, said brushes being of arched spring wire having arched portions of the same yieldingly retained in the keys and the conductors in said longitudinal and transverse grooves being wires having bare portions exposed to the opposite end portions of said spring wire brushes.

9. Program preselecting time control mechanism, comprising key levers journalled in side-by-side relation on a common center and having finger projections by which they may be individually angularly adjusted, longitudinally extending spaced and relatively insulated conductors at the back of said key levers substantially parallel with the pivotal axis of the same, transversely extending conductors at the back of said key levers and substantially in line therewith and arched spring brushes having the intermediate arched portions of the same seated in the rear peripheral portions of said levers and the ends of the same projecting into engagement with said longitudinally and transversely extending conductors.

10. Pivotally mounted station selecting time switch key levers having recesses in the sides of the same, said levers being disposed in closely related side-by-side relation, spring contacts entered sideways in said open-sided recesses in the key levers and confined therein each by an adjacent key lever and relatively stationary contacts for engagement by said spring contacts.

11. In combination, station selecting keys movably supported in side-by-side relation and each having a recess in one face of the same, adapted to be closed by the key adjoining the same, contact elements seated in said open-sided recesses and confined therein by said adjoining keys and relatively stationary contacts positioned for engagement by said first mentioned contacts.

12. In combination, substantially flat switch keys supported in side-by-side relation and mounted for movement in the direction of the substantially flat planes, said switch keys each having a recess in one side and a lug substantially closing the intermediate portion of such recess, an arched spring contact seated in said recess and having the intermediate arched portion of the same engaged in back of said stud, the recess in the side of one switch key being covered by the adjoining switch key and whereby said spring contacts are confined in their seated relation and relatively stationary contacts disposed for engagement by the ends of said arched spring contacts.

13. Program preselecting time control mechanism comprising a bank of keys pivotally mounted in side-by-side relation on a common axis, arched spring brushes on the backs of said pivotally mounted keys, an arcuate insulating support in back of said keys and curved to substantially the arc of travel of said spring brushes, spaced conductors extending longitudinally of said arcuate support in back of said keys, spaced conductors extending transversely of said arcuate support at the back of and in line with said keys, said last mentioned transverse conductors being curved to the approximate curvature of said arcuate support, said arched spring brushes having free contact ends and arranged each with one end in sliding engagement with one of said curved conductors and the other end selectively engageable with the first mentioned longitudinally extending conductors.

14. Program preselecting time control mechanism comprising spaced longitudinally extending conductors and spaced transversely extending conductors opposite said first conductors, a longitudinally extending shaft extending substantially centrally over said two groups of conductors and composed of sheet material rolled into substantially cylindrical form with the edges left spaced to provide a longitudinal slot, keys pivotally engaged on said shaft substantially in line with said transversely extending conductors, arched spring brushes carried by said keys and each slidingly engaged at one end with one of said transverse conductors and selectively engageable at the opposite end with different ones of said longitudinal conductors, and spacers on said shaft for maintaining said keys with said brushes aligned with said transverse conductors, said spacers having lugs entered in said slot in the shaft to hold them non-rotatably positioned between the keys.

15. Program preselecting time control mechanism comprising an arcuate insulating support, a shaft support interposed transversely in the intermediate portion of said arcuate support and provided with rests at opposite sides, shafts supported at opposite ends of the arcuate support and engageable with said rests, a cover engageable over said shaft support for securing said shafts in said rests, keys rotatably engaged on said shafts at opposite sides of said shaft support, brushes carried by said keys and conductors mounted in spaced relation on said arcuate support in back of said keys and engageable by said brushes.

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