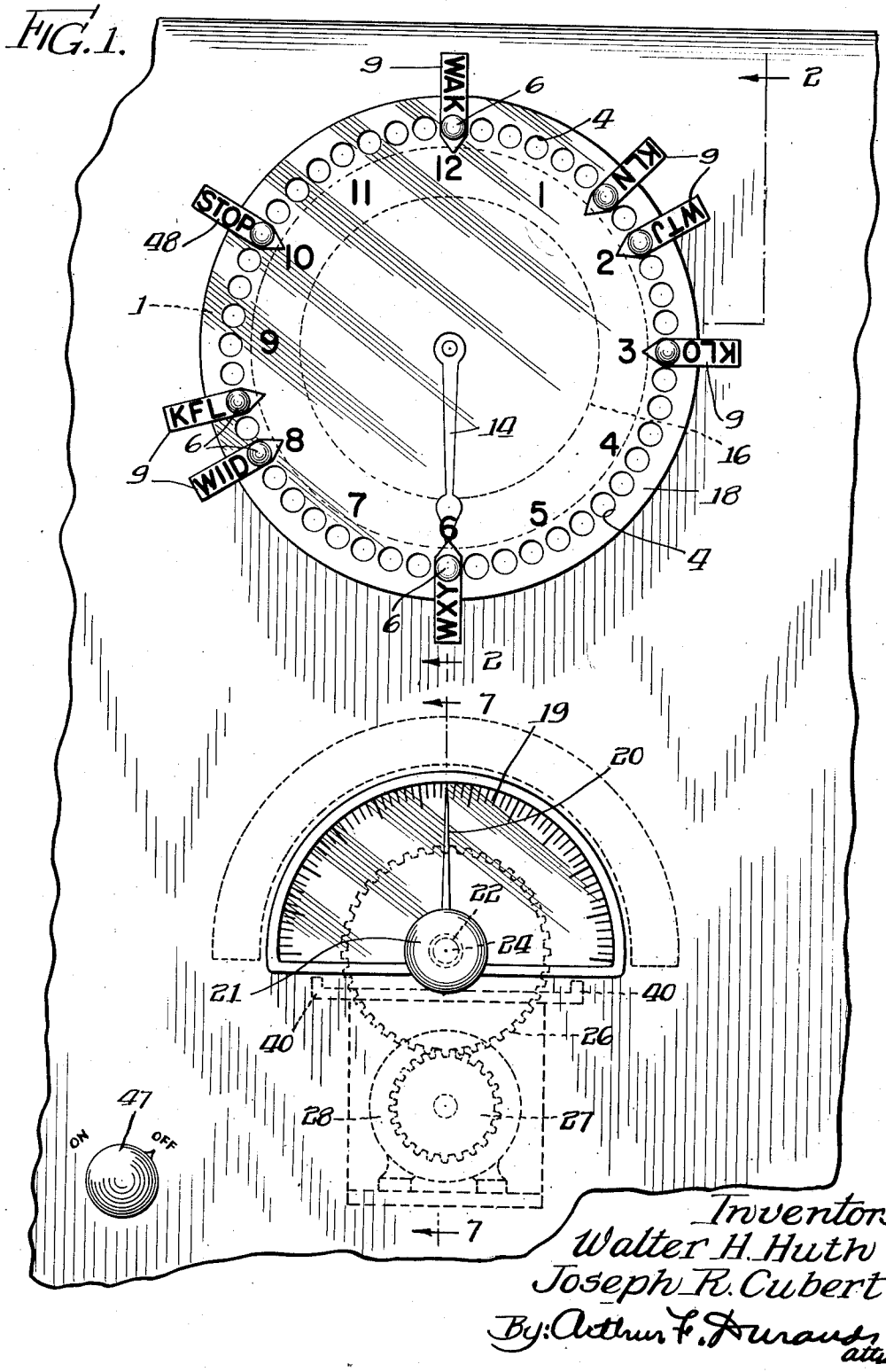
March 5, 1940. W. H. HUTH ET AL 2,192,313

TIME CONTROLLED RADIO RECEIVER

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FIG. 1.



Inventors
Walter H. Huth
Joseph R. Cubert
By: Arthur F. Durand
Atty.

March 5, 1940. W. H. HUTH ET AL 2,192,313

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FIG. 2.

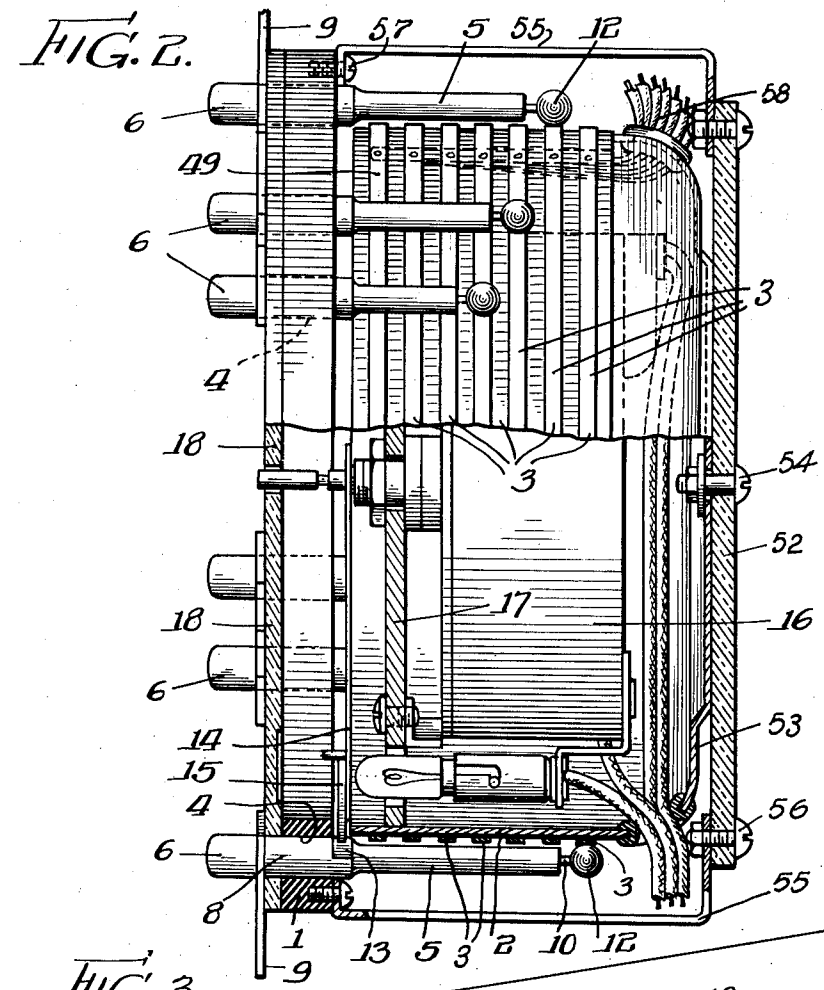


FIG. 3.

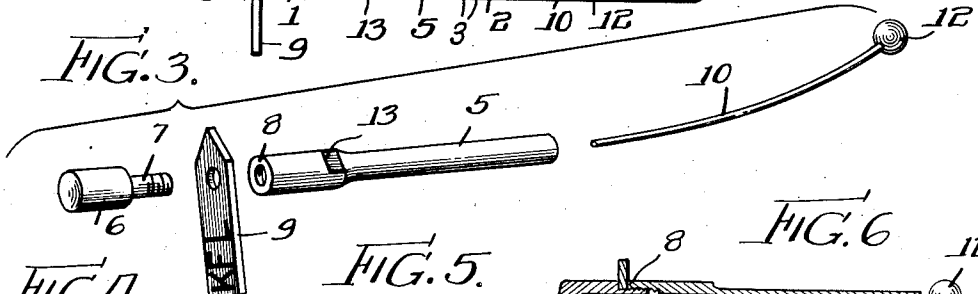


FIG. 4.

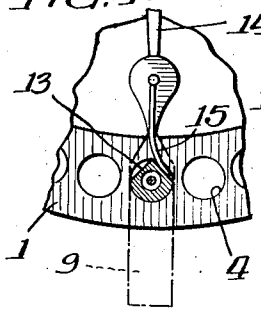


FIG. 5.

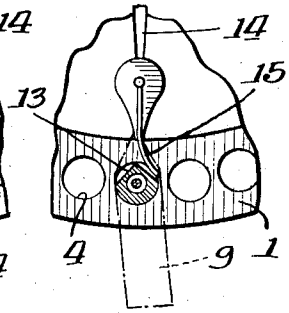
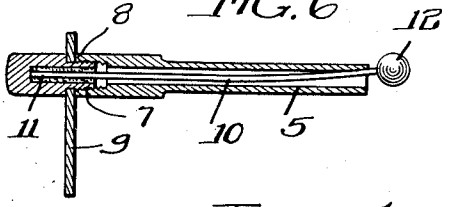


FIG. 6



Inventors:
Walter H. Huth
Joseph R. Cubert
By: Arthur F. Durand
atty.

March 5, 1940. W. H. HUTH ET AL 2,192,313

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FIG. 7.

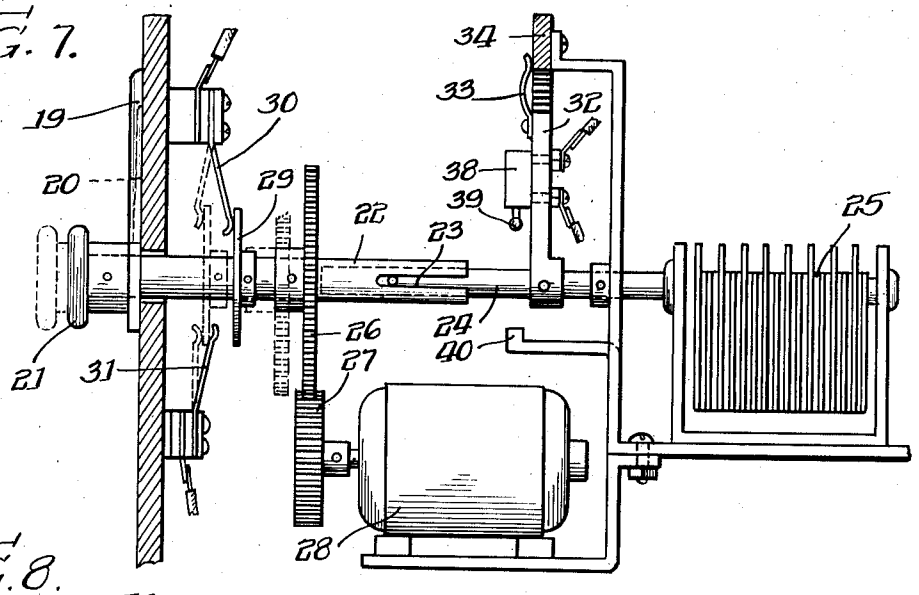
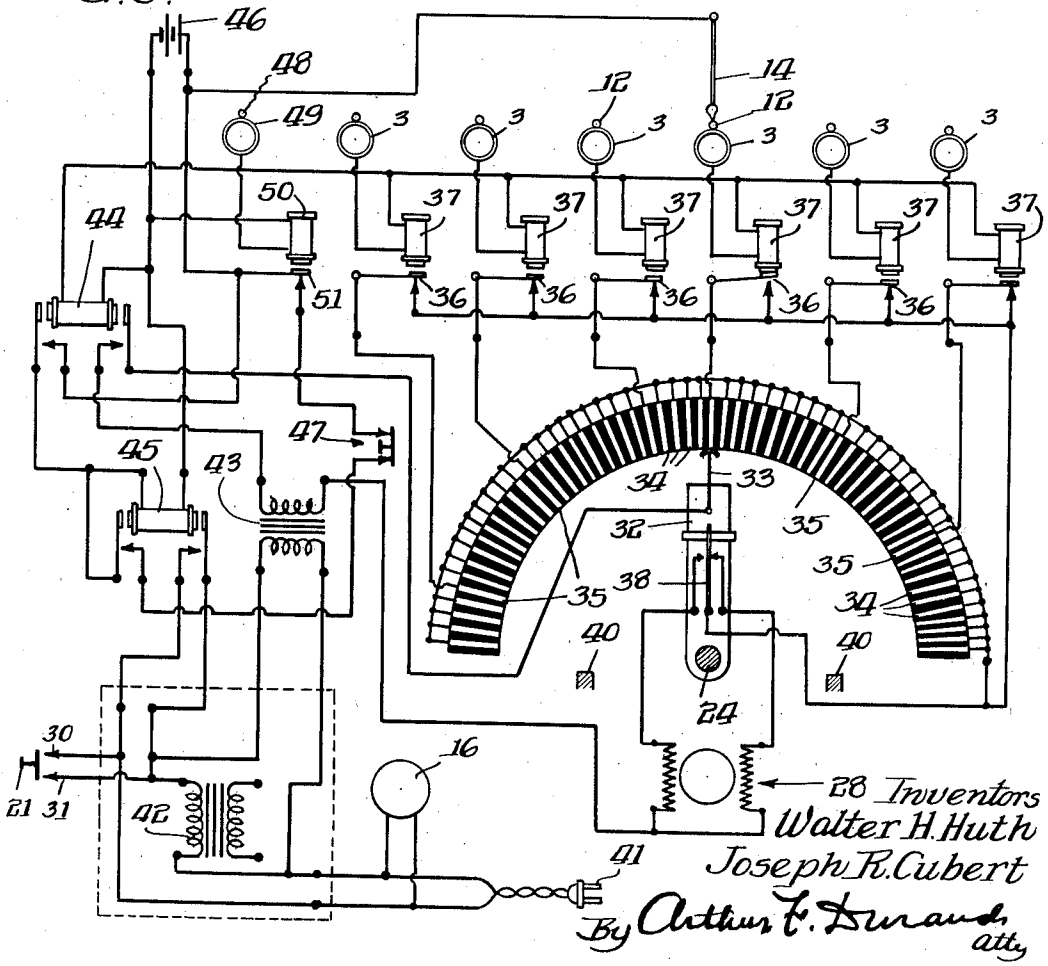


FIG. 8.



Inventors
Walter H. Huth
Joseph R. Cubert
By Arthur F. Durand
Atty

Patented Mar. 5, 1940 2,192,313

UNITED STATES PATENT OFFICE

2,192,313

TIME CONTROLLED RADIO RECEIVER

Walter H. Huth and Joseph R. Cubert, Chicago, Ill., assignors to Walter H. Huth Laboratory, Chicago, Ill., a corporation of Illinois

Application June 21, 1937, Serial No. 149,303

21 Claims. (Cl. 250—40)

This invention relates to clock-controlled radio receivers of such character that a clock is employed to automatically start the operation of the receiver at some predetermined time.

Generally stated, the object of the invention is to provide a novel construction and arrangement whereby a clock is combined with means for automatically tuning in, successively, a plurality of predetermined and pre-selected sending stations.

It is also an object to provide certain details and features of construction and combinations tending to increase the general efficiency and desirability of a clock-controlled radio receiver of this particular character.

To the foregoing and other useful ends, the invention consists in matters hereinafter set forth and claimed and shown in the accompanying drawings, in which—

Fig. 1 is a front elevation of the tuning dial, and of the station-selecting dial, of a clock-controlled radio receiver embodying the principles of the invention.

Fig. 2 is an enlarged vertical section on line 2—2 in Fig. 1 of the drawings.

Fig. 3 is a perspective view of one of the station-selecting switch plugs, with the parts thereof shown in separated condition.

Fig. 4 is a detail sectional view of one of said plugs, showing adjacent portions of the structure.

Fig. 5 is a similar view showing the plug in a different position.

Fig. 6 is a longitudinal section of one of said plugs in assembled condition.

Fig. 7 is a vertical section on line 7—7 in Fig. 1 of the drawings.

Fig. 8 is a diagrammatic view showing the wire or circuit connections for the different parts of the apparatus.

Referring to Figs. 1 to 6 of the drawings, the station-selecting dial mechanism comprises a relatively heavy ring 1 of insulating material, on which is carried a cylinder 2 of insulation, and upon which cylinder metal rings 3 are spaced apart and insulated from each other in the manner shown. The ring 1 is provided with a circular series of sockets 4 for the insertion of metal plugs of the kind shown in Figs. 3 and 6 of the drawings. These plugs are each composed of a sleeve section 5, a head portion 6 having a threaded stem 7 that screws in the threaded socket 8 of the sleeve, a flat metal arm 9 that is clamped between the ends of the sections 5 and 6, and a spring arm 10 that has its inner end soldered in place at 11, the outer end of this spring arm being provided with a metal ball or head 12, as shown. Each plug has a wedge-shaped portion 13, as shown in Figs. 3, 4 and 5, and the clock-hand 14 has its end provided with a flexible portion 15 for engagement with the said beveled or wedge-shaped portion of each plug. It will be seen that the clock body 16 is rigidly mounted upon a plate 17, suitably mounted within the cylinder 2, and in this way the end of the clock-hand 14 is in position to successively engage the wedge-shaped portions 13 of any plugs that are inserted in any of the sockets 4 previously mentioned. It will be seen that the plugs are of different lengths, as many different lengths as there are rings 3, previously mentioned. The translucent dial plate 18 at the front of the structure has the clock numerals thereon, as shown in Fig. 1 of the drawings, and it will be seen that there is a socket 4 opposite each clock numeral, and three sockets between each of the two sockets that are opposite the clock numerals. In this way, a plug can be inserted in a socket opposite a clock or time numeral, to bring in a sending station exactly at that hour, or it can be inserted in one of the sockets between, in order to bring in the same station either before or after that hour. It will be understood that there are as many rings 3 as there are sending stations to select from. The clock is preferably of the kind that is electrically operated, and the arrangement is such, as will hereinafter more fully appear, that when a plug, representing a certain sending station, of a certain length, is inserted in any of the sockets, the ball or head 12 thereof will engage the ring 3 that represents the desired sending station. When the end of the clock-hand 14 engages the wedge-shaped portion 13 of the plug representing that station, a circuit is closed through the plug and its engaging ring, and the desired station is automatically tuned in, as will hereinafter more fully appear.

Looking at Figs. 1 and 7, it will be seen that the tuning dial comprises a segment-shaped plate 19, having markings or divisions thereon, for cooperation with the hand or pointer 20, which latter is rotatable by a knob 21 on the outer end of the rotary sleeve 22, which latter has a sliding spline connection 23 with a shaft 24, which is the main shaft of the tuning condenser 25, which latter may be of any known or suitable character. It will be seen that the sleeve 22 has a gear 26 that engages a pinion 27 on the end of the shaft of the motor 28, which latter may be of any suitable or desired character. When the knob 21 is pulled out, as shown in dotted lines in Fig. 7,

the gear 26 is disengaged from the pinion 27, and in this condition the mechanism is adapted for hand-tuning, by simply rotating the knob 21 in the usual manner, thereby to operate the condenser 5 and tune in any desired station. Desirably, when the knob 21 is pulled out for hand-tuning, the metal disk 23 is in engagement with the spring contacts 30 and 31, thus closing the circuit in a manner and for a purpose that will hereinafter more fully appear. When the gear 26 is in engagement with the pinion 27, the mechanism is in condition for automatic tuning, inasmuch as the motor will drive the shaft 24 and thereby operate the condenser 25. For such automatic tuning, the shaft 24 carries an arm 32, provided with a metal wiper 33 that traverses a series of metal contacts 34, that are all connected in multiple, and also the more widely spaced single contacts 35, which latter are connected in multiple to the normally closed contacts 36 of the relays 37, of which latter there is one for every ring 3, as shown more clearly in Fig. 8, which latter is a diagram showing how the various parts described are wired and circuit-connected. Also, for automatic tuning, it is desirable that a reversing switch 38 be mounted on the arm 32, and provided with a movable switch arm 39 for engagement with the stop 40, so that when the dial pointer 20 has gone as far as it should go in one direction, the motor 28 is then reversed, by the action of the switch 38, causing the dial pointer 20 to then travel to the extreme other end of the scale of this dial, as will hereinafter more fully appear, and as will be seen from a further consideration of the diagram shown in Fig. 8 of the drawings.

In operation, as indicated in Fig. 8 of the drawings, an ordinary plug 41 is plugged into any ordinary socket or wall outlet to obtain the current necessary for the amplifying vacuum tubes, and for operating the motor 28, when automatic tuning is desired, as well as for operating the clock 16, through the medium of ordinary transformers 42 and 43, as shown. It will be understood that the secondary of the transformer 42 is connected to the radio receiving set in the ordinary manner, and as shown in Fig. 8, the switch knob 21 controls a circuit through the primary of this transformer. On the other hand, the seven relays 37, shown at the upper portion of the diagram, and the two supplemental relays 44 and 45 obtain energizing current from a 6-volt dry battery 46; or, in place of the latter, a rectifier, deriving current through the plug 41, could be used. The letters of the different sending stations are preferably placed on the arms 9, as shown in Fig. 1 of the drawings, and while the wiper 33 is in engagement with contacts 34 and 35 that are alive or charged, the motor keeps operating; but, when this wiper 33 engages a contact that is dead, as illustrated in Fig. 8, because of the open contacts 36, the motor then stops running because its circuit is open, and the clock-hand 14 remains in engagement with the plug representing the desired sending station. At this point, it will be seen that the arm 9 can be arranged as shown in Fig. 4, so that the motor will stop exactly at the pre-determined time at which the desired station is supposed to be starting a broadcasting program. On the other hand, if it is desired to cut out the advertising, or to tune in just a little ahead of the starting time, the arm 9 can be arranged at an angle, as shown in Fig. 5 of the drawings, so that the radio receiver will be started either just before or just after the beginning of the desired broadcasting program.

Thus, the clock-operated structure forms a sort of station-selecting dial, in which the switch plugs can be inserted in accordance with the particular sending stations desired to be brought in by the tuning condenser operated by the motor. In addition, the wiper 33 and the contacts 34 or 35 form, in effect, automatic means for controlling the motor circuits and stopping the motor each time the pre-determined desired sending station is tuned in by the condenser, for it will be seen that the parallel or multiple motor circuits include said wiper and contacts, and also the normally closed contacts of the relays 37, previously mentioned. Obviously, with the circuit arrangement shown and described, whenever a relay 37 is energized, it is energized in series with the relay 44, and the latter closes a circuit through the relay 45, and also through the traveling contact 33, previously mentioned. When the relay 45 is energized, it closes the circuit through the primary of the transformer 42 and also closes a circuit through its own coil to keep the power on in the radio set when the hand 14 is not in engagement with any plug. However, this power circuit can be opened, by the ordinary push-switch 47, indicated in Fig. 8 of the drawings. Of course, when the stop-plug 48 is inserted at any desired point, the entire operation of the radio receiver ceases when the clock-hand reaches this plug. This is because the extreme left-hand ring 49, as shown in Fig. 8, controls the energizing circuit of the extreme left-hand relay 50, and the latter controls the contacts 51 that are in the said locking circuit of the relay 45, by which the latter is held energized to keep the power on in the radio receiver. Thus there are six relays representing six sending stations, from which to select, and there are six of the rings 3, each allotted to one of said relays. But when the stop plug is inserted in engagement with the ring 49, then the relay 50 is energized, with the result that the radio receiver is turned off and has no operating current.

In general, it will be seen that the rings 3 form part of a housing for the clock 16, and that the axis of the revolving clock hand 14 is coincident with the common axis of said rings. In addition, it will be observed that switch plug portions 13 are provided which actually engage the wiper 15 on the clock hands 14, while the spring supported metal tips 12 of the plugs have yielding contact with the said rings, to close a relay energizing circuit through the clock hand wiper whenever the latter engages one of the said rings, which latter are in the circuits of the relays 37 and 50 shown and described. Therefore, each time a relay is energized, it opens a motor circuit, and the motor automatically stops, as shown and described, as soon as the wiper 33 on the wiper arm 32 of the condenser 25 engages the dead contact in the open motor circuit.

Looking at Figs. 4 and 5 of the drawings, it will be seen that the bevel formation 13 on each plug is of such character that, by turning or rotating the plug a little, in either direction, the time of contact with the clock propelled element 15 can be advanced or delayed, and that the user of the radio receiver is assisted in doing this by the sharp inner ends or pointers of the plates 9 with which the sending station plugs are provided, as these pointers are virtually or practically over the graduated circle of hours and minutes on the dial of the clock, and hence a plug can be

inserted to bring in a certain station at practically any point of time on said clock dial.

Thus each ring 3 represents a different sending station, and each plug is of a different length, to engage only one of said rings, so that each plug represents a different sending station, but each plug can be inserted in any one of a plurality of sockets, so that the sending station represented by the rings and its plug can be brought in at any desired point of time on the clock dial, automatically, as soon as the clock propelled circuit closing element 15 engages the plug.

It will also be observed that the clock propelled element 15 operates in a plane disposed between the inner ends of the sockets 4 and the outer edge of the drum or cylinder 2 on which the rings 3 are located, whereby the plugs 5 are entirely outside of said rings, thus making the construction simple and practical, not only for the purpose of reduced cost of manufacture, but also for the purpose of simplifying repairs and adjustments when such are necessary or desirable. Any plug is rotatable in any socket, while in engagement with its allotted ring through the medium of the ball 12, thereby to turn the pointed end of the member 9 in either one direction or the other, at the outer edge of the clock dial, and to thus predetermine at what hour, or even at what minute, some desired station will automatically be brought in by the radio receiver.

It will be seen that the back plate 52 is supported by the back wall 53 of the housing 2, through a medium of a bolt 54 extending through said plate on the wall thereof. In turn, it will be seen that this plate 52 is supported by brackets 55 on the insulated ring through the medium of the screws or bolts 56 and 57, all as shown more clearly in Fig. 2 of the drawings. Again, it will be seen that the electrical circuit wires 58 extend through the housing 2 at the rear thereof and that each wire is fastened to one of the rings 3 by means passing through the wall of the housing 2 as by the rivets indicated at the top of Fig. 2 of the drawings.

What we claim as our invention is:

1. In a clock controlled radio receiver, the combination of a plurality of metal rings spaced apart axially and insulated from each other to provide a cylindrical housing on which the said rings extend over the outside thereof, a clock disposed in the cylindrical housing, means at the front of said assembly forming a circular series of spaced sockets, each ring representing a different sending station, each socket representing a different point of time on said clock, single plugs of different lengths for insertion in said sockets, each plug being insertable in any one of said sockets to engage the periphery of its allotted ring for a different point of time on said clock, and having a tip for thus engaging only one certain ring, so that each plug is allotted to only the one ring, and the latter is allotted to only the one plug, whereby the plugs are all outside said housing, a clock propelled circuit closing element for engaging said plugs, wherever the latter are inserted, and circuits controlled by said rings and plugs and element to clock control the automatic tuning of said receiver for bringing in one or more of said sending stations.

2. A structure as specified in claim 1, the said tip of each plug being mounted on a flexible spring having metallic union with the portion of the plug that is engaged by said element.

3. A structure as specified in claim 1, each plug being beveled to engage said element, and each plug being rotatable in a socket to advance or delay the time of contact with said element.

4. A structure as specified in claim 1, there being also a stop plug for insertion in one of said sockets, having means whereby to discontinue the entire operation of the radio receiver when said clock controlled element reaches this stop plug.

5. A structure as specified in claim 1, comprising a cylinder of insulation upon the outer surface of which said rings are mounted and spaced apart, in the form of metal bands on the exterior of said cylinder, and thereby insulated from each other, together with means mounted on this cylinder to support the clock, with said clock controlled element traveling in a plane immediately outside of the outer edge of said cylinder, so that said plane is disposed between said outer edge and said means for forming said sockets, the latter being formed by a solid ring of insulation at the outer edge of said cylinder.

6. A structure as specified in claim 1, said plugs all having shoulders for engaging the outer ends of said sockets, to limit the insertion of the plugs, so that the outer ends or handles of the plugs may be the same length, which shoulders may be turned to the point on the clock dial at which time it is desired to bring in the desired sending station.

7. A structure as specified in claim 1, comprising capacity under the control of said circuits for tuning in the desired sending stations, as designated by the insertion of the plugs in the sockets, with a separate relay energizing coil in the circuit of each ring.

8. A structure as specified in claim 1, a plurality of said plugs having plates forming shoulders to limit their insertion, with the name of a different sending station on each plate, and screw means to removably hold each plate in place.

9. A structure as specified in claim 1, including adjustable capacity automatically operated and controlled by said circuits, with circuit controlling means on the axis of said capacity to automatically stop the latter for any predetermined sending station represented by any particular plug.

10. A structure as specified in claim 1, said clock propelled element being carried by the visible hand of the clock outside the visible dial of the latter, in a plane at the inner ends of said sockets.

11. A structure as specified in claim 1, having a glass front therefor, with the entrance to said sockets formed by holes in said glass.

12. A structure as specified in claim 1, said plugs each being rotatable in any socket to predetermine the time when the desired sending station will be brought in by the clock control.

13. In a clock controlled radio receiver, the combination of a plurality of metal rings spaced apart axially and insulated from each other, a clock disposed in the cylindrical housing formed by said rings, means at the front of said assembly forming a circular series of spaced sockets, each ring representing a different sending station, each socket representing a different point of time on said clock, single plugs of different length for insertion in said sockets, each plug being insertable in any one of said sockets to engage the periphery of its allotted ring for a different point of time on said clock, and having a tip for thus engaging only one certain ring, so that each plug is allotted to only the one ring, a clock propelled circuit closing element for engaging said plugs, wherever the latter are inserted, and circuits controlled by

said rings and plugs and element to clock control the automatic tuning of said receiver for bringing in one or more of said sending stations, each plug being beveled to engage said element, and each plug being rotatable in a socket to advance or delay the time of contact with said element.

14. A clock controlled radio receiver comprising a clock dial, means forming a ring of sockets around the outer edge of the dial, one or more plugs for insertion in said sockets, a clock operated electrical contact for engaging said plug or plugs, the plug being rotatable in any socket to predetermine the time of said engagement, and stationary circuit forming means for engaging said plug or plugs.

15. A structure as specified in claim 14, comprising a pointer on the plug or plugs co-operating with the dial to either delay or advance the indicated time of said engagement.

16. A structure as specified in claim 14, said engagement being at the inner end of each socket, in a plane between said circuit forming means and said means forming said sockets.

17. A structure as specified in claim 1, the clock being supported by a plate the edges of which impinge upon the interior of said housing, the said means for providing the sockets comprising an insulating ring spaced from the front edges of said housing, and said clock propelled element traveling in the space between said housing edges and said insulating ring.

18. A structure as specified in claim 1, and means behind the clock and whereby the housing is supported at its rear on said means for providing the sockets.

19. A structure as specified in claim 1, comprising a back plate behind the clock, means for fastening said back plate to the back of said housing, and means for supporting said back plate on said means for providing the sockets.

20. A structure as specified in claim 1, having a plate that impinges at its edge on the interior of the housing, behind said clock propelled element, to support the clock in position.

21. A structure as specified in claim 1, having electrical connections extending through and into the housing and then through the housing side wall to said rings.

WALTER H. HUTH.
JOSEPH R. CUBERT.