

Aug. 6, 1940.

J. POTTER

2,210,380

RECORDING DEVICE FOR RADIO RECEIVERS

Filed Nov. 24, 1936

4 Sheets-Sheet 1

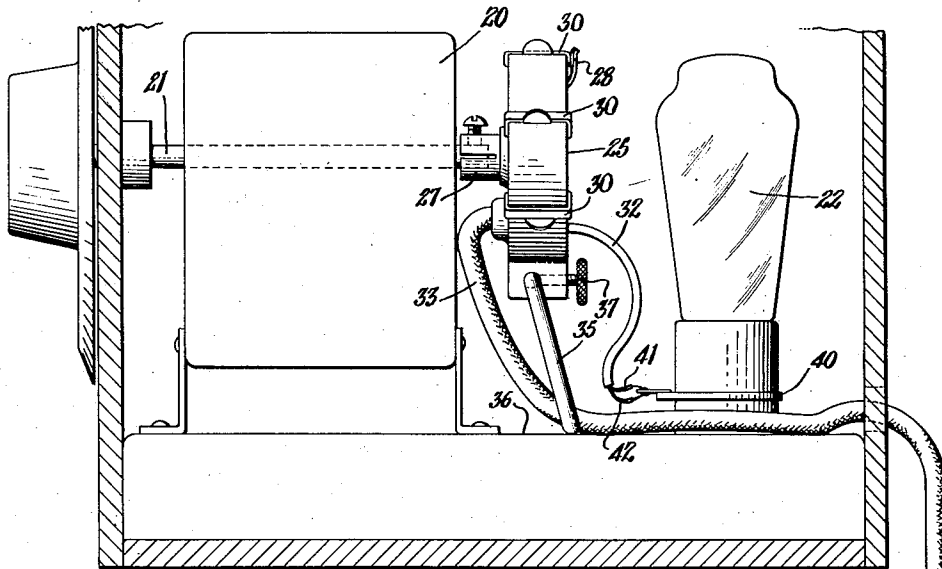


Fig. 1.

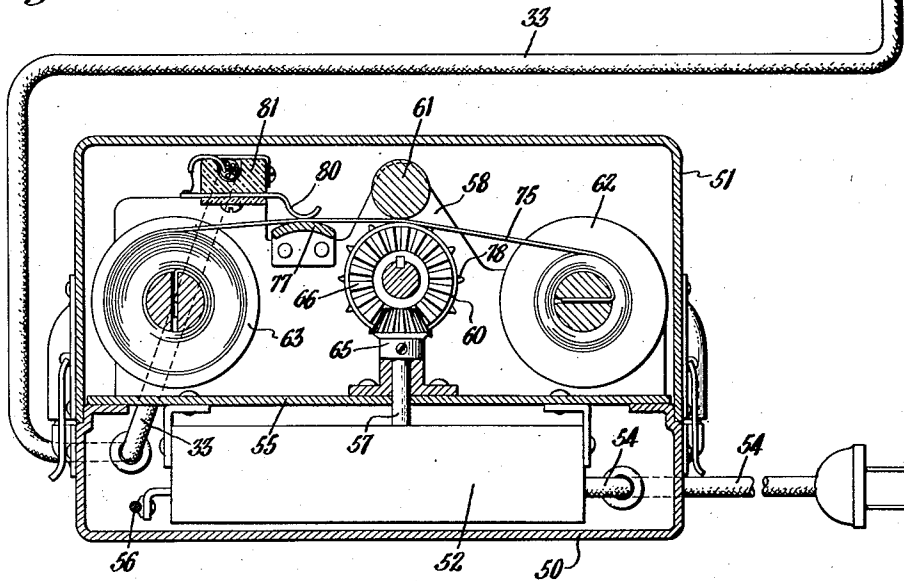
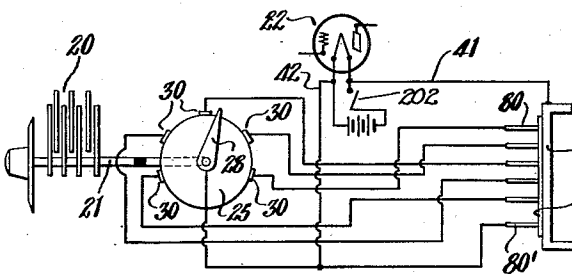


Fig. 2.



INVENTOR
John Potter
BY
Morgan Finnegan and Washburn
ATTORNEYS

Aug. 6, 1940.

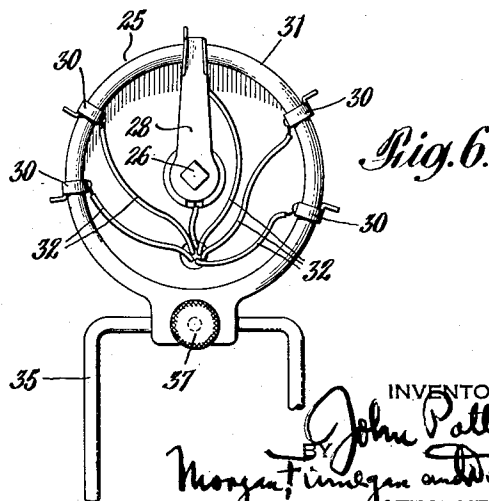
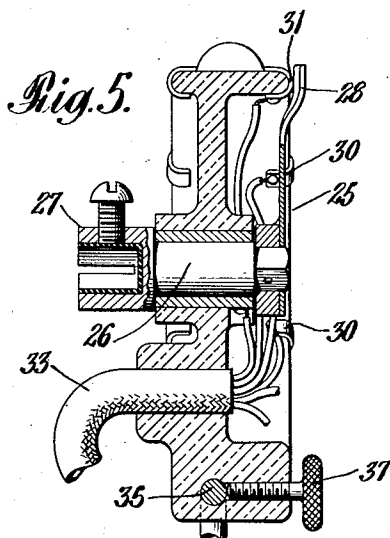
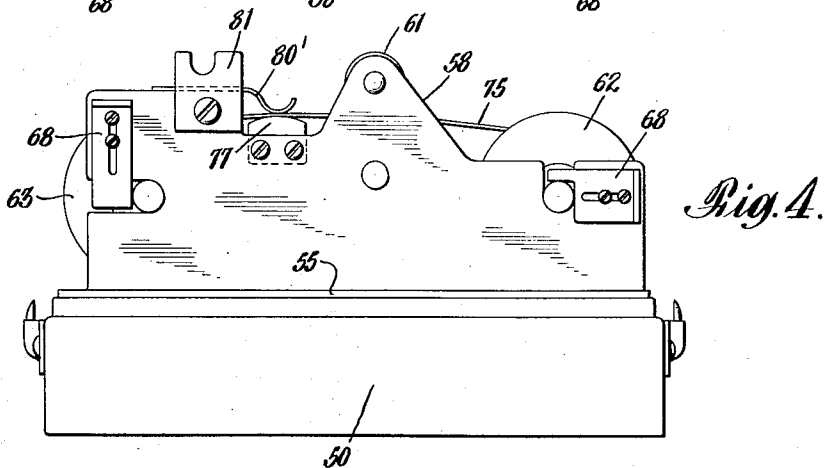
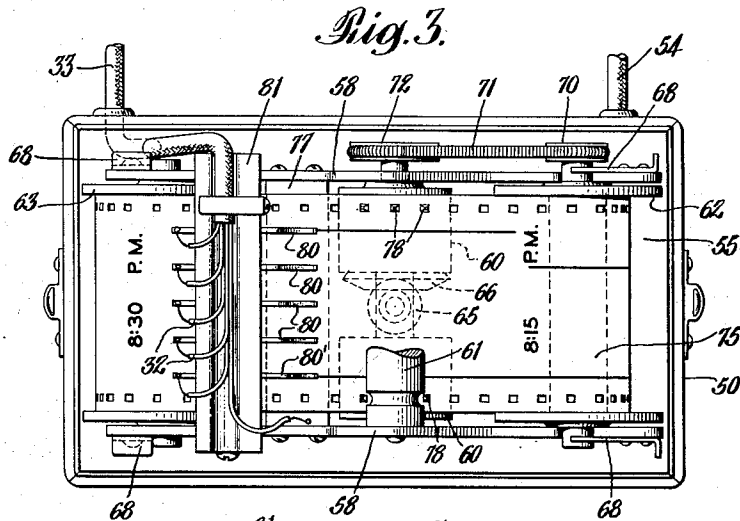
J. POTTER

2,210,380

RECORDING DEVICE FOR RADIO RECEIVERS

Filed Nov. 24, 1936

4 Sheets-Sheet 2



INVENTOR
John Potter
BY *Morgan, Finnegan and Durham*
ATTORNEYS

Aug. 6, 1940.

J. POTTER

2,210,380

RECORDING DEVICE FOR RADIO RECEIVERS

Filed Nov. 24, 1936

4 Sheets-Sheet 3

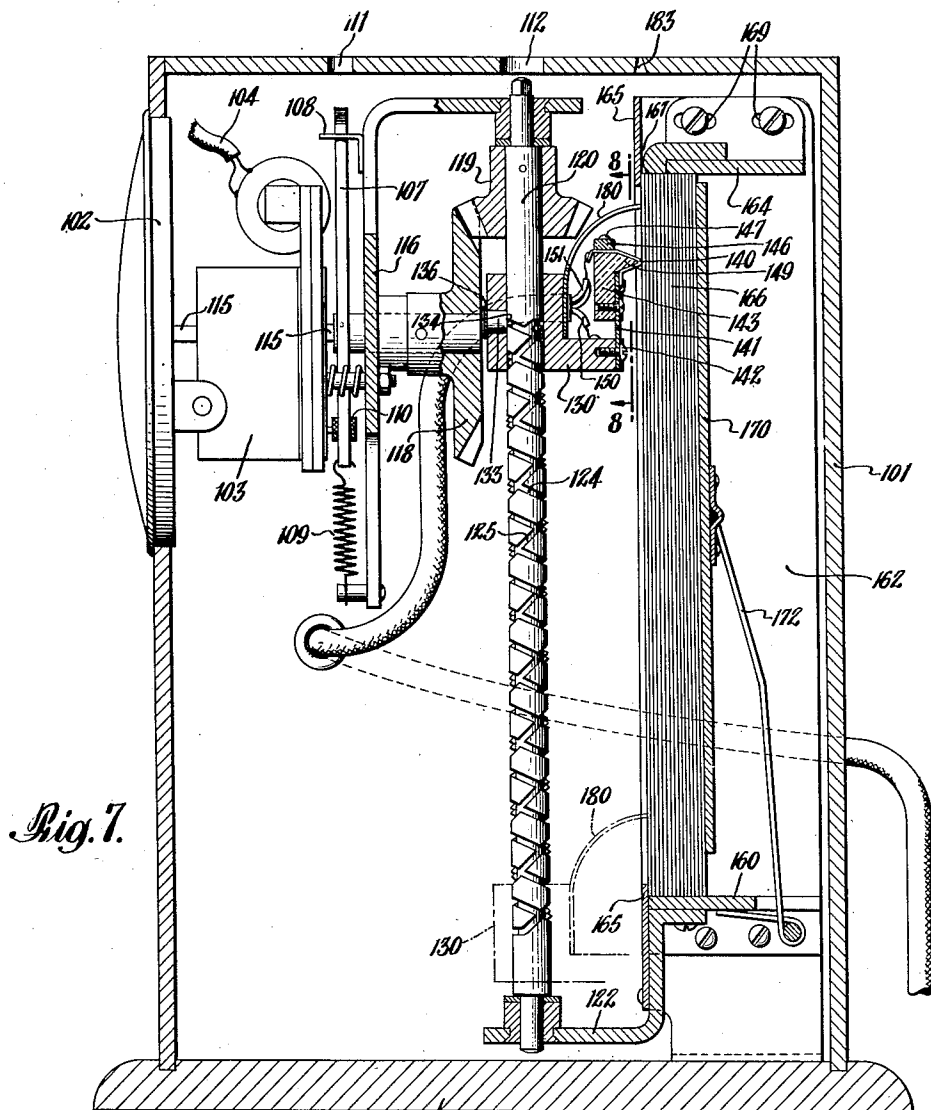


Fig. 7.

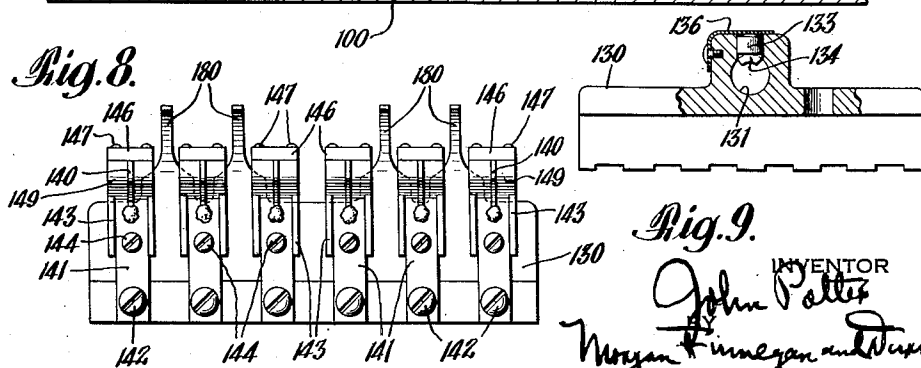


Fig. 8.

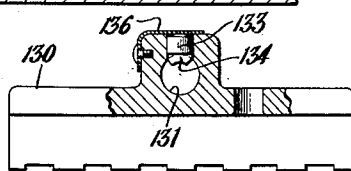


Fig. 9.

INVENTOR
John Potter
Morgan Finnegan and Washam
ATTORNEYS

Aug. 6, 1940.

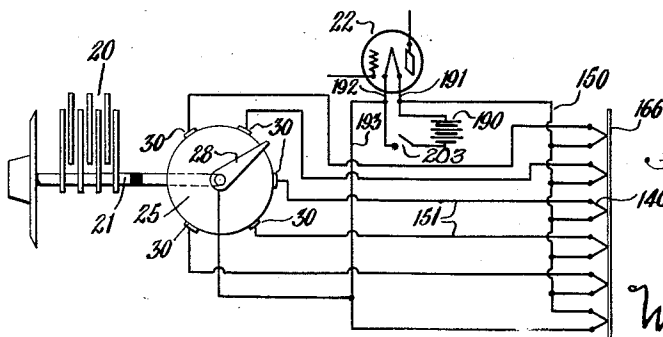
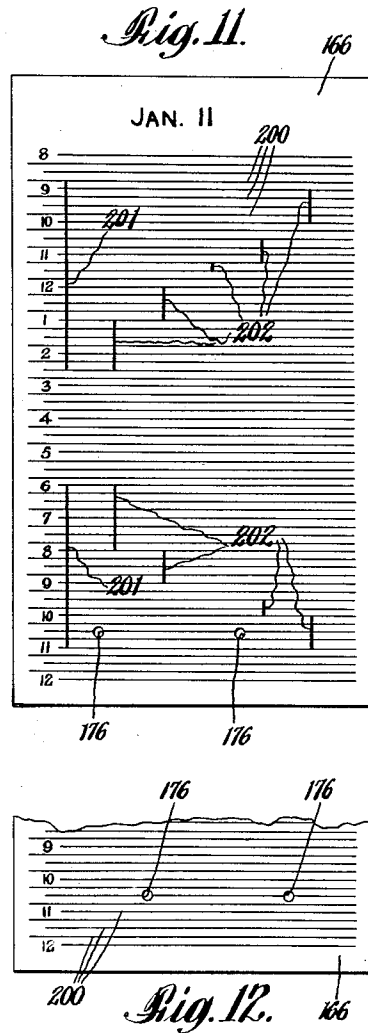
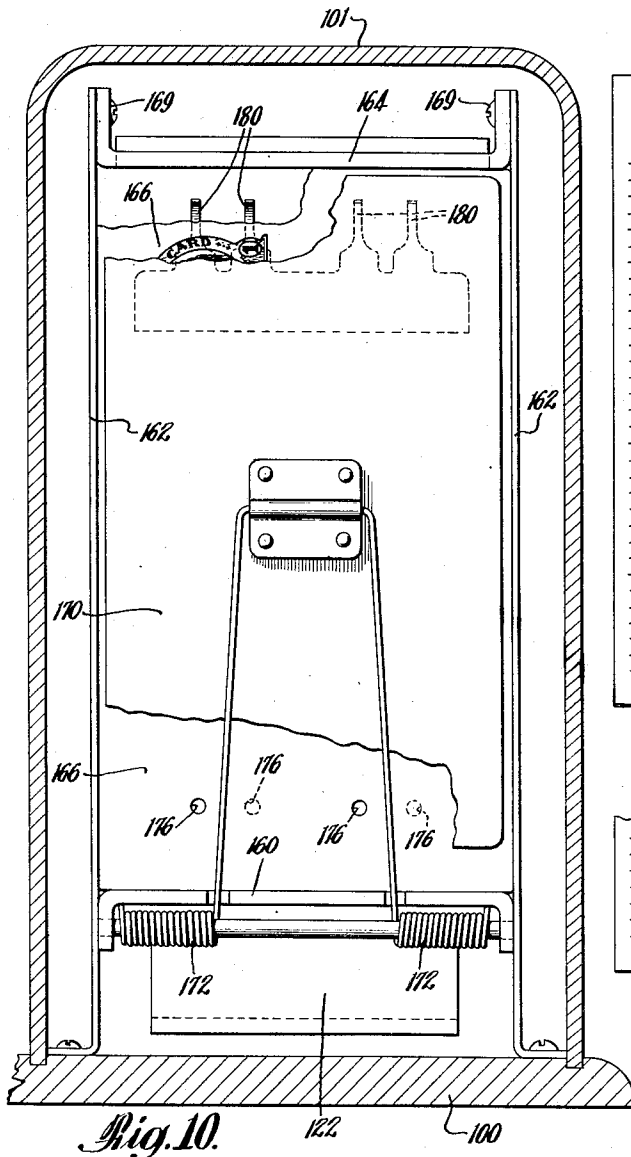
J. POTTER

2,210,380

RECORDING DEVICE FOR RADIO RECEIVERS

Filed Nov. 24, 1936

4 Sheets-Sheet 4



INVENTOR
John Potter
BY Morgan Fineman and Wushu
ATTORNEYS

UNITED STATES PATENT OFFICE

2,210,380

RECORDING DEVICE FOR RADIO RECEIVERS

John Potter, Brooklyn, N. Y.

Application November 24, 1936, Serial No. 112,450

2 Claims. (Cl. 234—36.5)

The present invention relates to a novel and improved recording mechanism for making a record of the stations received by and the periods of operation of a radio receiver.

5 Objects and advantages of the invention will be set forth in part hereinafter and in part will be obvious herefrom, or may be learned by practice with the invention, the same being realized and attained by means of the instrumentalities and combinations pointed out in the appended claims.

The invention consists in the novel parts, construction, arrangements, combinations and improvements herein shown and described.

15 The accompanying drawings, referred to herein and constituting a part hereof, illustrate embodiments of the invention, and together with the description, serve to explain the principles of the invention.

20 Of the drawings:

Figure 1 is a sectional view, partly diagrammatic, of a typical and illustrative embodiment of the present invention;

25 Figure 2 is a circuit diagram of the apparatus shown in Figure 1;

Figure 3 is a top plan view, with the cover removed, of the recording device shown in Figure 1;

Figure 4 is a side elevation of the apparatus shown in Figure 3;

30 Figure 5 is a detailed vertical sectional view of a switch used in connection with the present invention;

Figure 6 is a front elevation of a switch shown in Figure 5;

35 Figure 7 is a vertical sectional view through the central portion of a modified embodiment of the present invention;

Figure 8 is a sectional view taken on the line 8—8 of Figure 7;

40 Figure 9 is a detailed plan view, with certain parts broken away, of the parts shown in Figure 8;

Figure 10 is a rear elevation of the apparatus shown in Figure 7, with the rear cover portion removed;

45 Figure 11 is a view showing a typical record card as produced by the apparatus of Figures 7 to 10;

Figure 12 is a fragmentary view of another record card; and

50 Figure 13 is a circuit diagram of the recording device shown in Figures 7 to 10.

The present invention has for its object the provision of a novel and improved radio recording device adapted to make a record of the stations received by and the periods of operation of a

conventional radio receiving set. A further object of the invention is the provision of a recording device which can be easily and simply installed in connection with practically any type of radio receiving set so as to record data with reference to the operation of the radio set. Another object is the provision of a recording device which may be located at a distance from, but is controlled by the operation of the radio set. A further object of the invention is the provision of such a radio recording device, the record from which is easily interpreted and which can be accurately adjusted to give definite records with respect to a considerable number of radio stations. Still another object of the invention is the provision of a recording device in which the record is made by energy derived from the radio receiving circuit.

Referring now to the typical and illustrative embodiments of the invention, as adapted for use with the conventional type of radio receiver having a tuning or other station selecting element, and also having radio tubes or other power-actuated receiving devices, there is provided a selector switch having a plurality of variably positionable contacts to be positioned corresponding to different stations, and a movable contact moved by the station-selecting element to contact with one or another of the movable contacts.

The recording device proper, in one embodiment, comprises a none-self-starting synchronous motor, such as is commonly used in certain forms of electric clock, and tape feeding devices adapted to slowly but constantly move a record tape with reference to a plurality of recording styli. These recording styli are individually connected to their corresponding variably positionable contacts on the selector switch, and are selectively energized by power derived from the power supplied to one of the radio tubes, the selection being determined by the setting of the switch. These styli bear against the paper of the recording tape and press it against a platen. The time during which the set is in operation is measured by the position of the record mark along the length of the tape, while the selected station is indicated by the relative position of the record mark widthwise of the tape.

In one form of the device, the record is made by passing an electric current from the stylus to the platen through the record sheet or tape which is impregnated with an electrolytically decomposable substance, the tape being maintained in a moist condition during the recording process. Such a form of recording requires only a minute

current flow and does not interfere with the proper operation of the radio set.

In another form of the device, the styli are adapted to be heated by the energy derived from or controlled by the radio tube filament circuit, and these styli, one of which is heated, bear against the record strip or sheet which is treated with a thermo-sensitive substance adapted to be discolored by the heat from the heated stylus.

In accordance with another form of the invention, the device is adapted to operate upon successive record sheets, and the recording styli are moved back and forth by means of a synchronous clock motor, preferably making a complete movement in one direction over the surface of a record sheet in the major portion of one day, and reversely moving to eject the record sheet from the recording apparatus by the reverse movement of the styli during the remainder of the day.

If desired, the clock may also be connected by suitable gearing to hands mechanism visible from the exterior of the recording device so that the device not only serves as a recorder but also as a clock, at the same time giving a ready means of ascertaining whether or not the device is in operation.

It will be understood that the foregoing general description and the following detailed description as well, are exemplary and explanatory of the invention but are not restrictive thereof.

Referring now in detail to the illustrative embodiments of the invention, as shown in Figures 1 to 6 of the accompanying drawings, the device is shown as adapted for use in connection with a conventional radio receiver of which only the variable tuning element 20, having a shaft 21, and the radio tube 22, are shown. On the inside end of the shaft 21 is mounted the selector switch 25, which, as shown in detail in Figures 5 and 6, comprises a shaft 26 having a set screw collar 27 by which it is connected to shaft 21. Shaft 26 carries the contact arm 28 adapted to be moved into contact with one or the other of the contacts 30. Contacts 30 frictionally engage the peripheral rim 31 of the switch 25 and are connected to their individual conductors 32 which are led away from the switch in the form of a multiple cable 33. Switch 25 is held against rotation and is supported by means of the supporting rod 35 engageable with the base 36 of the receiver and firmly held thereagainst by means of set screw 37. Power is derived from the filament circuit of the radio tube by means of a wafer-adaptor 40 by which the leads 41 and 42 are connected to the filament prongs of the radio tube 22, lead 41 forming one of the wires within cable 33, while lead 42 is connected to the contact arm 28 and through it supplies power to one or the other of the conductors 32.

The recording device proper is shown in the lower half of Figure 1 and comprises a tightly sealed case 50, 51 within which is mounted the non-self-starting synchronous clock motor 52 energized by power supplied to it through the flexible conductor 54. This clock is mounted on the underneath side of sub-panel 55 and the slow speed shaft 57 of the clock motor projects upwardly through the panel into the upper portion of the casing. A starting lever 56 is accessible through a small aperture in the casing 50.

Sub-panel 55 supports parallel frame members 58 in which are rotatably journaled the feed sprocket roller 60, the pressure roller 61 and the tape drums 62 and 63, which rollers are parallel to each other. Shaft 57 carries at its upper end

a bevel gear 65 meshing with gear 66 fast to roller 60. Drums 62 and 63 are removably journaled in the side frame 58 and are held therein by the latches 68. Drum 62 is fast to a pulley 70 mounted on one end of its shaft and is driven by means of the spring belt 71 also running over the pulley 72 fast to one end of the driven roller 60. The cores of rollers 62 and 63 are slotted to receive the ends of the record tape 75, which tape is threaded between the rollers 60 and 61 and over the platen 77, which is preferably insulated from the side frame 58, and has its upper surface slightly convex. Tape 75 is perforated along its edge so as to be positively fed by means of the teeth of the sprockets 78 on roller 60.

The gearing from clock 52 to the roller 60 is preferably such that the tape 75 is fed several inches during each day.

Means are provided cooperating with the tuning controlled switch 25 for producing linear marks upon the record tape 75, and these means include a plurality of styli 80 insulated from each other and supported upon a block of insulating material 81 which is carried by the side frames 58. Styli 80 are bent downwardly so that they press lightly against the record tape 75 directly over the concave, convex platen 77. As embodied, the styli 80 are connected to their respective contacts 30 while stylus 80' is connected in parallel with all of the styli 80, and thereby the stylus 80' produces a record showing that the set was in operation while the styli 80 show which one, if any, of four selective stations was tuned.

The record tape 75 in one form of the invention is impregnated with an electrolytically decomposable substance such as an ammonium molybdate and a hygroscopic agent such as glycol or glycerine, serving to keep the tape moist after it is initially wetted and placed within the tightly sealed casing 50, 51. The styli 80 and 80' bear against the tape and establish a circuit through it between the styli and the platen 77, and only a minute current is required to produce an easily distinguishable mark upon the highly sensitive record surface.

Figure 2 of the drawings illustrates the circuit connections utilized in connection with this embodiment, and as there shown, power is derived for the recording styli from the filament circuit of the vacuum tube 22 which is energized through switch 202. Lead 41 is connected directly to platen 77 and the current passes from it to lead 42 and returns to the filament supply. Lead 42 is also connected to the contact arm 28 which may make contact with any one of the variably positionable contacts 30 of the switch 25, and these contacts 30 are connected to their respective styli 80.

Figures 7 to 13 of the drawings illustrate a modified embodiment of the invention in which the recording is effected by heated styli acting on a thermo-sensitive record surface which is preferably in the form of individual cards that are ejected one each day. As embodied, there is provided a base 100 upon which is supported the casing 101, and on the front of the casing is mounted a conventional clock dial 102, the hands of which are connected to be driven by a non-self-starting synchronous motor 103 supplied with power from the conductors 104.

Means are provided for starting the clock motor and for this purpose a rod 107 is slidably mounted in a guide 108 and is retracted by spring 109 and during a portion of its movement in a downward direction is adapted to bear against the knurled

knob 110 connected to the clock motor. The upper end of rod 107 is threaded and may be engaged by a tool inserted through the aperture 111 and the upper portion of casing 101.

5 The minute shaft 115 of the clock extends towards the center of the casing through supporting bracket 116 and carries bevel gear 118 fast to it. Bevel gear 118 meshes with bevel pinion 119 which is fixed to the rotatable shaft 120 journalled at its upper end in bracket 118 and at its lower end in bracket 122. Shaft 120 is provided with reversely cut threads 124 and 125 which are preferably of different pitch.

10 The recording styli are adapted to be moved at a slow uniform rate over the surface of the record card during the recording period, and are then reversely moved during the non-recording period. As embodied, there is provided a carriage 130 provided with an aperture 131 by which the carriage is vertically reciprocable on the shaft 120, and is moved therealong by means of the tooth 133 oscillatably mounted so that its reduced end 134 engages the threads 124 and 125, being held in this position by the spring leaf cover 136.

15 As the shaft 120 is driven by the clock at, for instance, one revolution per hour, the carriage 130 requires sixteen hours to travel in one direction and only eight hours to travel in the opposite direction, making the complete reciprocation in exactly twenty-four hours.

20 The recording styli comprised relatively short, narrow pieces of resistance wire ribbon 140 which are individually mounted on the carriage 130 by means of relatively rigid conductor straps 141 connected to carriage 130 by screws 142, and secured to the individual insulating blocks 143 by screws 144. The lower end of the resistance ribbon 140 is welded to the upper end of the strap 141 while the upper end of the ribbon is held fast by means of the insulating clamp 146 and the securing pins 147. Insulating pieces 143 are shaped to form a relatively sharp nose 149 and the conducting ribbons 140 conform closely to the shape of this surface. The lower ends of the resistance ribbons 140 are connected to a common conductor 150 while their upper ends are connected to individual conductors 151.

25 Means are provided for receiving and retaining a supply of record cards and successively presenting them to the recording styli and also for ejecting the record card on which the record has been made after the day's recording. As embodied, there is provided a supporting plate 160 near the bottom of the casing 101, and side plates 162 parallel to each other and extending from bottom plate 160 to near the top of the casing. Near the top is provided a gate plate 164 parallel to plate 160, and these four plates enclose a space conforming to the size of the record cards 166. Plate 164 is variably positionable with reference to the front plate 165 so as to provide a narrow gate 167 sufficient to allow the passage of only one of the record cards 166, and plate 164 may be secured in the proper position by means of the screw and slot connections 169. A presser plate 170 engages the rear face of the stacked record cards 166 and is pressed towards the recording styli by means of the plate-supporting spring 172. Cards 166 are held against being moved too close to the styli by means of the overlapping edges of the front plate 165.

Figures 11 and 12 show alternate cards. The odd cards are provided with holes 176 in the position shown in Figure 11, while the even cards

are provided with similar holes in the position shown in Figure 12. For ejecting the completed record cards from the machine during the non-recording period and for thereby bringing a fresh record card into recording relation with the styli 140, there are provided four fingers 180 also mounted on the carriage 130, two of these fingers being adapted to register with and engage the holes 176 in the odd cards while the other two fingers 180 are adapted to engage the holes 176 in the even cards. This engagement occurs at the end of the recording period with the fingers 180 in the position indicated by dotted lines on Figure 7, and as the shaft 120 moves during the non-recording period, carriage 130 is fed upwardly by thread 125 and the completed record card is ejected through the delivery slot 183. The spacing between the ends of fingers 180 and the nose of styli 140 is preferably slightly less than the distance between the holes 176 and the bottom of the record cards 166, thereby shielding the unused record cards from the recording styli during the non-recording movement of the carriage 130.

Figure 13 illustrates the circuit connections used in this embodiment, and as there shown the vacuum tube is supplied with current from a source of power 190 through switch 203 and the common conductor 150 is connected to one of the filament leads 191, while another conductor 193 is connected to the other filament lead 192. Conductor 193 is connected to one of the styli 140, thereby forming a record of operation of the set, and is also connected to contact arm 28 of switch 25 by which current is supplied to one or the other of the selected variably positionable contacts 30. These contacts 30 are connected to their individual conductors 151 to their respective styli 140, and thereby all but one of the styli correspond to particular stations which may be tuned by the radio set.

The surface of the record cards to be placed in contact with the recording styli is preferably coated with a thermosensitive substance, and for this purpose I have found a concentrated solution of nickel thiosulphate to be satisfactory. This solution is applied uniformly to one side of the card, after which the cards are dried, and are then adapted to be locally darkened by the application of a slight amount of heat such as is derived from contact with the heated tip of the resistance ribbons 140.

Means are also provided for initially setting the mechanism to the proper time so that its dial 102 will show correct time and the non-recording period will be from twelve midnight to eight a. m., or from eleven p. m. to seven a. m., as may be desired. For this purpose, the upper end of shaft 120 is squared to be engaged by a clock key which may be inserted through the aperture 112 in the upper portion of the casing 101. The casing 101 may also be suitably divided and hinged at its rear so as to facilitate the insertion of a new supply of cards 166, and this division may conveniently coincide with the slot 183.

Figures 11 and 12 show typical completed record cards, and these cards may, if desired, be provided with parallel rulings 200, indicating fifteen minute periods throughout the recording period. The line 201 at the left of the card indicates that the set was in operation from 9 a. m. to 2:30 p. m. and from 6:00 p. m. to 11:00 p. m., while the short lines 202 indicate the periods for which each of the five selective stations were tuned. It will be noted that the periods are 9:00

p. m. to 9:30 p. m., the set was in operation but some other than one of the five selected stations was tuned.

5 The invention in its broader aspects is not limited to the specific mechanism shown and described but departures may be made therefrom within the scope of the accompanying claims without departing from the principles of the invention and without sacrificing its chief ad-
10 vantages.

What I claim is:

1. In a recording device, the combination of a plurality of styli, a selector switch including a switch body carrying a plurality of frictionally
15 held adjustable contacts and a movable contactor arm to be actuated by the tuning control of a radio set, a switch controlling the operation

of the radio set, said first switch being provided with a plurality of contacts, each connected individually to its respective stylus and receiving power through said second switch, means for supporting a record surface against said styli and a non-self-starting synchronous motor for relatively moving the stylus and record surface. 5

2. In a recording device, the combination of, a stylus, a switch to be actuated by the tuning control of a radio receiver, a switch controlling
10 the operation of said radio receiver, circuits for supplying energy to said stylus thru both of said switches, means for supporting a record surface against said stylus and a non-self-starting synchronous motor for relatively moving the stylus
15 and record surface.

JOHN POTTER.