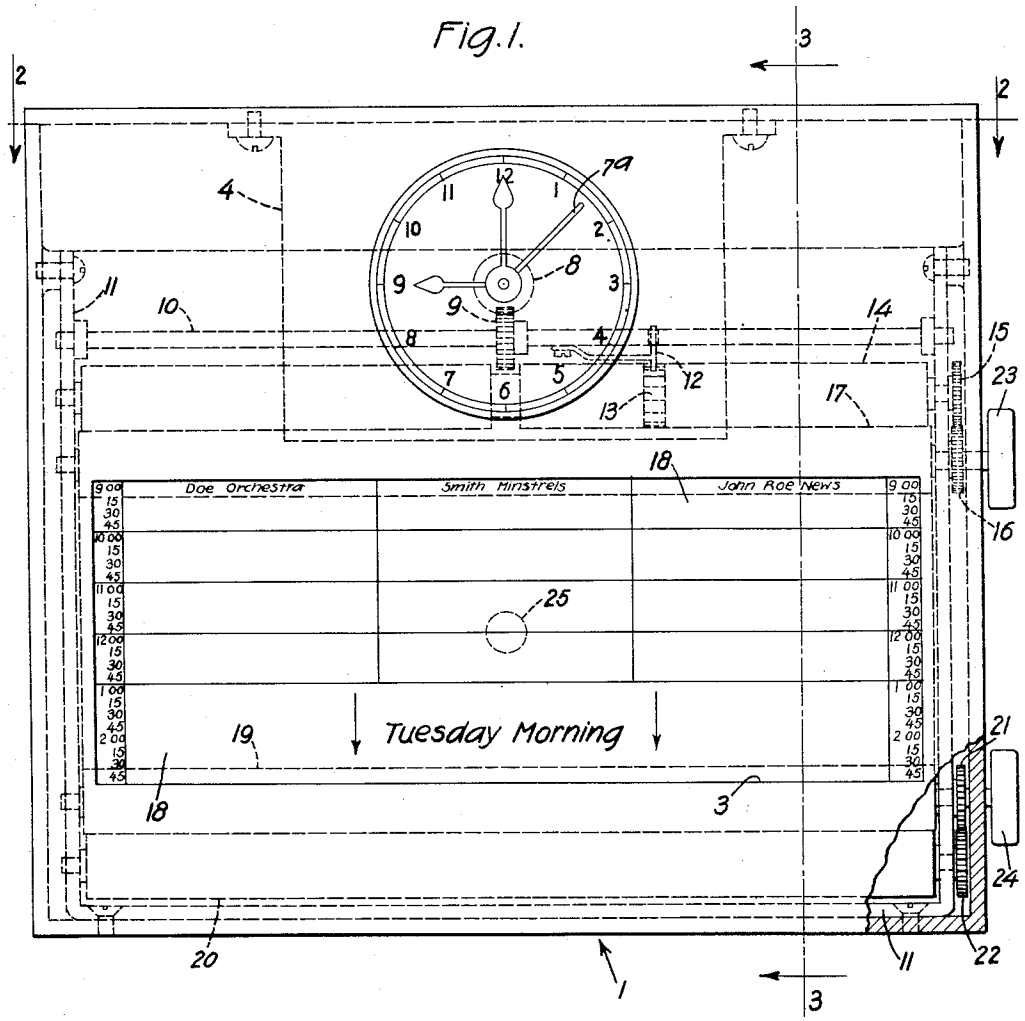
March 1, 1938. J. T. JONES 2,109,535

APPARATUS FOR DISPLAYING RADIO PROGRAMS

Filed June 23, 1934 5 Sheets-Sheet 1

Fig. 1.



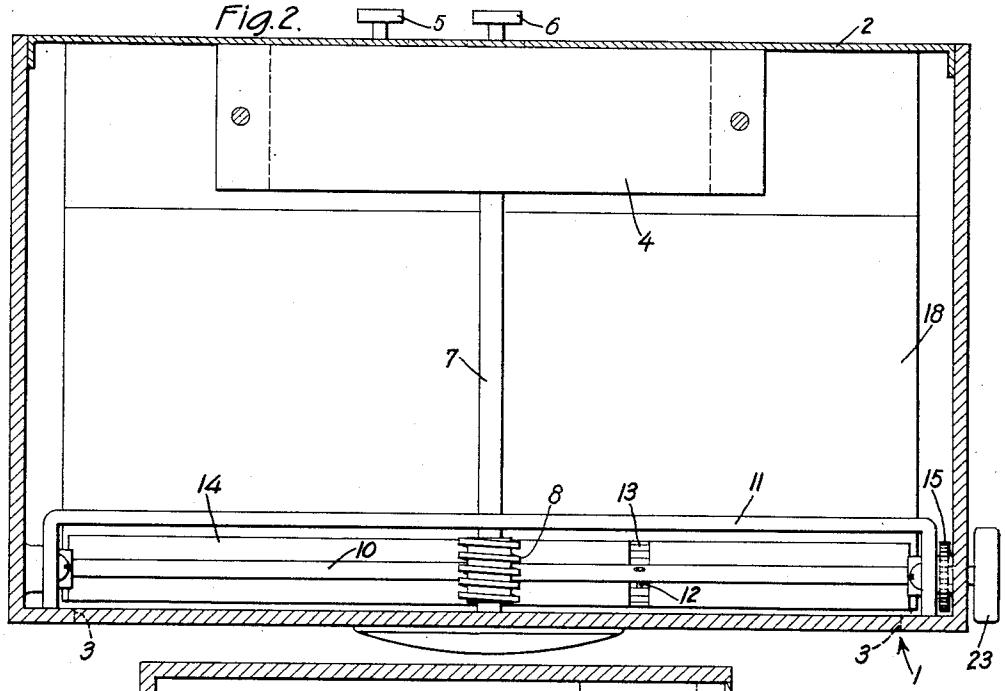
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APPARATUS FOR DISPLAYING RADIO PROGRAMS

Filed June 23, 1934 5 Sheets-Sheet 2

Fig. 2.



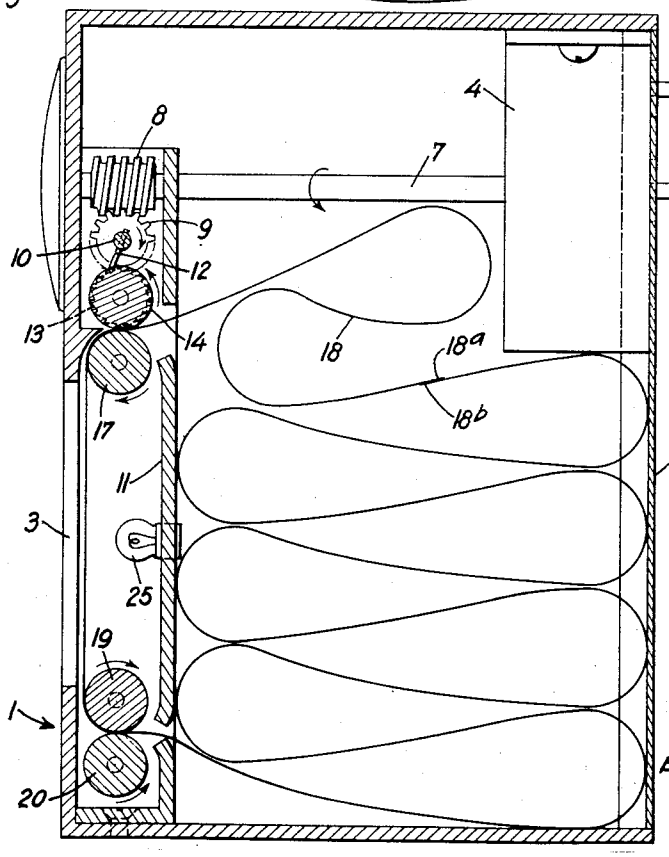


Fig. 3.

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APPARATUS FOR DISPLAYING RADIO PROGRAMS

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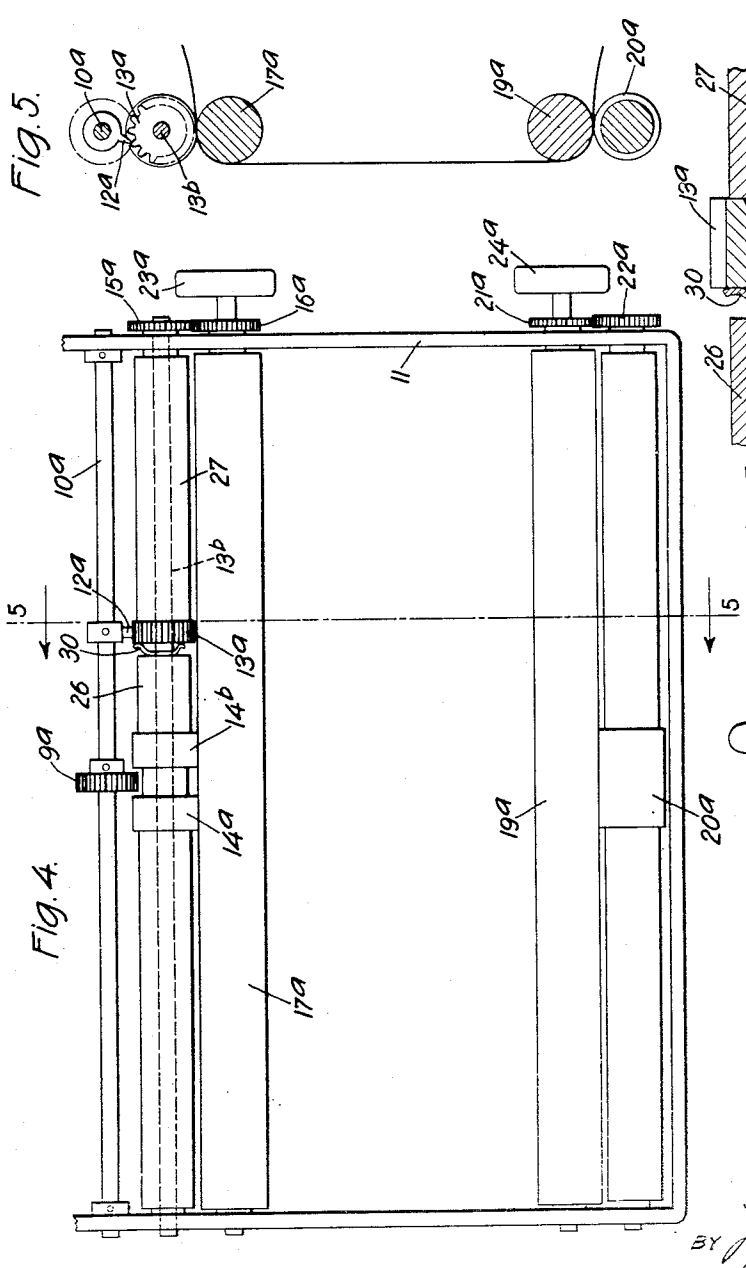


Fig. 5.

Fig. 4.

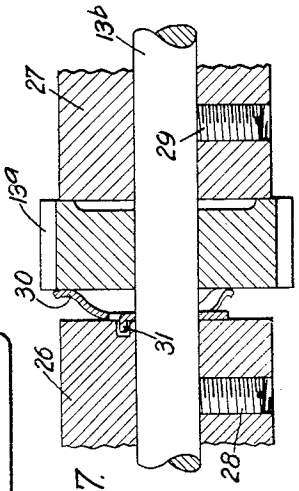


Fig. 7.

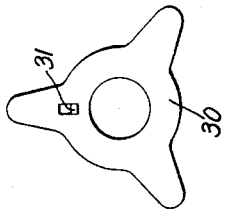


Fig. 6.

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APPARATUS FOR DISPLAYING RADIO PROGRAMS

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Fig. 9.

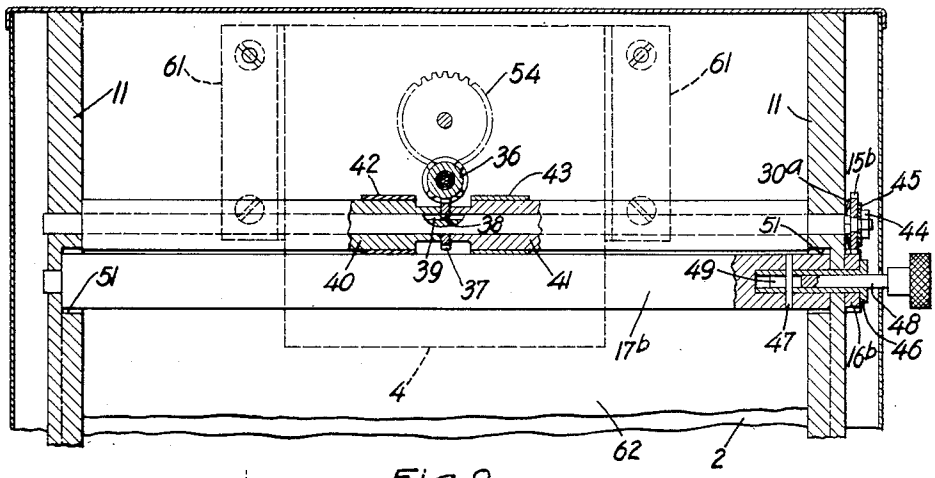
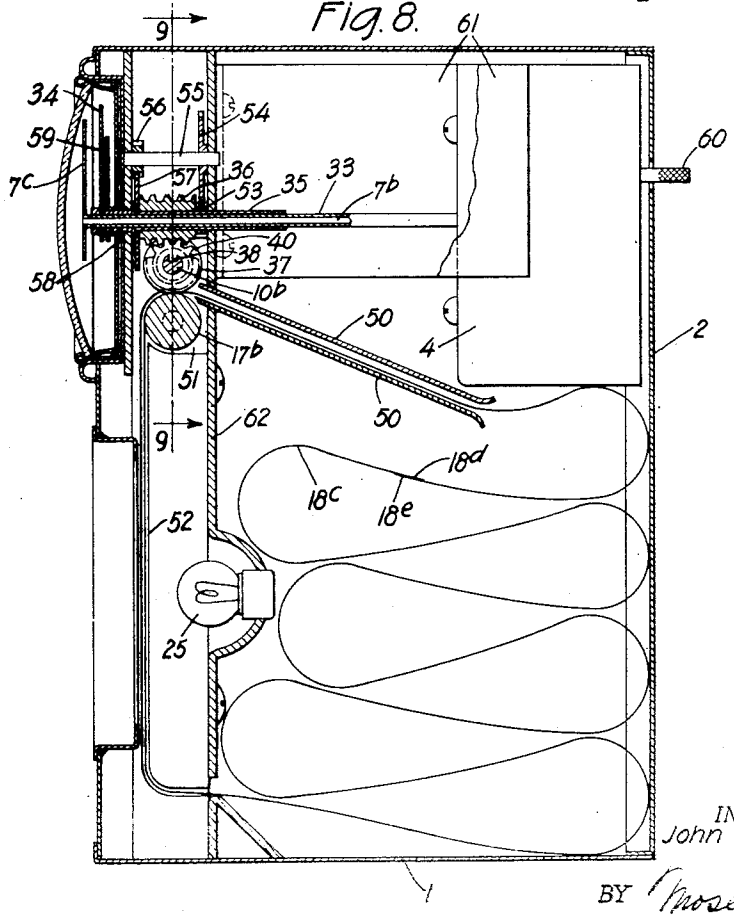


Fig. 8.



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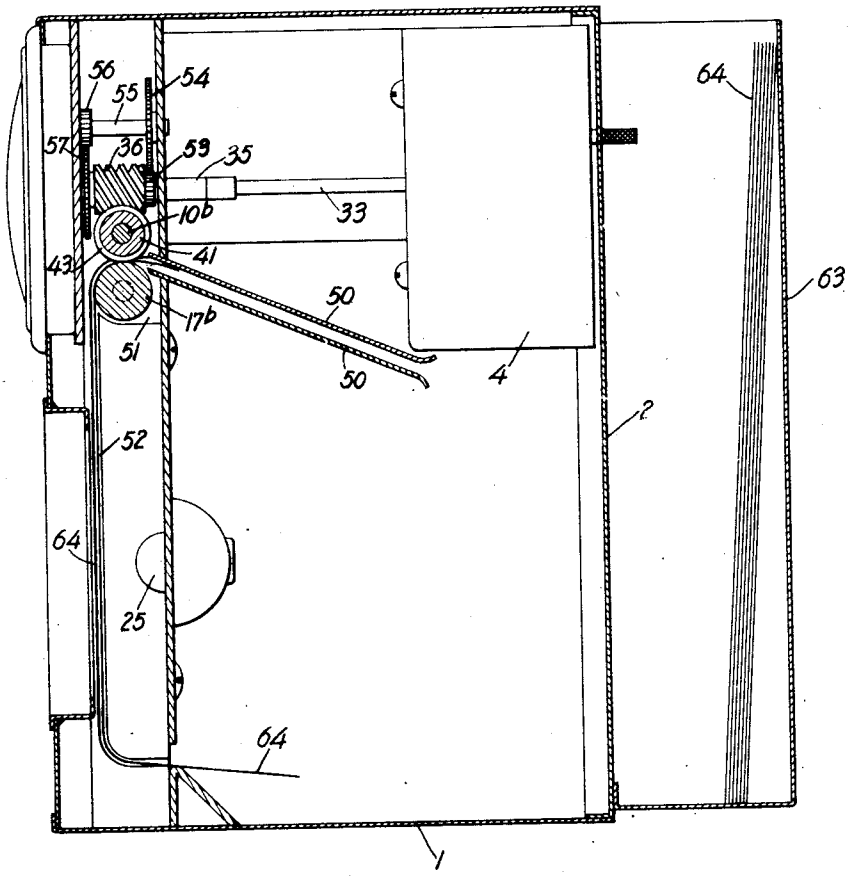
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APPARATUS FOR DISPLAYING RADIO PROGRAMS

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Fig. 10.



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UNITED STATES PATENT OFFICE

2,109,535

APPARATUS FOR DISPLAYING RADIO PROGRAMS

John Thompson Jones, Flushing, N. Y.

Application June 23, 1934, Serial No. 732,097

7 Claims. (Cl. 40—32)

This invention relates to apparatus for displaying radio programs.

One of its objects is the provision of a strip of paper bearing indicia of radio program numbers and of the respective times of broadcasting the same, the ends of said strip being adapted to be adhered to constitute it an endless band.

Another object is the provision of means for coordinating the sequence of display of said program numbers with the passage of time.

A further object is so to juxtapose a clock dial and the display of particular program numbers that the observer may at a glance note the time as indicated by the clock and the program numbers then available or about to become available, for reception.

A still further object is the provision of means for grouping and displaying, in point of time, the titles and the names of sponsors of a plurality of program numbers which, during a particular period, are simultaneously broadcast by different stations, in order that the radio user may make his selection of the number to which he wishes to listen.

It is at present customary for radio users to consult newspaper schedules of radio programs, the several numbers comprising each of which are generally grouped, with their respective broadcasting times, under a heading designating the station and its wave-length. In order that he may learn what numbers are available for selection, the user must locate his favorite stations in the more or less extensive schedule, and ascertain what each is to broacast at the particular time when he intends to tune in. Having made his selection, he then consults a time-piece and tunes in at the beginning of the desired number. Ordinarily, however, the radio user prefers not to go to this trouble. Instead, he tunes in on one or other of his favorite stations, without knowing what it is then broadcasting, listens for a few moments, finds that he is not interested in that particular number, and then tries one or more other stations. When, eventually, he gets a number which appeals to him, he has lost some considerable portion of it.

With the present invention it is unnecessary for the radio user either to consult newspaper schedules of programs or to lose a portion of some interesting number while experimenting to find what he wants.

In accordance with this invention, the titles and the names of the sponsors of a plurality of program numbers simultaneously broadcast by several leading stations are grouped and displayed with reference to time of broadcasting, so that the user may have before him information as to the numbers available from such stations during any quarter-hour period of the day, and during any day of the week, month and year.

The invention will best be understood by reference to the accompanying drawings, wherein like reference characters indicate like parts, and wherein

Fig. 1 is a front elevation, partly in section, of apparatus embodying one of the present preferred embodiments of the invention.

Fig. 2 is a top plan section on the line 2—2 of Fig. 1, viewed in the direction indicated by the arrows.

Fig. 3 is a vertical section on the line 3—3 of Fig. 1, viewed in the direction indicated by the arrows.

Fig. 4 is a fragmentary front elevation of a frame portion of the apparatus, showing modified forms of certain of the features associated with such frame portion.

Fig. 5 is a vertical section on the line 5—5 of Fig. 4, viewed in the direction indicated by the arrows.

Fig. 6 is a plan view, on an enlarged scale, of certain of the modified features of Fig. 4.

Fig. 7 is a fragmentary, longitudinal view, partly in section and partly in elevation, showing the arrangement of certain of the modified features of Fig. 4.

Fig. 8 is a vertical sectional view of a further modified embodiment of the invention.

Fig 9 is a section taken on the line 9—9 of Fig. 8, viewed in the direction indicated by the arrows.

Fig. 10 is a vertical sectional view of a still further modified embodiment of the invention.

Referring to the drawings: A cabinet, indicated generally by the reference numeral 1, is provided with a removable back plate 2, and with a viewing aperture 3 in its front wall. Mounted on the inner top surface of this cabinet is a housing 4, containing an electric or spring-wound clock mechanism (not shown). Projecting through apertures in the back plate 2 are shafts carrying, respectively, a clock-starting knob 5 and a clock-setting knob 6. The clock mechanism rotates a cylindrical sleeve 7, carrying the second hand 7a of the clock and also carrying a worm 8. This worm meshes with and drives a worm-wheel 9, mounted on a shaft 10, which is rotatably supported at its ends in bearings in a frame 11, mounted in the cabinet 1. Also mounted on shaft 10 and rotatable therewith is a flexible pawl 12, constructed and arranged progressively to en-

gage the teeth of a ratchet-wheel 13. The worm-wheel 9 is provided with fifteen teeth, and its driving worm 8 is of the single-thread type. Thus, the worm-wheel will be rotated once in fifteen minutes; and the pawl 12 will engage a ratchet-wheel tooth once during such period, rotating the ratchet-wheel and the feed roll 14 (on which it is mounted) a distance of one tooth.

As appears from Fig. 1, driving feed roll 14 carries at the right-hand end of its supporting shaft a spur gear 15, which meshes with and drives another spur gear 16, carried by the supporting shaft of a coacting feed roll 17. In the operation of the apparatus, an endless band of paper, 18, is fed between rolls 14 and 17, being held taut by the action of idler rolls 19 and 20. The supporting shafts of these idler rolls also have their bearings in the frame 11, and also are provided with coacting spur gears, 21 and 22 (Fig. 1). For the purpose of manual adjustment of the band of paper, 18, the shaft of driven feed roll 17 projects through an aperture in the side of cabinet 1, and this projecting end carries a knob 23. For the same purpose, the shaft of idler roll 19 also projects through the side of the cabinet, and its projecting end carries a similar knob, 24. The four rolls are preferably provided with soft rubber surfaces in order to insure positive feeding of the paper band 18.

As further appears from Fig. 1, the front surface of the paper band 18 has printed or written upon it indicia which divide it vertically into quarter-hour periods and into daily periods. In horizontal alignment with each such quarter-hour indication are the titles and the names of the sponsors of a plurality of radio-program numbers which are to be simultaneously broadcast, at the indicated time, by the user's favorite stations.

The mode of operation of the apparatus is as follows: The back plate of the cabinet is removed, and one end of the paper record 18 (which, at that time, is in the form of a strip) is inserted between idler rolls 19 and 20. The adjusting knob 24 is then manually turned in a clockwise direction, thus rotating idler roll 19, and, through gears 21 and 22, idler roll 20—thereby upwardly feeding the paper strip until its leading end is in position to be engaged by driving feed roll 14 and driven feed roll 17. Adjusting knob 23 is then manually turned in a clockwise direction, thus rotating driven feed roll 17, and, through gears 16 and 15, driving feed roll 14, thereby feeding the paper strip through said latter rolls. The rotation of driven feed roll 17 and driving feed roll 14, through manual turning of adjusting knob 23, is rendered possible by reason of the flexibility of pawl 12, which permits it to ride over the teeth of ratchet-wheel 13. When the leading end, 18*a*, of the strip has been fed through rolls 17 and 14 a sufficient distance, the trailing end, 18*b*, is attached thereto, as by application of an adhesive—the strip being thus converted into an endless paper band. The band is then manually fed through the rolls until a desired series of program numbers becomes visible at or near the upper edge of the viewing aperture 3. The back plate 2 is then restored to position, and the clock mechanism is started and set by manipulation of knobs 5 and 6, respectively. The feeding mechanism will then continue to function, in the manner hereinbefore described, to maintain the display of the several program numbers in synchronism with the times at which they are broadcast, as indicated by the clock. The paper band may, if desired, be illuminated by light rays projected therethrough from a lamp or lamps, such as 25.

Fig. 4 shows in front elevation rolls and actuating mechanism therefor, of modified form. In order to minimize the likelihood of irregular feeding of the paper band 18 (Figs. 1 and 3), by reason of lack of uniformity of pressure between said paper band and the long driving and driven feed rolls, 14 and 17, respectively (Fig. 1), and between said paper band and the long idler rolls, 19 and 20, respectively (Figs. 1 and 3), the area of driving contact may be reduced, as by employing two relatively short rolls such as 14*a* and 14*b*, pressing against correspondingly short portions of the driven feed roll 17*a*. Similarly, the contact between the idler rolls may be limited to a short portion, 20*a*, on the lower idler roll, pressing against a correspondingly short portion of the upper idler roll, 19*a*. The surfaces of rolls 14*a*, 14*b* and 20*a* may consist of soft rubber, and the respective coacting rolls 17*a* and 19*a* may be of metal or other suitable material. As an alternative to spring pawl 12 of Figs. 1, 2 and 3, there may be mounted on shaft 10*a* a hub member having integral therewith a single tooth, 12*a*, thus constituting it a single-tooth gear. At each revolution of shaft 10*a*, this tooth 12*a* engages one of the teeth of a fifteen-tooth spur gear, 13*a* which is rotatably mounted on the shaft 13*b*, between spacing rings 26 and 27 (Figs. 4 and 7). Spacing rings 26 and 27 may be attached to shaft 13*b* in any suitable manner, as by set-screws 28 and 29 (Fig. 7). A dished spider spring 30 (Figs. 6 and 7) is supported by shaft 13*b*, between spacing ring 26 and spur gear 13*a*. Formed in the hub portion of this spider spring is a finger 31, projecting at a right angle from the hub portion and adapted to enter a recess formed in the face of the spacing ring 26. This forms a connection whereby said spacing ring drives said spider spring, through rotation of shaft 13*b* (Fig. 7). In initially assembling the several members on the shaft 13*b*, one of the spacing rings, such as 26, is attached to said shaft against longitudinal or rotary movement, and the spider spring 30 is placed on the shaft with its finger 31 entering the recess in the face of said spacing ring. The spur gear 13*a* and the spacing ring 27 are then moved along the shaft and brought into such position thereon that the three arms of the spider spring 30 are sufficiently flexed to provide a frictional driving connection between such arms and the face of spur gear 13*a* contacting therewith; and to provide a similar frictional driving connection between the opposed faces of said gear and of the spacing ring 27. This friction is adequate to insure that the tooth 12*a* will rotate the spur gear 13*a*, in order automatically to feed the paper band 18. This frictional engagement may, however, be overcome by force manually applied to rotate adjusting knob 23*a* (Fig. 4). Thus it becomes possible manually to rotate driven feed roll 17*a* and driving feed rolls 14*a* and 14*b*, for purposes of adjusting the paper band, even though the single-tooth gear 12*a* may happen at the time to be in locked position with reference to one of the teeth of spur gear 13*a*, as shown in Fig. 5.

In the further modified embodiment of the invention shown in Figs. 8 and 9, the clock mechanism contained in housing 4 (Fig. 8) is provided with a solid shaft 7*b* for driving the second hand, 7*c*. This second hand shaft rotates in a tubular shaft 33 which drives the minute

hand 34. Attached to this tubular shaft 33 is a sleeve 35, carrying a quadruple-thread worm 36. This worm drives a 16-tooth worm-wheel, 37. Extending into the bore of this worm-wheel is an integral key, 38, engaging a spline 39 in a shaft 10b, having its bearings in the frame 11. Supported by the shaft 10b are two rolls, 40 and 41, which are rotatable on the shaft under certain conditions to be hereinafter described. Attached to roll 40 is a short sleeve 42, preferably of soft rubber, for feeding the paper band 18c. A similar sleeve 43 is attached to roll 41.

Attached to the projecting end of shaft 10b is a dished spider spring 30a, similar to the spring 30 of Figs. 4, 6 and 7. This spring is flexed (by pressure applied by a nut 44) between a shoulder formed on said shaft 10b and a spur gear 15b. This spur gear is rotatably mounted on shaft 10b, but the pressure exerted by dished spring 30a creates sufficient friction between the spring, the gear 15b, a washer 45, and said nut 44 to enable said gear to drive a coacting gear 16b, attached to a sleeve 46, connected by a pin 47 to a driven feed roll 17b. A roll-adjusting key 48, adapted to be inserted in the bore of sleeve 46, is provided with a slot 49 for engaging the pin 47, in order that the driven feed roll 17b may be manually rotated.

In this embodiment of the invention there is provided (Fig. 8) a two-piece guide 50 for the paper band 18c. Formed in each of the side walls of the frame 11 (Fig. 9) is a recess 51 (Figs. 8 and 9), which surrounds each end of the driven feed roll 17b and communicates with the aperture between the two plates forming the guide 50. Each such recess also communicates with a channel 52, also formed in each of the side walls of frame 11, and extending vertically downward from the recesses and horizontally into the main body of the cabinet 1 (Fig. 8). It will be noted that in this embodiment of the invention the idler feed rolls (19 and 20 of Fig. 1 and 19a and 20a of Figs. 4 and 5) are omitted, the guide 50, the recesses 51, and the channels 52 being substituted therefor and co-operating to maintain the paper band 18c in proper feeding position.

In operating this embodiment, the back plate 2 is removed from the cabinet, the trailing end 18d of the paper band 18c (which, at that time, is in the form of a strip) is threaded between the two members of the guide 50 and into engagement with the rubber sleeves 42 and 43 of the driving feed rolls 40 and 41 and with the coacting driven feed roll 17b, the margins of the band entering the recesses 51. The key 48 is then inserted in the sleeve 46 (Fig. 9), and its slot 49 is engaged with pin 47. Driven feed roll 17b is then manually rotated in a counter-clockwise direction to feed the end of the strip downwardly through the channels 52 and back into the main body of the cabinet 1. The friction of said strip between feed roll 17b and rubber sleeves 42 and 43 causes the rolls 40 and 41 to rotate on the shaft 10b. The leading end, 18e, of the strip is then adhered to the end 18d, thus converting the strip into an endless paper band. This manual feeding is made possible by reason of the fact that, while worm-wheel 37 and worm 36 lock driving shaft 10b against such rotation, spur gear 15b is caused to rotate on said driving shaft against the friction produced by flexure of dished spring 30a; and because of the further fact that rolls 40 and 41 are caused, in the manner described, to rotate on their shaft 10b.

Alternatively, the leading end of the paper band 18c may be initially threaded into the channels 52 and upwardly into engagement with feed roll 17b and rubber sleeves 42 and 43. In this case, key 48 will be manually rotated in a clockwise direction to feed said leading end downwardly between the two members of the guide 50.

Whichever method may be employed for threading the paper strip, when it has been properly positioned and its ends have been adhered, the clock is set by rotating the projecting shaft 60.

The quadruple-thread worm 36 being mounted on sleeve 35, and this sleeve being mounted on the tubular minute-hand shaft 33, the worm-wheel 37 will be rotated the distance of one tooth every quarter hour. The time divisions on the record 18 (Fig. 1) are correspondingly spaced.

The hour hand of the clock is driven in the following manner: A pinion 53 (Fig. 8), attached to the sleeve 35 which carries the quadruple-thread worm 36, meshes with and drives a gear 54, attached to one end of a countershaft 55. Attached to the opposite end of said countershaft is another pinion 56, which meshes with and drives another gear 57, attached to a sleeve 58, rotatably mounted on the minute-hand sleeve 33, and carrying the hour hand 59. The ratio of this gear train is 1:12.

In this embodiment of the invention, the housing 4 which contains the clock motor is attached by a bracket 61 to the partition wall 62 of the frame 11.

In the still further embodiment shown in Fig. 10, an open-top container 63 is attached to the back plate 2 of the cabinet 1. The purpose of this container is to receive program records which are on separate sheets or thin cards, such as 64, rather than on a long web. Such cards may, for example, contain programs covering a single day. They are to be threaded into the feeding mechanism and fed therethrough in the same manner as the web records.

As is well known, the programs of the larger broadcasting stations are, to a considerable degree, permanent as to their principal features, i. e., certain numbers are regularly broadcast at definite times on definite days. For this reason, the endless paper band 18 may be fed for perhaps several weeks before sufficient program changes have been made to render it obsolete. During this period it will, as to the principal program numbers of the user's favorite stations, at all times show the day, the hour and the minute at which such numbers are to be broadcast. The clock element will show the actual times at which the user is to tune in on a station in order to listen to the desired numbers.

It is contemplated that users of the apparatus shall, from time to time, be furnished revised program strips or sheets. In the interim, they may make revisions in writing. Moreover, blank spaces are provided (such as those adjacent the words "Tuesday morning" in Fig. 1), to enable them to write in data relating to any additional programs in which they may be interested.

In addition to the hereinbefore-described advantages of the apparatus, by way of convenience to the radio user, it embodies the further desirable feature of serving as an advertising medium

for the sponsors of the programs—the names of the sponsors and/or their products being printed on the paper band in association with the titles of the respective program numbers.

It is to be understood that the preferred embodiments of the invention shown in the drawings and described in the specification are merely illustrative; and that, without departing from its principles, the invention may be embodied in other and different forms and structures.

I claim:

1. In apparatus of the character described, the combination of an endless paper band bearing indicia of radio programs and of the respective times of broadcasting the same, means for feeding said band in order progressively to expose portions thereof, a clock, and means for simultaneously actuating said feeding means and said clock, said actuating means including connections between said clock and band-feeding means, and manually operable band-adjusting means for changing the position of said band relatively to said feeding means while still connected operatively with said clock, said band-adjusting means comprising a manually actuated friction roll adjacent to the leading portion of the exposed part of the band, and a manually actuated friction roll adjacent the trailing portion of said exposed part, said manually actuated rolls being operable independently of, but in conjunction with each other, whereby tension upon said exposed part may be insured.

2. A strip of paper bearing indicia of radio program numbers and of the respective times of broadcasting the same, with spaces suitably disposed to receive added annotations, means for feeding said band, and means adapted to expose and adjust said strip relatively to said feeding means, comprising spaced friction rolls between which said strip is supported and exposed, said rolls at each end of the exposed portion being operable manually independently of, but in conjunction with, each other, to set the exposed part of the strip under tension, and to adjust it regardless of the movement of said feeding means.

3. In apparatus of the character described, the combination of an endless paper band bearing indicia of radio program numbers and of the respective broadcasting times thereof, a clock, means for feeding said paper band, and common actuating means for maintaining said clock and said band-feeding means in synchronous relationship, said actuating means being connected flexibly with said band-feeding means to permit manual adjustments of said band while the operative connection with the clock is maintained, and means operable manually to place the exposed part of said band under tension and to adjust the same, comprising friction rolls spaced apart to leave a gap for exposing a part of the band, said rolls being individually and independently operable by hand.

4. In apparatus of the character described, the combination of a cabinet provided with a viewing aperture, an endless paper band supported in said cabinet and bearing indicia of radio program numbers and of the respective broadcasting times thereof, a clock, means for feeding said band past said aperture in order sequentially to expose said indicia to view, means for actuating said clock and for actuating said band-feeding means frictionally by said clock to maintain the exposed indicia in synchronism with the time showing of said clock, and means for manually adjusting said band-feeding means, while said synchronous relationship is maintained, said last-named means including spaced apart friction rolls, independently operable manually to place under tension the exposed portion of said band.

5. In apparatus of the character described, the combination of a cabinet provided with a viewing aperture, an endless paper band supported in said cabinet and bearing indicia of radio program numbers and the respective broadcasting times thereof, a clock, mechanism for actuating said clock, a shaft rotatable by said actuating mechanism, a flexible pawl mounted on said shaft and rotatable therewith, a ratchet-wheel actuated by said pawl, a roll to which said ratchet-wheel is attached, and another roll co-operative with said first roll to support said paper band and feed it past said aperture in order sequentially to expose said indicia to view in synchronism with the showing of time by said clock.

6. In apparatus of the character described, the combination of a paper band bearing indicia of radio program numbers and of the respective broadcasting times thereof, a pair of driven feed rolls and an idler feed roll for feeding said band in order progressively to expose portions thereof, supporting shafts for said rolls, said driven feed rolls being rotatable on their shaft, a source of power for actuating said driven feed rolls, means for guiding said band to said feed rolls, and means for guiding the same away from said rolls, each roll of said pair of driven feed rolls being also operable manually to place under tension and adjust the portion of the band exposed therebetween.

7. In apparatus of the character described, the combination of a paper band bearing indicia of radio program numbers and of the respective broadcasting times thereof, a driven band feeding roll rotatably mounted on a supporting shaft, an idler band-feeding roll attached to a supporting shaft, a source of power, speed-reduction gearing actuated thereby, a single-tooth gear actuated by said speed-reduction gearing, a gear intermittently actuated by said single-tooth gear and rotatably mounted on the shaft which supports said driven feeding roll, a spring embracing said shaft for exerting frictional driving force between said intermittently-actuated gear and said driven feeding roll, and means for manually rotating said feeding rolls against said frictional force in order to initially position said paper band.

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