

Nov. 28, 1933.

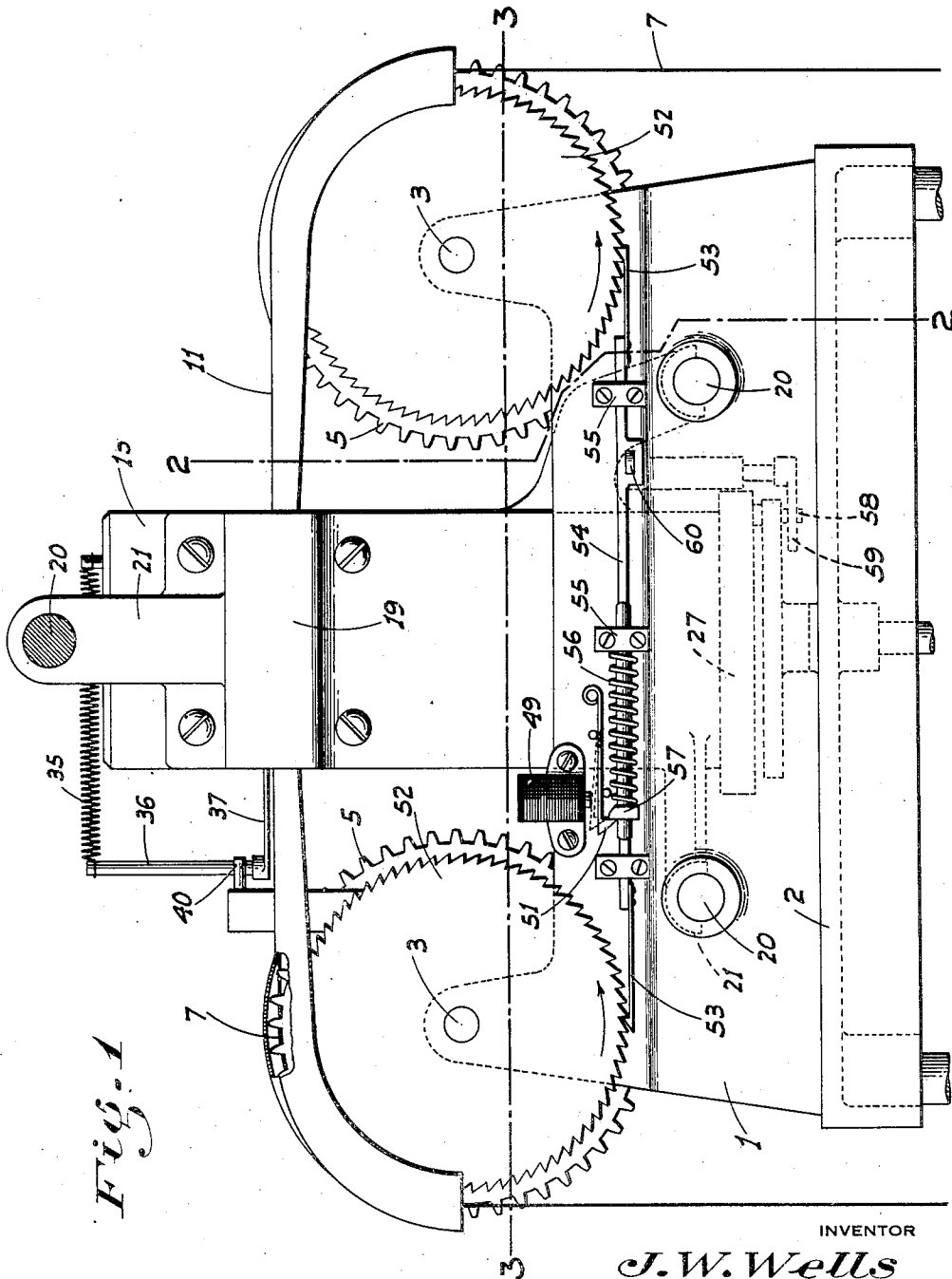
J. W. WELLS

1,936,700

METHOD OF AND APPARATUS FOR GIVING AUDIBLE TIME SIGNALS

Filed April 11, 1932

5 Sheets-Sheet 1



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5 Sheets-Sheet 2

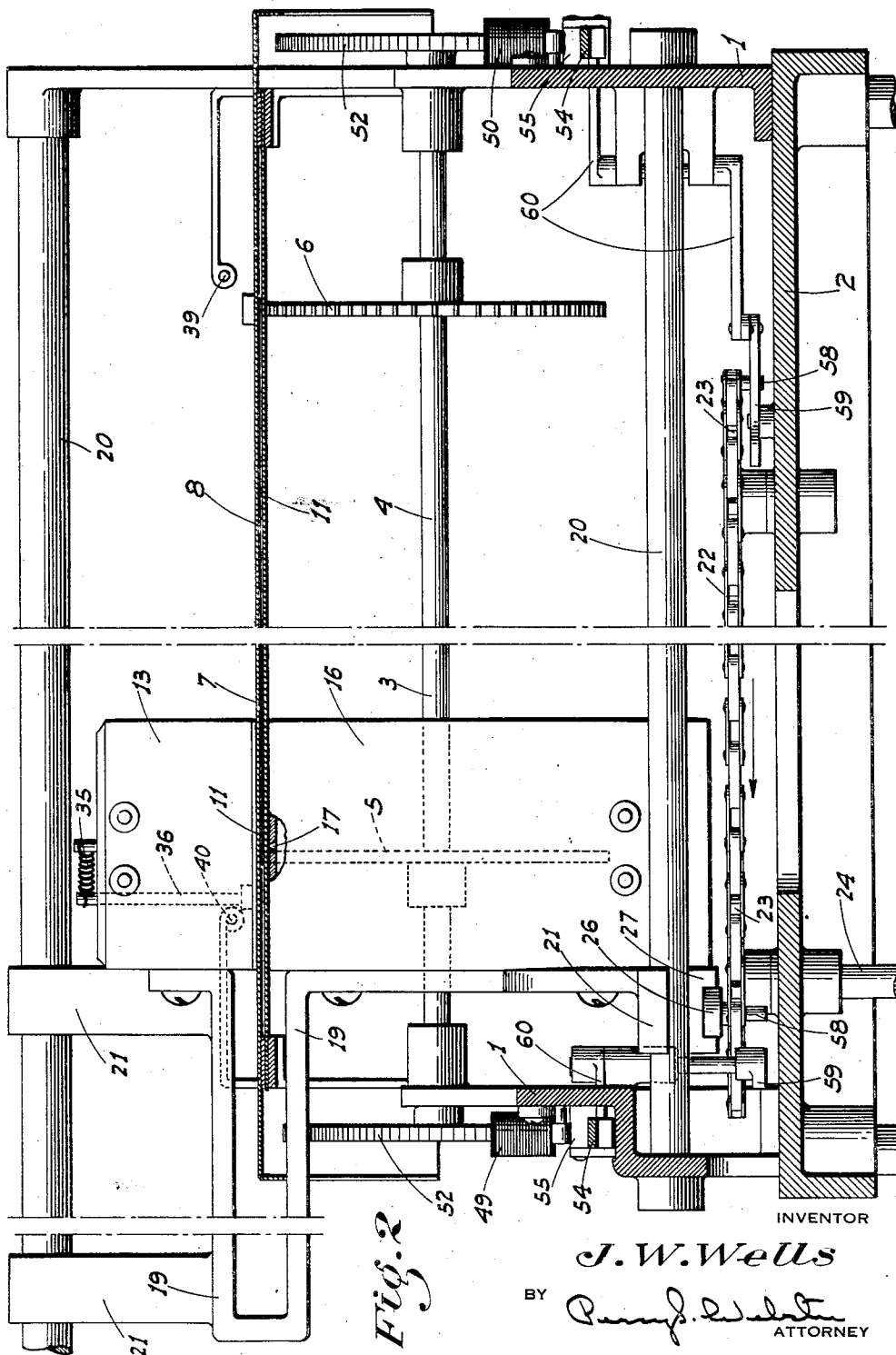


Fig. 2

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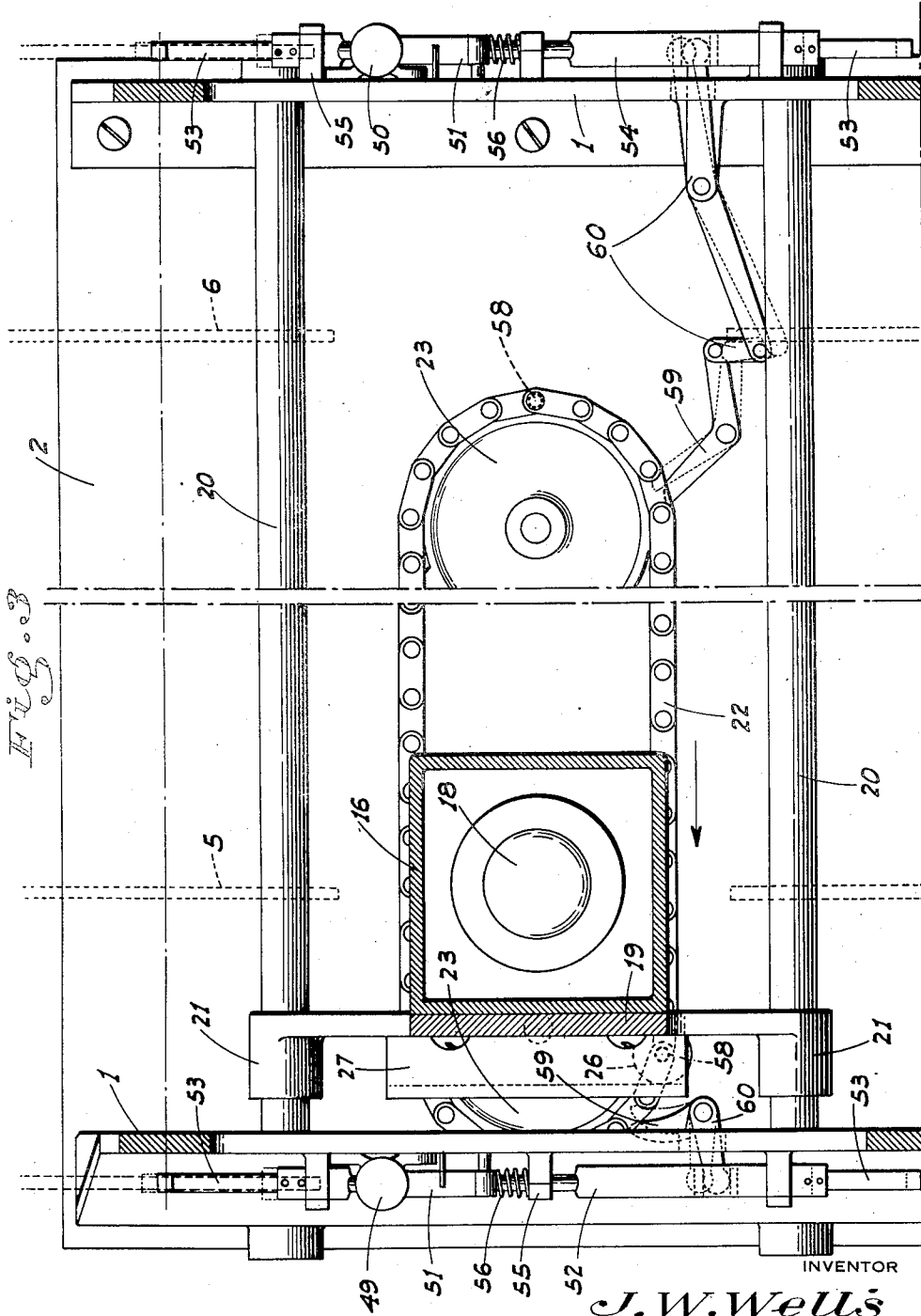
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METHOD OF AND APPARATUS FOR GIVING AUDIBLE TIME SIGNALS

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5 Sheets-Sheet 3



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Fig. 4

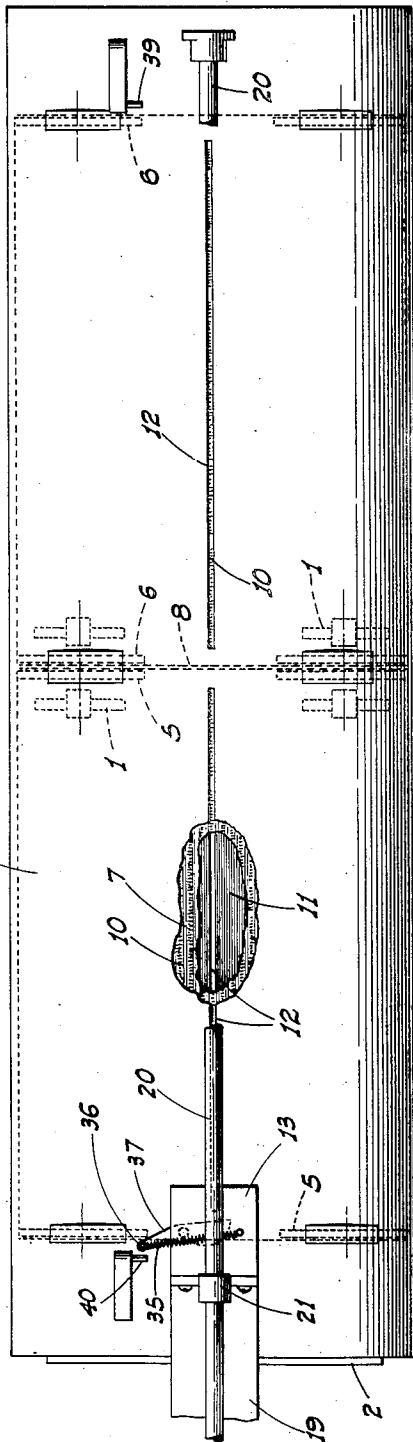
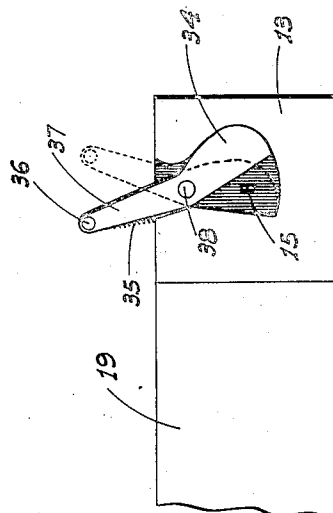


Fig. 5



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METHOD OF AND APPARATUS FOR GIVING AUDIBLE TIME SIGNALS

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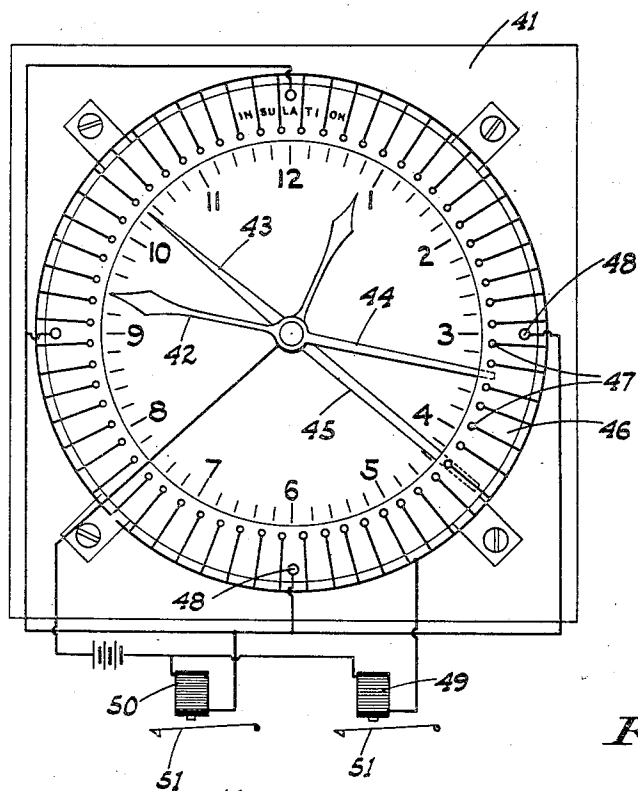


Fig. 7

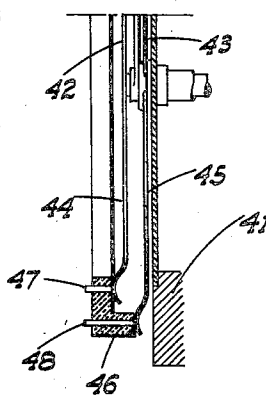
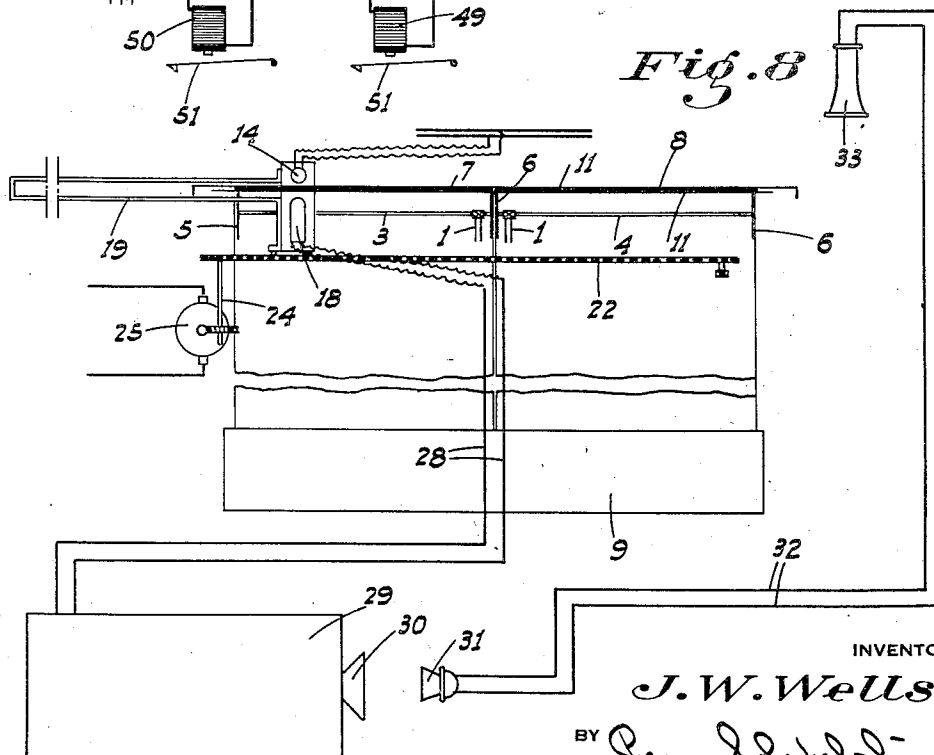


Fig. 8



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UNITED STATES PATENT OFFICE

1,936,700

METHOD OF AND APPARATUS FOR GIVING
AUDIBLE TIME SIGNALS

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Application April 11, 1932. Serial No. 604,499

17 Claims. (Cl. 179—6)

This invention relates to the giving of time signals to telephone subscribers. This is a form of service which is now commonly rendered by practically all large telephone exchanges and in some cases amounts to many thousands of calls a day. As a result, in such exchanges, a shift of operators has been assigned the task of doing nothing but giving out the time. This is an extremely monotonous occupation and yet one which requires constant alertness and a watching of the clock and repeatedly intoning the time to those who ask for it. This system is obviously a source of considerable expense to the telephone companies from which no revenue is derived. Also, as in every case where the human element controls, the chances for making errors in reading and giving out of the time are present.

The principal object of my invention is to eliminate the chance of error and the cost of operation to a great degree by providing an automatic time signal giving apparatus. This apparatus is so arranged that accurate time will be given to any telephone subscriber at any time of the day or night upon the proper number being dialed or the request being made to the exchange operator without any manual attention other than an occasional inspection being necessary to insure the continued and proper functioning of the apparatus. Once the apparatus is installed and in operation the only expense for upkeep is the relatively negligible amount necessary to supply the current for operating the motor, master clock and sound transcribing and amplifying units as will be evident from a perusal of the following description.

It is to be understood that the time signals as given are heard as spoken language, just as the human operators give them, and are not to be confused with relatively unintelligible signals by means of a buzzer or strokes of a gong, such as are sometimes given over the radio or on ship-board.

These objects I accomplish by means of such structure and relative arrangement of parts as will fully appear by a perusal of the following specification and claims:

In the drawings similar characters of reference indicate corresponding parts in the several views:

Fig. 1 is an end view of the main unit of the apparatus.

Fig. 2 is a longitudinal section on the line 2—2 of Fig. 1, foreshortened in the center.

Fig. 3 is a sectional plan on the line 3—3 of Fig. 1 similarly foreshortened.

Fig. 4 is a top plan view of the unit partly broken out.

Fig. 5 is a bottom plan view of the exciting lamp housing showing the shutter.

Fig. 6 is a diagrammatic face view of the master controlling clock and the contact and electrical features arranged therewith.

Fig. 7 is a fragmentary radial section of the clock and contact disk.

Fig. 8 is a diagram of the electric circuit of the sound reproducing unit of the apparatus.

Referring now more particularly to the characters of reference on the drawings, the numeral 1 denotes the end and intermediate frames upstanding from a base 2. Journaled in and extending between corresponding pairs of the frames are transversely separated pairs of shafts 3 and 4, the shafts of each pair being longitudinally aligned with each other. Separate and spaced pairs of film engaging sprockets 5 and 6 are fixed on the shafts 3 and 4 respectively, said sprockets engaging the usual edge holes in separate endless films 7 and 8. The films depend from the sprockets, the portion below being loosely received in a tray or box 9 or retained in any other way which may seem desirable.

Each film has rows of closely spaced sound track 10 recorded thereon in the customary manner, these rows being disposed transversely instead of lengthwise of the film as is usually the case and extending practically the full width between the sprocket engaging holes. Each row or line of track on the film 7, when reproduced, gives hours and minutes while the sound tracks on the film 8 give seconds. The tracks on the film 7 giving the time at one minute intervals there are therefore sixty such rows or tracks for each hour and a total of 720 in the entire length of the film. Double the number of rows is of course necessary if the designation a.m. or p.m. is used after each time signal. The sound track on the film 8 on the other hand only gives the time at five, ten or fifteen seconds apart for instance as may be decided to be the most suitable. It is of course to be understood that whatever the number of tracks there may be on each film such number is divided evenly into the entire length of the film so that the same may be turned in one direction continuously without any excessive spaces between any adjacent pair of sound tracks being had.

The films are disposed between rigid opposed plates 11 which are close enough to the film to prevent the same buckling, but without preventing sliding of the film. The upper plate 11 ex-

tends over the film supporting sprockets so that the teeth are held in positive contact with the film notches preventing any possible lost motion between the film and sprockets. Both plates have vertically aligned slots 12 cut therethrough substantially the width and length of the sound tracks and parallel thereto.

A casing for an exciting lamp 14 is disposed immediately over the upper plate with an opening 15 in its under side aligned with the slot 12. A housing 16 depends from the lower plate in vertical alinement with the housing 13 and having a top slit or opening 17 aligned with the opening 15. The housing 16 carries a photoelectric cell or tube 18 of standard character. The housings are connected together so as to form a rigid unit capable of movement along the slot 12 by means of a horizontal forked arm or bar member 19. This is of sufficient length to enable the housings to travel the full width of both films without the connected end of the arm member contacting with any part. Said member is supported from above and below the film and plates by fixed rods 20 supported from the frames 1 and engaged by bosses 21 mounted in connection with said arm member.

The arm member and housings are reciprocated a distance sufficient to move the housing openings beyond the opposed sprockets 5 and 6 some distance, by an endless chain 22 positioned under the housing 16 and passing about suitably positioned sprocket wheels 23 journaled on vertical axes in connection with the base 2. One sprocket wheel has a depending shaft 24 which is driven by a constant speed electric motor 25. One link of the chain has a roller 26 or similar element projecting upwardly at the pin of the link and engaging a transversely grooved block 27 fixed in connection with the member 19. A cross head type of drive between the chain and the member 19 is therefore provided. The chain is driven at such a speed that the housings travel at the rate of approximately ninety feet per minute—or at the same speed used in the forming of the sound track on the film.

The leads 28 from the tube 18 are connected to a sound reproducing and sound amplifying apparatus such as is commonly used in talking picture work and the like, and indicated by its enclosure 29. A loud speaker 30 is a part of such apparatus and it is disposed in facing relation to the transmitter 31 of an ordinary telephone line 32. As the photoelectric tube moves along the sound track the time, whatever it may be as indicated by said track, will be announced as spoken language through the speaker 30 and will be heard by anyone listening at the receiver 32 of the telephone line and connected to the transmitter 31.

It will of course be obvious that if the tube reproduced sounds from the track during its retractive movement such sounds would be backwards and would make no sense. The opening 15 of the exciting lamp housing is therefore closed during the retractive movement of the housings in the following manner.

The bottom of the housing 13 is provided with a pivoted shutter 34 adapted to uncover or cover the opening, and held in either position by a snap action spring 35. This spring is connected to a vertical pin 36 projecting upwardly from an arm 37 rigid with the shutter. When the housing is moved to the right or in the desired sound reproducing direction, the shutter is open and the arm 37 slopes to the right of the pivot pin 38 of the

shutter, or in the direction in which the unit is moving. As the opening 15 reaches the right hand end of the sound track of the film 8 (which is when the roller 26 is just beginning to make the turn about the adjacent sprocket wheel 23) the pin 36 engages a stop member 39 fixed in connection with the adjacent frame 1. This stop with a further movement of the housings throws the shutter arm over so that the snap action spring then pulls the shutter to a closed position. No light will then penetrate to the photoelectric tube with the return movement of the unit.

As the housing 13 reaches a corresponding position at the opposite end of its stroke the pin 36 engages another stop 40 which again pushes the shutter arm so that the shutter is snapped back to an open position ready for the next sound reproducing stroke of the unit. This shutter structure may of course be mounted in connection with the housing 16 instead of the housing 13 if desired.

Each time signal will be given various times according to the length of time necessary for the tube to make a complete stroke. Since the film 7 designates hours and minutes only, each track thereon will remain stationary for the full duration of a minute, and the signal will be given or announced as many times during that minute as the reciprocating unit makes complete strokes. The film 8 on the other hand designating seconds, said film remains stationary for ten or fifteen seconds, or whatever ones may be chosen to be announced, as a change for every second is not necessary and is hardly practical.

A longitudinal movement of the films to shift the sound tracks relative to the slot 12 according to the lapse of time is automatically controlled in the following manner:

41 denotes a clock preferably of the electrically controlled type having minute and second hands 42 and 43 respectively, the mechanism of the clock being of that type arranged to cause the minute hand to jump from one minute to the next instead of progressing slowly and steadily as is usually the case. The minute hand has an extension 44 forming a contact arm while the second hand has a similar extension 45 also forming a contact arm. Mounted in concentric relation with the clock is an insulation disk 46 having a circular row of contacts 47 to be engaged by the minute contact arm 44 and another row of contacts 48 to be engaged by the seconds contact arm 45. The contacts 47 are spaced apart corresponding to the arc of a minute but are disposed between the minute marks on the clock. The contacts 48 may be in alinement with the seconds marks and are spaced apart whatever number of seconds may be desired. The contacts 47 are all connected by suitable circuit leads to an electromagnet 49 while the contacts 48 are similarly connected to another separate magnet 50, each magnet actuating a spring catch 51.

Fixed on the ends of the shafts 3 and 4 are ratchet wheels 52 each corresponding pair of which is engaged on the bottom and arranged to be rotated by tangentially disposed spring pawls 53 mounted on the opposite ends of a horizontal bar 54 slidable in bearings 55 on the adjacent frame 1. A spring 56 about the bar between one bearing and a collar 57 on said bar acts to move the latter in a direction opposite to that required to rotate the ratchet wheel in a film advancing direction.

Pivotally mounted on the base 2 to overhang the path of movement of pins 58 depending from the chain 22 at spaced intervals are pivoted arms 59, connected by suitable linkage 60 to the respective bars 54. The arm and link of each bar are so arranged relative thereto that when the latter is in the above recited retracted position the corresponding arm 59 projects into the path of the pins 58. The arms are positioned on the return side of the chain so as to be engaged and moved by either one of the pins during the retractive movement of the photoelectric tube supporting structure. As a pin engages one of the arms 59 it moves the same out of its path and in so doing of course rotates it. This rotation by reason of the connected linkage will impart longitudinal movement to the corresponding bar 54 causing the ratchet wheels to be rotated an arcuate distance equal to the space between adjacent teeth. This spacing is such as to be sufficient to move the film lengthwise so that one sound track is moved clear of the slot 12 and the next one alined therewith.

The magnet being normally de-energized its catch 51 engages the collar 57 at the termination of the advancing movement of the pawls and ratchet wheels, thus holding the spring 56 from action and retaining the arm 59 out of the path of the chain pins. The action of both bars 54 and their associated parts is the same so that both films remain stationary regardless of the various reciprocating strokes of the tube supporting structure until with the movement of the contact arms of the minute or seconds hands over the corresponding fixed contact points, the corresponding magnets are energized and the catches 51 pulled clear of the collars 57.

The springs 56 are then free to function to retract the pawl bars which again causes the arms 59 to be moved into the path of the pins 58 ready for a subsequent rapid advancing movement. The magnets being only energized for a very short period the catches are free to again engage the bar collars when the bars are pulled along by the engagement of the pins 58 with the arms 59.

The sound track on the films is of course initially positioned so as to be synchronized with the actual time as indicated by the clock. In operation therefore as the tube supporting unit moves in one direction a spoken time signal such as "Ten twenty-five and fifteen seconds" will be repeated a number of times, followed by "Ten twenty-five and thirty seconds" a corresponding number of times as the seconds recording film is advanced; these annunciations being followed in due turn by "Ten twenty-six, etc.," as the minute recording film is advanced. The reproducing unit reciprocates at such a speed that even if a change in the position of the film is not made at the exact second on account of the wrong position of the chain pins relative to the arms 59 at that time, the time as announced will be accurate to within a very few seconds.

I claim:

1. A time announcing apparatus including an endless film having a sound track thereon indicating a certain time in words, a photoelectric tube, an exciting lamp for the tube, said tube and lamp being disposed with the film therebetween, means connecting said tube and lamp to form a unit rigid while permitting movement thereof the full length of the track, means mounting the unit for movement parallel to the track, and means for constantly reciprocating the unit

through a stroke not less than the length of the track.

2. A structure as in claim 1, with means functioning automatically to prevent the passage of light rays between the lamp and tube with the travel of the unit in one direction.

3. A structure as in claim 1, with housings in which said lamp and tube are enclosed, the adjacent faces of the housings having openings alining with the track, a shutter for one of said openings mounted on the corresponding housing, and means functioning with the reciprocating movement of the unit to move the shutter to a closed position with the arrival of the unit at one end of its stroke and to reopen the shutter as the unit reaches the opposite end of its stroke.

4. A time announcing apparatus including an endless film having a plurality of sound tracks thereon each indicating a different time and extending in parallel relationship transversely of the film, a photoelectric tube, an exciting lamp therefor, said lamp and tube being disposed in opposed relation with the film therebetween, means connecting the light and tube together to form a rigid unit while permitting movement of the same the full length of any track, means mounting the unit for movement parallel to the track, means for reciprocating the unit across both films, means for advancing the film a distance equal to the spacing between adjacent tracks with the retractive movement of the unit, and clock actuated means for controlling the functioning of said film advancing means.

5. A time announcing apparatus including a film having a plurality of sound tracks thereon each indicating a different time and extending in parallel relationship transversely of the film, a photoelectric tube, an exciting lamp therefor, said lamp and tube being disposed in opposed relation with the film therebetween, means connecting the light and tube together to form a rigid unit while permitting movement of the same the full length of any track, means mounting the unit for movement parallel to the track, means for reciprocating the unit through a stroke of predetermined length, sprocket wheels on which the film is mounted, a ratchet wheel mounted in axial connection with one of said wheels, a pawl engaging said ratchet wheel and movable tangentially thereof to rotate said wheel a predetermined amount, a member mounted on the unit reciprocating means, an element engageable and movable by said member when the unit is in a predetermined position, connections between said element and pawl arranged so that the element will be positioned in the path of the member when the pawl is in a retracted position, and clock controlled means preventing retractive movement of the pawl once it has been advanced until a period of time corresponding to that indicated by adjacent sound tracks has elapsed.

6. A time announcing apparatus including a film having a plurality of sound tracks thereon each indicating a different time and extending in parallel relationship transversely of the film, a photoelectric tube, an exciting lamp therefor, said lamp and tube being disposed in opposed relation with the film therebetween, means connecting the light and tube together to form a rigid unit while permitting movement of the same the full length of any track, means mounting the unit for movement parallel to the track, means for reciprocating the unit through a stroke of predetermined length, sprocket wheels on which the film is mounted, a ratchet wheel mounted in

axial connection with one of said wheels, a pawl engaging said ratchet wheel and movable tangentially thereof to rotate said wheel a predetermined amount, means to move the pawl in a wheel rotating and film advancing direction with the movement of the unit in a retractive direction, spring means tending to move the pawl in a retractive direction, a catch normally preventing the spring from functioning, and clock-movement controlled means to release the catch at successive periods of time corresponding to those indicated by the sound tracks.

7. A structure as in claim 6, in which said last named means comprises a clock having a time-indicating hand, a contact-extension fixed with said hand, stationary contacts disposed in the path of movement of said extension and spaced circumferentially of the clock a distance equal to the difference in time indicated by adjacent sound tracks, an electromagnet to release the catch, and a circuit in which said extension contacts and magnet are interposed.

8. A time announcing apparatus including a pair of films arranged in transversely alined and parallel relationship, spaced sound tracks on one film indicating hour and successive minute signals, sound tracks on the other film indicating different seconds signals, all said tracks extending transversely of the films with one track at a time on each film disposed in longitudinal alinement with each other, a photoelectric tube and light unit movable in a fixed path along a track and across both films, a circuit with which the tube is electrically connected, means to reciprocate the unit across the films, clock-movement controlled means to advance the first named film lengthwise a distance equal to the spacing between adjacent sound tracks thereon once every minute, and clock-movement controlled means to advance the other film a similar distance once with the passage of a number of seconds equal to that indicated by adjacent sound tracks on said other film.

9. In a time announcing apparatus, a pair of endless films arranged in transversely alined and adjacent relationship, spaced sound tracks on the films extending transversely thereof, a photo-electric tube and light unit movable in a fixed path across both films, means to reciprocate the unit along said path, and separate time controlled devices to separately and intermittently advance the films a distance equal to the spacing between adjacent sound tracks.

10. A time announcing apparatus including an endless film having spaced sound tracks thereon extending transversely of the film, a photo-electric tube and light unit, means mounting said unit for movement parallel to the film and track, an endless chain both runs of which are parallel to and the same distance from the film, sprocket wheels on which the chain is mounted spaced apart a distance greater than the length of the film track, means for driving one sprocket, an element on the chain, and a guide block fixed on the unit and extending transversely of the chain in which said element is slidably guided.

11. A time announcing apparatus including an endless film having spaced sound tracks thereon extending transversely of the film, a photo-electric tube and light unit, means mounting said unit for movement parallel to the film and track, an endless driven chain, and a driving connection between the chain and unit to reciprocate the latter the full length of said track with the movement of the chain in one direction.

12. A time announcing apparatus including an endless film having spaced sound tracks thereon extending transversely of the film, a photo-electric tube and light unit, means mounting said unit for movement parallel to the film and track, an endless driven chain, a driving connection between the chain and unit to reciprocate the latter along and beyond one end of the track, a film advancing mechanism including a pivoted lever whose movement in one direction causes the film to be advanced, and a pin projecting from the chain to engage one end of the lever to thus move the same with the movement of the chain; said pin being so positioned on the chain relative to the position of said driving connection as to cause the lever to be moved during one stroke of the unit.

13. A time announcing apparatus including an endless film having spaced sound tracks thereon extending transversely of the film, a photo-electric tube and light unit, means mounting said unit for movement parallel to the film and track, an endless driven chain, a driving connection between the chain and unit to reciprocate the latter along and beyond one end of the track, a film advancing mechanism including a pivoted lever whose movement in one direction causes the film to be advanced, and a pin projecting from the chain to engage one end of the lever to thus move the same with the movement of the chain; and clock-movement controlled means to hold said end of the lever out of the path of the pin until the unit has been reciprocated a predetermined number of times.

14. An announcing apparatus including a pair of films arranged in transversely alined and adjacent relationship and having transversely extending sound tracks thereon, a photo-electric tube and light unit movable in a fixed path across both films, and means to reciprocate said unit along said path with a stroke greater than the combined width of the films.

15. An announcing apparatus including an endless film having transversely extending photographic traces thereon, spaced rollers about which said film passes, and means for scanning said traces including a photo-electric tube on one side of the film in a position between the rollers, a light for said tube disposed in cooperating relation therewith but on the opposite side of the film, a frame connecting the tube and light together to form a rigid unit while permitting movement of the tube and light along a path the full width of the film, and means applied to the frame to reciprocate the same along said path.

16. An announcing apparatus including an endless film having transversely extending photographic traces thereon, a photo-electric tube and light unit mounted for movement transversely of the film to scan such traces, means for reciprocating the unit, and means preventing the passage of light to the tube during the movement of the same in one direction.

17. An announcing apparatus including an endless film having transversely extending photographic traces thereon, a photo-electric tube and light unit mounted for movement transversely of the film to scan such traces, means for reciprocating the unit, a shutter for the light disposed between the light and tube, means to open the shutter at the beginning of each alternate stroke of the unit, and means to close the shutter at the end of each such stroke.