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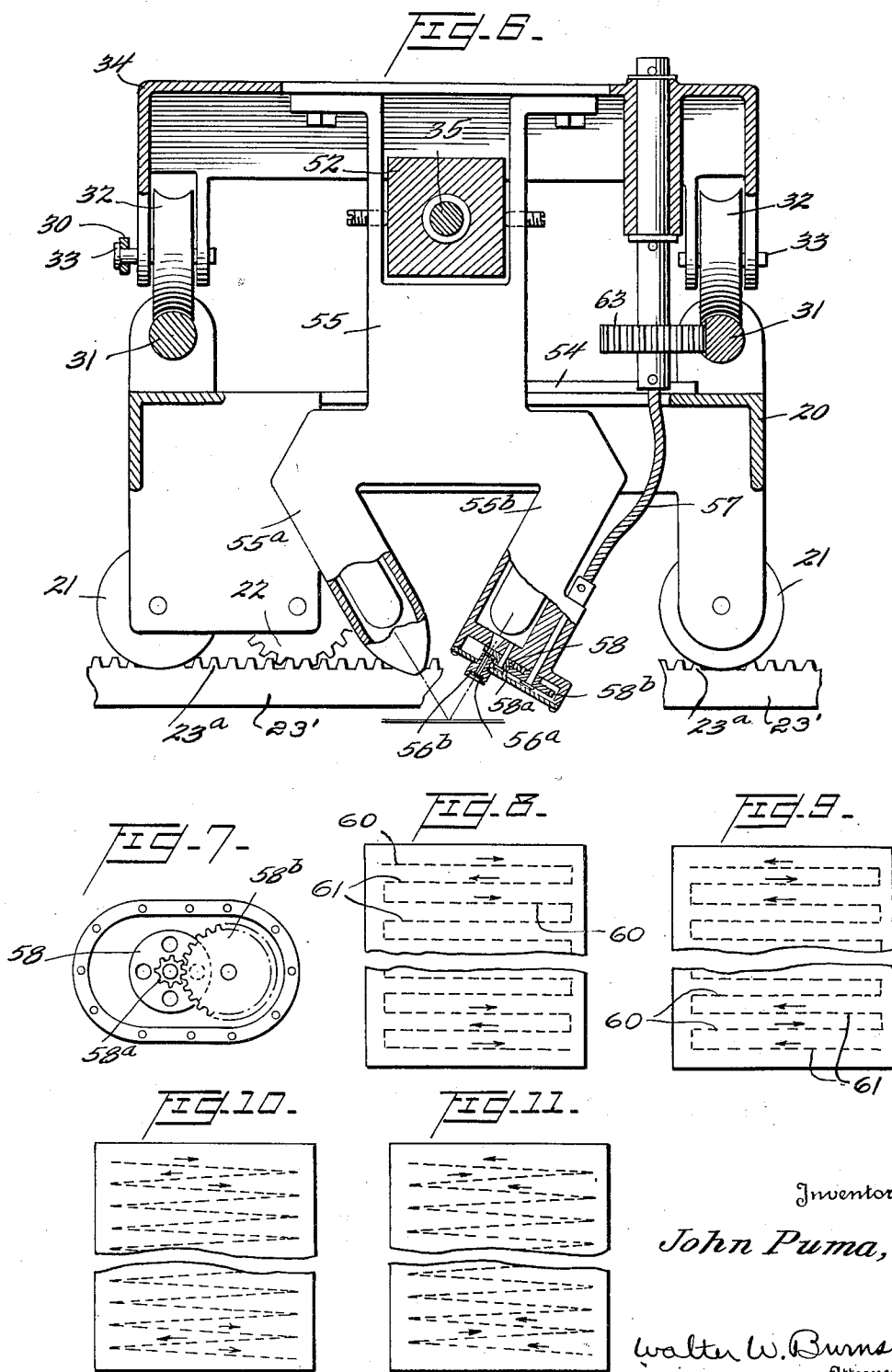
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SOUND REPRODUCING MECHANISM

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3 Sheets-Sheet 3



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SOUND REPRODUCING MECHANISM

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4 Claims. (Cl. 179—100.3)

This invention relates to sound reproducing devices and has particular relation to devices for reproducing spoken words or sounds from a book, page or other sheet.

5 I am aware that the reproduction of sound from record with use of the photo-electric cell has been accomplished, particularly in connection with the development of talking pictures. The details of the particular construction of the photo-electric cell and the particular sound producing elements and the particular substances used in producing the record lines or the substances used in making the surface upon which the record lines are placed are all separate and apart from the present invention.

15 The present invention relates to the arrangement of the record on its surface and to the general arrangement of the devices and mechanisms for moving the photo-electric cell and its cooperating illuminating element over the record.

20 The primary object of this invention is the provision of a means for reproducing sound from recordings on a page.

25 Another object of the invention is the provision of a means for reproducing audible readings from recordings on a page.

30 Another object of the invention is the provision of a means for producing continuously audible readings from recordings along parallel lines on a page.

35 Still another object of the invention is the provision of a means for moving a photo-electric cell in a predetermined manner in longitudinal and lateral directions to follow recordings on a page.

40 A still further object of the invention is the provision of a photo-electric cell and of means to illuminate a portion of a record in the proximity of the photo-electric cell as the latter passes along the record line.

45 A still further object of the invention is the provision of means which will enable persons with defective eye-sight or those who although not having defective eye-sight, are yet unable to concentrate on reading over a long period of time, to have text books which with the present invention, can be read to them. In this way they will be relieved of eye strain and much concentration effort.

50 Other and further objects of the invention will be apparent to those skilled in the art from a reading of the complete specification and claims.

Referring to the drawings wherein there is illustrated an embodiment of the invention,

55 Fig. 1 is a lower end elevational view,

Fig. 1a is a fragmental sectional detail view on the line 1a—1a of Fig. 3.

Fig. 2 is a side elevation,

Fig. 3 is a plan view,

Figs. 4 and 5 are respectively sectional views 5 on the lines 4—4 and 5—5 of Fig. 1,

Fig. 6 is an enlarged sectional view on the line 6—6 of Fig. 1,

Fig. 7 is a bottom view of the light arm 58b of Fig. 6,

Figs. 8, 9, 10 and 11 are diagrams of the recordings on sheets or pages.

Similar reference characters refer to the same or similar parts throughout the description and drawings.

15 The invention broadly comprises the provision of a sound record arranged in lines across a sheet and a carriage with a light-sound producing device to travel across or latitudinally of the sheet and also longitudinally of the sheet to place the light-sound producing means in proper relation to a new line when the end of a record line is reached.

In carrying out this invention, there is illustrated in the present embodiment a carriage 25 mechanism which is in reality a carriage having a transverse or latitudinal movement and another carriage having a longitudinal movement, the former being carried upon the latter. These carriages are referred to as the line carriage and 30 the step carriage.

The step carriage 20 is supported by wheels 21 and 22, upon cylindrical tracks 23, 23', the latter having on its top, a rack 23a. The wheel 22 is provided with suitable teeth which mesh with 35 the teeth of the rack 23a on the track 23'.

The wheel 22 is mounted on the shaft 24 which carries a cog-wheel 25. Mounted adjacent the wheel 25 is an escapement-feed device comprising an E-shaped operating member 26 which is pivoted on its center bar in position so that its outer bars contact the teeth of the cog-wheel 25. The outer bars are so shaped that alternate movements of the E-shaped operating member will permit rotation of the wheel 22 sufficiently to 45 cause movement of the step-carriage 20 a distance equal to the distance between the centers of two adjacent rows of recording, when as illustrated in the present embodiment, the lines of recording are placed in parallel lines. The power 50 for this movement is supplied by driving means which will be later described.

An operating lever 27 is provided and is pivoted adjacent the E-shaped member and is connected to the latter so that as the lever 27 swings, it will 55

move the E-shaped member. A spring 28 is connected to the lever 27 and to the end of the center bar of the E-shaped member in such a way as to form a toggle. After the lever 27 moves the E-shaped member a distance past dead center, the spring 28 completes the movement to move the step-carriage a distance equal to the distance between two adjacent record lines as already described.

The upper end of the lever 27 is connected by a slot and pin connection 29 to a shifter bar 30 which controls the movement of the lever 27 through the slot 30a, as will be later described.

Mounted in the frame of the carriage 20 are two cylindrical tracks 31 which in the present embodiment are placed in vertical planes which are at 90° to the vertical planes containing the axes of the tracks 23, 23a. Upon the tracks 31, rest the grooved roller wheels 32 which by their shafts 33 carry the top or line carriage 34. This carriage carries directly the photo-electric cell and the illuminating device which move along the record line of the sheet, in a manner to be described.

In the shifter bar 30, is a groove which surrounds the ends of the shafts 33. As the line carriage moves along the record line to its end, the shaft 33 on the end toward which movement is taking place, contacts with the groove end. Continued movement causes, through the lever 27, the operation of the E-shaped operating member 26 and a step movement of the carriage 20. This movement brings the photo-electric cell in registry with a new record line at its starting point.

Along the center and beneath the top of the line carriage 34 is a double screw shaft 35. This shaft is mounted at its ends in bearings on the step carriage 20 and has at one end a bevel gear 36 which is driven by a bevel gear 37 which is mounted on a shaft 38. A bevel gear 39 is at the bottom of the shaft 38 and meshes with a bevel gear 40 on a short shaft 41.

On the end of the shaft 41 is a pinion gear 42 which is driven by a pinion gear 43 on the motor or power shaft 44. This pinion gear 43 also drives a pinion gear 45 on a shaft 46. This shaft 46 extends the length of the page or sheet upon which are the record lines and is mounted at its ends in bearings 46'. A keyway extends the length of the shaft 46 to permit the gear 45 to travel with the lower or step carriage 20 as the latter moves along in its step-by-step travel.

Between the sides of the lower carriage and surrounding the shaft 46 are two springs 47, 47a between which is a sliding nut 48 having a right hand and a left hand thread section on movable pins 49, 49a, respectively. These thread sections are in position to register with one or the other of right hand and left hand screw threads which extend throughout the length of the shaft 46. As the shaft 46 is turned by the gears 45, 43 from the power or motor shaft 44, the nut 48 is moved in one direction or the other, depending upon which pin 49, 49a is in contact with its thread on the shaft 46. The escapement mechanism 25, 26 with the tooth wheel 22, and the rack 23a prevent movement of the carriage 20 along the rails 23 until the escapement device is operated.

When the shaft 46 is turned and movement of the carriage 20 is prevented, one of the springs 47, 47a, is compressed. As soon as the escapement 25, 26 is operated, the spring 47 or 47a causes the carriage 20 to move the distance between the centers of two adjacent lines. This

movement is the step-by-step movement heretofore referred to. The pitch of the thread of the shaft 35 and the pitch of the thread of the shaft 46 are so related to the gearing between the shaft 44 and the shaft 35 that a movement of the carriage 34 the full length of the record line across the sheet will correspond to the movement of the nut 48 for a distance equal to the space between two record lines.

When the step carriage 20 is moved by the nut 48, the springs 47 and the escapement mechanism 25, 26, to either end of the page, an E-shaped toggle shifter 50 is engaged at 50a by a reversing switch member 50c. The spring 50b after passing dead center, shifts the positions of the pins 49, 49a, throwing out the one which has been in and throwing in the one which has been out. This places the reverse thread into operation and the step carriage moves in the opposite direction.

In order to shift the movement of the line carriage 34 by the right and left hand threaded shaft in order to reverse its direction of travel, I have provided a travelling nut 52 which is similar in operation to the nut 48, already described. This nut 52 is provided with pins 52a which have fragmental threads, one in position to engage the right hand thread and one in position to engage the left hand thread. These pins 52a are so held in spaced relation by a shifter member 53, that only one pin may engage its thread at a time. A lug 53a extends from the shifter member 53 and is in position to engage the reversing switches 54 which are mounted on the step carriage 20 and in position to reverse the position of the shifter as the line carriage 34 reaches the end of a record line. The spring 53b operates to complete any movement of the shifter 53 by a toggle action after the shifter 53 passes a central position. In this manner a complete reversal of movement is quickly accomplished at the end of each line.

Suspended from the line carriage 34 is a bracket member 55 having two arms 55a, 55b extending therefrom. Within one of the arms 55a, 55b is a photo-electric cell to which is connected the sound mechanism with which it coacts. As the details of construction of the photo-electric cell and its coating parts are not a part of this invention and are well known in the art, no further description will be given. At the bottom of the arms 55a, 55b is a suitable opening through which the light enters the arm from the record to contact the cell.

The other arm 55b, 55a is provided within, with an illuminating lamp. At the bottom of one of the arms, as 55b, a lens 55a is provided in the opening 55b between the lamp and the point of record illumination, where the record is illuminated for the photo-electric cell. A suitable source of electric current, for the lamp and photo-electric cell 56, is provided.

Adjacent the opening 55b is a shutter 58 which operates to shut off and permit passage of a ray of light to or from that small portion of the record line which it is desired to reproduce at any particular instant. The shutter 58 is operated by gears 58a, 58b, the latter of which is on the end of a flexible shaft 57 which in turn is operated from a gear 63. The gear 63 coacts with the teeth of a rack on the side of one of the cylindrical rails or tracks 31. Since the gear 63 is journaled in bearings in the line carriage 34, it will be evident that the movement of the carriage 34 along its tracks or rails 31 will cause operation of the shutter to be opened or closed 75

at a predetermined time. The shutter and the recordings on the record line are, of course synchronized.

The tracks 23, 23' may be supported on any suitable supports. For example, small screw jacks 23b may be placed at the ends of the tracks and adjusted to fit the thickness of the book or pages upon which the record is placed. These jacks 23b are secured to a table or other support 23c.

The record itself which may be on the leaf of a book or on pages which are inserted and removed as desired, has in the modification herein shown, been placed in lines which are parallel to each other as shown at 60, 61. The record lines 60 are recorded from left to right and the record lines 61 are recorded from right to left.

The step carriage 20 moves from the end of one line to the beginning of the next line and thus takes care of the longitudinal movement of the photo-electric cell. The line carriage 34 moves the photo-electric cell and coating devices along the line across the sheet or in a latitudinal direction. These terms are used in a functional sense and do not relate to the relative length and breadth of the particular record surface.

In using this invention, the page with the record thereon is brought into a position relative to the photo-electric cell so that the latter is at the beginning of the recording and also so that the mechanisms are so set that when started, relative movement will be given the record and photo-electric cell, different parts of the record being successively illuminated and transmitted to the photo-electric cell to be, by its coating parts, translated into sound. As the end of the line is reached, the photo-electric cell is transferred to registry with a new record line and in the illustrated embodiment, a travel in the reverse direction begins. When the last line of the page is finished the step carriage movement is reversed so as to start reproduction of the recordings in a reverse direction.

The particular method of recording and the substances and materials used are not a part of this invention per se and consequently will not be described in detail in this application.

In Figs. 10 and 11, I have shown diagrammatically a recording wherein the step by step device including the parts 25, 26, 27, 28, 29 and 30 are disconnected so that the carriage 34 will have a progressive movement longitudinally of the sheet at the same time the carriage 20 is moving across the sheet. Used in this way, the springs 47, 47a would act merely to hold the nut 48 in one position relatively to the carriage 20.

While there is shown and described an embodiment of this invention, it is to be understood that the showing is merely illustrative and that modifications and changes may be made in the construction and arrangements without departing from the spirit of the invention and within the scope of the appended claims.

Having described my invention, what I claim is:

1. A sound reproducing mechanism comprising a photo-electric cell, a surface having sound recordings in lines extending across the small dimension of the surface, means for illuminating the record lines adjacent the position of the photo-electric cell, means for bringing about an intermittent coactive operation between the illuminating means, photo-electric cell and the record at predetermined intervals and means including a track parallel to the sheet for supporting and relatively moving the photo-electric cell and illuminating means with relation to the record lines and progressively along the latter.

2. A sound reproducing mechanism comprising a photo-electric cell, a flat surface of proportions suitable to form a sheet in a book having sound recordings in lines extending across the surface, means for illuminating the record lines adjacent the position of the photo-electric cell, means for bringing about an intermittent coactive operation between the illuminating means, photo-electric cell and the record at predetermined intervals, means including a track parallel to the sheet for supporting and relatively moving the photo-electric cell and illuminating means with relation to the record lines and progressively along the latter and means operating at the end of each record line to cause the photo-electric cell to begin travel along the next record line.

3. A sound reproducing mechanism comprising a photo-electric cell, a surface having sound recordings in lines extending across the surface, means for illuminating the record lines adjacent the position of the electric cell, means for bringing about an intermittent coactive operation between the illuminating means, photo-electric cell and record at predetermined intervals and including a light-interrupting device, means for relatively moving the photo-electric cell and illuminating means with relation to the record lines and progressively along the latter and means operating at the end of each record line to cause the photo-electric cell to begin travel along the next record line.

4. A sound reproducing mechanism comprising a photo-electric cell, a surface having sound recordings in lines extending across the surface, means for illuminating the record lines adjacent the position of the photo-electric cell, means for bringing about an intermittent coactive operation between the illuminating means, photo-electric cell and record at predetermined intervals and including a rotating light-interrupting device, means for relatively moving the photo-electric cell and illuminating means with relation to the record lines and progressively along the latter, means operating at the end of each record line to cause the photo-electric cell to begin travel along the next line and means for operating the interrupting device proportional to the speed along the record line.

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