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MAY 25, 1943.
BY A. P. C.

G. FRIES
SPEAKING MACHINES
Filed May 14, 1941

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393,493
3 Sheets-Sheet 1

Fig. 1

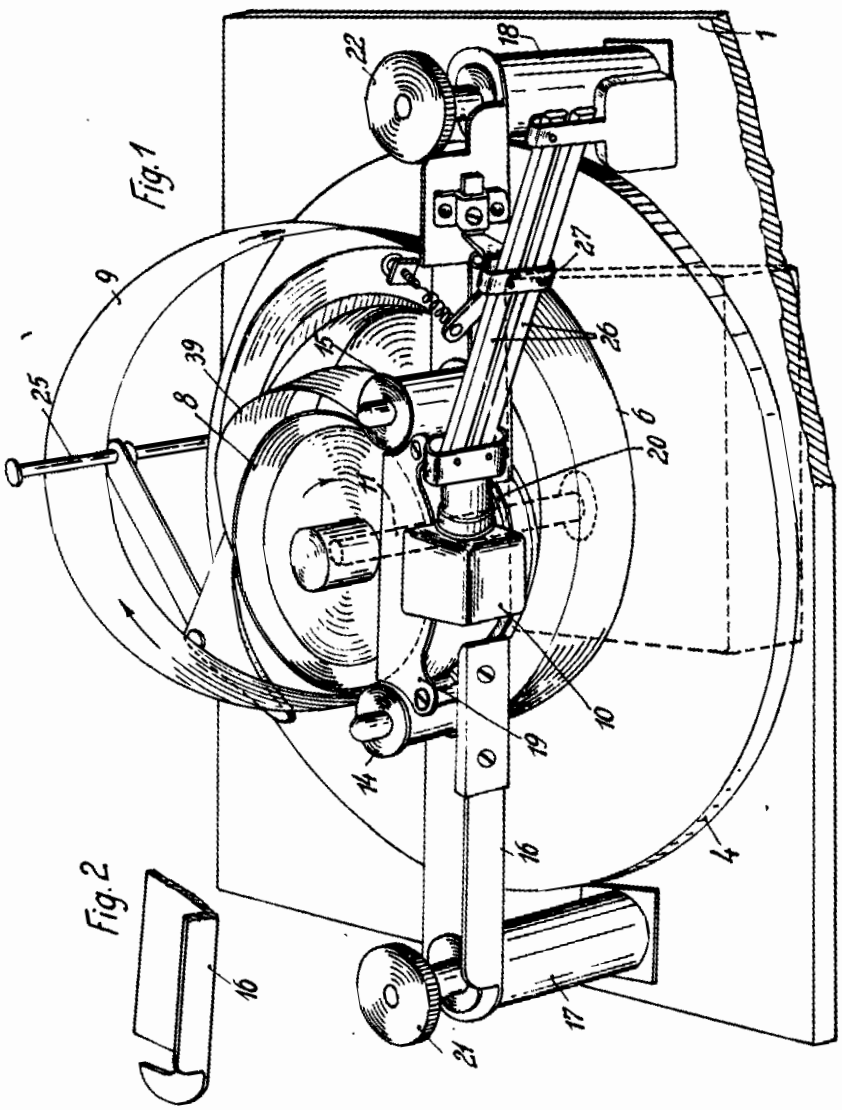


Fig. 2




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Fig. 3

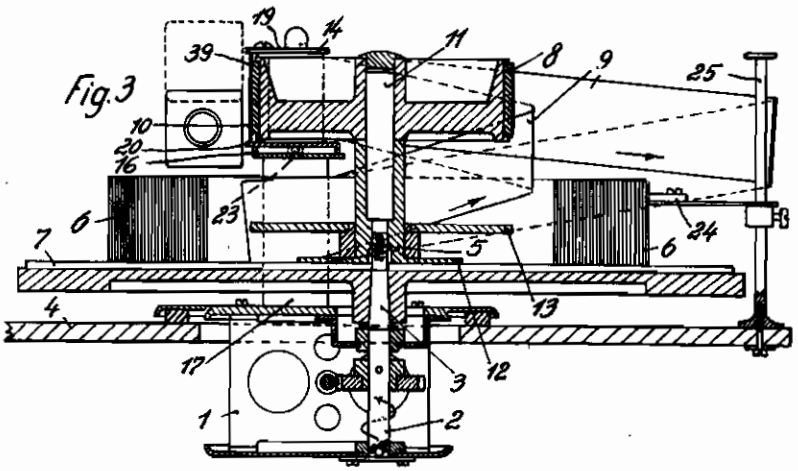


Fig. 4

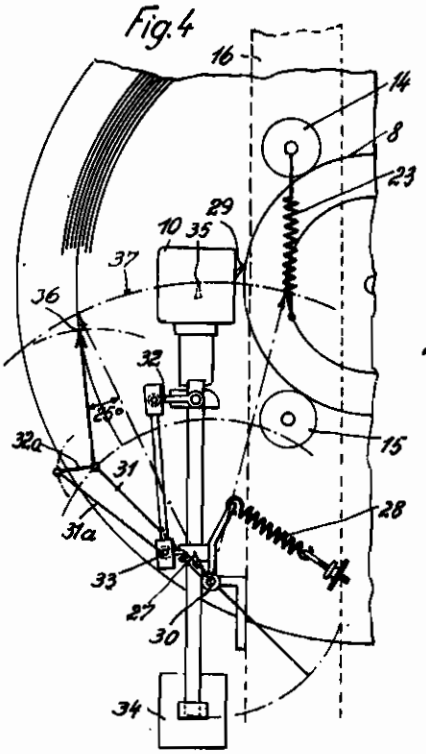


Fig. 5

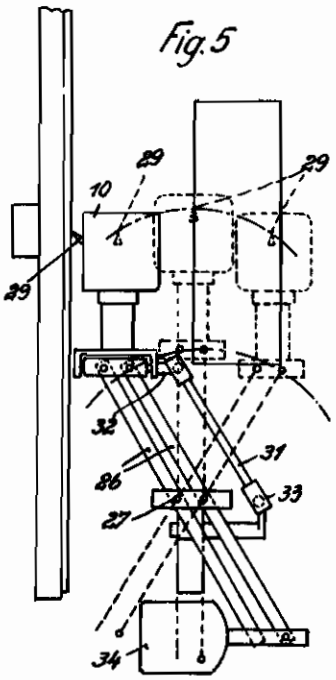


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Fig. 6

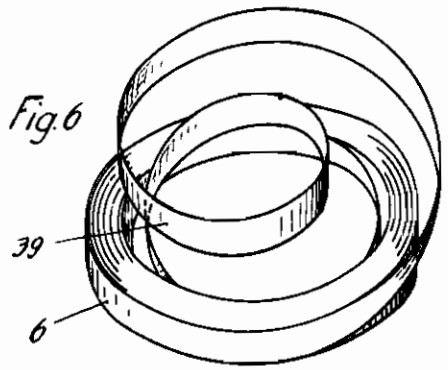



Fig. 7

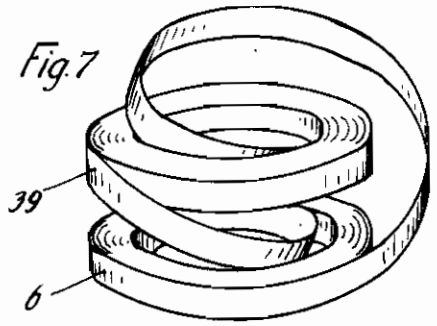
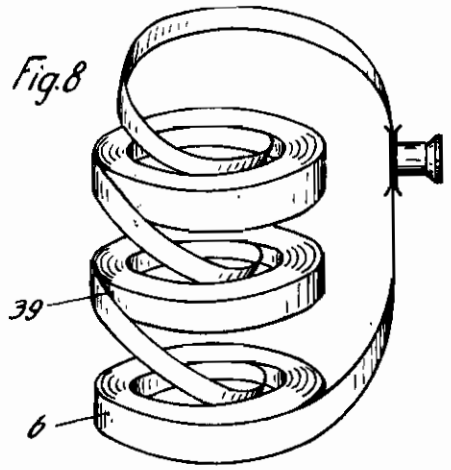



Fig. 8

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# ALIEN PROPERTY CUSTODIAN

## SPEAKING MACHINES

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vested in the Alien Property Custodian

Application filed May 14, 1941

The present invention relates to speaking machines or instruments provided with means for scanning a circular band.

It is well known that in film apparatus serving the purpose of recording and/or reproducing acoustic events the means for effecting tranquillization of the running off of the film must be particularly carefully constructed so that the quality of the acoustic events is not reduced by disturbances of a mechanical kind. To this purpose devices have been developed by which the film is to be led along the sound control point in a particular quiet or calm manner and which are formed as mechanical filters, brakes and the like.

Tranquillization of a film is rendered particularly difficult if the running off film is re-wound as circular film reel. This also is accompanied by a special consumption of power.

For this reason devices have been proposed for the re-winding of known circular films which with more or less expense are to allow a simple re-winding consuming little power.

However, hitherto the further problem has not yet been solved i. e. to re-wind free of objections circular films of substantial length for the purpose of sound recording and sound reproducing.

Now, the present invention is concerned with this problem which is solved by the fact that for re-winding a circular film two reels are concentrically arranged upon the axis of a disc record speaking machine one above the other, whereby for guiding the film the ordinary driving gear of the plate of the speaking machine and for scanning a speaking head guided in parallel are provided. Therefore, according to the invention a normal driving gear of disc records or a device of similar construction is used in such a manner that the plate, carrying the disc record, serves as support for the circular film and that the film is guided around a drum the axis of which forms the prolongation of the axis of the plate, carrying the disc record and which drum is directly driven by the axis of the plate so that the film, leaving the interior of the circular film reel and moving over the drum along the control point exteriorly runs upon the circular reel again.

This device allows in the most simple manner the re-winding of a circular film reel of considerable length (200 m) and simultaneously results in such a tranquillized running of the film at the point of control that special means for obtaining tranquillization of run at the point of control are superfluous.

Moreover, with a driving gear of the plate, supporting the disc record, making as usual 78 revolutions per minute, a film speed at the point of control of 10–80 cm per second may be obtained by using drums of different diameter for leading the film along this point of control without, thereby, influencing the run of the film, or the tranquillization of run, or rendering the demand of power larger than the power supplied by the plate driving gear for instance.

The fact that the demand of power for re-winding even the longest circular film reels may be so small is due to the peculiarity of the device, and the action is based on this that the film, running upon the outer edge of the circular film reel, tends to run faster with this film in accordance with the larger diameter and in this manner causes a pull which directly reacts upon the drum and tends to accelerate the speed of the latter. In this manner a mechanical back-coupling results so to say which is accompanied by an economy in output.

In the accompanying drawings one construction according to the invention is shown by way of example.

In these drawings:

Fig. 1 is a perspective view of the general construction of the device,

Fig. 2 is a perspective detail view of one end of a bridge shown in Fig. 1,

Fig. 3 is a vertical section on the line *a*—*b* in Fig. 1,

Fig. 4 is a plan view illustrating the movement of the control point in horizontal direction,

Fig. 5 is a view showing the movement of the control point in vertical direction, and

Figs. 6 to 8 show details of the reel formation.

As shown in Fig. 3 the plate 4, supporting the disc record is fixed by a cone 3 upon the shaft 2 of the motor 1 of a driving gear of a speaking machine. The prolongation of the shaft 2 has a left-hand thread 5 as is used in a manner known per se for fixing record foils for the purpose of sound recording.

To reduce as far as possible the friction of the individual layers of the circular film reel 6 it is of importance to arrange upon the plate 4 and between the latter and the reel 6 a plate 7 of glass or other hard and polished material.

The drum 8, serving to lead the film 9 along the control point 10, is, by means of the shaft 11 and the disc-like enlarged lower end 12 of the latter, fixed by means of the left-hand thread 5 centrically and free of shocks to the shaft 2 of the plate 4.

Besides the drum 8 a guide disc 13 is attached to the shaft 11 in the height of about one half

the width of the film. The disc 13 has about the same diameter as the drum 8 and serves to prevent that the film 9 running out of the circular reel 6 may eventually reach the shaft 11 which in the present case might disturb running off free of objections.

Upon the bridge 16, carrying the rollers 14 and 15 and the control member 10 and resting upon the posts or uprights 17 and 18, guide members 19 and 20 are mounted (Fig. 1) which serve to laterally guide the film 9 and cause an absolute rectilinear guidance of the film 9 along the control member 10.

After loosening the fixing screws 21 and 22, the bridge 16 may be turned around the post or upright 19 for the purpose of exchanging the film. As shown in Fig. 2 the bridge 16 is provided with a recess to allow removal from the post or upright 17.

The lower film reel 6 then lies perfectly free and may be removed as easy as a disc record for instance. The upper film reel is designated 39. The insertion is just as easy, because, after placing the film reel 6 upon the plate 4 carrying the disc 7, the film running out of the inner reel is, when the bridge is moved towards the operative position, arranged between the guide members 19 and 20 and on closing the bridge 16 is automatically brought into the proper position around the drum 8 by the rollers 14 and 15.

To ensure running off of the film between the guide members 19 and 20 around the drum 8 without causing compression of the film material, and also ensuring that the film perfectly rests upon the drum, the roller 14 at the running off side only is formed as a pressure roller which is drawn against the drum by a spring 23, whereas the roller 15 serves to closely guide the film 9 towards the drum 8 only.

Preferably the upper surface of the drum 8 is coated with gum in a manner known per se to ensure good driving of the film.

To warrant a rather concentric rotation of the circular film reel 6 about the shaft 11 an adjustable finger 24 is provided against which the film reel bears with slight pressure during rotation. As the friction is very slight, the use of rollers is not necessary here.

Only for reels of greatest length of film (from about 150 m upward) a roller preferably is provided at the holding rod 25 for guiding the film round the latter.

As the control member 10 for scanning of films or disc records must be properly guided vertically as well as horizontally a specially constructed holder 26 is provided.

The holder 26 acts in the manner of a weighing table for the vertical scanning. The pivot of the weighing table is located at 27 and the weight of the control member 10 is balanced by the counter weight 34. By means of a spring 28, a needle 29 serving for film scanning is slightly pressed against the film and thereby is guided for instance in the groove out in the film.

For horizontal scanning, the control head 10 is turned about 90° so that for instance the needle 29 comes to rest upon the disc record. The pivot of the holder 26 is now located at 30 and a link 31 with a lever 32 at the control head 10 and the pivot 33 causes that for instance the needle 29 in the groove of the disc record always is located in the direction of the tangent to the diameter, when moving over the disc record.

This is represented in Fig. 4 in which the needle 29 is shown at 35 in the position at the inner radius of the disc record, whereas this is indicated at 36 at the outer radius with a diagrammatic view of the leverage 31*a*/32*a*. It is to be seen that for this way the correction of the position of the needle with regard to the tangent would amount to about 25° relatively to the position over the way 37 which the needle would perform, if the pivot of the holder 26 would be at 30 and the holder would be rigidly connected to the control head 10.

The rectilinear guidance of the sound control point 10 along the film 9 is of particular importance, if magnetic or photographic records come into consideration as these are effected by means of magnetic or optical gaps and hereby an inclined position of the scanning gap relatively to a straight record would cause a considerable sound distortion. For scanning a sound groove by means of a needle it is not so critical, if the length of the way from the point of the needle 29 to the pivot 30 or 27 respectively is rather large, because the point of the needle is punctiformly guided in the groove.

This is known from the usual sound take off device for disc records.

If the holder for the control head is positively guided, then by employing corresponding control heads, the device may be used for recording and reproducing acoustic events in accordance with all known methods for recording and reproducing.

A substantial advantage of the invention consists in the fact that practically no upper limits exist for the length of the reel as may be gathered from the following consideration.

In the drawing in Figs. 1 and 3 the second reel 39 located above the first reel clearly is to be seen. The reel 39 is concentrically located above the reel 6. This second reel 39 rolls off about the drum 8. It consists of one winding only which, when being considered from above, represents a closed winding and, therefore, technically must be designated as a reel, because a reel begins with the first layer and, therefore, may be of one layer only and yet be a reel. Fig. 6 represents this formation. Of course, this second reel may also be of several layers and yet the rewinding of the endless film is possible free of objections, as has been shown by tests (Fig. 7). From these tests the possibility results that reels of any desired number of layers may be arranged one above the other to re-wind endless films of any desired length, for instance to produce picture recording cameras in which a single loading with film in the dark room is sufficient for an uninterrupted time of taking pictures of several hours (see Fig. 8). This serves to further explain the device claimed in the main claim.

Finally, a special peculiarity in the concentric arrangement of reel layers of an endless film one above the other is, that even with films having an upper surface sensitive to friction, for instance a light sensitive layer, this upper surface is not subjected to the danger of a strong wear and means for protecting such surfaces, such for instance, as forming the subject matter of older patents are rendered superfluous with the arrangement according to the present invention.

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