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W. HAGEMANN

MAGNETIC PHONOGRAPH

Filed May 29, 1922

Fig.1.

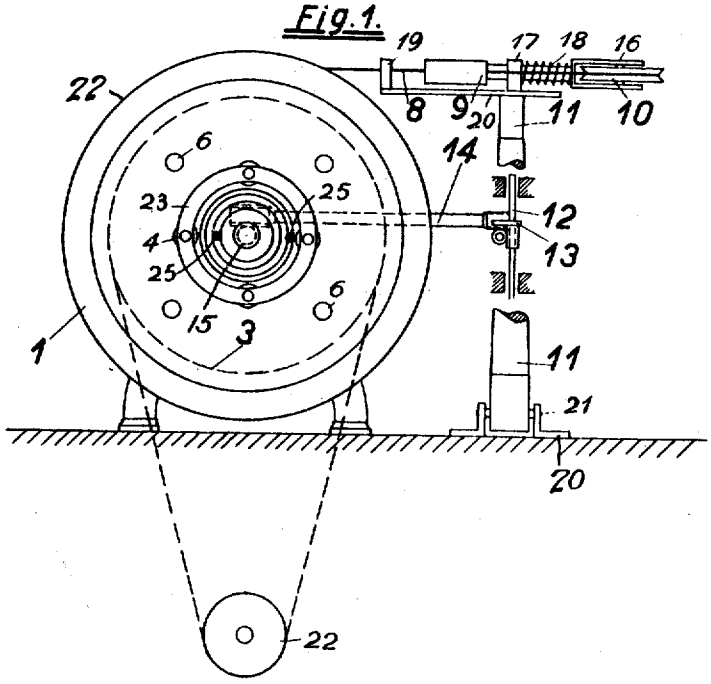
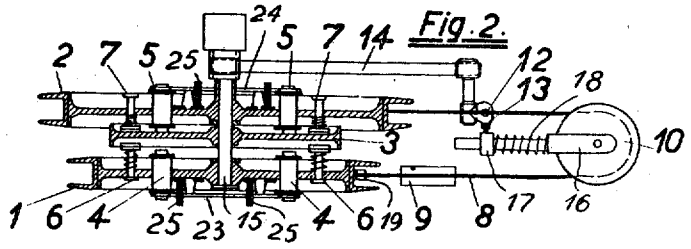


Fig.2.



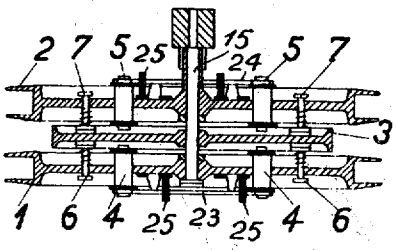


Fig.3.

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UNITED STATES PATENT OFFICE.

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MAGNETIC PHONOGRAPH.

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To all whom it may concern:

Be it known that I, WALDEMAR HAGEMANN, a citizen of the Republic of Germany, residing at Berlin-Lichterfelde, Germany, have invented certain Improvements in Magnetic Phonographs, of which the following is a specification.

Phonographs of the Poulsen type, in which the sound vibrations are recorded magnetically upon a fine traveling steel wire, depend, for the strength and the purity with which the sounds are reproduced, on the speed of the wire: the higher the speed of the wire, within certain limits, the better the reproduction. Good results have not so far been obtained with a speed lower than three metres per second. As the machine may be required to reproduce a speech of half an hour's or an hour's duration, it is evident that a wire about 10,000 metres long and of considerable weight would be required for this purpose. The manipulation of such a bulk moving at a high speed, is connected with difficulties, particularly when the machine is used for dictating purposes and has to be handled by a technically untrained office staff. It is essential, therefore, that the wire reels and their operating mechanism should be constructed with great care so that a sudden stoppage and reversal of the movement can be accomplished with ease and certainty. It is moreover essential that mechanical vibrations and consequent extraneous noises should be eliminated, and this is hardly possible with the usual small reels of about 10 cm. diameter which have to revolve with a great velocity and which therefore are apt to set up vibrations, in the bearings, that interfere with and hinder the recording and the reproduction of the sounds.

The object of the present invention is to produce an apparatus of this kind by means of which the wire can be run at the necessary speed without causing mechanical vibrations and without involving difficulties in the manipulation of the machine, and the invention consists in arranging two reels loosely on the same shaft, one at each side of a loose driving pulley to which either can be coupled by a slight axial, relative displacement, the wire being led over a guide pulley from the loose reel to the one coupled to the driving pulley. Means are provided for an automatic braking of the reels as soon as the coupling is released.

By this arrangement the reels can be made large enough to produce a wire motion of about 3 metres per second at a reel speed of from 3 to 4 revolutions per second. At this speed there will be no detrimental mechanical vibrations, and a sudden stoppage and reversal of the reels can be effected without jerks and without undue strain on the wire and on the mechanism.

In the accompanying drawings the invention is illustrated by way of example,

Fig. 1 representing a side view of the arrangement, partly in section, and

Figs. 2 and 3, horizontal sections of slightly different constructions of the same, showing the driving pulley in different positions.

Two wire reels 1 and 2 are rotatably but not slidably arranged on a rigidly supported shaft 15 at opposite sides of a driving pulley 3 which is capable of rotary as well as of a slight axial movement. The sound-recording wire 8 is led over a guide pulley 10 from one reel to the other and passes through a magnetic element 9 by means of which the sound is recorded and reproduced. The pulley 10 is held in a fork 16 the stem of which is slidably guided in a bracket 17, a spring 18 being arranged on the stem so as to support the pulley and keep the wire in uniform tension. The element 9, together with the bracket 17 and wire guides 19 are carried by a base plate 20 which is secured to the free end of a supporting arm 11 which is pivoted at 21 so that it can be oscillated for coiling the wire uniformly on the receiving reel. The arm 11 is oscillated by a heart-shaped cam 13 which revolves with a shaft 12, motion being imparted to the latter from the shaft 15 by means of a shaft 14 and suitable gears.

A driving pulley 3 receives motion direct from a motor 22 and can be coupled to either reel for winding the wire onto it, the other pulley being rotated in the opposite direction by the unwinding of the wire. The coupling of the driving pulley to either reel is preferably effected by means of axially arranged electro-magnets mounted symmetrically in the reels, the pulley 3 is made entirely or partly of iron so as to be attracted to the reel whose magnets are energized. The magnets 4 of the reel 1 are connected to a ring 23, and the magnets 5 of the reel 2, to a ring 24. The windings of the magnets are connected to terminals 25 to which current is

supplied by means of suitable sliding contacts. The reel 1 is also fitted with friction elements 6, and the reel 2 with similar elements 7. These friction elements, which are shaped like buffers, are actuated by springs and bear normally, with slight pressure, against the driving pulley 3 so that the reels, whose movements are opposed and interdependent, are held stationary by the pulley. If one set of magnets is energized, however, the pulley will be attracted thereto, as shown in Fig. 2, and applied to one set of its friction elements with increased force, the frictional hold of the opposite friction elements being weakened or released so that the reels can rotate, one with the pulley and the other in the opposite direction. As soon as the magnets are switched off, the pulley moves back to the position shown in Fig. 3 and stops the movement of the reels. Even if the current is switched off direct from one set of magnets onto the other, the stopping and reversal of the movement of the electric motor 22 thus controlled, though quick, will be sufficiently gradual for eliminating any jerks or any overstraining of the wire.

The slightly increased tension on the wire, and consequent adjustment of the pulley 10 in opposition to the spring 18, at the stopping of the reels, can be utilized for the operation of additional brakes controlled by means of levers from the fork 16. The reels may be adapted for axial displacement instead of the driving pulley, and the friction elements as well as the magnets may be connected to the pulley instead of to the reels with the same result.

The reels 1 and 2 can be of different sizes, and may be provided with detachable, flanged rims in which to accommodate the wire. Such a construction is shown in Fig. 2.

Constructed according to the invention, the apparatus, besides being noiseless in operation, will require very little driving power.

I claim:—

1. A magnetic phonograph having two revolubly mounted reels adapted to carry the record wire, a revolubly mounted driven member, friction means carried by said reels and adapted to normally restrain any movement thereof relative to said driven member, and means adapted to move said driven member with respect to said reels so as to increase the hold of said friction means on one of said reels and decrease it on the other.

2. A magnetic phonograph having two revolubly mounted reels adapted to carry the record wire, friction means carried by said reels and adapted to normally restrain the movement thereof, a revolubly mounted driven member adapted to positively drive one of the said reels at a time, the movement of said driven member to positively drive one of said reels being adapted to cause the lessening of the frictional hold of said friction means on that reel which is not being positively driven.

3. A magnetic phonograph having a stationary shaft, two separated reels revolubly mounted on the said stationary shaft and adapted to carry a record wire, guiding means for the said record wire located intermediate said reels, the said wire being adapted to be so wound on the said reels that if one of said reels is revolved so as to wind up the record wire, the other reel is caused to revolve in the opposite direction, a driving pulley revolubly mounted on the said shaft intermediate the said reels and means mounted on said reels and cooperable with said driving pulley for rotation of the reels and means adapted to laterally move the said pulley on the said shaft so as to cause it to engage either one of said reels and cause the positive actuation thereof.

4. A magnetic phonograph having a stationary shaft, two revoluble reels adapted to carry the record wire and mounted on the said shaft, each of said reels having electromagnetic means connected thereto, a driving pulley mounted on the said stationary shaft intermediate the said reels and made of iron or the like, the said pulley being adapted to move on the said shaft when it is attracted by the electro-magnetic means on one of said reels, the said pulley cooperable with means for engaging the reel towards which it is actuated to cause the revolution of the said wheel.

5. A magnetic phonograph having a stationary shaft, two separated reels revolubly mounted on the said stationary shaft and adapted to carry a record wire, guiding means for the said record wire located intermediate said reels the said wire being adapted to be so wound on the said reels that if one of said reels is revolved so as to wind up the record wire, the other reel is caused to revolve in the opposite direction, and a driving pulley revolubly mounted on the reel shaft.

WALDEMAR HAGEMANN.

Witnesses:
E. HOLTZERMAN,
ARTHUR SCHROEDER.