June 29, 1937. L. NEUMANN 2,085,383

SOUND RECORDING AND REPRODUCING MACHINE

Filed Feb. 23, 1933 2 Sheets-Sheet 1

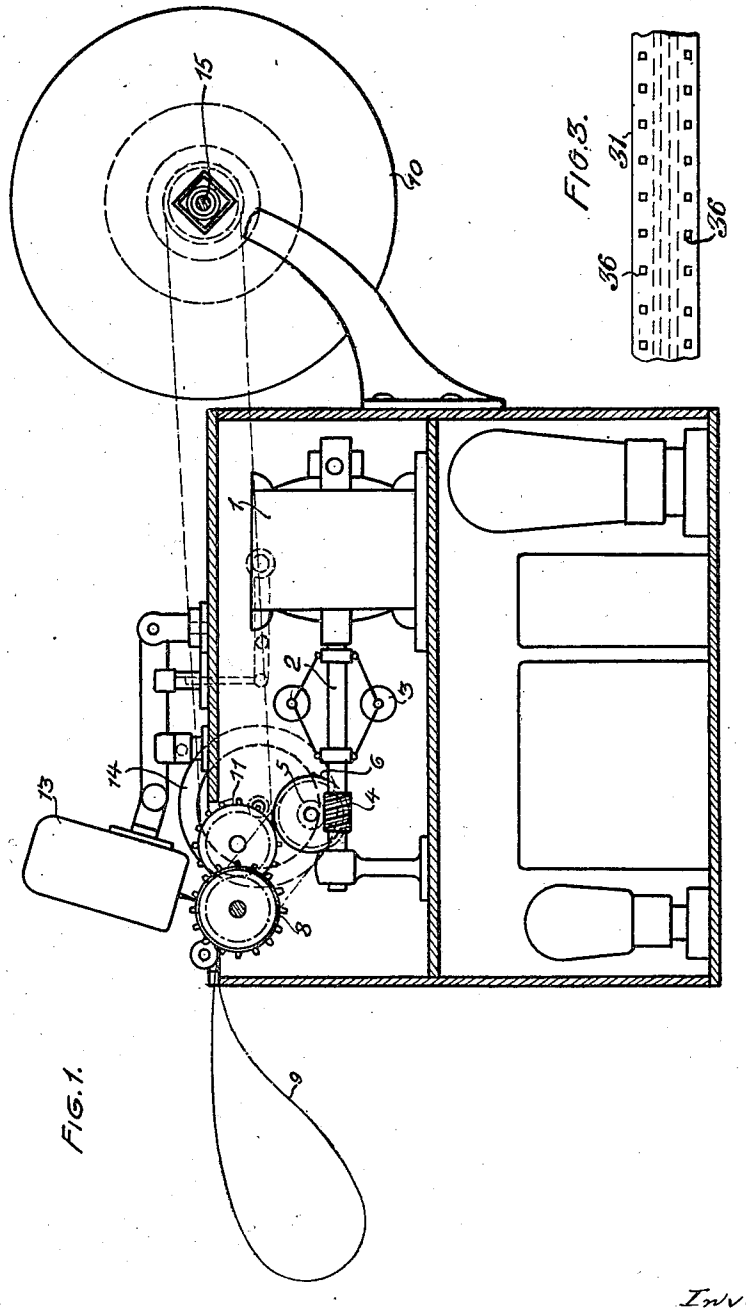


FIG. 1.

FIG. 3.



FIG. 4.

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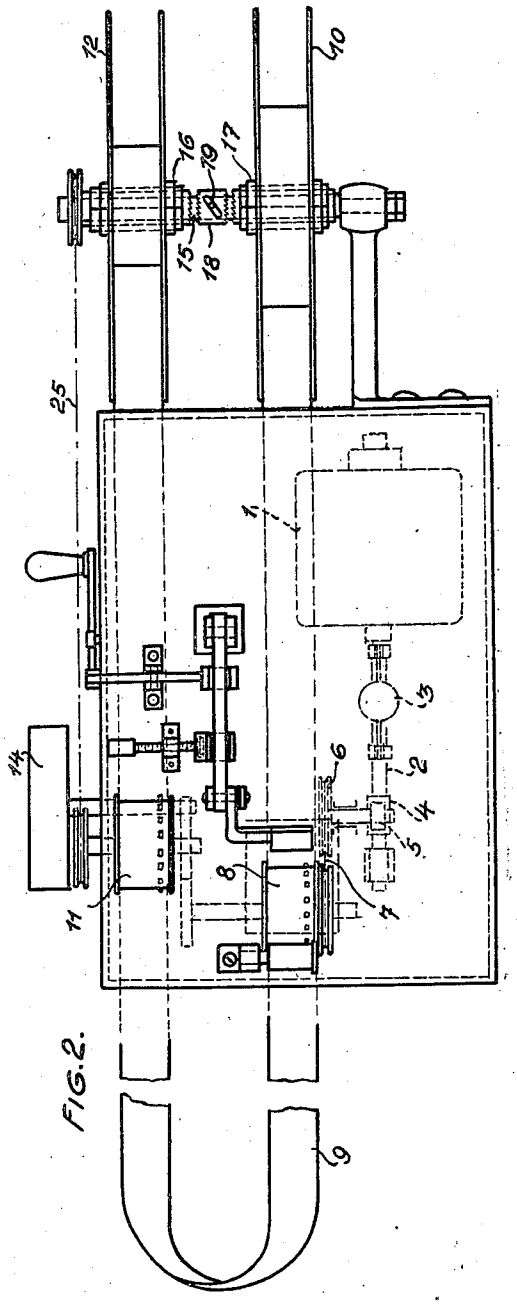


FIG. 2.

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Patented June 29, 1937

2,085,383

UNITED STATES PATENT OFFICE

2,085,383

SOUND RECORDING AND REPRODUCING MACHINE

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Application February 23, 1933, Serial No. 658,226
In Austria February 29, 1932

1 Claim. (Cl. 274—43)

This invention relates to improvements in sound record carriers for dictation machines with mechanical sound recording and reproduction.

The objects and nature of the invention will be clearly understood from the following description taken in connection with the accompanying drawings in which Figs. 1 and 2 show a dictaphone in longitudinal section and in plan view respectively. Fig. 3 is a plan view of the corresponding tape-like sound wave record carrier. Fig. 4 is a cross-sectional view of sound wave record carrier on an enlarged scale.

The arrangement is operated by a motor 1 on the shaft 2 of which is mounted a regulator for keeping constant the number of revolutions. A worm 4, secured to the shaft and meshing with a worm wheel 5, drives a belt pulley 6 which by means of a belt 7 drives a sprocket wheel 8 for feeding the recording or reproduction band 9. The perforations, extending along each side of the band 9, are engaged by the teeth or sprockets of the sprocket wheels 8 and 11. The band 9 passes from the drum 10 to the sprocket wheel 8, makes a loop and passes to the sprocket wheel 11, which is driven by the wheel 6 by way of toothed wheels mounted on the same shaft, and from the wheel 11 the said band passes to a drum 12, which is rotated by a belt drive. By means of a pinion, the feed wheel 11 rotates a flywheel 14, thereby providing for a uniform feed of the band. A pick-up 15, for recording and reproducing, bears with its needle on the band upon the wheel 6. During the recording, the pick-up is connected to the lead-out of an amplifier, arranged in the apparatus. When the band has been fed for one length, the direction of rotation of the motor is reversed and the band fed in the opposite direction so that the sound waves may be recorded lengthwise parallel to the sound waves first recorded. However for this purpose, the band-drum hitherto driven must be released, and the hitherto idle drum be driven. An automatic coupling comprises a hollow shaft mounted on a fixed shaft 15 and rotated by means of a belt drive 25. Two exteriorly square-section bosses 16, 17 for the band-drum are mounted on the hollow shaft. These bosses are freely rotatable on said hollow shaft but they are secured against axial movement by pins, screwed into said bearings and engaging annular grooves in the hollow shaft. Claws on the sides of the bearings facing each other are adapted to co-operate with corresponding claws of a coupling sleeve 18 mounted on the shaft between both bearings. This sleeve is provided with an inclined slot, which is engaged by a pin 19 fixed to the hollow shaft. When the latter is rotating, the sleeve 18 moves in the direction of an axial component generated by the pin 19 engaging said inclined slot. In view of this movement, the claws at one side of the coupling sleeve engage the claws of one of the drum bosses, thereby rotating the same. When reversing the direction of rotation of the hollow shaft, the direction of the axial component will be varied accordingly, so that the coupling sleeve engages the other drum boss and thus rotates the same in the opposite direction.

An essential feature of the present invention consists in that the band 31 is made of gelatine which may have perforations 36 therein. Up to now gelatine-bands have not been used because, when they are used for talking films, they are developed and thus treated with liquids, a treatment which they cannot stand in view of their solubility in water, while according to the present invention the band is immediately ready for reproduction after the recording operation without any treatment whatever. Further it is known to use gelatine for plates or rollers. However it is new to use the gelatine in the form of a band and it has been found that this band is sufficiently strong. The use of gelatine in the shape of a band establishes new possibilities for the automatic recording and reproduction of sounds, because only by the band-shape is the necessary capacity given and gelatine is the only material of any practical use. Cellon and celluloid are too hard. In the case of sound recording and reproducing machines, the use of gelatine is of advantage because it is not necessary to resort to a hardening process between the recording operation and the reproduction operation, so that the apparatus is suitable for use in offices in view of its handiness and speed.

It is of particular advantage to make the sound-waves carrier in the form of a foil-band. The sound-waves are applied by cutting grooves into the tape-shaped sound-waves carriers of considerable thickness. Therefore in this case the thickness of the material underneath the groove is smaller than the thickness of the band. The noise caused by the stylus in such records is comparatively loud, because, when cutting the grooves, particles of material become loosened. The pressure of the stylus on the band is comparatively slight if foil-bands according to the invention are used for the record. In the case of foil-bands, the grooves are formed by pressure, indenting or impression. The thickness of material is the same underneath the sound-wave

groove as it is at the smooth parts of the band. The stylus always slides on a smooth surface on the band, so that stylus-noises are obviated, because the material is not cut but deformed. A further advantage of the use of foils is their small weight. Further, foil-bands can be rolled far easier than thick bands, so that they constitute an improved and inexpensive recording material for talking machines. Even in the case of very thin foils, the strength of the same is quite sufficient.

The sound-waves groove **45** is impressed in the foil-band **44** (Fig. 4) by the stylus of the pick-up box. The band is of the same thickness throughout, even underneath the groove, because the records are made mainly by impression. The grooves are deep and rigid and are directly pressed out in the case of ductile material. The grooves are easily formed in view of the small resistance of the material. Metals particularly aluminium, and further non-metallic materials for instance celluloid, cellon, gelatine and so forth are suited for the band.

Under the term foils are to be understood bands of a thickness of less than 0,2 millimetre. Foils of a slightly smaller thickness than 0,1 millimetre have proven to be of particular advantage. Foils of this thickness can be readily rolled, they are sufficiently strong and possess durable and readily made sound-wave grooves. Even foils of a thickness of 0,02 to 0,03 millimetre are adapted for use.

What I claim is:—

A sound record carrier for dictation machines with mechanical sound recording and reproduction consisting entirely of an unhardened gelatin band with a thickness less than 0.2 mm. and having at least one groove formed therein by the dictation machine, the band being capable of reproduction in the dictation machine in the unhardened state.

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