

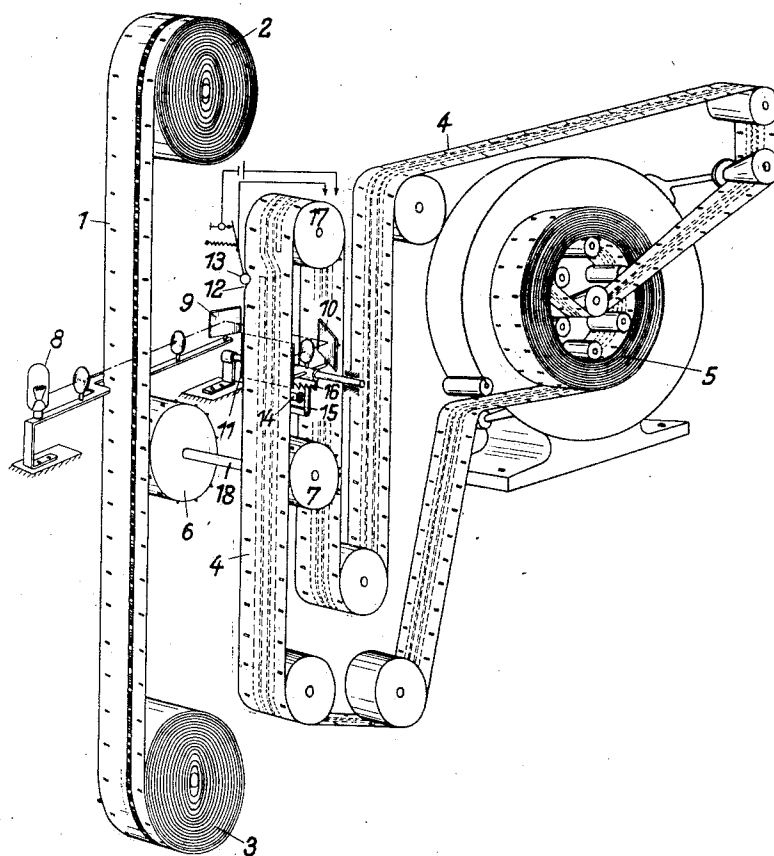
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D. VON MIHÁLY

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APPARATUS FOR PRINTING PHOTOGRAPHIC SOUND RECORDS

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Inventor:

Dénes von Mihály

By Bailey & Larson

Attorneys

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APPARATUS FOR PRINTING PHOTOGRAPHIC SOUND RECORDS

Dénes von Mihály, Berlin-Wilmersdorf, Germany,
 assignor of six-tenths to the firm Julius Pintsch
 Aktiengesellschaft, Berlin, Germany

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This invention relates to an apparatus for printing photographic sound records.

There have been two possibilities for providing endless bands of film with a plurality of parallel sound tracks from which a long musical piece or several shorter ones can be reproduced continuously, i. e., (a) the direct recording on the film band by means of a narrow light beam acting upon the film and controlled by the microphone currents, and (b) the transfer of a phonographic or photographic record from a disc or from a film onto the endless film by means of a narrow light beam acting upon the film and controlled by a reproducing device cooperating with said disc.

However both said possibilities have many disadvantages. The direct recording involves high expenses; moreover, in case that the cheaper and fireproof narrow film is to be used, it offers also technical difficulties due to the reduced size of the sound record and to the increased light losses caused thereby. With the transfer of disc records all defects caused by the imperfectness of the mechanical production of sound records on the disc are transmitted onto the photographic record, and further defects are added by the transmitting means; besides the transmission takes much time since it can not be effected more quickly than an audible reproduction of the original sound record. The transfer of a photographic record in one track by reproducing and recording has similar disadvantages.

The object of this invention is to produce a sound record consisting of a plurality of subsequent parallel sound tracks on an endless band of film by printing from a sound record consisting of a single track. Herewith the original film record is transferred onto the endless band of film may be at a reduced scale in case of using a narrow film for the endless band but otherwise entirely unchanged and without additional defects; and the transfer takes only a little part of the time which would be necessary for reproducing and again recording the sounds since here the film can be illuminated through a much larger gate than with recording. For the same reason this method enables to use a narrow film for the endless band without impairing the quality of the sound record.

A further object of the invention is to subdivide the single track of the original sound record on the primary film into a plurality of subsequent parallel tracks on the endless secondary film by causing intermittent relative movements between the secondary film and the printing light beam

in a direction transversely of the film while the film is repeatedly passed through said light beam in the same lengthwise direction.

A further object of the invention is to provide means controlled by one of the films for causing the lateral relative movements between the film and the printing light beam. If the control of the lateral relative movements should be effected by the primary film then this film has to be provided with suitable control means, like notches or perforations, at intervals corresponding to the length of the secondary film; should the control be effected by the secondary film, then a single notch or the like in this film is sufficient.

With optical printing it is advantageous to effect the relative lateral displacement between the film and the printing light beam by moving said light beam; while with contact printing one of the two films has to be moved laterally at the predetermined intervals.

In the drawing a printing apparatus according to the invention is illustrated diagrammatically.

The primary film 1 provided with a sound record in a single track is withdrawn from the spool 2 by means of the sprocket 6 guided through the light beam of the light source 8 and wound upon the spool 3. The endless band of film 4 is withdrawn from the coil 5 at the inner convolutions thereof by the one side of the sprocket 7, is then guided by the rollers 17 in a loop to the other side of the sprocket and back to the coil, and is paid on the coil at the outer convolutions thereof. The sprockets 6 and 7 are mounted upon and driven by a common axis 18, so that relative lengthwise oscillations between the two films can not arise which is particularly important if the endless band is a narrow film and the reduced dimensions of the sound record printed upon it involve an increased uniformity of the movement of the films.

The primary film is traversed by the light of the light source 8, and the light beam is reflected onto the secondary film by the mirrors 9 and 10 through a mask 11. This mask is provided with an opening the width of which is equal to the width of the single sound tracks to be printed upon the film 4.

The mirror 10 and the gate 11 are mounted upon a shiftable support 19 which is secured to the ratchet bar 16 and engaging this bar in the pawl 15. This pawl forms the armature of the electromagnet 14 in the circuit of which there is a contact 13 which glides on the edge of the film 4. In the edge of the film 4 a notch 12 is provided. As soon as the notch 12 passes the

contact 13, this contact closes the circuit of the magnet 14 which attracts the pawl 15. Thereby the ratchet bar 16 and the support 19 are shifted in a direction transversely of the film 4, and with them also the mirror 10 and the mask 11. Thereby the printing light beam is shifted laterally and directed to the next track to be printed on the film.

This method enables, f. e., to transfer a sound record from a primary film of 1200 m. length onto an endless band if narrow film of 30 m. length in the form of 40 subsequent sound tracks running round the film in parallel to the edges of the film, the adjacent sound tracks being connected by bridging portions provided at one point of the film. It is obvious that the sound record on the endless film can also be combined of the sound records of several different primary films, or that each one of several sound records recorded in single parallel tracks on the primary film may thus be transferred onto the endless film. To enable to select the desired sound record on the primary film, the support carrying the light source and the mirror 9 may be also shiftable transversely of the film 1.

Of course the apparatus according to the invention can also be used for transferring a sound record recorded in several adjacent sound tracks on an endless film onto a film with two ends in form of a single sound track, this process being the inversion of the above described process. For this purpose only the direction of the printing light beam has to be reversed.

Having now particularly described and ascertained the nature of my invention and in what manner the same is to be performed I declare that what I claim is:

1. In a film printing apparatus, a primary film having sound records recorded thereon, a source of light for passing a beam of light through said records, an endless strip of secondary film, means for deflecting said beam after the same has passed through said primary film, means for moving said secondary film continuously through said deflected beam, and means for shifting the position of said deflecting means transversely to the direction of movement of said secondary film.

2. In a film printing apparatus, a primary film having sound records recorded thereon, a source of light for passing a beam of light through said records, an endless strip of secondary film, optical means for deflecting said beam after the same has passed through said records, means for moving said secondary film repeatedly and continuously through said deflected beam, a mechanism for shifting the position of said deflecting means transversely to the direction of movement of said

secondary film after every substantially complete passage of said secondary film through said deflected beam, and means on one of said films and being movable therewith for controlling said mechanism.

3. In a film printing apparatus, a primary film having sound records recorded thereon in single tracks, a source of light directing a beam of light through a sound track of said primary film, means for moving said primary film through said beam, an unexposed endless strip of secondary film, means for deflecting the beam onto said secondary film after said beam has passed through said primary film, means for confining the cross-sectional area of said deflected beam, means for moving said secondary film repeatedly and continuously through said deflected beam, means for shifting the position of said deflecting means and said confining means transversely to the direction of movement of said secondary film after every substantially complete passage of said secondary film through said deflected beam, means on one of said films and movable therewith for controlling said shifting means, and means for maintaining a constant ratio of speed between said films.

4. In a film printing apparatus, a primary film having sound records recorded thereon in single tracks, a source of light directing a beam of light through a sound track of said primary film, means for moving said primary film in longitudinal direction through said beam and for preventing transverse movement of said primary film, an unexposed endless strip of secondary film, means for deflecting the beam onto said secondary film comprising at least two reflectors, said reflectors being positioned relative to each other so that the incident beam coming from said light source, passing through said primary film and striking one of said reflectors is parallel to the reflected beam emitted from the other reflector and striking said secondary film, means for moving said secondary film repeatedly and continuously in longitudinal direction through the reflected beam and for preventing transverse movement of said secondary film, means for confining the cross-sectional area of said reflected beam, means for maintaining a constant ratio of speed between said films, means for shifting the position of one of said reflectors and said confining means intermittently and transversely to the direction of movement of said secondary film through said reflected beam, said shifting means including an electro-magnetic element and means on one of said films and movable therewith for controlling said element.

DÉNES VON MIHÁLY.