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LIGHT STOP FOR SOUND RECORDING

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FIG. 1.

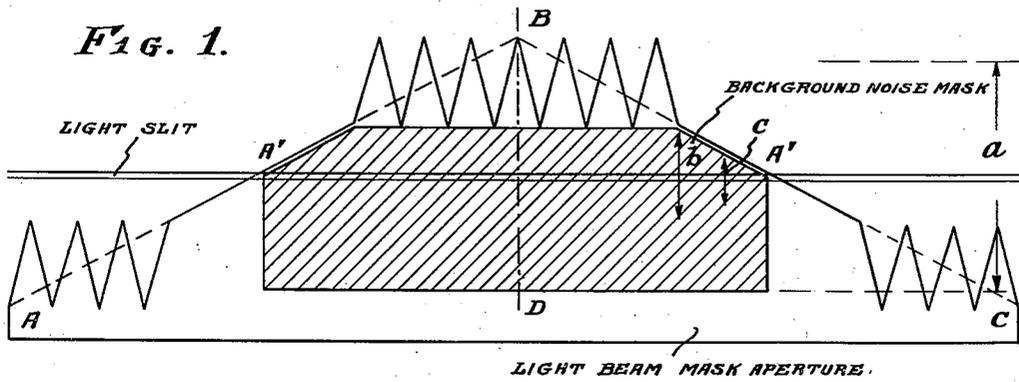


FIG. 2. I

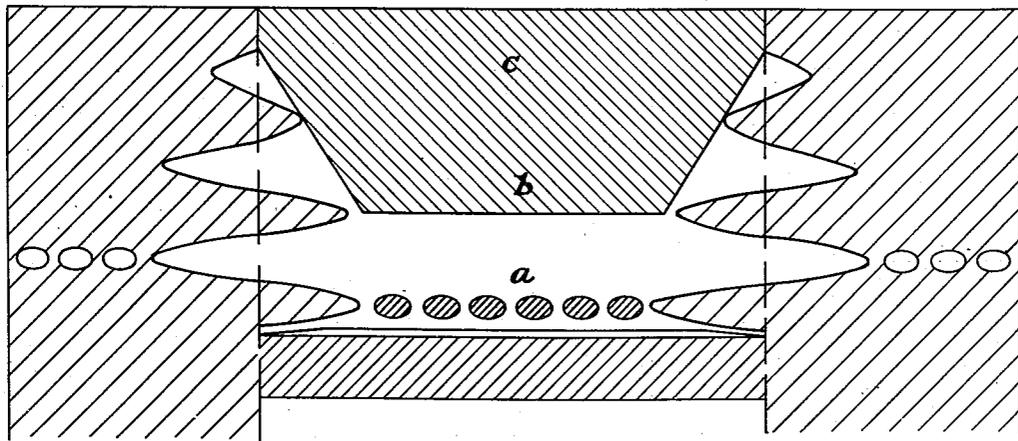
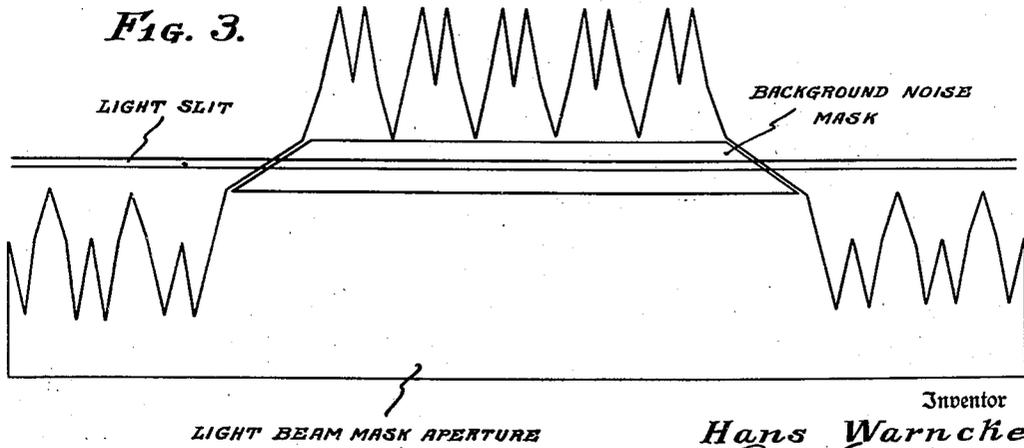


FIG. 3.



LIGHT BEAM MASK APERTURE

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# UNITED STATES PATENT OFFICE

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## LIGHT STOP FOR SOUND RECORDING

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4 Claims. (Cl. 179—100.3)

The invention relates to a light stop by means of which a sound record can be produced such that at small amplitudes the recording is obtained in two sound tracks, and at large amplitudes in a greater number of sound tracks.

A light stop is already known which for the purpose of recording a talking film operates in accordance with the known method of zero line displacement, and whereby at small amplitudes the recording is carried out in a single sound track, and at large amplitudes however, in a greater number of sound tracks. Such an arrangement is disclosed by Peterson Patent 1,997,976. This arrangement has the disadvantage that at large amplitudes the troughs are liable to become blurred.

The present invention relates to a light stop and indicates a method and arrangements for recording a film whereby this disadvantage is eliminated.

With the light stop according to the invention, it is possible to record a film without back ground noise as well as to provide a record on a normal film. For the production of a film without back ground noise, the known principle of recording by means of variable area is employed.

A linear as well as non-linear record can be produced with the light stop according to the invention. In this connection, it should be borne in mind that at non-linear recording the light stop is to be such that through proper choice of the length of the reproducing slot, a linear reproduction can still be attained.

With the light stop according to the invention, such a record can be obtained that at large amplitudes the recording takes place in several sound tracks such that the zero line of these additional sound tracks is displaced.

Furthermore, with the light stop according to the invention a sound record can be produced that is free of back ground noise whereby the light stop method and the method of zero line displacement are used in combination. At small amplitudes the variable area recording method is used, and at large amplitudes the zero line displacement.

The invention will now be explained in connection with the drawing, of which

Fig. 1 shows a recording slot and a light stop arranged in accordance with the invention.

Fig. 2 is an explanatory diagram relating to a sound record produced by means of such a light stop, and

Fig. 3 shows a modification of the light stop. The light stop or mask shown in Fig. 1 is de-

rived from the ordinary triangular light stop A, B, C. The triangle cut away at the top is divided into several smaller triangles, in the present case into seven triangles. In the embodiment shown, the triangles have the same size. This is, however, not an absolute necessity but simply incidental to the particular light stop represented. Thus, the individual small triangles may vary in size the prerequisite condition being only that a linear record can be attained. The two lower portions of the edges of the original triangle A, B, C are likewise divided into a plurality of triangles, for which the same is true as explained in connection with the division at the top of the original triangle. In order to obtain a linear recording with this light stop, it is necessary that the sum of the jags at the top of the light stop be equal to the sum of the jags at the lower edges of the triangle. The position of the light stop as indicated is the zero position. The light stop can cover up the record in the manner shown in the drawing. However, the light stop need not necessarily have the shape shown. But it will be of advantage to match it with the center of the controlling light stop. The light stop is symmetrical to the center line B D of the original triangle.

Fig. 2 shows a record produced with the light stop according to Fig. 1. Three different amplitudes are drawn, namely *c*, *b*, *a* and which are also drawn up in a corresponding manner in Fig. 1. At zero amplitude the background light stop or mask intercepts all light projected upon the film from the controlling light stop. At the small amplitude *c*, the controlling light stop is oscillated transversely of the light slit and its edges oscillate about the two center lines I, II of the record. The intercepting or background noise light stop moves backwards in a corresponding manner being activated in accordance with the volume of the sound as set forth in McDowell Patent 1,855,197, for example. Hence at small amplitudes, the recording is carried out in two sound tracks such that the surface of the film situated between the two center lines I, II, and which is not taken up by the record, is covered up by the background light stop. When the amplitude or volume assumes the value *b*, the recording is likewise still being carried out in two sound tracks. However, as soon as the amplitude or volume assumes a higher value such as *a*, the recording will be carried out in a greater number of sound tracks. As soon as the amplitude or volume has attained such value that the recording takes place in a greater number of

sound tracks, the background light stop is completely removed from the reproducing slot.

When recording with a light stop according to Fig. 1, it may be of advantage eventually to carry out a recording with non-linear characteristic. This can be accomplished in that the light stop according to Fig. 1 be extended on both sides and this symmetrically with respect to the center line B D. This is suitably done by increasing the number of jags on the lower edges of the light stop by several identical jags symmetrically arranged to the center line B D. Then a record obtained with such a light stop is no longer linear at large amplitudes. It can be readily seen however, that a linear reproduction can be obtained with a slot having a length necessary for ordinary linear recording with a light stop. This has the following advantage:

At the reproduction the film may slightly vary in its lateral movement towards both directions in front of the reproducing slot, and this without entailing distortions, since the number of tracks passing beyond the scanning slot in the one direction enter with an identical number into the scanning slot on the other side.

Fig. 3 likewise shows a light stop according to the invention which represents a modification of the light stop illustrated in Fig. 1. This modification resides in that the small triangles at the top and at the lower edges of the light stop are again divided into small triangles. It is obvious that this dividing can be continued still further. Light stops adapted accordingly are included in the scope of the present invention. For practicing the invention the edges of the small triangles are not necessarily required to be straight but may also have a curved shape. Moreover, the invention does not depend upon the triangular shape of the light stop. Otherwise all statements made concerning the light stop according to Fig. 1 as well as concerning the sound record according to Fig. 2 and produced by this light stop, can be respectively applied to the light stop of Fig. 3.

The light stops according to Figs. 1 and 3 may also be such that the distribution of the light on the jags at the top and at the bottom line of the light stop be symmetrical to the position of rest

i. e. to the recording slot. In the arrangement in Figs. 1 and 2, at the movement of the light stop across the slot in the direction from the lower to the higher position, the jags of the luminous triangles enter the slot at large amplitudes. However, if the light stop moves across the slot from a higher to a lower position, the light passes first through the slot along the bottom line of the triangles. Furthermore, the light stop may also be such that at movements of the light stop about the position of rest, the points of the luminous triangles at the upper jags as well as at the lower jags move first across the slot, or the arrangement may be so adapted that the base lines of the small luminous triangles of both types of jags move across the slot.

I claim as my invention:

1. The electrical impulse recording method which includes varying the record track throughout one range of amplitudes in accordance with both said impulses and the volume of said impulses, and varying said track throughout another range of amplitudes only in accordance with said impulses.

2. The electrical impulse recording method which includes exposing a record track throughout one range of amplitudes to a light beam having its edges varied respectively in accordance with said impulses and in accordance with the volume of said impulses, and exposing said track throughout another range of amplitudes to a light beam having its edges varied only in accordance with said impulses.

3. The electrical impulse recording method which includes varying the record track throughout a relatively low range of amplitudes in accordance with both said impulses and the volume of said impulses, and varying said track throughout a relatively high range of amplitudes only in accordance with said impulses.

4. In a sound recording system, means for modulating light throughout one range of sound amplitudes in accordance with both said sound and the volume of said sound, and means for varying said light throughout another range of said amplitudes only in accordance with said sound.

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