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SOUND RECORDING SYSTEM

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FIG. 1

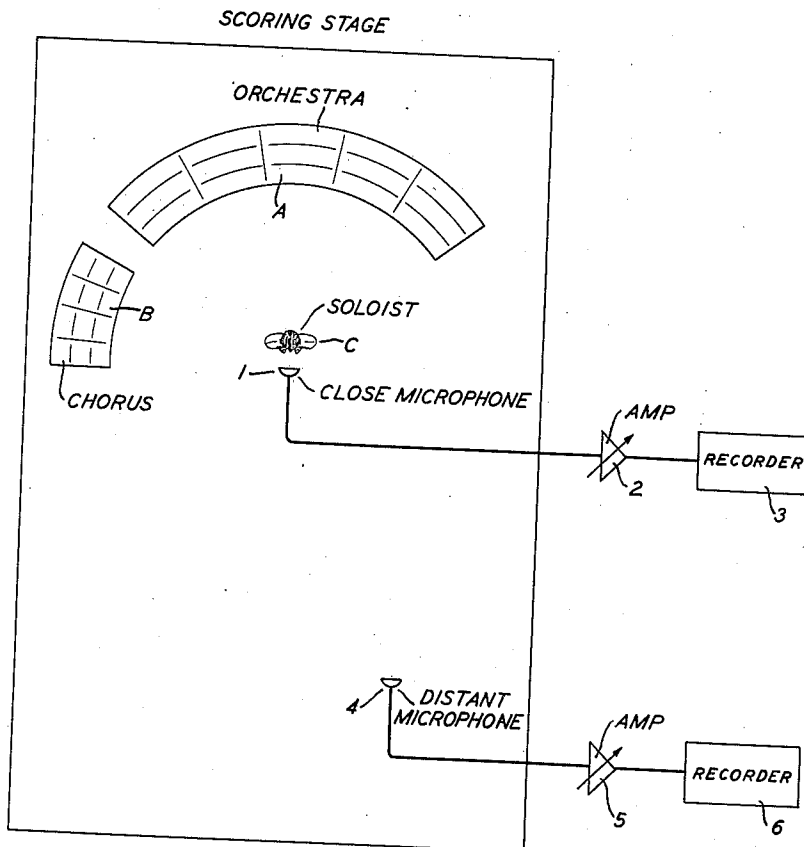
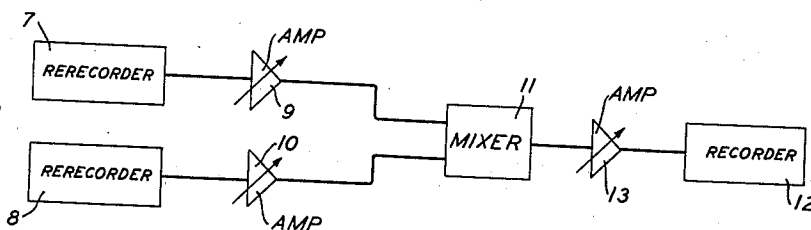


FIG. 2



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2,083,385

SOUND RECORDING SYSTEM

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6 Claims. (Cl. 179—100.1)

This invention relates to the recording of sound. While its major advantages are best realized when sound is recorded in timed relation to accompany motion pictures to produce so-called sound pictures, it may be used to advantage in recording sound for any purpose with or without accompanying pictures.

In order to properly amuse and to create authentic emotional reactions in people who attend the showing of sound pictures, various factors must be considered, some of which go beyond the mere excellence of the picture and sound from a purely technical standpoint. Thus, from the beginnings of sound pictures it has been recognized that in order to create a pleasing illusion, the sound must appear to emanate from its apparent source. It is equally desirable that the character of the sound should be of an appropriate nature. Thus, speech apparently emanating from a figure photographed as a "close-up" should create the illusion of coming from a point relatively close to the auditor, whereas speech emanating from a figure in the background should have such characteristics as to apparently originate at a point remote from the auditor.

In attempting to solve the problems incident to meeting the requirements just outlined, it was discovered that the illusion of apparent distance of a sound was due to a factor which has generally been termed "liveness". The "liveness", in turn, depends on the degree to which reverberational effects of the original sound are recorded along with it. In general, the greater the "liveness" the farther the apparent source of sound appears to be from the listener. A sound record embodying a minimum of liveness appears close at hand and is suitable for use in "close-ups". In connection with the correlation of the perspective of the sound with the perspective of the picture two factors are concerned. In addition to the liveness just discussed, loudness has an effect on this perspective relationship. However, experiments have shown that the amount of "fore and aft" effect obtainable by change of loudness only is quite restricted comparable with the range obtainable with the combined use of liveness and loudness.

In my Patent 1,939,074, issued December 12, 1933, it has been shown that there is a proper correlation between microphone placement with respect to the distance of the camera from the sound source. This has proved to be quite satisfactory in most cases, but there are situations which it cannot satisfactorily meet. For instance, a voice accompanied by a full symphony

orchestra is not difficult to record on a good scoring stage. If, however, the voice in various parts of the song is first to be a long shot, then a close-up and then a semi-close-up, etc., it is either necessary to know how the picture will be taken before the "scoring" is done or to find some means of changing the liveness of the voice recording after the records have been made and the picture has been cut.

In actual picture production it is frequently advantageous to prescore musical scenes. That is, the voice with orchestral accompaniment is recorded without taking pictures of the action. Subsequently, this music is played and the action in its proper setting is photographed. Obviously, in this situation it is desirable to make recordings in such a manner that the sound perspective can be adjusted in the dubbing process after the picture has been cut.

It is the object of this invention to provide a recording method such that this result may be obtained. Broadly, the method consists of making two simultaneous records through separate recording channels by means of two recording devices. The first of these recordings is made with a low enough liveness factor so as to be suitable for an extreme close-up, while the second record is recorded with a liveness factor such that it is suitable for an extreme long shot. With these two records available at the time dubbing takes place, it is possible to obtain any desired liveness between the two values originally recorded by the simple expedient of mixing the two tracks in the proper proportions.

It is to be noted that this method may be applied to any system of recording sound and is in no way related to the particular apparatus and methods used in producing the preliminary records. It is thought that the invention will be better understood from the following detailed description, reference being had to the accompanying drawing, in which:

Fig. 1 shows diagrammatically a scoring stage and equipment for producing two records with different liveness factors; and

Fig. 2 shows diagrammatically an apparatus layout for reproducing, mixing and rerecording these records into a final record having the desired perspective properties.

Referring now to Fig. 1, a scoring stage generally is indicated within the lines of the rectangle. The walls of the scoring stage are preferably of material so treated as to provide a satisfactory insulation against outside noises and also having suitable sound reflecting properties so as

to provide desirable reverberational effects. It will be assumed that the space within the outlines at A is occupied by an orchestra and that the space within the lines designated at B is occupied by an accompanying chorus. The position of the soloist is indicated at C. This position, definitely ahead of the members of the orchestra and the members of the chorus, is, for most purposes, quite a satisfactory one. Microphone 1 is placed so as to be directly accessible to the soloist and also to receive the sound from the members of the orchestra and chorus. It is placed with respect to the chorus and orchestra in such a position as to permit the soloist to acoustically stand out in front of the accompaniment. This microphone, being so close as is practicably possible, will pick up a minimum of reverberation relative to the volume of direct sound impinging upon it and will, therefore, produce a record with a minimum of liveness. The output of the microphone is amplified by means of any well-known variable gain amplifier or combination of amplifiers diagrammatically indicated at 2 and is then supplied to a recorder of any desired type diagrammatically indicated by the rectangle designated 3. A second microphone 4 is located at a point within the scoring stage quite remote from the soloist, orchestra, and chorus. As a result, the percentage of reverberational effects which it will pick up is relatively large compared to the percentage of direct sound effects. The result is that its output will produce a record having a maximum liveness. The output of microphone 4 is suitably amplified by a variable gain amplifier or combination of amplifiers indicated at 5, and is supplied to a recorder of any desired kind diagrammatically indicated by the rectangle designated 6.

After the records are made, they are suitably processed in accordance with the nature of the medium on which they were made.

The records may now be reproduced during the filming of the action in order to provide proper timing for such action. The picture film is then edited and cut and it is decided what views are to be utilized. The result of this editing is to provide an indication as to the kind of "shots" to be used throughout and is, therefore, a measure of the degree of sound perspective which is necessary to create satisfactory illusion in the successive action sequences. The final record is obtained by rerecording from the original records and mixing them in suitable proportions. Fig. 2 shows a suitable layout of apparatus for accomplishing this result. Rerecorders 7 and 8 are provided. These rerecorders are, in reality, electrical reproducing devices of any desired type limited only in that they must necessarily bear such relation to the original recorders as to be capable of reproducing records of the type produced by said recorders. Rerecorder 7 may reproduce the record made by recorder 3 and rerecorder 8 may reproduce the record made by recorder 6. The output of rerecorder 7 may be suitably amplified by a variable gain amplifier or series of amplifiers indicated at 9. The output of rerecorder 8 may be similarly amplified by corresponding amplifier equipment shown at 10. The output of amplifiers 9 and 10 is supplied to a suitable mixing circuit 11 which may be of any well-known type and may include a potentiometer whereby a desired percentage of the input from either channel may be fed into the mixer. The output of the mixer is supplied to a recorder 12 of any desired character either di-

rectly or through a variable gain amplifier or series of amplifiers designated 13, if desired.

It is obvious that for close-up scenes, the gain of amplifier 9 is brought well up, while that of amplifier 10 is kept at a minimum. For long shot scenes, amplifier 10 would be operated at a sufficiently high level to suitably load the recorder, while amplifier 9 would be set for minimum gain. For medium shots, amplifiers 9 and 10 would preferably be set at approximately corresponding positions. As was pointed out, if desired, the mixing can be done by a suitable potentiometer in the mixer which, for close-ups, will be set so as to derive full power from the record being reproduced by rerecorder 7, while substantially excluding the output from rerecorder 8.

It is believed to be obvious that for intermediate positions other than the three discussed, excellent approximations can be made by an attendant without difficulty after observing the apparent distance of the apparent source of sound from the auditor.

What is claimed is:

1. A sound recording method in which two separate preliminary records of the same sound are made, which consists in recording one of said records with a maximum of liveness, recording the other of said records with a minimum of liveness, reproducing said records, electrically and controllably mixing the output from said reproduced records, and rerecording said mixed output whereby a final record is produced of such liveness that proper sound illusions are created in accordance with the apparent distance of the sound source from an auditor.
2. A sound recording method in which two separate preliminary records of the same sound are made, which consists in recording one of said records from a microphone placed at a relatively great distance from the source of sound to produce a record with a maximum of liveness, recording the other of said records from a microphone placed relatively close to the source of sound whereby a record with a minimum of liveness is produced, reproducing said records, electrically and controllably mixing the output of said reproduced records and rerecording said mixed output whereby a final record is produced of such liveness that proper sound illusions are created in accordance with the apparent distance of the sound source from an auditor.
3. A sound recording method in which two separate preliminary records of the same sound are made, recording one of said records with suitable amplification from a microphone at a relatively great distance from the source of sound whereby a record with a maximum of liveness is produced, recording the other of said records with suitable amplification from a microphone placed close to the source of sound whereby a record with a minimum of liveness is produced, reproducing said records, electrically and controllably mixing the output of said reproduced records, and rerecording said mixed output whereby a final record is produced of such liveness that proper sound illusions are created in accordance with the apparent distance of the sound source from an auditor.
4. A sound recording method in which two separate preliminary records of the same sound are made, which consists in recording one of said records with a maximum of liveness, recording the other of said records with a minimum of liveness, electrically reproducing said records, controllably mixing the output from said repro-

duced records by means of a variable gain amplifier and rerecording said mixed output whereby a final record is produced of such liveness that proper sound illusions are created in accordance with the apparent distance of the sound source from an auditor.

5 5. A sound recording method in which two separate preliminary records of the same sound are made, which consists in recording after suitable amplification the output of a microphone placed at a relatively great distance from the source of sound whereby a record with a maximum of liveness is produced, recording the other of said records from the suitably amplified output
10 of a microphone placed close to the source of sound whereby a record with a minimum of liveness is produced, electrically reproducing said records, controllably mixing the output from said reproduced records by means of a variable gain
15 amplifier, and rerecording said mixed output whereby a final record is produced of such liveness

that proper sound illusions are created in accordance with the apparent distance of the sound source from an auditor.

6. A prescoring method of making sound pictures which consists in making two separate preliminary records of the same sound, one with a maximum of liveness and the other with a minimum of liveness, reproducing sound from either or both of said records, photographing the action in timed relation with said reproduced record, editing and cutting the action film so produced, then simultaneously reproducing said preliminary records, electrically and controllably mixing the output from said reproduced records, and rerecording said mixed output whereby a final record is produced of such liveness that proper sound illusions are created when the picture is projected in accordance with the apparent visual distance of the sound source from an auditor.

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