Feb. 14, 1933. J. WEINBERGER 1,897,222

SOUND RECORDING

Filed Nov. 10, 1928 2 Sheets-Sheet 1

Fig. 1.

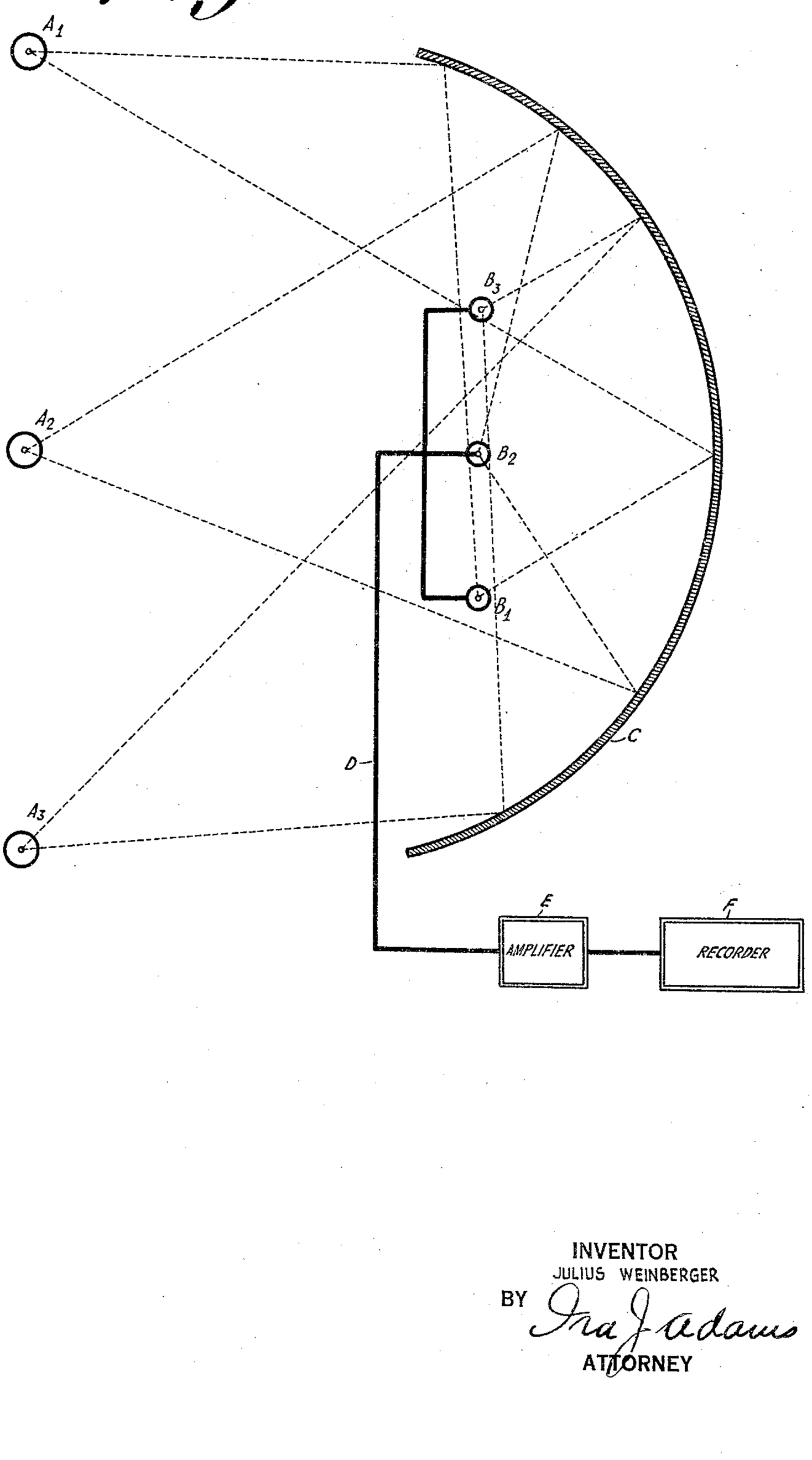

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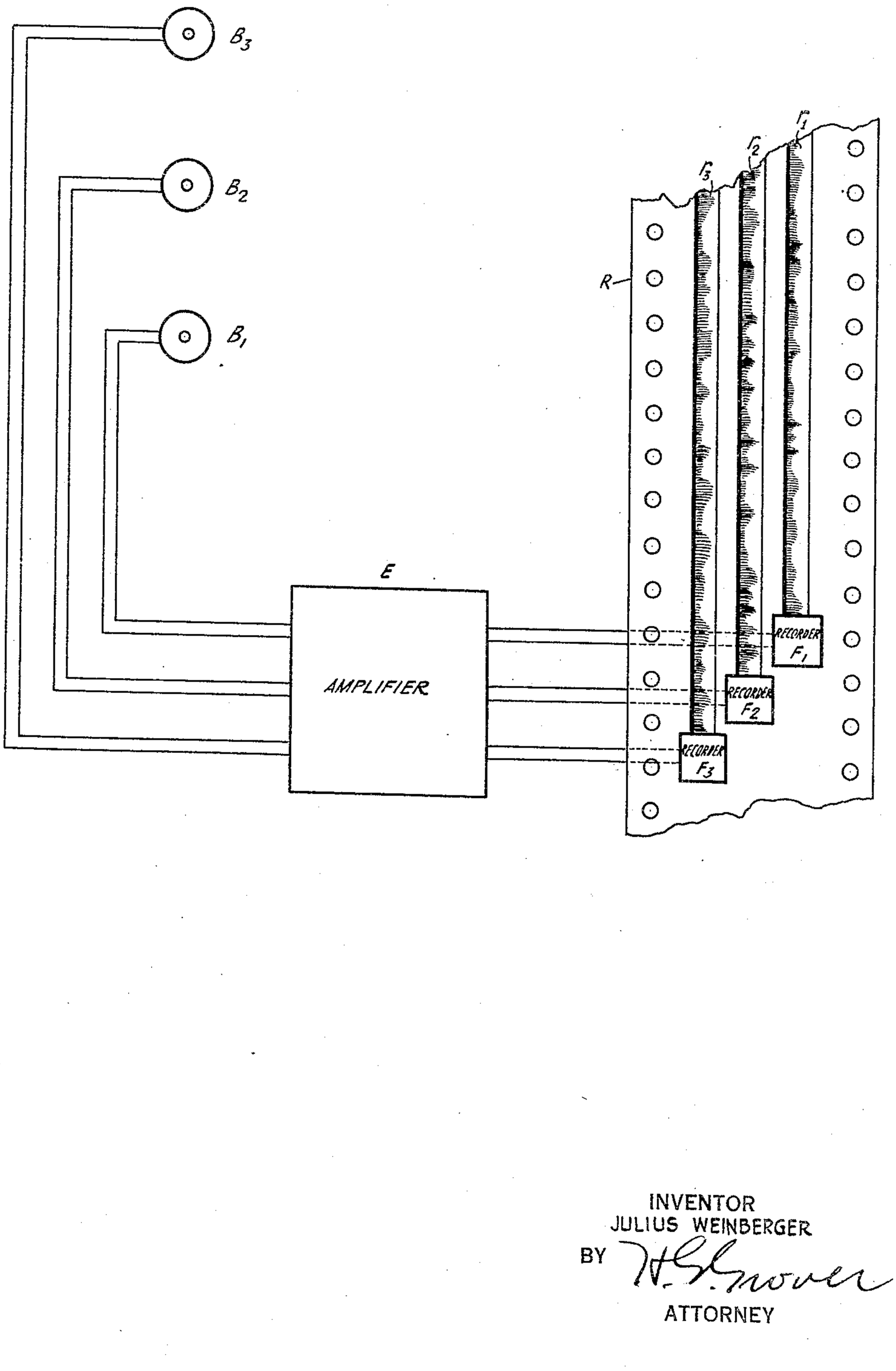
Fig. 2



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UNITED STATES PATENT OFFICE

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SOUND RECORDING

Application filed November 10, 1928. Serial No. 318,410.

The object of this invention is to provide an improved system for the recording of sounds produced in the course of a dramatic action.

A further object of this invention is to secure an improved method of picking up the sounds for the purpose of recording or reproducing them electrically for use in talking moving pictures, radio broadcasting and the like.

It is a further object of this invention to provide an improved method of recording sound which will permit a sense of motion or location of the actors to be recorded.

Further objects of this invention will be apparent on inspection of the following specification taken in connection with the drawings.

It has been the practice in the past in picking up sounds in broadcasting and talking moving picture studios to place the microphones near the sound sources. For example, it is customary in radio broadcasting to place the speaker or singer from three to six feet away from a microphone.

It is clear that if the speaker or singer were to move about while talking or singing the sound intensity reproduced by the microphone would vary greatly. For example, if the speaker should be placed three feet from the microphone and should then move three feet to the right or left the output of the microphone would be diminished by a considerable extent perhaps as much as one-half.

In the recording of spoken plays or musical plays, particularly when motion pictures are being recorded simultaneously with the recording or reproduction of the sound, it is necessary to allow considerable freedom of action to the artists as regards the position from which they talk or sing. It is also necessary from the dramatic standpoint to allow them considerable freedom of action. It is also frequently necessary to record the sound made by an actor while he is walking across the stage.

The present method of picking up sounds with relatively close microphones thus seriously hinders the proper performance of plays and methods of controlling the microphone output are ineffective to cope with this problem.

This invention has for its object, permitting the actors any desired degree of latitude during the performance of a play. The method used by me is to place a large reflecting screen in front of the actors and locate a series of microphones along the focal plane of the screen so that as the actors move about the stage the microphones will pick up a total of sound practically undiminished regardless of the location of the sound source upon the stage.

Having thus briefly described my invention attention is invited to the accompanying drawings in which:

Fig. 1 shows a diagrammatical layout covering my method of sound recording.

Figure 2 is a schematic diagram showing the independent recording method constituting part of my invention.

Referring now more particularly to the drawings the reflecting screen which forms the basis of my invention is represented at C. The microphones B1, B2, and B3 are shown located along the focal plane of the reflector. The sound sources are represented at A1, A2, and A3. The lead from the microphones is shown at D and the amplifier and recording systems are shown diagrammatically at E and F respectively. It is apparent that any desired number of microphones may be used arranged along the focal plane of the reflector in such a manner that the center of sound from any point upon the stage will always be within the line of microphones or at the most on the last microphone. Thus, when a sound emanates from A1 the reflected sound will be concentrated upon the microphone B1 and when the sound emanates from points A2 or A3 the concentrated reflection will occur by B2 or B3 and these microphones will have the greatest output respectively.

It is clear that as the source of sound shifts the focus points will move relatively little so that a few microphones will take care of the relatively great movement of the sound sources.

The reflector is to be located at a relatively

large distance from the source of sound, for example, if the stage is 20 feet wide the reflector may be located from 20 to 50 feet away. It is clear, of course, that the further away the reflector is from sound the less will be the shift of the point of focus as the sound sources move. It is further clear that if the sound sources move backward and forward upon the stage there will be no appreciable effect upon the position of the focus point as the reflector will serve to concentrate the sound in the same focus practically irrespective of the distance of the sound source from it. This is an added advantage over the use of close up microphones which produce variation of sound when actors move in any direction.

The type of reflector may be any of the well known forms and, for instance, may be parabolic or elliptical or of any other geometric form capable of producing concentration of energy in a focal plane. The dimensions of the reflector must be large as compared with the wave lengths of the sound it is desired to reflect, for example, for ordinary speech the reflector may be from 10 to 20 feet in diameter. The reflector may be constructed of wood, plaster, metal or any other sound reflecting material.

Since the reflector concentrates the received energy, it may be at a very considerable distance from the sound sources and still produce as much energy in the microphones at its focal plane as if the microphones were placed relatively close to the sound sources in the customary manner.

The sound which reaches microphone B1 with the greatest intensity is that which emanates from the source A1 and at this time with sound emanating from the source A1 the microphone B3 will receive the least energy. The same is true with respect to the microphone B3 and the sources A3 and A1.

Referring to Fig. 2, by utilizing the energy developed in the various microphones B1, B2 and B3 to record upon separate sound records $r1$, $r2$ and $r3$ respectively, a record R may be produced which when reproduced having the various parts or separate sound records actuate speakers or reproducers located in spaced relation behind the screen upon which a corresponding picture is being projected, a sense of the motion of the performers will be produced and the sound will appear to come more closely from the lips of the performer who is supposed to be talking at a given time. This method of reproduction is similar to that outlined in Craig Patent 1,260,337 of March 26, 1918 or Foley Patent 1,589,139 of June 15, 1926.

This pickup system may be used to control a recorder which will record the total amount of sound or the sum of the energies received in the various microphones upon one sound record and the strongest intensity of sound upon a second or distribution record as explained in detail in my application, Serial No. 318,411, filed concurrently herewith.

Having thus described one embodiment of my invention I wish it to be understood that I am not to be limited by the form shown but rather by the scope of my invention as set forth in the following claims:

I claim:

1. The method of sound recording, which comprises, concentrating sound from a plurality of locations in a focal region, and recording said sound in accordance with the location of said concentration upon said focal region and thereby producing a record which will indicate the location of the sound source and the maximum sound intensity at any given instant.

2. The method of sound recording, which comprises, concentrating sound from a moving source upon a focal region, and recording said sound in accordance with the location of said concentration in said focal region and thereby producing a recording which will indicate the direction of the sound source and the maximum sound intensity at any given instant.

3. The method of sound recording, which comprises cencentrating sound emanating from a plurality of locations upon one of the several points in a focal region and recording the sound picked up at each of said points to produce a sound record, the intensity of which will vary in accordance with the location of the sound concentration with respect to the respective points and therefore in accordance with the actual location of sound at a given instant.

4. The method of sound recording, which comprises, concentrating sound emanating from a moving source upon one of several points in a focal region, recording the sound picked up at each of the points to produce a sound record, the intensity of which will vary in accordance with the location of the sound concentration with respect to the respective points and therefore in accordance with the actual location of the sound at a given instant.

5. The method of sound recording, which comprises, producing sound in a plurality of locations, concentrating said sound upon one of several points in a focal region, and recording the sound picked up at each of said points to produce a sound record, the intensity of which will vary in accordance with the location of the sound concentration with respect to the various points and therefore in accordance with the actual location of the sound source at a given instant.

6. The method of sound recording, which comprises, producing sound at a moving point, concentrating said sound upon one of several points in a focal region, recording the sound picked up at each of said points to

produce a sound record, the intensity of which will vary in accordance with the location of the sound concentration with respect to the several points and therefore in accordance with the actual location of the sound source at a given instant.

7. The method of sound recording, which comprises, generating a sound in several different localities, concentrating the said sound upon a focal region, and recording said sound in accordance with the location of said concentration upon said focal region and thereby producing a record which will indicate the location of the sound source and a maximum sound intensity at any given instant.

8. The method of sound recording, which comprises, producing sound at a moving point, concentrating said sound upon a focal region, and recording said sound in accordance with the location of said concentration upon said focal region and thereby producing a record which will indicate the location of the sound source and the maximum sound intensity at any given instant.

9. The method for recording sound which comprises generating a sound in any one of a plurality of locations, concentrating said sounds upon a series of points in the focal region, and independently recording the sound picked up at each of said points.

10. The method of recording sound which comprises generating a sound at a moving point, concentrating said sound upon a series of points located in the focal region, and independently recording the sound picked up at each of said points.

11. The method of sound pick-up which includes concentrating the sound emanating from a moving point upon a moving focus defining a line which is substantially parallel to the movement of said point and substantially perpendicular to the direction of sound propagation, and picking up said sound from a series of points in said line.

12. The method of recording sound which comprises concentrating the sound emanating from a moving source upon points defining a line substantially perpendicular to the direction of sound propagation, and recording the sound picked up at said series of points.

13. The method of sound recording which includes generating sounds at a moving point, concentrating said sounds along a line substantially perpendicular to the direction of sound propagation, and picking up said sounds at a series of points within the locus of said concentration.

JULIUS WEINBERGER.