

March 18, 1941.

I. R. GOSHAW
MICROPHONE CONTROL SYSTEM

2,235,518

Filed Aug. 27, 1938

2 Sheets-Sheet 1

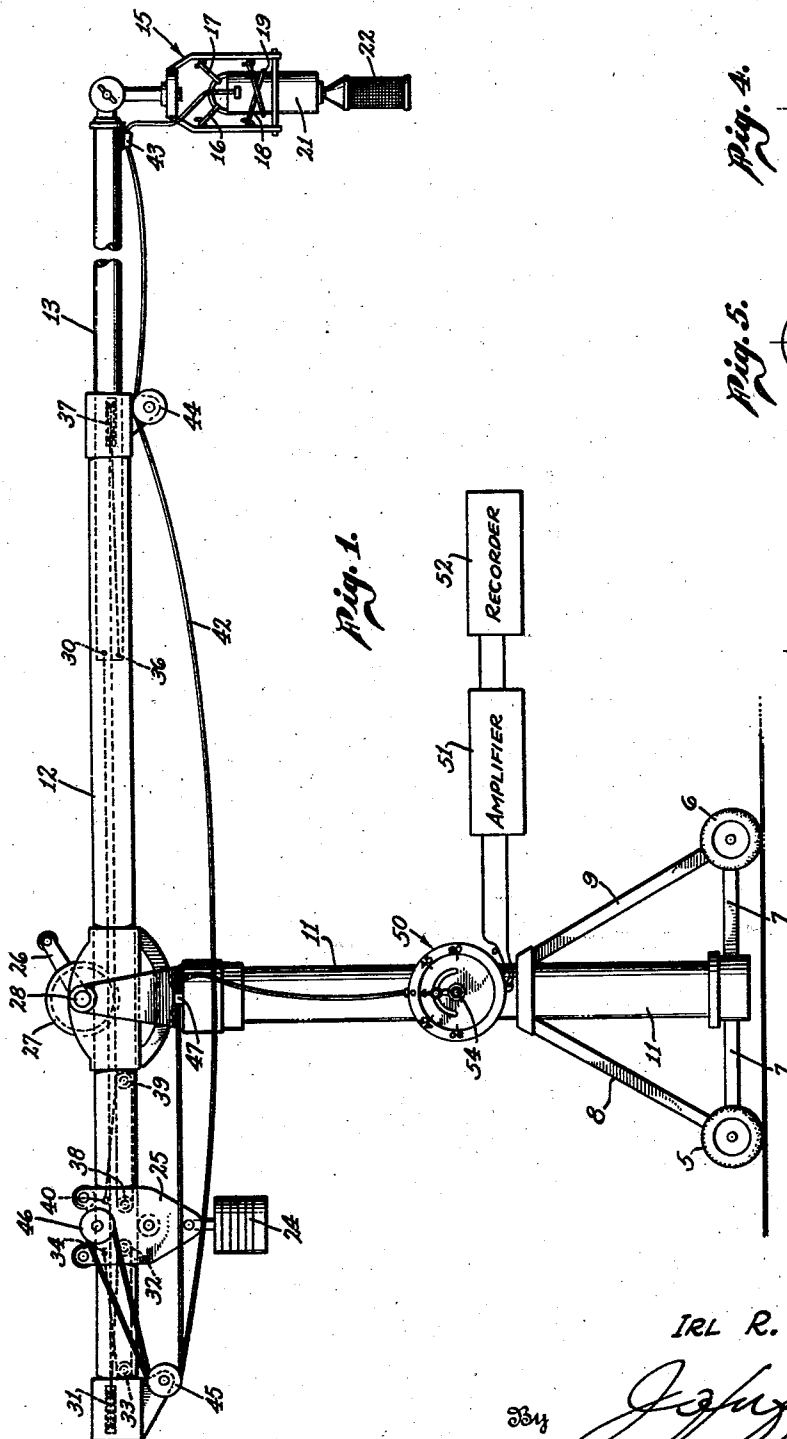


Fig. 1.

Fig. 4.

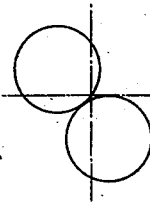


Fig. 5.

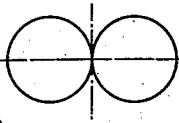
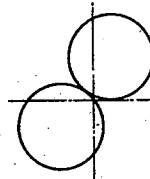


Fig. 3.



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2 Sheets-Sheet 2

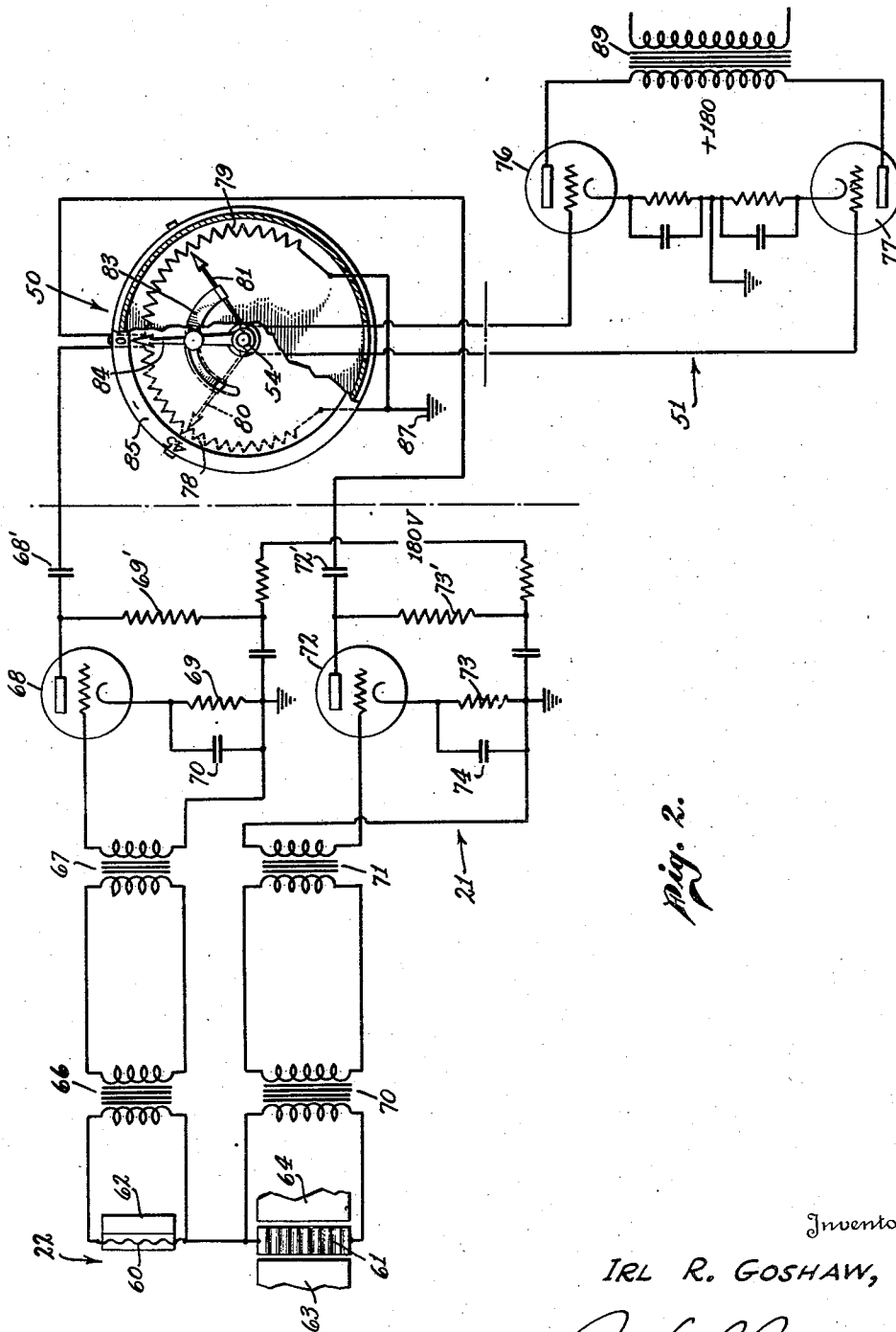


Fig. 2.

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UNITED STATES PATENT OFFICE

2,235,518

MICROPHONE CONTROL SYSTEM

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Application August 27, 1938, Serial No. 227,054

9 Claims. (Cl. 179-1)

This invention relates to talking motion picture apparatus and particularly to a boom system for placing a microphone in its optimum position for detecting a moving source of sound or different sound sources within a prescribed area, such as a motion picture set.

Accompanying the photographing of motion pictures, sound is picked up by a microphone, and it has been the general practice to suspend the microphone on the end of the telescoping cross arm of a boom, the microphone being raised, lowered and moved horizontally by movement of the cross arm. So as not to unnecessarily move the microphone during recording, the boom is generally placed so as to position the microphone at some fixed position where all the sounds may reach it with comparable energy and a similar frequency response if the microphone is always directed at the particular source of sound, regardless of its position on the set. To change the microphone's direction, it must be rotated so as to follow the movement of a sound source about the set or to shift from one source to another in different parts of the set.

Several methods of and means for accomplishing the rotation of a microphone at the end of a boom have been suggested and patented. The use of a motor for accomplishing this result is disclosed in U. S. Patent 1,924,679, this practice, however, having the fault of creating electrical disturbances caused by the operation of the motor, which are picked up by the immediately adjacent microphone. An advance over the motor control is shown in U. S. Patent 2,122,778. This improvement employs a purely mechanical system which, although eliminating electrical motor disturbances, does create wind reaction and complicates the mechanism of the boom structure, as it is necessary to provide means for extending and withdrawing the operating cables, as shown in the patent. Other mechanical systems have been employed, such as square shafts and bevel gears which may be rotated by the boom operator to rotate the microphone.

The present invention eliminates the motor and all mechanical devices and permits the microphone to remain absolutely fixed while effective rotation thereof is obtained. The operator need only rotate a knob on a dial similar to a radio receiver to follow the sound source about the set without actually moving the microphone in any respect. The boom structure is simplified since only the usual electrical cable extension from the microphone is required. The

electrical circuit used is based upon the disclosure in U. S. Patent to L. J. Anderson, No. 2,173,219, of Sept. 19, 1939, and the microphone is of the type shown in U. S. Reissue Patent 19,115 of March 13, 1934.

An object of the invention, therefore, is to simplify a microphone boom construction while providing means for accomplishing all the necessary movements of the microphone.

Another object of the invention is to obtain effective rotation of a microphone mounted on the end of a boom without any physical movement of the microphone.

Another object of the invention is to reduce interference with the pick-up sensitivity of a microphone.

Although the novel features which are believed to be characteristic of this invention will be pointed out with particularity in the claims appended herewith, the invention itself, its objects and advantages, the manner of its organization and the mode of its operation will be better understood by referring to the following description read in conjunction with the accompanying drawings forming a part thereof, in which:

Figure 1 is a side elevation of a movable microphone boom embodying the invention;

Figure 2 is a circuit diagram employed in Fig. 1; and

Figures 3, 4 and 5 are characteristic curves of the microphone used in the invention.

Referring now to Fig. 1, a truck having wheels 5 and 6, crosspieces 7, and braces 8 and 9 has mounted thereon, a column member 11. Pivoted and rotatable on the column 11 is cross arm 12 having a telescoping endpiece 13 at the end of which is mounted a microphone cradle support 15 resiliently supporting, by rubber bands or springs 16, 17, 18 and 19, a microphone pre-amplifier 21 and microphone 22. The cradle, microphone and amplifier are not rotatable in any manner with respect to the end of the arm 12.

To the left of the column 11, the arm 12 has mounted thereon a traveling counterweight 24 hung on a roller block 25. The arm 12 is extended and withdrawn within the arm 12, and the weight 24 moved correspondingly to balance the arm 12, by actuating a bell crank 26 operating on a wheel 27 rotatable about the pivot point 28. Two cables shown by the dotted lines are also employed for this purpose. One end of one of the cables is attached to the inner end of arm 12 at 30, from which the cable extends around a pulley 31 at the left-hand end of the arm 12, around a pulley 32 on the block 25, a pulley 33

at the end of the arm 12, and then to point 34 where it is attached to the block 25. The other cable is attached at 36 to the arm 13 and extends around a pulley 37 at the right-hand end of arm 12, around actuating pulley 27, to a pulley 38 on the block 25, to a pulley 39 attached near the pivot point of the arm 12, and then to a point 40 where it is attached to the block 25. Thus, rotation of the pulley 27 in one direction will extend the arm 13, and rotation of the pulley 27 in the other direction will withdraw the arm 13, the weight 24 traveling along the left-hand end of the arm 12 to counterbalance the weight of the microphone and associated elements as their distance varies from the column 11.

The pick-up leads from the microphone are contained in a cable 42, which is attached to the arm 13 at 43, then extends over a pulley 44 at the right-hand end of arm 12, then around one of a pair of pulleys at 45, over a pulley 46 mounted on the traveling block 25, then back over another pulley at 45, and to the column 11, where it is attached at 47. The cable 42 then extends to a dial 50, the output of which is fed into an amplifier 51 and then to a recorder 52. Thus, the extension and withdrawal of arm 13 do not cause any slack in the cable 42, since the traveling block 25 takes up the slack automatically. For positioning the microphone, therefore, the truck is first placed, then the pulley 27 rotated to extend the microphone, after which the arm 12 may be rotated on the column 11 to further position it. Thereafter, the microphone may remain absolutely fixed with respect to a certain scene, the action being followed solely by the turning of a knob 54 at the dial 50. Although an amplifier 21 has been shown positioned adjacent the microphone 22, this is not a necessity and this amplifier may be positioned on the column 11 or included in the amplifier at 51.

Referring now to the circuit employed to produce the rotational results above-described, reference is made to Fig. 2 wherein the microphone 22 is shown as comprising a pair of slightly crimped conductive ribbons 60 and 61 mounted at right angles to one another between respective magnets 62, 63 and 64. The microphone ribbon 60 is connected through transformers 66 and 67 with the input of a vacuum tube 68 having a biasing resistance 69 and bypass condenser 70 in its cathode circuit. The output of ribbon 61 is similarly connected through transformers 70 and 71 to the input of a vacuum tube 72 having biasing resistance 73 and the bypass condenser 74 in its cathode circuit. It will be noted that the input to tube 72 is connected in phase opposition to the input to tube 68.

The outputs of tubes 68 and 72 are capacity-resistance coupled by condensers 68' and 72' and resistances 69' and 73' to respective tubes 76 and 77 through respective potentiometer resistances 78 and 79, these last resistances being arranged in circular formation so that sliders 80 and 81, respectively, may be operated simultaneously through a connection 83. The other terminals of resistances 78 and 79 are connected together and to ground at 87. The connection 83 has a pointer 84 mounted thereon for cooperation with a dial 85. Thus, by the turning of the knob 54 (see Fig. 1), sliders 80 and 81 are moved over their respective resistances in such a manner that when one resistance is entirely out, the other resistance is entirely in, and vice versa, thus making either ribbon 60 or 61 effective. Intermediate positions utilize both ribbons

simultaneously and produce intermediate patterns, as will be described.

The output of the potentiometer 50 is impressed on tubes 76 and 77, mentioned above, amplified therein and transmitted through transformer 89 for transmission to a recorder or other load circuit.

Referring now to Figs. 3, 4 and 5, when the pointer 84 is to its extreme left position, the microphone characteristic will be in accordance with Fig. 3 and will, therefore, be directional to a sound source positioned in the neighborhood of 45° with respect to the front position of the microphone. With the dial pointer 84 in the extreme right position, the microphone characteristic will be in accordance with Fig. 4, or at an angle of 90° with respect to the characteristic of Fig. 3, since the ribbons 60 and 61 are at right angles. With the pointer 84 in its central position, the characteristic of the microphone 22 is shown in Fig. 5. Intermediate positions of the pointer will provide the microphone with intermediate characteristics. This variation of 90° is satisfactory for the majority of sets since the characteristics are circular though greater variations are obtainable with different settings of the microphone ribbons. It is to be understood that separate microphones positioned at right angles may also be employed without departing from the spirit of the invention.

Thus, without actual physical or bodily translation of the microphone 22, effective rotation thereof is obtained by the simple manipulation of the knob 54 on the dial 50, which eliminates wind resistance and disturbances caused by movement of the microphone while simplifying the boom structure itself.

I claim as my invention:

1. A microphone boom system comprising a vertical standard, a telescoping cross arm carried by said standard, a microphone carried by said cross arm, said cross arm being adapted to move said microphone vertically and horizontally, and adjustable means mounted on said standard for producing a rotational effect to said microphone while maintaining said microphone stationary.

2. A microphone boom system comprising a vertical standard, a telescoping cross arm carried by said standard, a microphone carried at the end of said cross arm, said cross arm being adapted to move said microphone vertically and horizontally, and adjustable means mounted on said standard for changing the directional characteristic of said microphone while maintaining said microphone stationary.

3. A microphone boom system comprising a vertical standard, a cross arm mounted on said standard adapted to be rotated and pivoted, a microphone mounted on the end of said cross arm, and means mounted on said standard for producing effective rotation of said microphone, said means comprising a movable member slidable over a plurality of resistances for changing the directional characteristic of said microphone.

4. A microphone mounting comprising a standard, a cross arm mounted on said standard, a microphone mounted on said cross arm adapted to be moved vertically and horizontally, a cable from said microphone, said cable being attached to said standard, and adjustable means mounted on said standard and connected to said cable for varying the pointing of said microphone, said microphone remaining stationary during said variation.

5 5. A microphone mounting including a beam, a microphone supported in fixed relation with said beam, and adjustable means coupled to said microphone and attached to said beam for remotely controlling the pointing of said microphone while maintaining said microphone stationary.

10 6. A microphone boom system comprising a vertical standard, a cross arm mounted for rotation and pivoting on said standard, an arm member adapted to telescope within one end of said cross arm, a weight member adapted to vary in position along the other end portion of said cross arm, rotatable means mounted on
15 said standard, means interconnecting said arm member, said weight member and said rotatable means for extending and retracting said telescoping member and correspondingly varying the position of said weight member on said cross arm
20 by rotation of said rotatable member, a microphone mounted at the end of said arm member, a cable attached to said microphone and said standard, said cable being mounted on said weight member, and adjustable means mounted
25 on said standard and connected to said cable for producing a rotational effect to said microphone while maintaining said microphone stationary.

30 7. A microphone mounting comprising a microphone, an amplifier connected to said microphone, a hanger for supporting said microphone and amplifier, a cross arm for supporting said hanger, a standard for supporting said cross arm,

a stationary scale mounted on said standard, a movable pointer mounted for cooperation with said scale, and electrical connections between said microphone and said pointer for varying the directional characteristic of said microphone. 5

8. A microphone mounting including a beam, a microphone supported at the end of said beam in fixed relation with respect to said beam, a plurality of resistances fixedly mounted in circular form, a connecting slider for each of said
10 resistances, means for simultaneously operating each of said sliders for varying the directional characteristic of said microphone for producing a rotational effect to said microphone while maintaining said microphone stationary. 15

9. A microphone directional control comprising means for fixedly supporting a microphone in a definite location, a pair of resistances mounted in circular form remote from said microphone, electrical connections between said microphone
20 and said resistances, a connecting slider for each of said resistances, means for interconnecting said sliders for simultaneous operation thereof, one position of said means including all of one of said resistances and eliminating the other of said
25 resistances, and another position of said means eliminating the first-mentioned resistance and including the second-mentioned resistance, a stationary scale associated with said last-mentioned means, and means for rotating said last-mentioned means. 30

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