June 3, 1947. B. F. RYAN ET AL 2,421,437

MICROPHONE BOOM

Filed Nov. 10, 1944 5 Sheets-Sheet 1

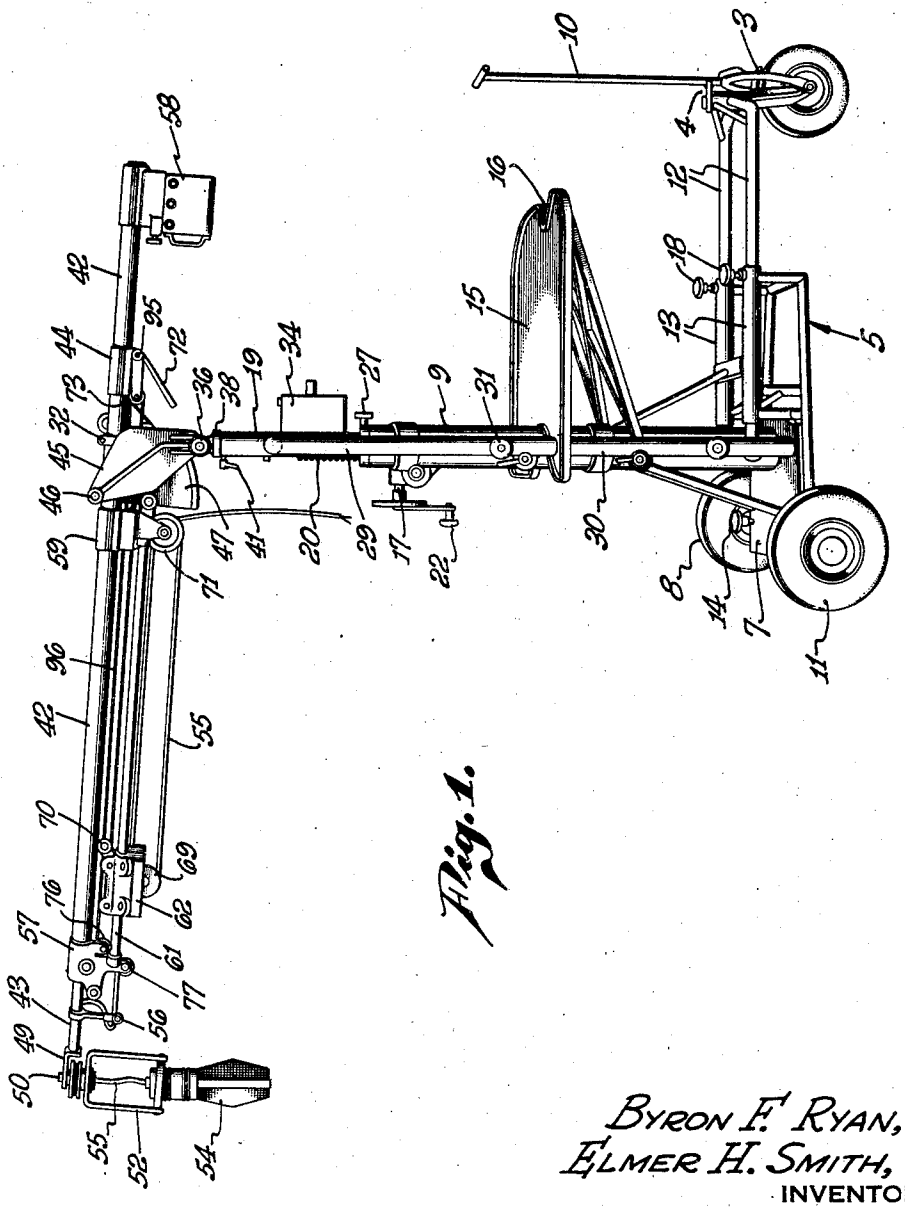


Fig. 1.

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MICROPHONE BOOM

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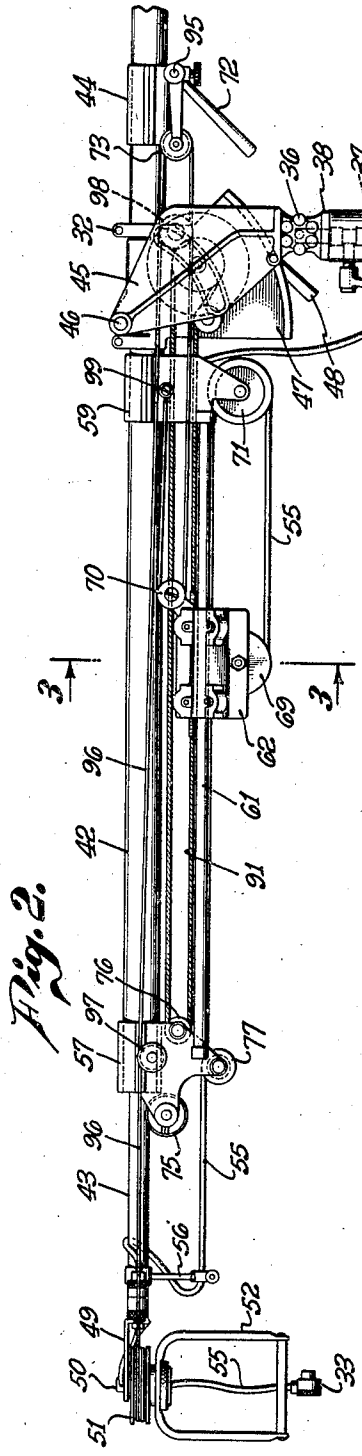


Fig. 2.

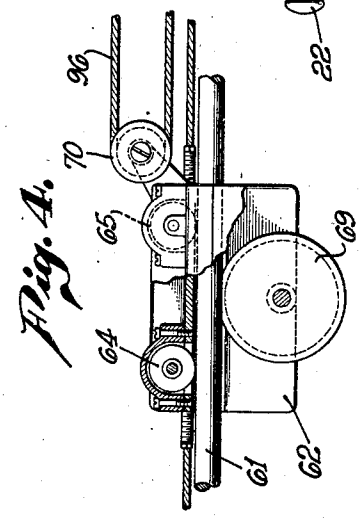


Fig. 4.

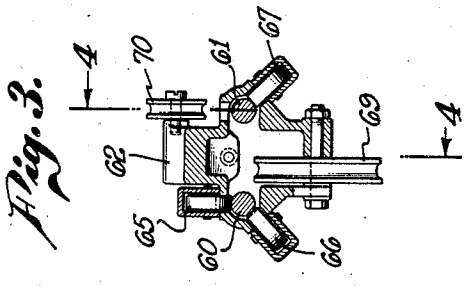


Fig. 3.

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MICROPHONE BOOM

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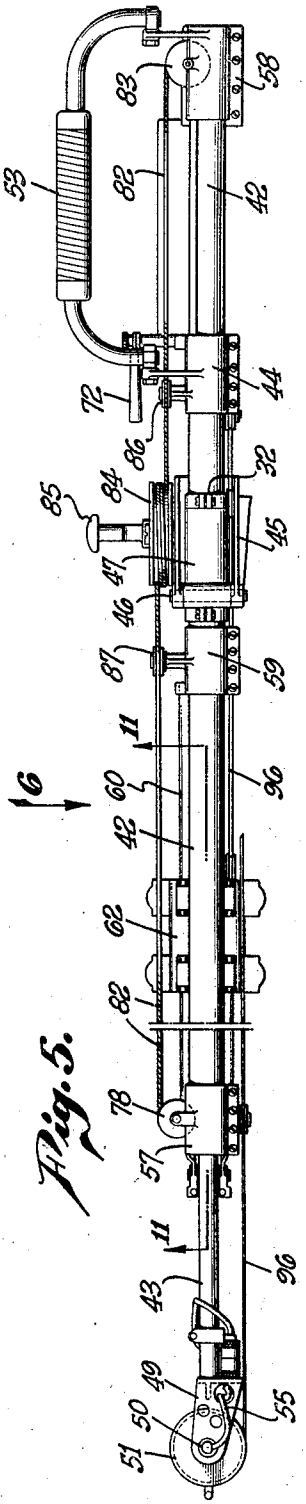


Fig. 5.

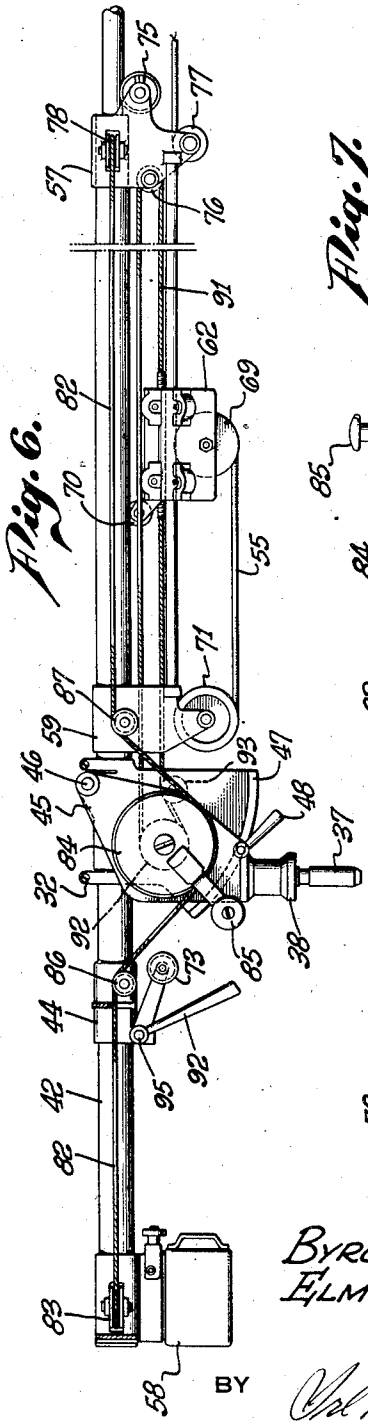


Fig. 6.

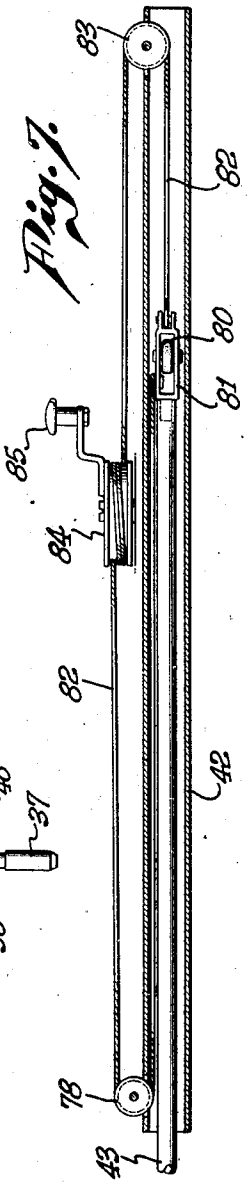


Fig. 7.

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MICROPHONE BOOM

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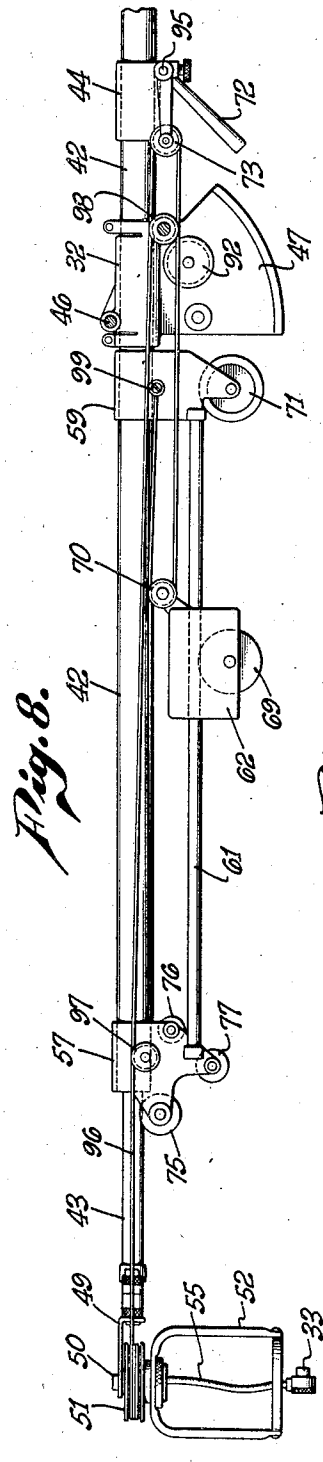


Fig. 8.

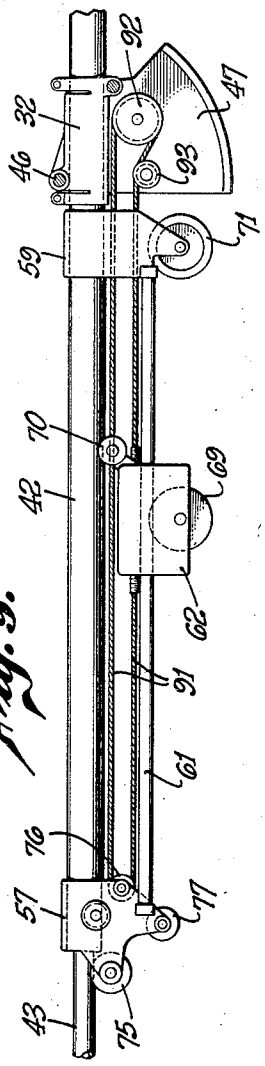


Fig. 9.

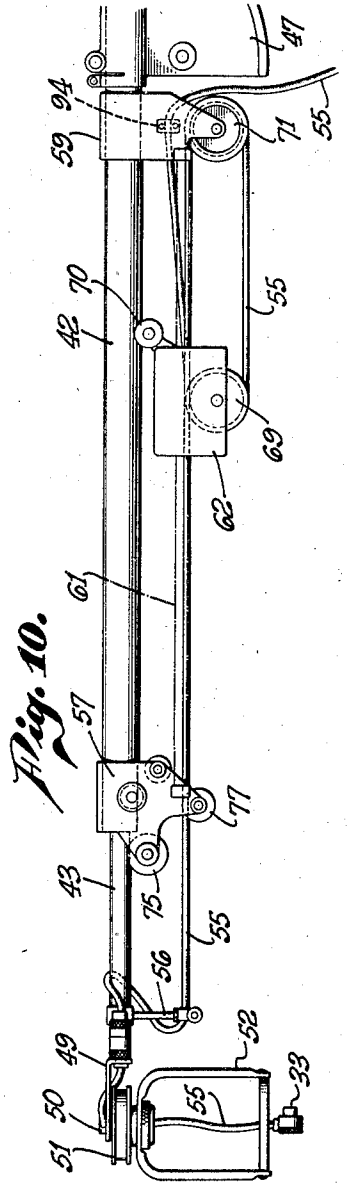


Fig. 10.

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MICROPHONE BOOM

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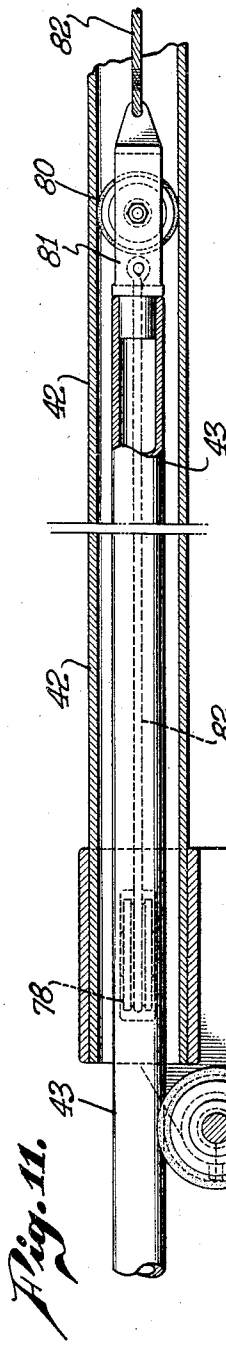


Fig. 11.

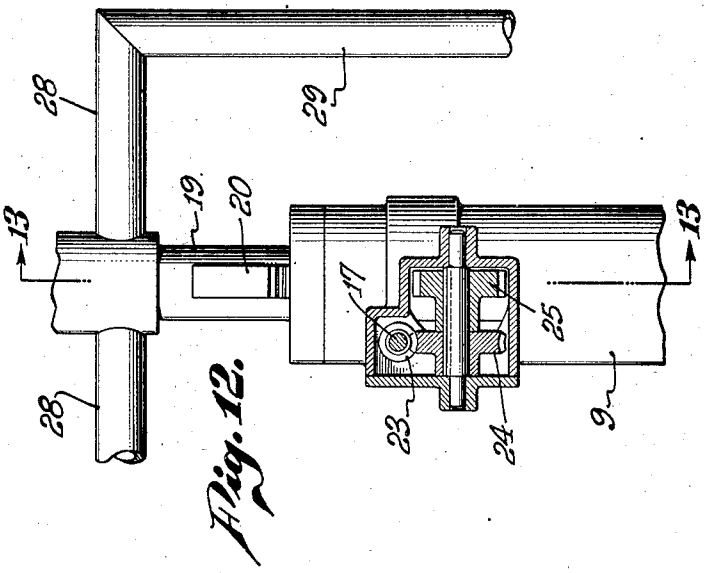


Fig. 12.

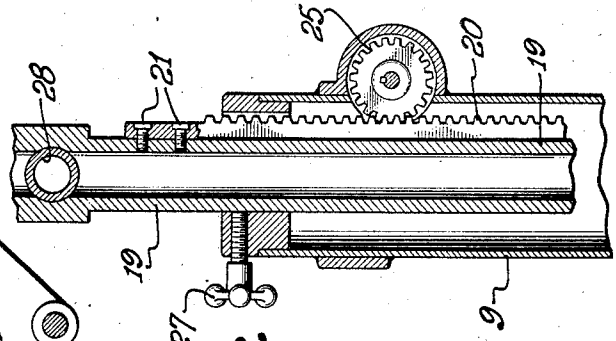


Fig. 13.

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Patented June 3, 1947

2,421,437

UNITED STATES PATENT OFFICE

2,421,437

MICROPHONE BOOM

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Application November 10, 1944, Serial No. 562,800

15 Claims. (Cl. 179—152)

1

This invention relates to booms, and particularly to the type of boom wherein a microphone is supported and variably positionable laterally, vertically, and rotationally.

Booms of the general type of this invention are well-known, as evidenced by Mueller Patent No. 2,122,778, which shows a type of boom providing for the rotation of the microphone itself, the rotation and elevation thereof about a boom supporting standard, and the extension and retraction thereof away from and toward the standard. The boom of this patent utilizes a fixed counterweight, and the counterweight end of the boom is connected to the standard to maintain the crossarm in balance during adjustment of the microphone away from and toward the standard. In Goshaw Patent No. 2,235,518, a similar type of boom is illustrated, but one in which the counterweight is adjustable along the opposite side of the crossarm from the microphone to maintain the boom in balance during the extension and retraction of the microphone, this feature being of prime importance to the operator manipulating the microphone about a motion picture set. It will be noted that the booms of these patents are particularly sturdy, while the crossarms have considerable overhang on the counterweight side. In view of the length of the counterweight side of the crossarm, it is impractical and many times impossible to use such a boom within a room where the boom standard or vertical supporting column must be outside of the camera angle. In the past, the prior type of boom could only be used in small rooms by extending the crossarm through a window, this method being unsatisfactory because the window limited the adjustability of the crossarm and the view of the operator.

One of the main features of the present boom, therefore, is an extensible boom structure which is counterbalanced at all times, which is sturdy and has all the controls of the usual boom, and which will occupy a minimum of space behind the boom support. This is accomplished by using a fixed counterweight which may be any desired size so that the minimum length of crossarm can be employed on the counterweight side, and by providing an adjustable counterweight on the microphone side of the crossarm. With the adjustable counterweight on the microphone side of the standard, when the inner telescopic section of the crossarm is extended, the counterweight travels toward the standard and vice versa to maintain the boom in perfect balance at all times. The boom is also provided with a particularly

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sensitive and accurate rotational control. The boom is mounted on a carriage or perambulator which may be expanded or contracted, both as to wheel base and tread, so as to be accommodated in a small space when necessary and which may be transported through narrow doors.

The principal object of the invention, therefore, is to facilitate the manipulation of a microphone about a motion picture set.

Another object of the invention is to provide a microphone boom having controls for rotational, lateral, and vertical adjustment, and which may be used within a small space such as small rooms.

A further object of the invention is to provide an improved microphone boom which is readily portable through small openings, and which will occupy the minimum amount of space.

A further object of the invention is to provide an improved rotational control for a boom supported microphone.

A still further object of the invention is to provide an improved microphone boom which has all the necessary controls arranged in a particularly convenient manner.

A still further object of the invention is to provide an improved boom and carriage therefor which will require the minimum of space for the operation of the boom.

Although the novel features which are believed to be characteristic of this invention will be pointed out with particularity in the appended claims, 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 hereof, in which:

Fig. 1 is a perspective view of a microphone boom and its perambulator embodying the invention.

Fig. 2 is a side view of the main portion of the microphone boom of Fig. 1.

Fig. 3 is a cross sectional view of the adjustable counterweight mechanism taken along the line 3—3 of Fig. 2.

Fig. 4 is a cross sectional view of the mechanism of Fig. 3, and taken along the line 4—4 of Fig. 3.

Fig. 5 is a plan view of the microphone boom of the invention.

Fig. 6 is a side view looking in the direction of the arrow 6 of Fig. 5.

Fig. 7 is a partial view illustrating the cable arrangement for extending and retracting the microphone.

Fig. 8 is a partial view illustrating the cable arrangement for rotating the microphone.

Fig. 9 is a partial view illustrating the cable arrangement for extending and retracting the counterweight.

Fig. 10 is a partial view illustrating the electrical transmission cable arrangement for the microphone.

Fig. 11 is a partial view illustrating the attachment of extending cable to the inner telescopic member of the crossarm, and taken along the line 11—11 of Fig. 5.

Fig. 12 is a view of the elevating mechanism for the cross-arm taken along the line 12—12 of Fig. 2, and

Fig. 13 is a cross sectional view of the elevating mechanism taken along the line 13—13 of Fig. 12.

Referring now to the drawings in which like numerals identify similar elements, and particularly to Fig. 1, the boom is supported and moved about by a three-wheeled carriage or perambulator 5 having a frame of tubular members and a platform 7 supporting a hollow tubular boom standard or mast 9. The single castor wheel end of the perambulator has a handle 10 for pulling and guiding it to any desired location. When the handle is raised to a vertical position, it is locked at 4 and applies a brake 3 to the tread of the castor wheel tire. U-shaped tubular members 12 are adapted to telescope in and out of tubular members 13 so that the perambulator or carriage may be contracted into the minimum of space commensurate with stability. Thumb screws 18 hold members 12 fixed in any adjusted position. The tread of the perambulator is also adjustable so that wheels 8 and 11 may be separated to obtain stability during transportation and operation of the boom and brought together to permit passage through narrow doors or openings. The axes of wheels 8 and 11 are not coincident but parallel so that the axles of the wheels may be moved in and out of parallel tubes and locked in position by set screws, one of which is shown at 14. An operator's platform 15 is adjustably mounted on the standard 9 and has a notch 16 at one end thereof to accommodate the handle 10 when the carriage is contracted.

Within the hollow standard 9 is a slidable sleeve 19, (see Figs. 12 and 13) along which a rack 20 is attached in any suitable manner, such as by screws 21. The sleeve 19 is raised or lowered when a handle 22 is turned to rotate a shaft 17 carrying a worm 23 in mesh with a worm gear 24. The rotation of the gear 24 rotates a pinion 25 in mesh with the rack 20, and thus moves the sleeve 19 up and down as desired. The pitch of worm 23 is such as to lock this elevating mechanism in any adjusted position. For safety, however, the sleeve 19 is locked in any fixed position by the hand set screw 27. To stabilize the sleeve 19 and to prevent its rotation, tubular cross members 28 are welded to the upper portion of sleeve 19, the members 28 having two vertical extensions 29 which telescope in the vertical frame members 30. A telephone box 34 is shown mounted on one of the vertical stabilizing supports 29.

Continuing upwardly, the sleeve 19 is adapted to have inserted therein a pivot pin 37 which pin also extends into a casting having a lower shoulder portion 38 (see Fig. 6), and two parallel spaced crossarm pivot supporting hangers 45. The boom is thus rotatable about the axis of the pin 37, and the pin may be locked to the sleeve 19 in a groove in the pin by a set screw having a handle 41 and locked to the casting by a set screw

36. By this construction, the boom may be supported on other mounts, such as lamp tripods, if desired. The pivot point on the hangers 45 shown at 46 for tilting the crossarm is forward of the axis of the standard to obtain the maximum in rear overhang of the crossarm commensurate with stability.

The horizontal or crossarm portion of the boom has two main sections, an outer hollow section 42 and an inner hollow section 43. (See Fig. 11.) The outer section 42 is suspended on the pivot 46 between the two triangular hangers 45. Clamped on the section 42 is a sectional flange 47 suspended between the brackets 45, the flange 47 being adapted to be locked against the brackets 45 in any adjusted position of the crossarm by a set screw turnable by a handle 48. (See Figs. 2 and 6.) The mounting 32 and the flange 47 is all one casting.

At the outer end of the telescoping crossarm member 43, is a bracket 49 which supports a hollow shaft 50 on which a pulley 51 is rotatable, the pulley housing a coiled tension spring. Attached to the pulley 51 is a microphone cradle 52 to which a microphone 54 is attached in any suitable manner. By the use of a spring to rotate the microphone in one direction and a single cable such as 96 (see Fig. 2) having a few turns wrapped around pulley 51 with the end attached thereto to rotate the microphone in the opposite direction, the microphone 54 is readily controlled to its optimum pickup position when the source of sound shifts about the set. An electrical cable 55 having a terminal plug 33 is connected to the microphone and passes up through the hole in the shaft 50 and is attached to a bracket 56 on the telescopic member 43.

The main supporting member 42 carries a fixed mounting bracket 57 at one end thereof and a counterweight 58 at the other end thereof together with a handle 53 (see Fig. 5) for manually tilting and rotating the crossarm. With the counterweight 58 fixed, it can be of considerable weight, which reduces the rear portion of the member 42 for a given length of boom. However, the counterweight 58 may be adjusted to provide the proper balance when microphones of different weights are attached to cradle 52. Just in front of pivot point 46 is a bracket 59 mounted on the member 42, while a third bracket 44 is attached to member 42 on the rear side of the pivot point 46.

Between the brackets 57 and 59, two track rods 60 and 61 extend, on which a counterweight carriage 62 travels between the brackets to counterbalance the weight of the microphone 54 and crossarm section 43 during extension and retraction. The counterweight carriage 62 is mounted on eight rollers (see Figs. 3 and 4), there being four top rollers, two of which are shown at 64 and 65 in Fig. 4 and one in Fig. 3, and four rollers at 45 degrees, two to each rod, one of which is shown at 66 on rod 60, and one at 67 on rod 61. By mounting the traveling counterweight 62 in this manner, a smooth noiseless motion is obtained. The counterweight carriage 62 also carries a pulley 69 for the electric cable 55 and a pulley 70 for the cable 96 which controls the rotation of the microphone 54. On the bracket 59 is a pulley 71 for the electric cable 55, and a guide roller 67, while the bracket 44 carries a bell crank 72 on one arm of which is a pulley 73 around which the cable 96 for rotating the microphone passes. A guide roller 86 is also mounted on bracket 60. (See Fig. 6.)

Referring again to front bracket 57 on the

member 42, this bracket not only supports the ends of the track rods 60 and 61, but also carries a rubber tired roller 75 on which the section 43 travels and is supported, a pulley 77, over which the microphone electrical cable 55 travels, a pulley 76, around which the control cable 91 for the counterweight carriage 62 passes, and a horizontally mounted pulley 78 around which the cable 82 passes for extending and retracting the member 43.

The manner and means for controlling the length of the crossarm by the position of the section 43 within the section 42, is shown in Figs. 5, 6, 7, and 11. As mentioned above, the section 43 rolls on roller 75 at the end of member 42, while the inner end of the member 43 carries a roller 80 mounted within a rectangular bearing bracket 81 attached to the end of section 43. The roller 80 rotates on a horizontal axis, and is made of rubber like roller 75, so as to provide noiseless operation when the member 43 is extended and retracted. The control cable 82 is fastened to the end of the bracket 81 and passes around a pulley 83 at the rear end of the section 42 and then over guide pulley 86 to take-up sheave drum 84 to which a handle 85 is attached for rotating the drum. The extension cable 82 continues from the drum 84 over guide pulley 87 on bracket 59 to pulley 78 where it passes inside the member 42 and between sections 42 and 43 to the bearing bracket 81 to which it is attached. Thus, it will be observed that rotation of the drum 84 will pull the inner section 43 in and out of the hollow section 42 extending the microphone 54 away from and retracting it toward the supporting standard.

Referring now to Fig. 9, it will be noted that the cable 91 is attached to one end of the counterweight carriage 62, and passes around pulley 76, then around a drive pulley 92, over a pulley 93, and to the other end of carriage 62. The pulley 92 is mounted on the same shaft with drum 84, and the pulley 92 therefore rotates with the drum 84. As the drum 92 rotates, the counterweight carriage 62 is moved along the track rods 60 and 61 and thus counterbalances the microphone and rod 43 as the rotation of drum 84 extends and retracts the microphone. In this manner, the boom will always be maintained in balance, which is a necessary condition for its efficient operation.

In order to permit the microphone electrical cable 55 to be lengthened and shortened as the microphone is moved away from and toward the standard, the counterweight carriage 62 carries the microphone electrical cable 55 over pulley 69, the cable 55 also passing around the pulley 71 on bracket 59. (See Fig. 10.) The cable is attached to the bracket 59 at 94. Thus, as the microphone end of the cable 55 moves outwardly, the pulley 69 approaches the pulley 71 along with carriage 62 and supplies the necessary length of cable.

As mentioned above, the crank 72 pivoted at 95 (see Fig. 8), rotates the bracket 52 and thus the microphone 54, since the crank bodily translates the pulley 73 in an arc toward the rear end of the crossarm, thus effectively shortening the cable 96 between the microphone and pulley 73. The cable extends from the wheel 51 over rollers 97 and 98, around crank roller 73, back around roller 70 on the counterweight carriage 62 and then to point 99 on bracket 59 where it is attached. It will be noted that as the microphone is extended, the microphone end of the cable 96 may be extended also, since the roller 70 is brought toward the roller 73. The microphone may thus be rotated when in any extended position, since the effective shortening of cable 96 will rotate the microphone in one direction, while the release of crank 72 will rotate the microphone in the opposite direction by the tension of the spring in the pulley 51. In the past, several types of mechanism have been employed for rotating the microphone, such as geared rods rotatable by hand, but these prior structures do not provide the accuracy and noiseless control such as is obtainable with the simple lever action just described.

The above described microphone construction not only permits the use of a microphone within a small room being used as the set, but provides a complete lateral, vertical, and rotational control thereof in the same manner as the former types of boom having long overhangs. The three-wheeled perambulator may be extended to transport the boom stably to the desired location, and may be then contracted, both in tread and wheel base, to pass through small openings and to occupy the minimum of space. Even though the rear counterweight is fixed to provide a short rear length of crossarm, the boom is perfectly balanced at all times by having a traveling counterweight on the microphone side of the crossarm. All controls are within easy reach of the operator with a minimum of movement, while the rotational control, which is used more than the others, is arranged in its simplest and most convenient form.

We claim as our invention:

1. A boom comprising a crossarm adapted to be extended and retracted, a standard for supporting said crossarm, means for extending said standard for elevating said crossarm, means connecting said standard and crossarm for tilting and rotating said crossarm, a counterweight on one end of said crossarm fixedly mounted thereon, a second counterweight movable along said crossarm on the other side of said standard, and means for varying the position of said second counterweight on said crossarm during the extension and retraction of said crossarm.

2. A boom having an extensible and retractable crossarm, means for pivoting said crossarm near one end thereof, a standard for supporting said crossarm at said pivot point, a counterweight on said crossarm on one side of said standard, said counterweight being fixed on said crossarm, and an adjustable counterweight on said crossarm on the other side of said standard, said second counterweight being adjustable along said crossarm as said crossarm is extended and retracted.

3. A microphone boom for adjustably positioning a microphone at a point within a predetermined space comprising a standard, a fixed crossarm section pivoted on said standard, a second crossarm section adapted to be extended and retracted in and out of said fixed crossarm section, a microphone mounted on the end of said extensible crossarm section, means for extending and retracting said extensible crossarm section, a counterweight mounted on said fixed crossarm between said standard and microphone, and means for moving said counterweight toward said standard as said microphone is moved away from said standard.

4. A microphone boom comprising a standard, a fixed crossarm section pivotally and rotatably mounted at the top of said standard, a second crossarm section slidable in and out of said fixed crossarm section, a microphone rotatably mounted on the end of said second crossarm section, a counterweight positioned between said stand-

ard and said microphone on said fixed crossarm section, means for moving said counterweight along said fixed crossarm section as said microphone is moved away and toward said standard, a lever pivoted on said fixed crossarm member adjacent said standard, and means extending from said lever to said counterweight and to said microphone rotating means for rotating said microphone when said lever is actuated.

5. A microphone boom in accordance with claim 4 in which said last mentioned means includes a pulley on said counterweight, a pulley on said lever, and a cable from said microphone and extending around said pulleys.

6. A microphone boom comprising a vertical standard, a crossarm having a section pivotally and rotatably mounted on the top of said standard, and an extensible section within said first section, a microphone rotatably mounted on the end of said extensible section, a drum on said standard, cable means extending from said extensible section to said drum for extending and retracting said extensible section, a counterweight carriage, means for mounting said carriage between said microphone and said standard, a pulley adapted to rotate with said drum, cable means extending between said pulley and said carriage for moving said carriage, and cable means extending from said lever to said carriage and to said microphone for rotating said microphone when said lever is actuated.

7. A microphone boom comprising a vertical standard, a crossarm mounted on top of said standard, said crossarm being adapted to be lengthened and shortened, a counterweight adjustable along said crossarm on one side of said standard, and a second counterweight fixedly mounted on said crossarm on the other side of said standard.

8. A microphone boom in accordance with claim 7 in which a microphone is attached to one end of said crossarm, said fixedly mounted counterweight being attached to the other end of said cross arm at a point to counterbalance both said microphone and adjustable counterweight.

9. A microphone boom construction comprising a mast, a bracket adapted to rotate on a vertical axis on the top of said mast, a crossarm adapted to be mounted on a horizontal axis at the upper end of said bracket, a flange adapted to move with the crossarm, means on said bracket for locking said flange thereto in any adjusted position of said crossarm, a movable carriage, means for mounting said carriage under said crossarm, means for extending and retracting said crossarm away from and toward said mast, and means for simultaneously moving said carriage with the extension and retraction of said crossarm.

10. An extensible boom construction comprising a hollow member, a mast, means for pivoting said hollow member at the top of said mast, a second member adapted to slide in and out of said hollow member, said second member having a microphone mounted at one end thereof, a roller on the inner end of said second member for contacting the inner surface of said hollow member, a second roller on the end of said hollow member adapted to support said second member, a plurality of track rods mounted on said hollow member, a carriage adapted to travel on said rods, cable means for moving said carriage toward said mast when said microphone is moved away from said mast, an electric cable for said microphone, a cable for rotating said microphone, and a plurality of pulleys on said carriage for carrying said electrical cable and said rotating cable in a taut condition during the extension and retraction of said microphone.

11. An extensible boom construction in accordance with claim 10 in which said mast comprises an upper section and a lower section, and means are provided for raising and lowering one section thereof.

12. An extensible boom construction comprising a hollow crossarm member, a second crossarm member adapted to slide in and out of said hollow member, a microphone, a hanger for mounting said microphone for rotation on the end of said second member, a track mounted on said hollow member, a carriage adapted to travel on said track as said second member is extended and retracted, a lever mounted on said hollow member, and a cable connected to said hanger and passing from said hanger to said lever and to said carriage, rotation of said lever rotating said microphone in any adjusted position.

13. An extensible boom construction in accordance with claim 12 in which an electrical cable is provided for said microphone, said electrical cable being carried by said carriage.

14. In a mechanism of the kind described, an extensible crossarm, a standard supporting said crossarm, means connecting said crossarm to said standard whereby said crossarm may be both tilted and rotated with respect to said standard, counterweights on said crossarm, means for simultaneously extending or retracting said crossarm and shifting the position of one of said weights to compensate for the out of balance condition that develops during the extension or retraction of said crossarm, a base on which said standard is mounted, and means whereby said base may be extended both laterally and longitudinally to render said mechanism stable in any position of use.

15. A microphone boom comprising a base, means whereby said base may be expanded both laterally and longitudinally to insure stability of the boom in any extended position, a vertical standard mounted on said base, a crossarm mounted on top of said standard, said crossarm being adapted to be lengthened and shortened, a counterweight adjustable along said crossarm on one side of said standard, and a second counterweight fixedly mounted on said crossarm on the other side of said standard.

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