CONTROL FOR CONTINUOUSLY OSCILLATING APPARATUS

ABSTRACT OF THE DISCLOSURE

A support and control apparatus for oscillating a workpiece, such as a TV camera, through a substantial angular range, about an upright axis for purposes of observing and/or recording the actions and movements of persons and things viewed by the camera throughout its range of oscillation. The apparatus includes an electric motor driving a gear train for oscillating a pair of spaced arms in one direction whereupon one arm engages a lever for actuating switch means to reverse the direction of rotation of the motor and gear train for moving said arms in the opposite direction with the other arm upon engagement with said lever actuating said switch means to again reverse the direction of the motor and gear train whereby the gear train continuously oscillates the workpiece.

BACKGROUND AND SUMMARY OF THE INVENTION

This invention relates to a support and control apparatus of the type for mounting on an upright surface, such as a wall or post, for supporting a workpiece, such as a TV camera, and oscillating it in a generally horizontal direction through a substantial angular range. Apparatus of this general class is capable of many uses and is especially suitable for observing the movements and actions of persons and objects, such as by way of example for observing children in a nursery, children in school, as an aid in detection of persons engaging in the acts of shoplifting and theft. The very presence of such apparatus frequently tends to discourage actions of shoplifting and theft.

Apparatus of this general type thus serves useful purposes in stores, offices, factories, banks, and the like, and is also very useful as an aid in surveillance work such as in schools, Government buildings, prisons and various types of institutions. One of the objects of this invention is to provide a novel form of support and control apparatus for oscillating a workpiece, such as a TV camera, motion picture cameras, etc., which is simple in construction, efficient in use and capable of being economically manufactured.

Another object is to provide an improved form of support and control apparatus of the character indicated which is constructed so as to eliminate possible magnetic or electrical interference between the driving mechanism of the apparatus and the workpiece, such as a TV camera. A further object of this invention is to separate the driving mechanism and the workpiece in a manner which permits utilization of an extremely small, inexpensive type of driving motor by virtue of which the workpiece, such as the camera or the like, is caused to be oscillated.

Other objects and advantages of this invention will be apparent from the following description, taken in connection with the accompanying drawings, in which:

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. 1 is a side elevational view of the apparatus embodying the present invention mounted on an upright surface with a workpiece supported thereon.

FIG. 2 is a front end view of the apparatus with a workpiece mounted thereon.

FIG. 3 is an enlarged view, partly in section and partly in elevation, taken as indicated at line 3—3, FIG. 1.

FIG. 4 is a side elevational view of the assembly of the driving mechanism and control apparatus embodying the invention.

FIG. 5 is a horizontal view, partly in section and partly in elevation, of the driving mechanism and control apparatus, taken as indicated at line 5—5 of FIG. 4.

FIG. 6 is a full size end view of the assembly of the drive mechanism and control apparatus, as seen in FIGS. 4 and 5, showing the main control lever in one position of adjustment with respect to two switches in the electrical circuit by virtue of which the motor and driving mechanism are operated in one direction.

FIG. 7 is a view similar to FIG. 6 but showing the main lever in its other position of adjustment with respect to the two switches by virtue of which the motor and driving mechanism are operated in the opposite direction.

FIG. 8 is an electrical wiring diagram for the motor circuit.

DESCRIPTION OF THE PREFERRED EMBODIMENTS

As seen in the drawings, the apparatus comprises a main support 10, attached to an upright wall 12 and the support 10 being in the nature of a shelf upon which is supported the driving and control apparatus embodying the present invention for supporting and oscillating a workpiece. Said mechanism is enclosed within a housing 14, secured on top of the support 10 such as by means of screws 16. The driving mechanism and part of the control apparatus, which in the main is enclosed within the housing 14, is totally supported from the underside of a cover plate or panel 18 which is seated upon the top of the housing 14, in overlapping registration to an opening formed in the top of said housing. The cover or plate 18, with the driving mechanism and control attached thereto is firmly secured with respect to the housing 14 by screws 20.

Suspended from the underside of the cover 18, by screws 22, as clearly seen in FIGS. 4 and 5 of the drawings, is an assembly comprising an electric motor 24 and its associated drive mechanism in the nature of gearing as indicated generally at 26. As may be noted in FIG. 5 the small pinion 28, at the input end of the gearing, which is mounted on the armature shaft, serves to drive a gear train comprising of gears and pinions, with the gear 30 at the output end being mounted on a stud 32, which extends upwardly through the cover plate 18, and on which is fixedly secured an upright stud shaft 34 by means of a set screw 36. The upper end of the stud 34 is milled to provide two substantially parallel flat faces against which is seated a clevis portion of a mounting bracket 38, on which bracket is secured, by means of bolts, screws or adhesive, a workpiece indicated at 40. The workpiece indicated at 40, and as represented in the drawings, is a housing which may contain a TV camera or motion picture camera or other apparatus. The clevis portion of the bracket 38 is connected to the upper end of the stud shaft 34 by a bolt and wing nut assembly 42 by virtue of which the mounting bracket 38 may be adjusted by tilting about the horizontal axis of the bolt so as to position the workpiece, such as a TV camera, in a desired, oriented position for the desired range of movement of the workpiece, such as viewing of the pictures taken by the camera.

Fixedly secured to the stud shaft 34, by screws 44, is a bracket member 46, having a portion shaped to conform to the contour of the stud shaft as seen in FIG. 3 of the drawings and having a pair of angularly spaced apart, laterally extending arms 48, positioned above the cover 18. The outer end of each of the arms 48 is apertured at
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51 and the terminal portion bent outwardly for the reception of a flat spring member 50, which is rigidly secured to the inner arm 48 by a rivet 52. The spring members 50, 52 constitute as continuations or extensions of the arms 48 of the bracket 46, and the extreme outer ends of each of the spring members 50 is formed to provide an inwardly bent leg 53, the purpose of which will hereinafter be described. The respective sets of arm assemblies 46-52 constitute parts of control means and by virtue of the angular relation of the arm assemblies to each other determines the range of angular oscillating movement of the stud shaft 34 and the workpiece supported thereon. Secured to the underside of the cover plate 18, by means of bolts 68, is a depending bracket 62 which is pivotally mounted at 64, an upright control lever 66. The cover plate 18, together with bracket 62, constitute frame means for supporting the motor and drive mechanism as well as a portion of the control means. The upper end of the lever extends upwardly through an aperture 68 in the cover plate 18, and serves as an abutment, extending in a position to be engaged alternately by the flat springs 50 of the arm assemblies carried on the stud shaft 34. The lower portion of the control lever 66 is formed with a pair of oppositely disposed cams 70, of arcuate contour, which interact with the outer ends of the outward spring pressing nubbins or actuators 72 of the switches 74, mounted on said bracket 62, as seen in FIGS. 4, 5 and 6 of the drawings.

It is to be understood that each of the switch units 74 are of the conventional type sold under the trademark Micro, and wherein the contacts thereof are normally closed and by virtue of which spring pressure is exerted on the nubbin or actuator 72 to normally and yieldingly urge it to its outermost position. The ends of the nubbins or actuators ride against the arcuate contour of the cams 70 incident to rocking movement of the lever 66. As will hereinafter be apparent, the opposite actuation of the two switches 74 occurs simultaneously, incident to each rocking movement of the lever 66.

The operation of the electrical circuits for the motor is controlled by the main switch 76 on the housing 14 for enclosing the driving mechanism. As seen in FIG. 8, the circuit includes two alternate circuit portions in each of which a switch 74 is included. When the main motor switch 76 is closed, the motor driven mechanism first rotates the stud shaft 34 through an angular range of movement until one spring arm 50 engages the abutment end of the lever 66, at which time the lever is releasably secured at that position, as seen in FIG. 6 of the drawings. It will be seen that incident to such movement, one of the cams 70 depresses the nubbin or actuator 72 of the left-hand switch 74 seen in FIG. 6, to open one of the alternate motor circuits, and simultaneously the opposite cam 70, permits the nubbin or actuator 72 of the switch 74, at the right hand side of the mounting bracket, as seen in FIG. 6, to follow the contour of the cam and move outwardly to close the said switch thereby energizing the other alternate portion of the motor control circuit, so that the motor, together with the gearing, is driven in the opposite direction, and rotates the stud shaft 34, and workpiece in the opposite direction until the other spring arm 50 engages the abutment on the upper end of the lever 66, and rocks the lever 66 to the position seen in FIG. 7 of the drawings, in which position the nubbins or actuators of the two respective switches 74, are reversely actuated, so as to break the alternate portion of the motor control circuit, and permitting the left-hand switch 74 and permitting the left-hand switch 74 to move to a closed position for again completing the first one alternate motor circuit.

As may be observed in FIGS. 6 and 7 of the drawings, the control lever 66, when in either of the two positions shown in these figures of the drawings, is releasably retained in such position by the spring pressure exerted on the nubbin or actuator of the switch, which is then in closed position with the actuator spring pressed outwardly, because in such a position, the axis of the actuator is slightly higher than the axis about which the arcuate contour of the cam 70 is formed, while the axis of the actuator of the other switch is slightly below the axis about which the contour of its corresponding cam 70 is formed.

From the foregoing it will now be apparent that, when the main switch 76 is closed, one of the two switches 74 being in a closed position, the corresponding alternate portion of the motor circuit is energized to oscillate the shaft stud together with the workpiece carried thereon in one direction until the other spring arm 50 engages the abutment end of the lever 66 and rocks it to its opposite position, at which time the first alternate portion of the motor circuit is broken, and the second alternate portion of the motor circuit is energized and the apparatus then continues to recycle as long as the main switch 76 is closed.

It is to be understood that the bracket arm 46, including arms 48, is made of relatively soft metal so that said arms, together with spring arm 50 may be bent toward or away from each other, such as at the positions indicated at A and B in FIG. 3, for varying the extent or range of the angular movement through which the workpiece will be oscillated.

The inwardly bent legs 53, on the ends of the flat spring members 50, preclude, during any overtravel of the driving mechanism, from sliding off of and out of engagement with the abutment end of the lever 66.

Although I have herein shown and described a preferred embodiment of my invention, manifestly it is capable of modification and rearrangement of parts without departing from the spirit and scope thereof. For example, the motor and driving mechanism may be mounted in the lower portion of the housing 40, with the stud shaft extending downwardly from the housing and connected to a support and, with the control arms on the stud shaft positioned immediately below the housing 40. This latter arrangement is not believed to be as satisfactory as the construction herein disclosed because it will require a heavier duty motor, because the motor in such an arrangement will also have to oscillate the motor and driving mechanism. In addition it might result in magnetic interference with a TV camera when positioned within the housing 40. I do not, therefore, wish to be understood as limiting this invention to the precise embodiment herein disclosed, except as I may be so limited by the appended claims.

What is claimed is:

1. In a support and control apparatus of the character indicated, a fixed base member, a support means, a workpiece carried on the stud, frame means on the support means, drive mechanisms including a reversible electric motor carried on said frame means and operably connected to the stud for oscillating the workpiece, electric circuit means for the motor, having a pair of alternate operating portions, and control means including a pair of angularly related arms connected to said stud for sequentially making and breaking of alternate portions of the motor circuit and thereby sequentially reversing the motor and drive mechanism for continuously oscillating said workpiece, said control means comprising a pair of switches on the frame, connected in alternate portions of the motor circuit, a lever pivoted on the frame and having an abutment portion positioned to be engaged by said arms, and the opposite portion of the lever having a pair of oppositely disposed cams, said pair of switches having spring biased operating nubbins positioned for cooperating with the control means, the engagement of the abutment portion by one of said arms actuates one switch to open position and the other switch to closed position to reverse the motor and drive mechanism and the engagement of the abutment portion by the other arm actuates said other switch to open position and said one switch to closed position to drive the motor and mechanism in the opposite direction.

2. In the support and control apparatus of claim 1, said arms having yieldable outer end portions for engaging
the abutment portion of the lever and accommodating a limited amount of overtravel of the arms.

3. In the support and control apparatus of claim 1, said cams each having an arcuate operating surface cooperating with the ends of the respective operating nubbins of the switches with the axes about which said arcuate surfaces are generated, being moved alternately above and below the axes of said nubbins by said arms engaging the abutment portion of the lever, whereby said lever is releasably held alternately at either of its actuated positions by the spring pressure of the nubbins of the switches acting on said cam surfaces.

4. In a support and control apparatus of the character indicated, a fixed support means, frame means mounted on the support, drive mechanism including a reversible electric motor carried on the frame, an upwardly extending stud operably connected to the drive mechanism for oscillating movement, a workpiece connected to the upper portion of the stud for movement therewith, electric circuit means for the motor, having a pair of alternate operating portions for driving the motor alternately in opposite directions for oscillating said stud and workpiece, and control means comprising a pair of angularly related arms connected to said stud, a lever pivoted on the frame and having an abutment portion positioned in the path of travel of and engageable alternately by said arms, the opposite portion of the lever having a pair of oppositely disposed cams, and a pair of switches connected in said alternate portions of the motor circuit and each having an operating member coacting with a respective cam and actuated thereby to alternately drive the mechanism in opposite directions for continuously oscillating said stud and workpiece.

5. In the support and control apparatus of claim 4, said arms each having a flat leaf spring at their outer ends for alternately engaging the abutment portion of the lever and accommodating a limited amount of overtravel of the arms.

6. In the support and control apparatus of claim 5, said leaf springs each having a bent outer end to preclude the spring from riding off of said lever.

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