This invention relates to weight counterbalancing devices particularly suitable for floor scrubbing machines.

The main objects of this invention are to provide an improved counterbalancing device adapted to maintain a substantially constant or uniform pressure on the bristles of a floor scrubber regardless of the amount of wear of the bristles; to provide a weight counterbalancing device which is of simple construction and free of mechanical troubles so as to give satisfactory service for a long period of time; and to provide a weight counterbalancing device which is readily adjustable to accommodate varying conditions and specified requirements.

An illustrative embodiment of this invention is shown in the accompanying drawing, in which:

Fig. 1 is a fragmentary view, partly in elevation and partly in section, of a floor scrubbing machine equipped with the improved weight balancing unit.

Fig. 2 is an enlarged sectional view, taken on the line 2—2 of Fig. 1, looking in the direction indicated by the arrows.

Fig. 3 is a fragmentary view showing one arm of the bell crank and its axis of pivotal support with relation to the center from which the arcuate cam slot therein is formed.

In the construction of power driven floor scrubbing machines, it has been found most satisfactory to build the electric driving motor and gear reduction box as a unit and to attach the driven power shaft emerging from the gear box directly to the floor scrubbing brush unit.

With such a construction, it is necessary or desirable to pivot this motor and brush unit on the frame of the floor scrubbing machine so as to be freely swingable in a vertical plane. In this manner, the floor scrubbing brushes are maintained in contact with the floor at all times regardless of the unevenness thereof.

However, in the manufacture of the larger sizes of floor scrubbing machines, an electric motor of considerable size and weight is required in order to have sufficient power for rotating the relatively large scrub brush unit. The weight of such a heavy motor and gear box, resting upon the bristles of the scrubbing brushes, has a tendency to bend them over and therefore the necessity has arisen for providing the motor and brush unit with suitable counterbalancing means which will tend to relieve the brush bristles of a portion of their load and at the same time permit a required weight or pressure thereon so as to secure an effective and desirable scrubbing action of the brush bristles.

In other words, scrubbing brushes of this character do not operate to the best advantage if too much weight is placed thereon. On the other hand, there must be enough weight on the bristles to cause them to perform and work in an efficient manner. Furthermore, provision must be made for automatically maintaining this desired amount of weight upon the brush bristles as the bristles wear away and become shorter during long periods of use.

In the construction shown in the drawing, the front end of a floor scrubbing machine frame 10 is shown provided with a wheel or roller 11, which is adapted to rest upon and traverse the floor being scrubbed, the wheel 11 being journaled on a shaft 12. The shaft 12 also pivotally supports the rear end of a forwardly extending arm 13, the front end of which is rigidly attached to an electric motor 14, so as to be freely swingable in a vertical plane. The motor 14 is provided with a gear reduction case 15 rigidly connected thereto, which, through suitable reduction gears, not shown, permits the motor 14 to rotate a vertically disposed shaft 16 which depends from the under side of the gear box 15.

The lower end of the driving shaft 16 is connected to a sheet metal disc 17, the under side of which is provided with a plurality of resiliently mounted scrubbing brushes 18.

The details of construction of the brush holder 17 and mountings for the brushes 18 are shown in the co-pending application of Walter S. Finnell, Serial No. 211,633, filed June 3, 1938, and assigned to the assignee of the present invention.

Means are provided for partially counterbalancing the weight of the motor 14 and its unitary reduction gear and case and comprise a bell crank member generally designated 20, which is pivotally supported on a pin 21 so as to swing in a vertical plane parallel to the plane of movement of the motor and brush unit. The pin 21 is rigidly mounted at its opposite ends at the top end of an upstanding bracket 22, the lower end 23 of which is welded or otherwise rigidly secured to a forwardly extending arm 24 of the frame 10.

The bell crank 20 is provided with two arms, one of which, 25, is provided with a transversely extending conical shaped aperture 26 through which extends one end of a rod 27. The end of the rod 27 extending therethrough is provided with a semi-spherical head 28 which rests against the top surface of the arm 24 and permits limited swinging movement of the rod 27 within the
conical shaped aperture 26. The other end of the rod 21 is threaded into one end of a turnbuckle 29, the other end of which threadably receives one end of a rod 30. The other end of the rod 30 is pivoted at 31 in an upstanding clip 32 which is rigidly secured to the top of the motor 14. The two rods 21 and 30 with the connecting turnbuckle 29 provide an adjustable link connection between the bell crank arm 25 and the motor and brush unit.

The other arm 33 of the bell crank member 20 is provided with an arcuate slot 34, the radius of which is taken from a center point offset with respect to the axis of pivotal movement of the bell crank, i.e., offset with respect to the axis of the bell crank pivot pin 21, as shown most clearly in Fig. 3 of the drawing, thus forming a cam slot.

The slot 34 receives and the side walls thereof engage a roller 35 which is journaled on one side of and at the top end of a substantially vertically disposed rod 36. The rod 36 extends through an aperture in the top end of an inverted cup shaped cylindrical member 37 which houses a helical compression spring 38. One end of the compression spring 38 bears against the underside of the closed upper end of the cup 37, and the other end thereof bears against a washer 39, which is adjustably positioned relative to the rod 36 for varying the tension on the spring, by a nut 40 which is threaded on the lower end of rod 36. The cup member 37 is welded or otherwise rigidly secured to the bracket 22 and positioned so that the axis of the rod 36 is offset or in spaced relation to the axis of pivotal support of the bell crank member 20.

In the operation of this device suitable tension is placed on the spring 28 by the nut 40, and the motor unit is connected to the arm 25 of the bell crank in proper relation to the length of the bristles of the brush 18 by adjustment of the turnbuckle 29. In this position the roller 35 is near the left hand end of the cam slot 34. As the bristles wear off of the brushes during the normal use thereof, the motor unit and brush holding unit lowers toward the floor, at which time the bell crank is rotated clockwise, as viewed in the drawing, whereupon the cam slot 34 raises the rod 36 and further compresses the compression spring 38. Although but one specific embodiment of this invention has been herein shown and described, it will be understood that numerous details of the construction shown may be altered or omitted without departing from the spirit of this invention as defined by the following claims.

What is claimed is:
1. In a floor scrubbing machine, a frame, a scrubbing brush movably connected to said frame and tending to move downwardly by force of gravity, a weight balancing device for said brush mounted on said frame, including a bell crank pivotally supported by said frame, a link connecting one arm of said bell crank to said brush, the other arm of said bell crank having a cam slot therein, and yielding means acting between said frame and said cam slot tending to rotate said bell crank in a direction to counterbalance the weight of said brush.
2. In a floor scrubbing machine, a frame, a scrubbing brush movably connected to said frame and tending to move downwardly by force of gravity, a weight balancing device for said brush mounted on said frame, including a bell crank pivotally supported by said frame, an adjustable link connecting one arm of said bell crank to said brush, the other arm of said bell crank having a cam slot therein, and yielding means acting between said frame and said cam slot tending to rotate said bell crank in a direction to counterbalance the weight of said brush.

3. In a floor scrubbing machine, a frame, a scrub brush pivotally connected to said frame so as to tend to swing downwardly by force of gravity, a device mounted on said frame for countering the weight of said brush, said device including a bell crank pivotally mounted on said frame, a link connecting one arm of said bell crank to said brush, the other arm of said bell crank having a cam slot therein, and yielding means acting between said frame and said cam slot tending to rotate said bell crank in a direction to counterbalance the weight of said brush.

4. In a floor scrubbing machine, a frame, a scrub brush pivotally connected to said frame so as to tend to swing downwardly by force of gravity, a device mounted on said frame for countering the weight of said brush, said device including a bell crank pivotally mounted on said frame, a link connecting one arm of said bell crank to said brush, the other arm of said bell crank having a cam slot therein, and yielding means acting between said frame and said cam slot tending to rotate said bell crank in a direction to counterbalance the weight of said brush.

5. In a floor scrubbing machine, a frame, a scrub brush pivotally connected to said frame and tending to move downwardly by force of gravity, a device mounted on said frame for countering the weight of said brush, said device including a bell crank pivotally mounted on said frame, a link connecting one arm of said bell crank to said brush, the other arm of said bell crank having a cam slot therein, and yielding means acting between said frame and said cam slot tending to rotate said bell crank in a direction to counterbalance the weight of said brush.

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