AUTOMATIC CHALKBOARD ERASING APPARATUS

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ABSTRACT

An automatic chalkboard eraser consists of a body which spans the board and has bearings running along the top and bottom thereof, a plurality of erasers rotatably mounted in the body and bearing against the board, an electric motor carried by the body, and drive means connecting the motor, the erasers, and traverse means. Manual and automatic switches provide for operation of the device in either direction within limits.

2 Claims, 8 Drawing Figures
AUTOMATIC chalkboard ERASING APPARATUS

BACKGROUND OF THE INVENTION

This invention relates to automatic chalkboard erasers and comprises a plurality of erasers rotatably mounted on a board-spanning body with powering and control means therefore.

The effectiveness of a teacher or lecturer using a blackboard in his presentation to a class or audience is materially affected to his disadvantage by the necessity of stopping blackboard work from time to time to erase and this stoppage becomes a progressively greater disadvantage as the size of the board and the expanse of coverage thereof increases. While some attempts have been made to provide automatic chalkboard erasers, still such devices have not proven particularly successful and therefore are not generally used or available.

Consequently, an object of the present invention is to provide a novel chalkboard eraser with powering means and controls whereby the user may at will drive the eraser in either direction and at a desired distance across a board which it is desired to clear.

Another object is to provide an automatic chalkboard eraser with convenient means for removing accumulated chalk dust.

DETAILED DESCRIPTION OF THE DRAWINGS

In the accompanying drawings which illustrate the invention,

FIG. 1 is a perspective view showing the novel apparatus mounted on a chalkboard.

FIG. 2 is a front elevation of the device with the protective cover removed.

FIG. 3 is an enlarged vertical transverse section through the upper part of the mechanism.

FIG. 4 is a front elevation of the structure in FIG. 3, with the protective cover mostly broken away.

FIG. 5 is an enlarged side view of the lower part of the mechanism, parts being shown broken away and sectioned.

FIG. 6 is a front elevation of the structure in FIG. 5 with the cover mostly broken away and sectioned.

FIG. 7 is an inside (rear) view of one of the erasers enlarged.

FIG. 8 is a wiring diagram.

FIG. 1 shows a more or less conventional chalkboard 10 with top, bottom and side framing 11, 12, 13 and 14. The automatic eraser apparatus, generally designated 15 spans the board from top rail 16 to bottom rail 17. The portion of apparatus 15 which is actually seen in FIG. 1 is the protective casing including front wall 18, left side wall 19, top wall 21 and an enlarged box-like bottom part 22. Mounted conveniently on front wall 18 is the stop-start switch button 23 and forward and reverse (right and left hand movement) control switch buttons 24 and 25.

FIG. 2 shows the apparatus with the protective cover 18-22 removed to expose the mechanism. The apparatus consists principally of a long narrow lightweight body plate 29 which is rotatably mounted the eraser units, generally designated 30-43, inclusive, all substantially identical and better illustrated in FIGS. 3-7 inclusive. An extension plate 44 is adjustably secured by bolts 45 to the lower edge of body plate 29 and has a bracket plate 46 projecting outwardly from the right edge thereof. Secured to plate 46 by bolts 47 are clevice elements 48 which pivotally mount a lug 49 projecting sidewardly from an electric motor 50. Motor shaft 51 extends through a slot 52 in plate extension 44 and at its inner end rigidly mounts a sheave wheel 53 which is connected by a belt 54 to a substantially larger speed reduction pulley wheel 55 (FIGS. 5 and 6). A coil tension spring 56 connects motor 50 to bracket plate 46 for maintaining tension on drive belt 54.

The eraser assemblies may be better understood by reference to FIG. 3 showing an outer sheave wheel or pulley 58 rigid with a floating shaft 59 which is journaled in a guide bushing 60 secured to and projecting inwardly from an adjusting plate 61 through main body plate 29. At the inner end of shaft 59 there is secured a circular eraser unit, including the plate 62 bolted at 63a to an insert 63, itself secured in the end of shaft 59 by a set screw 63b, and four segmental erasing pads 64 of felt or other suitable chalk erasing material. Insert 63 has a flat (not shown) for cooperation with set screw 63b. Between the felt blocks 64 are radial slots 65 for a purpose to be described. A coiled spring 66 is compressed between guide bushing 60 and plate 62 and causes the eraser blocks 64 to bear against the chalkboard with sufficient force to achieve their purpose and to float in order to move in and out in case of a warped chalkboard or misaligned joints therein.

At the bottom of the body plate 29, previously mentioned sheave wheel 55 has a shaft 70 journaled in a bearing bushing 71 secured in an adjusting plate 72 bolted to body plate extension 44. At the outer end of shaft 70 there is provided a small sheave wheel 73. An idler sheave 74 on shaft 75 is suitably journaled in body plate extension 44.

At the upper end of body plate 29 (FIGS. 3 and 4) a sheave wheel 76 on a shaft 77 is journaled in a bushing 78 secured in the body plate and carrying at its inner end a drive pinion 79. Pinion 79 meshes with a rack 80 secured to the underside of top rail 16, previously mentioned, for driving the apparatus across the board. Sheave wheel 76 as well as all of the driving sheaves on the eraser units, as 58 in FIGS. 3 and 4, are driven by a belt 82 which winds back and forth about the pulleys, as best shown in FIG. 2, to rotate the erasers in opposite directions, thence about top drive pulley 76 and bottom drive pulley 73. Additional belt adjustment or guide pulleys are shown at 83, 83a, 84 and 85 along the straight run of belt 82. Drive pulley 73, of course, is driven from the motor by means of pulleys 55 and 53 and belt 54. The arrangement and relative sizes of the pulley wheels provide a proper speed reduction action.

In order to guide the apparatus along the board and maintain the proper assembly therewith, there are provided guide rollers 86 and 87 for running in and along slots 88 and 89, respectively, in top and bottom rails 16 and 17. Upper guide rollers 86 are mounted on shafts 90 received in bearings 91a in a bearing block 91 which is adjustably bolted, as at 91b in FIG. 4, to the upper extremity of body plate 29. Shims 91c provide for adjusting the spacing of plate 29 and the eraser units relative to the chalkboard. Lower guide rollers 87 are mounted on shafts 92 extending through body plate extension 44 and secured thereto by means of spaced collars 93.
FIG. 8 shows a wiring schematic, including the electric motor 50 having forward and reverse terminals 95 and 96, a common return terminal 97, manual forward and reverse switches 24 and 25 and normally closed limit switches 101 and 102. One side 98a of 110 volt or other power circuit 98 breaks through manual on-off switch 23, thence divides in lines 99 and 100, respectively, breaking in series through one manual directional switch 24 and one limit switch 101 and the other manual directional switch 25 and limit switch 102. Limit switches 101 and 102, shown in FIG. 6, respectively engage abutments on opposite board side framing 14 and 13 to stop motor 50 at the edge of the board. Thus, if the apparatus arrives at the left edge of the board, the corresponding limit switch 102 will be opened, but the opposite limit switch 101 will be closed. Then if the rightward directional switch 24 is closed, the apparatus will move oppositely until either the rightward directional switch 24 or the corresponding limit switch is opened and vice versa.

OPERATION

In order to operate the apparatus assembled as shown in FIG. 1 and 2, manual switch 23 is first moved to the "on" position and then one of the reversing switches 24 or 25 is actuated in accordance with the desired direction of movement of the erasing apparatus. Motor 50 is then energized so as to cause rotation of pinion 79, to drive the apparatus across the board and at the same time, rotate the eraser units for obliterating chalk markings on the board. The erasers will follow slightly overlapping paths so the entire board will be affected. Rotation of the eraser pads 64 will cause the collected chalk to be thrown out centrifugally through slots 65 and this will be caught within the protective casing and dropped to the bottom frame 12 which is grooved to retain the collected dust. Preferably, sealing strips will be provided along the side walls 19 of the casing, as at 104 in FIG. 1. The casing may be secured in position, as by readily removable bolts 106 extending into the edges of the body plate and these may be readily removed in order to remove the protective casing for access to the mechanism.

In case it is desired to clean the bottom framing 12 and/or the eraser pads 64, loosening of bolts 45, which secure extension plate 44 to main body plate 29, will permit guide rollers 87 to be dropped out of their slots in bottom rail 17 so that the entire mechanism can be removed. Thereupon, the erasers may be cleaned in position or may be removed from their mounting and guiding shafts 59 for better cleaning or replacement. The procedure for removing the erasers for cleaning, without disengaging rollers 86 and 87 from their tracks, is as follows:

1. Remove cover and drive belt 82.
2. Remove set screw 63b in floating shaft 59 which will release the eraser insert 63.
3. Pull pulley 58 and shaft 59 outwardly releasing the eraser unit 62, 64.
4. Remove the eraser unit and its spring 66 and spring seat washers 66a and 66b sidewise from behind plate 29.
5. To replace the eraser unit, reverse steps 1 through 4, being sure to align the flat or insert 63 with set screw 63b.

Plate 29 and the carried eraser units may be adjusted to fit the chalkboard.

Thus, it is possible for an instructor or other person using a chalkboard to easily and quickly obliterate all or any portion of the markings thereon simply by pushing the on-off button and one of the forward or reverse buttons, which will cause the device to move across the board obliterating chalk markings as it goes. Upon reaching one of the side frames, the corresponding limit switch will be opened and the apparatus automatically stopped in condition ready for its next traverse in the opposite direction.

Various features may be modified as will occur to those skilled in the art and the exclusive use of all modifications as come within the scope of the appended claims is contemplated.

I claim:

1. Apparatus for erasing a chalkboard comprising railways for mounting adjacent the board, a body member for spanning the board, cooperating bearings on spaced portions of said member and said railways mounting said member for traverse across the board and determination of the positioning of said member transversely of the board, a plurality of eraser units rotatably mounted on and projecting laterally of said member, cooperating drive elements on said body member and at least one of said rails, each of said eraser units incorporating other drive elements and segmentally separated erasing pads, a motor carried by said body member, power transmission means interconnecting said motor and said drive elements, controls for said motor for causing said body member and erasers to move at the will of the operator in either direction along the board and to stop automatically upon reaching a predetermined position relative to the board, and housing means normally encasing said body member and eraser units for collecting chalk dust discharged centrifugally between said pads.

2. Apparatus for erasing a chalkboard comprising railways for mounting adjacent the board, a body member for spanning the board, cooperating bearings on spaced portions of said member and said railways mounting said member for traverse across the board and determination of the positioning of said member transversely of the board, a plurality of eraser units rotatably mounted on and projecting laterally of said body member, cooperating drive elements on said body member and at least one of said rails, each of said eraser units incorporating a shaft mounted on said body member for rotary and axial movements relative thereto, a drive element and eraser pad means on said shaft, and spring means urging said pad means away from said body member, a motor carried by said body member, power transmission means interconnecting said motor and said drive elements, and controls for said motor for causing said body member and erasers to move at the will of the operator in either direction along the board and to stop automatically upon reaching a predetermined position relative to the board.