July 19, 1966 S. M. MARCH 3,261,113

MOTOR OPERATED CHALK BOARD MOUNTING

Filed Nov. 13, 1963 2 Sheets-Sheet 1

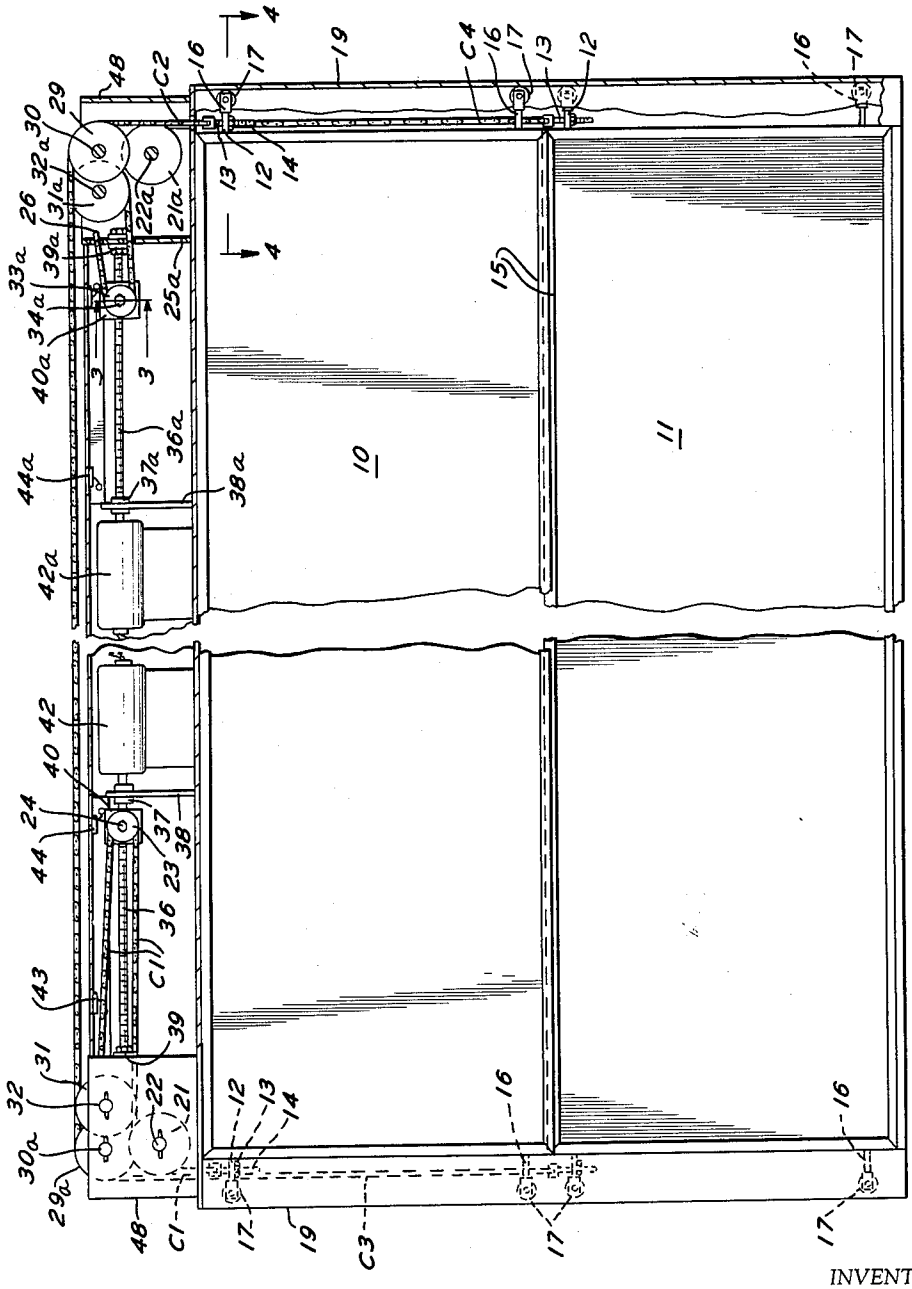


FIG. 1

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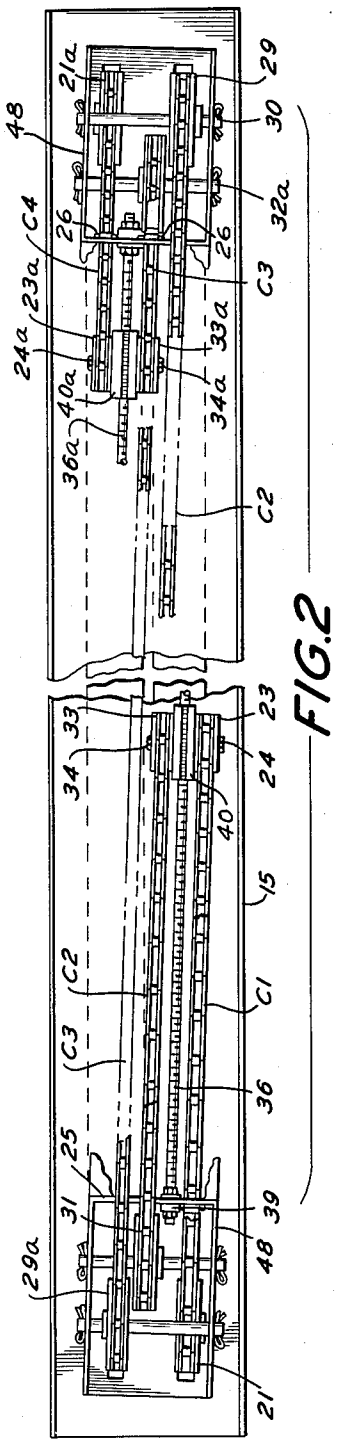


FIG. 2

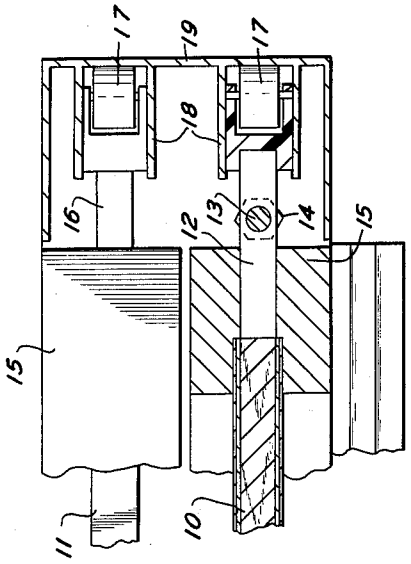


FIG. 4

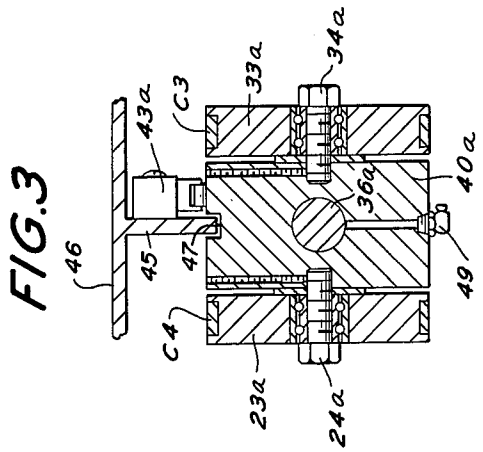


FIG. 3

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MOTOR OPERATED CHALK BOARD MOUNTING

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9 Claims. (Cl. 35—63)

This invention relates to a chalk board mounting including apparatus for moving the board up and down from a position of disuse or screening, to an exposed position in which the chalk marks thereon are visible.

There has been a pronounced trend toward longer and heavier boards of this type which are no longer of either wood or slate as was the practice for many years with limitations imposed by the size of slate, but are in lengths of from about 10 to 30 feet and movable up and down. It has been proposed to suspend such boards from steel cables to be moved by motor driven pulleys or drums. The boards are heavy requiring strong supporting members in order that the cables be not stretched an amount to become more elongated on one side of a board than the other, usually a longer tension member has been found to elongate more than the other. Some length adjusting mechanisms have been tried, but alone have been found to require too much attention for adjustment. The weight of the chalk board has been an important factor contributing to such elongation, but alone this has not been a problem, since steel suspension cables are available in many sizes.

An important factor has been the fact that space is not always available on a floor above the boards for locating the motor driven winding drums and pulleys around which the cable must pass. And not all school and college classrooms now in existence or being built can afford to locate the ceilings at a height to provide space enough above the raised chalk board for the necessary lifting apparatus.

One factor not seemingly considered in the past as important is that the stronger the suspension cables, the stiffer they become and necessitate large diameter pulleys and drums in order not to impose objectionable stresses and elongation from having cables continually flexed around the winding apparatus.

According to the present invention lifting apparatus for heavy elongated chalk boards has been provided capable of greatly reducing elongation in the flexible tension members without having to have large diameter lifting apparatus. This new result has been attained by three features: first, the use of a roller chain, which is functionally an articulated tension member that does not become additionally stressed by being passed around a pulley; secondly, a compact arrangement is provided by a travelling nut on a rotatable shaft moving in the same direction for shortening the chains coming from opposite sides of a chalk board; and finally, the combination of the two preceding factors whereby a better and more compact arrangement is possible with small head room and without objectionable elongation in the tensioned lifting members.

The nature and characteristic features of the invention will be more readily understood from the following description taken in connection with the accompanying drawings forming part thereof, in which;

FIGURE 1 is a view in elevation of two chalk boards and the lifting mechanism therefore, parts being broken away to show the details of construction;

FIG. 2 is a fragmentary top plan view, enlarged, of the structure shown in FIG. 1;

FIG. 3 is a vertical sectional view, enlarged, taken approximately on the line 3—3 of FIG. 1; and

FIG. 4 is a horizontal sectional view, enlarged, taken approximately on the line 4—4 of FIG. 1.

It should, of course, be understood that the description and drawings herein are illustrative merely, and that various modifications and changes can be made in the structure disclosed without departing from the spirit of the invention.

Like numerals refer to like parts throughout the several views.

Referring now more particularly to the drawings, FIG. 1 illustrates two chalk boards **10** and **11** each of which may be moved to an opposite position to that illustrated, i.e. the upper and front board **10** may be lowered with or independently of movement of the lower and rear board **11** to an upper position. Each end portion of each board **10** and **11** has an attaching bracket **12** near the top of the end portion thereof for the connection by a threaded connector **13** and nut **14** of a roller type chain. The board **10** has chains C1 and C2 connected to its brackets **12** and the board **11** has chains C3 and C4 connected to its brackets **12**. While the roller chain can be of any desired type that having a pitch of the order of three eights of an inch is satisfactory for many installations.

Each chalk board **10** and **11** is set within a channel shaped frame **15** of metal or any other suitable material. Guide brackets **16** secured to the frames **15** and having rollers **17** riding in vertical trackways **18** within vertical end frames **19** position the boards **10** and **11** during their movement and while they are at rest.

The supporting chain C1 from its connector **13** passes upwardly and over a support pulley **21** rotatably carried on a shaft **22**, around a force applying pulley **23** on a stub shaft **24** and back to a wall **25** to which it is secured by a pin **26**.

The chain C2 from its connector **13** passes upwardly and over a support pulley **29** rotatably carried on a shaft **30**, then across to the other end, around a support pulley **31** rotatable on a shaft **32**, then around a force applying pulley **33** on a stub shaft **34** axially aligned with the stub shaft **24**, and back to the wall **25** to which it is secured by a pin **26**.

A rotatable threaded shaft **36** is supported at one end in a bearing **37** in a vertical mounting plate **38** and at its left end is carried by a thrust bearing **39** mounted in the wall **25**. The shaft **36** has a nut **40** thereon in which the stub shafts **24** and **34** are carried and advantageously can have 11 to 18 threads per inch to avoid undue longitudinal thrust longitudinally on the shaft **36** while holding the nut **40**.

The shaft **36** is driven by a reversible electric motor **42**, and limit switches **43** and **44** are provided actuated by engagement therewith of the nut **40** at the ends of its desired path of movement. A guide rail **45** carried by an upper frame plate **46** and engaging in a groove **47** in the nut **40** can be employed to aid in retaining the alignment of the nut **40** during its travel.

The shafts **22**, **30***a* and **32** at one end and the shafts **22***a*, **30** and **32***a* at the other end can be supported in box frames **48**.

The chains C3 and C4 are connected to the chalk board **11** and supported and driven in a similar manner but of reverse hand.

The supporting chain C4 from its connector **13** passes upwardly and over a support pulley **21***a* rotatably carried on a shaft **22***a*, around a force applying pulley **23***a* on a stub shaft **24***a* and back to a wall **25***a* to which it is secured by a pin **26**.

The chain C3 from a connector **13** passes upwardly and over a support pulley **29***a* rotatably carried on a shaft **30***a*, then across to the other end around a support pulley

31*a* rotatable on a shaft 32*a*, then around a force applying pulley 33 on a stub shaft 34 axially aligned with the stub shaft 24*a*, and back to the wall 25*a* to which it is secured by a pin 26.

A rotatable threaded shaft 36*a* is supported in a bearing 37*a* in a vertical mounting plate 38*a* and at its other end is carried by a thrust bearing 39*a* mounted in the wall 25*a*. The shaft 36*a* has a nut 40*a* thereon in which the stub shafts 24*a* and 34*a* are carried.

The shaft 36*a* is driven by a reversible electric motor 42*a*, limit switches 43*a* and 44*a* are provided actuated by engagement therewith of the nut 40*a* at the ends of its desired path of movement. The guide rail 45 can be employed to aid in retaining the alignment of the nut 40*a* during its travel.

The section shown in FIG. 3 indicates a limit switch arm of the limit switch 43*a* for opening the circuit of the right motor 42*a* shown in FIG. 1 when the travelling nut 40 has reached the right end of its travel along the threaded motor driven shaft 36.

The pulleys 21, 21*a*, 29, 29*a*, 31, 31*a*, 23, 23*a*, 33 and 33*a* are shown as being of the antifriction type. The fitting 49 is provided for supplying lubricating grease between shafts 36 and 36*a* and nuts 40 and 40*a*.

It will thus be seen that by energization of the motors 42 and 42*a* in the desired directions the chalk boards 10 and 11 can be raised and lowered as desired, positioned at intermediate locations as desired and that this permits one board to be placed in covering relation to the other and both at a desired level.

I claim:

1. The combination with an elongated chalk board and apparatus for moving the same up and down, of the improvement for reducing the danger of unequal total elongation in flexible tension members connecting said board with said apparatus, said improvement including a motor, a rotatable threaded shaft driven by said motor, a nut in threaded engagement with said shaft, a roller type chain secured to each side end portion of said board and of a type to sustain its portion of the weight of said board with substantially no elongation, a support pulley over each end portion of said board and over which one chain is passed, a force applying pulley on each of opposite sides of said nut, a support for said motor and for said support pulleys, a chain from one side being passed from its end pulley and thence over a nut supported pulley and secured to said support, a chain from an opposite side of said board being passed from its end pulley

thence over a pulley for changing the direction of chair movement and finally over the nut supported pulley and secured to said support whereby on translation of said nut by rotation of said shaft said board is moved substantially vertically.

2. A combination according to claim 1 in which said chalk board is provided with vertical guideways and antifriction rollers movable in said guideways.

3. A combination according to claim 1 in which each side of said chalk board is provided with two antifriction rollers spaced apart vertically.

4. A combination according to claim 3 in which said upper guide roller on each side is supported by an extension from said board and to which the chain on that side is adjustably secured.

5. A combination according to claim 1 in which a frame of channel shaped cross-section is provided around said board.

6. A combination according to claim 1 in which a limit switch is provided adjacent each end of travel of said nut to open a motor circuit for prevention of overrunning of said nut and chalk board moved thereby.

7. A combination according to claim 1 in which a second chalk board of substantially the same size as that first mentioned is provided for movement up and down with respect to said first chalk board.

8. A combination according to claim 7 in which said second chalk board is closely spaced with respect to the first chalk board in a direction normal to the planes of said boards.

9. A combination according to claim 7 in which each board moving apparatus is also closely spaced from the other and located above said board whereby the chains for each board are of a length to enable each board to be moved to a position above or below the other board.

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