Nov. 5, 1957 R. C. SLOAN 2,811,739

MOUNTINGS FOR MOVABLE WALL PANELS

Filed Aug. 24, 1955 3 Sheets-Sheet 1

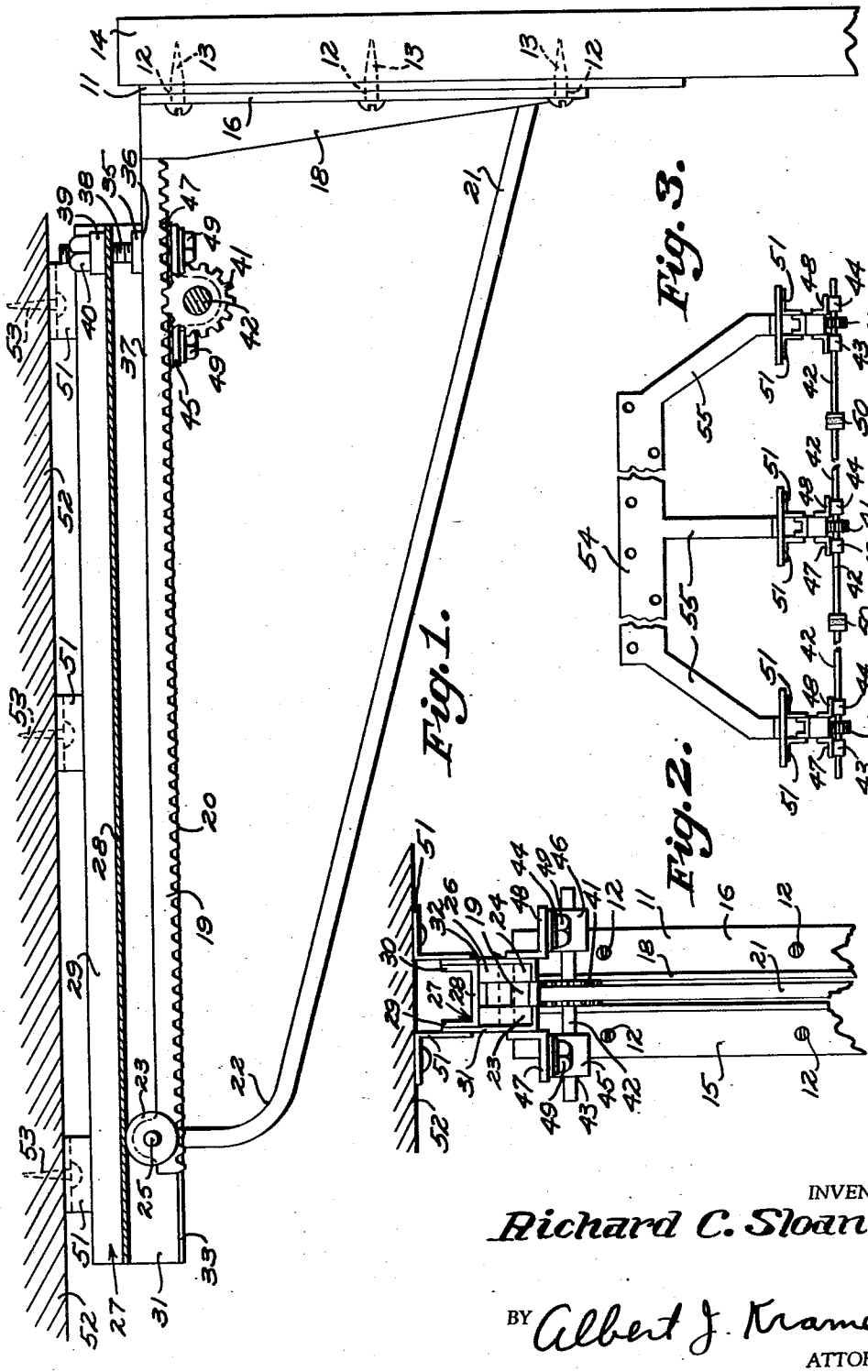


Fig. 1.

Fig. 3.

Fig. 2.

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Filed Aug. 24, 1955 3 Sheets-Sheet 2

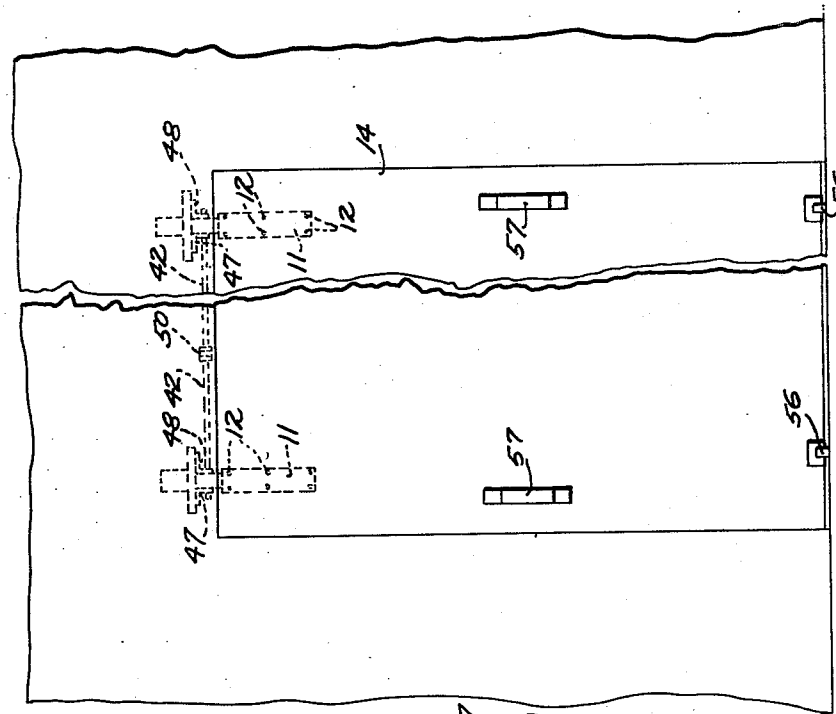


Fig. 5.

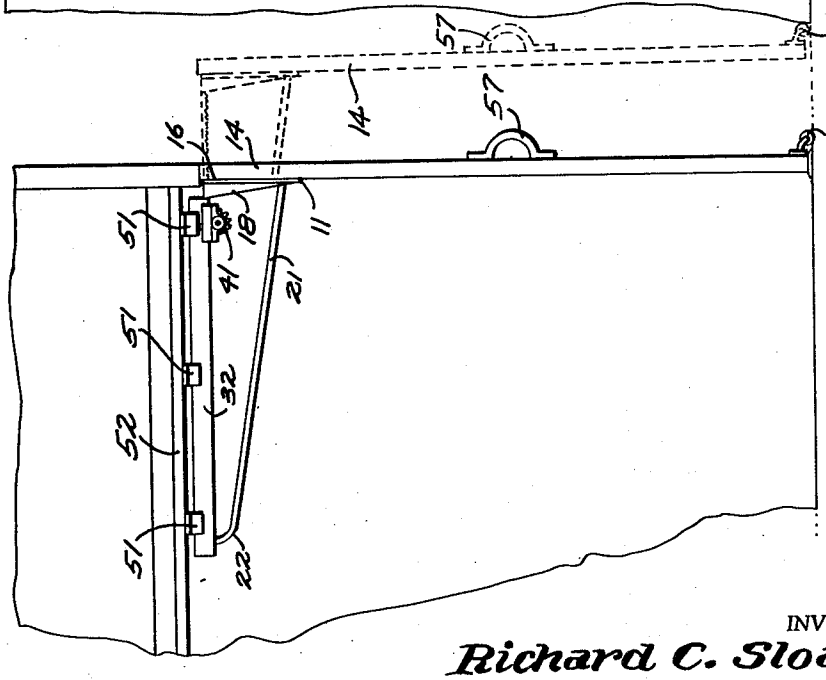


Fig. 4.

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Filed Aug. 24, 1955 3 Sheets-Sheet 3

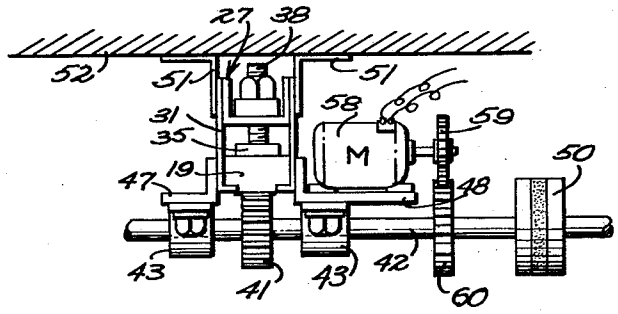


Fig. 6.

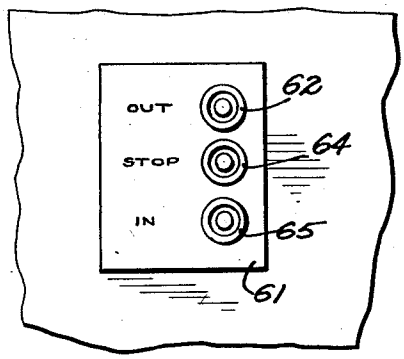
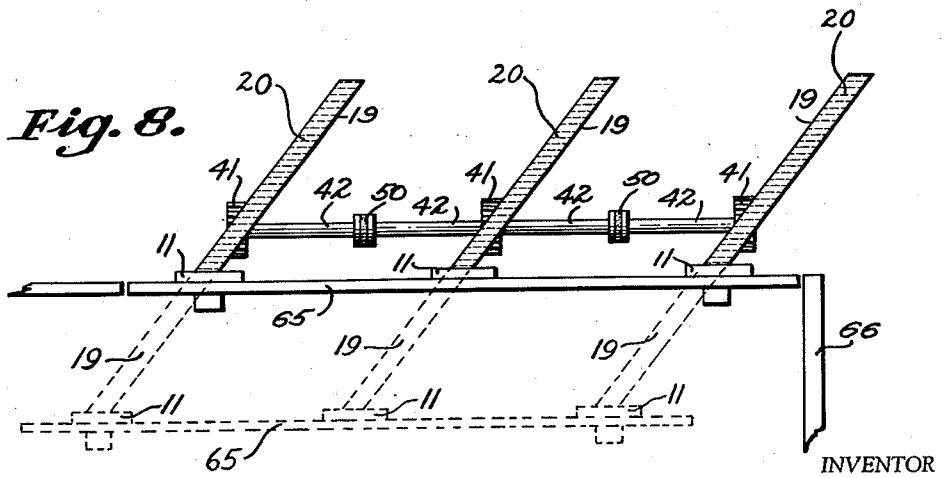


Fig. 7.

Fig. 8.



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MOUNTINGS FOR MOVABLE WALL PANELS

Richard C. Sloan, Ashland, Ohio

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10 Claims. (Cl. 16—87)

This invention relates to building structures and is more particularly concerned with the provision of means for mounting a door, wall section, or other wall panel so that it can be moved in parallelism. Parallelism, as used herein, refers to movement of an object so that every position thereof is constrained to lie in a plane parallel to the plane of every other position of the object.

The general object of the invention is the provision of such means which is simple in construction and which can be utilized with relative ease and inexpensiveness.

Another object of the invention is the provision of such means in which the direction of motion of the panel is either at right angles to the permanent plane of the wall or at an angle thereto.

A further object of the invention is the provision of a device of the type mentioned which has particular adaptability to classrooms for conserving classroom space and increasing storage space adjacent the classroom itself without sacrificing the customary display and blackboard facilities, while, in fact, making it possible to increase such facilities for any given wall area of a classroom.

A still further object of the invention is the provision of such means which can be used for increasing utilizable space in schools, offices, hospitals, libraries, gymnasiums, locker rooms, storage rooms, and other places.

These and other objects and advantages of the invention will appear more fully from the following description considered together with the accompanying drawing.

In the drawing:

Fig. 1 is a side elevational view, partly in section, of a hanger member comprising an embodiment of the invention as it appears attached to a wall panel member.

Fig. 2 is a rear end view of the embodiment, partly broken away.

Fig. 3 is a schematic view on a smaller scale showing a group of the hanger members connected together and special bracket means therefor.

Fig. 4 is a view similar to Fig. 1, but on a smaller scale to include the entire wall panel member and bottom support rollers, the door being in a partially opened position.

Fig. 5 is a front elevational view of the parts shown in Fig. 4.

Fig. 6 is a fragmentary view of a motor actuated embodiment.

Fig. 7 is a face view of a type of wall switch for use with the embodiment of Fig. 6.

Fig. 8 is a schematic plan view of a special diagonal form of mounting.

Referring with more particularity to the drawing in which like numerals designate like parts, the embodiment illustrated comprises a vertical mounting plate **11** provided with apertures **12** for the reception of screws **13** or other suitable means for securing it to the back of a wall panel **14**, which may be a door, a wall section, or other panel member.

To the back of the plate **11** there is secured a bracket in the form of a pair of angles **15** and **16** having a pair of members **17** and **18** in parallel spaced relation to each other projecting rearwardly from the plane of the plate. The front portions of these angles are secured to the plate **11** by welding or by any other suitable means.

Projecting rearwardly from the top of the plate **11** is a horizontal rack gear **19** having its rack teeth **20** along its bottom side. The forward end of the rack gear is disposed between the members **17** and **18** and is permanently secured thereto by welding or by any other suitable means.

The lower end of the bracket **15**, **16** is welded or otherwise secured to the forward end of a bracing bar **21**. The bar **21** projects rearwardly and upwardly to a point near, but below, the rear end of the rack gear **20**. It then curves upwardly forming a bight or curved portion **22** and thence upwardly to contact the rack gear **20** to which it is permanently secured, such as by welding, the purpose of which will be described hereinafter.

The rear end of the rack gear **20** also carries a pair of rollers **23** and **24**. These rollers straddle the rack gear and are rotatably supported on the ends of an axle **25** passing through the rack, substantially as shown.

The rack and rollers together are disposed in a horizontal trackway **26** which is conveniently fabricated of an upper longitudinal channel **27** having a horizontal web section **28** and side portions **29** and **30**. An elongated L-shaped member **31** and a correspondingly reversed L-shaped member **32** are welded to the side portions **29** and **30**, respectively, as shown, forming the trackway space between the web section **28** and the horizontal portions **33** and **34** of said members **31** and **32**, for the reception of the rollers **23** and **24**. The width of the portions **33** and **34** is such as to leave a space therebetween in the form of an elongated slot for the slidable movement of the rack gear **20** therein longitudinally.

Within the forward end of the trackway, there is disposed a pressure disc **35** having a smooth side **36** in slidable contact with the top surface **37** of the rack gear **20**. A threaded shaft **38** has its lower end secured to the top of the disc **35** and its upper end is threadedly engaged with a boss **39** at the top of the channel web section **28**. The upper end of this threaded shaft **38** is also provided with a nut **40** as a releasable locking means to hold the shaft and hence the disc **35** in adjusted positions relative to the rack gear **20**. By these means the rack gear is maintained in meshed relation with the hereinafter described pinion gear **41**.

Beneath the front end of the trackway there is disposed a pinion gear **41** in meshed relation with the rack gear **20**. The pinion gear is secured to a shaft **42** for rotation therewith, and the said shaft is rotatably mounted in bearings **43** and **44** on either side. The bearings are held in position by any suitable means, such as shackles **45** and **46**, respectively, secured to brackets **47** and **48**, respectively, by means of bolts **49**. The brackets **47** and **48** are secured by welding or otherwise, to the members **31** and **32**. Flexible couplings **50** are also provided for connecting together two or more longitudinally aligned shafts **42**.

Angle brackets **51** are provided at the front, rear, and midsection of the device for securing it to a ceiling **52** or other horizontal support by means of screws or bolts **53**. However, in cases where it is inconvenient to secure the device directly to a horizontal surface, it may be secured to a vertical surface as shown in Fig. 3, by means of a special type of hanger bracket comprising a vertical plate **54** for securing directly against the vertical surface, and arms **55** projecting therefrom diagonally or otherwise, as needed, to the angle brackets **51**, as may be necessary.

In any particular installation, at least two of these devices should be used for a given panel, the pinion gear shafts being connected together with the flexible couplings. This will insure the fact that the movement of the panel will always be constrained to positions of parallelism. The flexibility of the couplings makes it unnecessary to have highly precise longitudinal alignments of the shafts **42**.

To relieve stresses on the panel and the mounting members, floor rollers **56** may be secured to the bottom of the panels, as illustrated in the drawing. Also, handles

57 or other similar devices may be attached to the panel to facilitate manually moving the panel outwardly and inwardly. Instead of moving the panels manually, an electric servomotor 58 may be mounted on one of the devices, as shown in Fig. 6, and geared to the pinion gear shaft by gears 59 and 60, or by any other suitable means. Actuation of the motor in one direction will result in the panel moving outward and actuation in the opposite direction will move the panel backward. Motor control is effected by a wall switch 61 (see Fig. 7) having an "out" button 62, an "in" button 63 and a "stop" button 64. Limit switches (not shown) may also be used to limit the relative movement of the rack gear and trackway. The limit of extension, however, is otherwise fixed by the abutment of the bight portion 22 against the pinion gear 41.

The invention is particularly useful in classrooms and results in the increased utilization of classroom space. Desks can be placed close to a wide door or wall panel, much closer than they could be placed to the door or panel if it were hinged, without creating any traffic bottlenecks when children are entering or leaving the room. It makes it easier for supervisors to maintain an orderly mass withdrawal of children from the classroom during emergencies, fire and civil defense drills, or at the end of a class period, particularly when such mass withdrawals require the collection by the pupils of their belongings from the closet or space behind the panel or door. A line of recession, for example, can be formed through one end and out the other. Due to the fact that the limitations of a swinging door or doors are not present, the doors or panels of the present invention can be made as wide as desired, hence providing closet space which is limited only by the size of the particular room.

In cases where it is desired to provide a closet space or recessed wall area adjacent a corner of a room, and yet maintain a condition for moving persons unidirectionally, in one end and out the other, the hanger devices may be installed as shown in Fig. 8 at a horizontal angle to the wall panel 65 adjacent a side wall 66. For this purpose, the vertical plate 11 of each device is set at a horizontal angle to the rack gear 19 and bar 21, while the pinion gear 41 is in a plane at right angles to the panel 65 and the teeth of the rack gear are parallel to the teeth of the pinion gear. This permits the shafts 42 to remain parallel to the panel 66 and to be connected together with the flexible couplings 50, as in the previously described embodiments. Consequently, when the wall panel 65 is pulled out, it moves in a diagonal direction and yet is constrained to parallelism motion.

The space on the front face of the panels may be used for corkboards or chalkboards to afford additional space for pupil participation in blackboard exercises or display boards for classroom work.

The back of the panels may be provided with shelves for books or other storage items, hooks for garments, etc., that would be conveniently accessible to a person walking along the inside of the panel after the panel has been pulled out.

Where projectors are used as a visual teaching aid, the projector screen may be mounted on a panel of this type whereby the parallelism movement provides an additional amount of adjustment between the screen and its projector.

In addition to classroom uses, the invention also has general utility to provide enlarged storage and/or temporary dressing space in an efficiency apartment, a doctor's office, locker rooms, warehouses, archives, libraries, etc.

Having thus described my invention, I claim:

1. A hanger device comprising a vertical panel mounting plate, a horizontal rack gear secured to the plate, means for attaching the plate to a horizontally movable vertical panel member, members forming a longitudinal trackway for slidably supporting said rack gear, means for supporting said trackway in a horizontal position, a pinion gear rotatably connected to said forming members, said pinion gear being in meshed relation with said rack gear, means rotatably supporting the pinion gear on the forming members in meshed relation with the rack gear, a shaft secured for rotation with said pinion gear, and means for coupling said shaft to the corresponding shaft of a similar door hanger device.

2. A hanger device comprising a horizontal rack gear, means for securing said rack gear to a horizontally movable vertical panel member, members forming a longitudinal track to slidably support said rack gear, means for supporting said trackway in a horizontal position and means for securing the trackway in a stationary position relative to the rack gear, a pinion gear rotatably carried by said forming members, a shaft secured for rotation with said pinion gear, means rotatably supporting the pinion gear on the forming members in meshed relation with the rack gear, and means for coupling said shaft to the corresponding shaft of a similar door hanger device.

3. In combination, a horizontally movable vertical panel member, a plurality of hanger devices each having a rack gear and means securing the rack gears to the panel, members forming longitudinal stationary trackways for slidably supporting said rack gears, means for supporting said trackway horizontally, a rotatable pinion gear stationary with the trackways for each of said rack gears, means rotatably supporting the pinion gears on the forming members in meshed relation with the rack gears, and means for coupling said pinion gears together for simultaneous rotation.

4. The combination as defined by claim 3 in which the rack gear of each device is disposed in a horizontal plane at right angles to the panel.

5. The combination as defined by claim 3 in which the rack gear of each device is disposed in a horizontal plane at an angle to the panel other than 90°.

6. A hanger device comprising a vertical plate, a horizontal rack gear, means for securing one end of said rack gear to an upper part of the plate, a bracing bar having one end thereof secured to the rack gear and the other end secured to a lower part of said plate, members forming a longitudinal trackway for slidably supporting said rack gear, means supporting said trackway horizontally, a pinion gear, and means rotatably supporting the pinion gear on said forming members in meshed relation with the rack gear.

7. A hanger device as defined by claim 6 and a roller carried by the rack gear for engaging the trackway.

8. A hanger device as defined by claim 6 in which the forming members include a member in contact with the rack gear to hold it in engagement with the pinion gear.

9. A hanger device as defined by claim 8 and means for adjusting the position of the contact member relative to the rack gear.

10. A hanger device comprising a vertical plate, a horizontal rack gear, means for securing one end of said rack gear to an upper part of the plate, a bracing bar for said rack gear extending from a bottom part of the plate to the opposite end of the rack gear, members forming a longitudinal trackway for slidably supporting said rack gear, means for supporting the trackway in a horizontal position, a pinion gear, and means on the forming members to rotatably support said pinion gear in meshed relation with the rack gear, said bracing bar having a portion thereof in alignment with said pinion gear to abut it when the rack gear is in a predetermined position of extension relative to the trackway.

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