Feb. 25, 1930. E. KINNEY 1,748,555

GEAR AND RACK DEVICE

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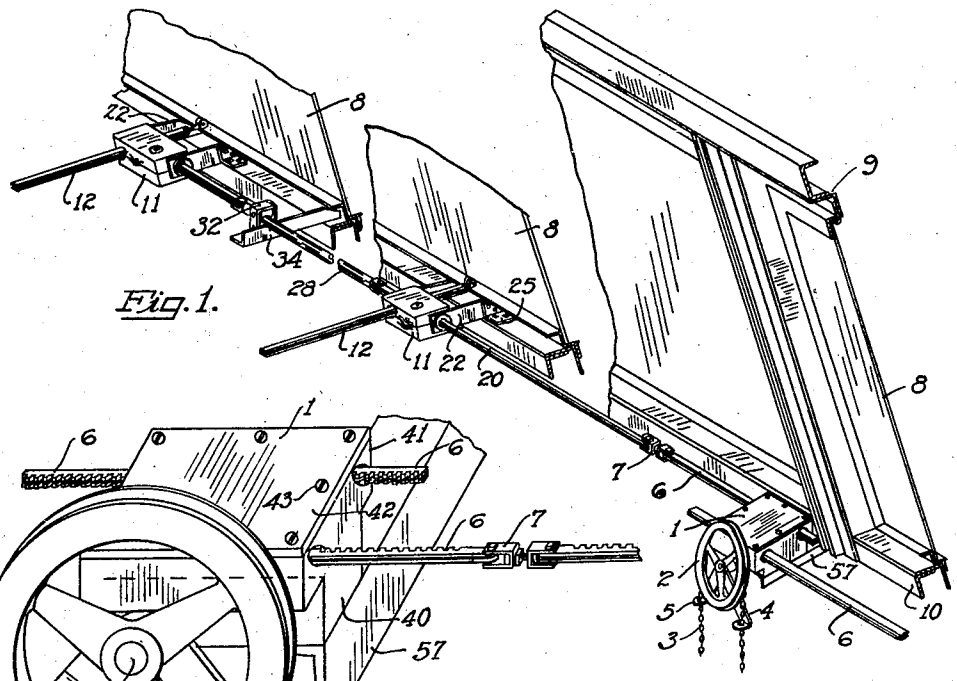

Fig. 1.

Fig. 2.

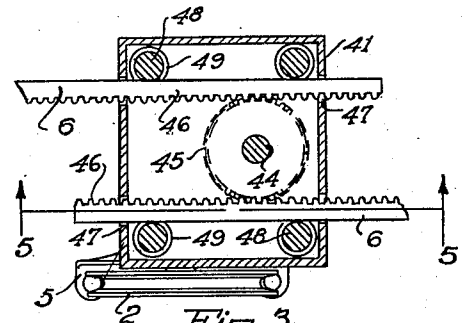

Fig. 3.

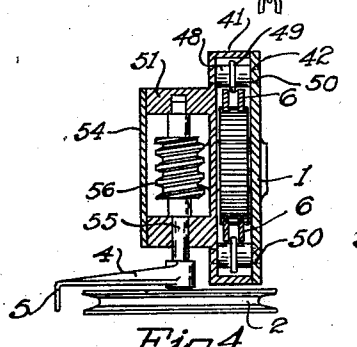

Fig. 4.

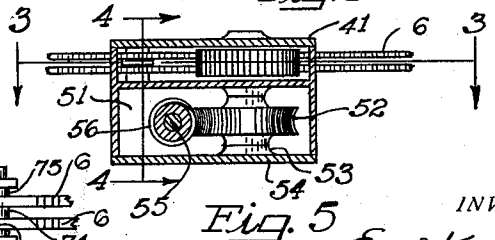

Fig. 5.

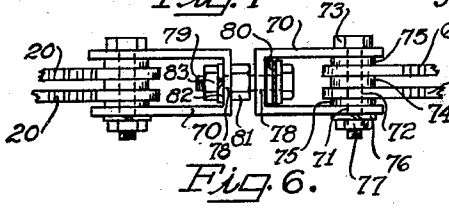

Fig. 6.

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GEAR AND RACK DEVICE

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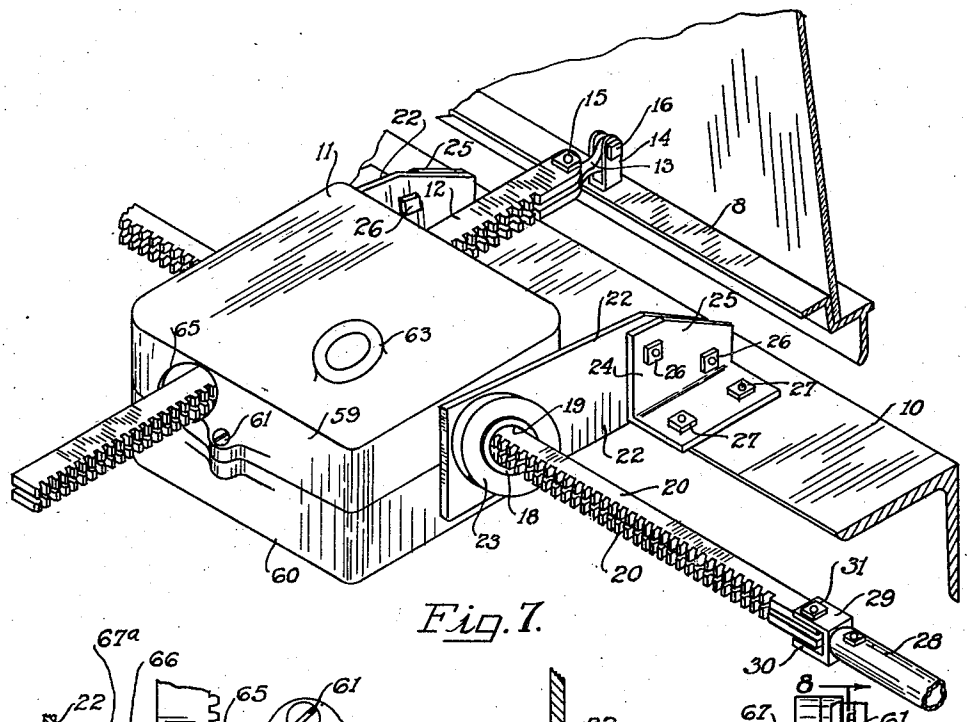

Fig. 7.

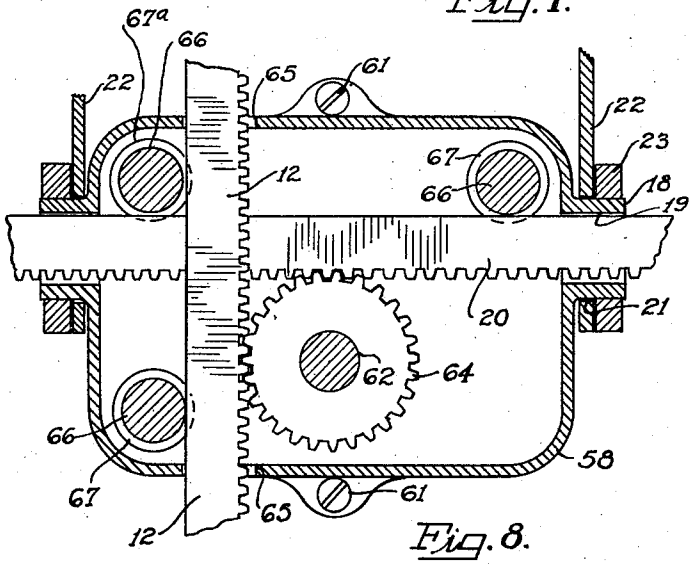

Fig. 8.

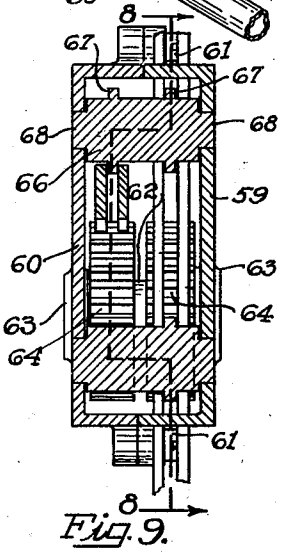

Fig. 9.

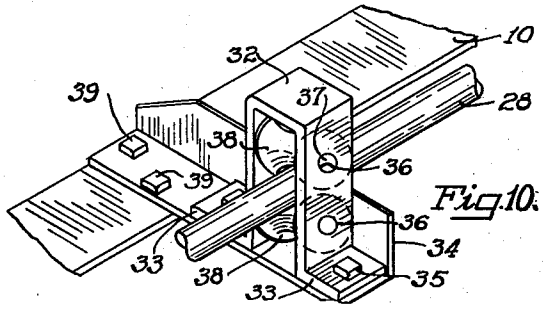

Fig. 10.

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Patented Feb. 25, 1930 1,748,555

UNITED STATES PATENT OFFICE

EARL KINNEY, OF MONTGOMERY COUNTY, NEAR DAYTON, OHIO, ASSIGNOR, BY MESNE ASSIGNMENTS, TO THE DAYTON GREENHOUSE MANUFACTURING COMPANY, OF DAYTON, OHIO

GEAR AND RACK DEVICE

Application filed January 24, 1925. Serial No. 4,457.

This invention relates to new and useful improvements in sash-operating devices.

It is the principal object of my invention to provide means whereby several sash may be opened or closed simultaneously from a single power unit by the tension applied to an operating rack, thus permitting a uniform adjustment of the sash throughout the run thereof. In the torsion type, an irregular adjustment of the sash is the result, those most distant from the power unit being opened a esser amount than those adjacent to the power unit, due to the torsion in the operating tube or bar.

It is also another object of my invention to apply tension to the tension member through a power unit.

It is a further object of the invention to apply thrust to the sash operating arm at right angles to the tension member.

My invention also relates to new and improved means for a self adjustment of the sash operating unit when the sash is opened or closed.

In the accompanying drawings, Figure 1 is a perspective view of a section of monitor sash equipment provided with the mechanical sash operator of my invention. Figure 2 is a perspective view of the power unit for applying tension to the tension member. Figure 3 is a sectional view taken through the power unit on the line 3—3 of Figure 5, showing the tension members and the pinion in mesh with them. Figure 4 is a sectional view taken through the power unit on the line 4—4 of Figure 5, showing the worm drive. Figure 5 is a sectional view taken through the power unit on the line 5—5 of Figure 3, showing the worm gear and tension rack pinion. Figure 6 is a side elevational view of the swivel joint employed between the tension racks, to permit a partial rotation of the latter where required. Figure 7 is a perspective view of the sash operator and its mounting means. Figure 8 is a sectional view taken through the sash operator on the line 8—8 of Figure 9, showing the method of applying a transverse movement to the sash rack. Figure 9 is a sectional view taken through the sash operator on the line 9—9 of Figure 8, showing the rack spacing rollers. And Figure 10 is a perspective view of the tension member supporting means.

Referring to the accompanying drawings for a detailed description of my invention, the numeral 1 in Figure 1 indicates a power unit to be hereinafter more fully described and having attached to the shaft thereof a sheave 2 adapted to receive an operating chain 3. The sheave 2 is provided with a guide yoke 4 provided with depending arms 5 through which the chain 3 passes in order to assure the alinement of the latter with the sheave regardless of the direction or angle from which the chain is pulled.

Passing through the power unit, and engaged thereby, are two tension racks 6, 6 having attached to the end of each a swivel member 7 to be hereinafter described. The racks 6, 6 are adapted to be simultaneously extended or retracted by the operator of the sheave.

Referring to Figure 1, a section of the monitor sash is shown, composed of several individual sashes 8, 8, 8, preferably hinged at their top edges to a structural member 9 and provided with a structural steel sill 10. Although this type of construction is employed, it is obvious to those skilled in this art that my device may be applied to any other form of construction.

Secured to the steel sill 10 at a central point of each sash, is a sash operator 11 to be hereinafter described, and provided with a double sash rack 12 which is pivoted to the sash proper by a link 13 and U shaped member 14 secured to the sash 8. The link 13 is secured to the double rack by a bolt 15 in a vertical line, and the link is pivoted to the U shaped member 14 by another bolt 16 at right angles to the bolt 15, thus providing a flexible connection between the sash and rack. (See Figures 1 and 7.)

The sash operator 11 is provided on each side with a hub-like projection 18 having formed in each one of its ends a hole 19 through which a double tension rack 20, 20 passes. The projections 18 are received by holes 21 in the support arms 22, and have secured to their extended ends retaining collars 23. It is thus seen that the sash operator 11

is provided with a swivel mounting in the arms 22.

Each one of the arms 22 is bolted or otherwise suitably secured to a vertical flange 24 of a clip 25, by bolts 26, and the clip is attached to the sill member 10 by bolts 27, thus providing a firm support for the sash operator. (See Figure 7.)

When the sash to be operated are of such width or spacing that the racks 22 are not of sufficient length to connect the adjacent sash operators, a tubular link 28 is employed, with a forked member 29 bolted in each end thereof. The racks 20, 20 are secured between the forked ends 30 of the member 29 by means of a bolt 31. (See Figures 1 and 7.)

The tubular link 28 is provided with a support 32 to prevent sagging or misalinement of the various tension members. The support 32 is preferably of inverted U shape, having formed integral with the open end thereof feet 33 which are secured to an angle support 34 by means of bolts 35. Each side of the support 32 is provided with two holes 36, 36 registering with corresponding holes in the opposite side. These holes 36 receive the axial projections 37 of two concave rollers 38 in which holes the latter are free to rotate. The tubular link 28 passes between these rollers, and is thus permitted a free movement between them. The angle support 34 is secured to the sill member 10 by bolts 39 through the latter. (See Figures 1 and 10.)

My power unit will now be more fully described. Referring to Figure 2, the numeral 40 represents a housing having an enlarged upper portion 41 provided with a flat cover 42 and maintained in oil tight relation with a housing proper by screws 43 around its periphery.

Extending vertically through the upper portion 41 of the housing is the worm gear shaft 44 to which there is keyed or otherwise secured a spur gear 45 adapted to engage the spur teeth 46 on the pairs of opposite racks 6, 6. (See Figure 3.)

The sides of the housing 41 are provided with holes 47 through which the racks 6, 6 are free to pass when operated by the gear 45. These racks 6, 6 are engaged, adjacent to each side of the housing, by a flanged roller 48, whose function is to keep the racks in proper relation with the gear. A flange 49 upon the said rollers, engages the recess between the pairs of racks, and thus effects a vertical alinement of the latter with respect to the holes 47. The rollers are provided at each end with an axial projection 50 which is journaled in a hole in the housing 41 and cover 42. (See Figures 3, 4 and 5.)

In the reduced lower portion 51 of the housing 40, there is secured to the shaft 44 a worm gear 52. The projecting end of the shaft is journaled in a hole in a boss 53 integral with a lower cover plate 54. At right angles to the worm shaft 44 is a worm shaft 55, whose one end is journaled in the lower housing 51 and whose opposite end projects through the latter to receive the sheave 2. (See Figures 3, 4 and 5.)

Mounted upon the shaft 55 is a suitable worm 56 to engage the worm gear 45 for the purpose of effecting a rotation of the latter when the sheave is rotated and thus to cause a corresponding movement of the racks 6, 6. (See Figures 4 and 5.)

The power unit is secured to an angle support 57 which in turn is suitably secured to the sill 10.

The sash operator 11 consists of a housing 58 split at its central portion into an upper half 59 and a lower half 60, the two halves being bolted together by screws 61 which project through their adjacent flanges. (See Figure 7.) Projecting vertically between the upper and lower halves of the housing 58 is a shaft 62 whose ends are journaled in bosses 63 integral with the housing. Secured to this shaft 62 near its central portion are two spur gears 64.

Through each hub-like projection 18 previously described, on each side of the housing 58, the tension racks 20, 20 pass. The housing is also provided with similar holes 65, 65 in its sides opposite the racks 20, 20, to permit the passage through them of the rack 12. These holes 65 and the holes 19 are so arranged that the racks 12 and 20 passing through them will mesh with the teeth of the spur gears 64. (See Figure 8.) The racks are engaged adjacent to each side of the housing by a flanged roller 66 similar to the rollers 48, which maintains the racks in proper relation to the gears. A flange 67 upon the rollers 66 engages the recess between the pairs of racks, thus effecting a vertical alinement of the latter with their respective holes 19 and 65 in the housing 58. By referring to Figures 8 and 9, it is apparent that one of the rollers 66 is in contact with both pairs of racks 12 and 20, and it is therefore provided with a double flange 67a for engagement with the recess between each pair of racks. The rollers 66 are provided with axial projections 68 at each end, which are journaled in holes in the upper and lower faces of the housing 58 to permit a free rotation of the said rollers.

As previously described, my invention comprises a stationary power unit having projecting therefrom tension racks 6, 6 adapted to be extended or retracted and connected with other tension racks 20, 20 of the sash operators, said sash operators being pivotally mounted in order to compensate for a circular movement of the sash 8 to which the rack 12 is attached. It is therefore obvious that a means must be provided to permit a partial rotation of the racks 20, 20 without disturbing the racks 6, 6, and

to this end I have provided the swivel joint shown in Figure 6. The numeral 70 indicates a U shaped member, having in the ends thereof holes 71 registering with similar holes 72 in the ends of the racks 6, 6 and 20, 20 and through which a bolt 73 passes. This bolt carries a spacing collar 74 which is interposed between said rack members, and a spacing collar 75 between each rack and each side of the U shaped member 70. The extended ends of the bolts 73 are provided with a lock washer 76 and a nut 77 by which means the above parts may be drawn tightly together to form a rigid connection between the U shaped members 70 and their respective racks. (See Figure 7.)

The adjacent ends of the two U shaped members 70, 70 are provided with holes 78 to receive a bolt 79 having within one of the members 70 under the head of the bolt 79 a bearing thrust collar 80. The threaded end of the bolt 79 is provided with a check nut 81 between the members 70, 70 and a lock washer 82 and a nut 83 within one of said members, thus permitting a firm connection between one of the members 70 and the bolt 79, and a swivel connection between the other members 70 and said bolt, provided with the bearing 80 to allow a free rotation of the racks 20, 20 while under tension.

Having described my invention, I claim:

In a device of the type described, a double operating rack, a gear in mesh with said rack, a second double rack at substantially right angles to the first rack, a gear in mesh with the second rack, the individual racks of each double rack being spaced a short distance apart, and a roller having a smooth surface engaging the smooth edges of the racks of each set, and having a central flange adapted to engage in the spaces between the racks of each set to maintain the first and second racks in proper relation to the gears.

In testimony whereof I have hereunto set my hand this 22d day of January, 1925.

EARL KINNEY.