

June 19, 1934.

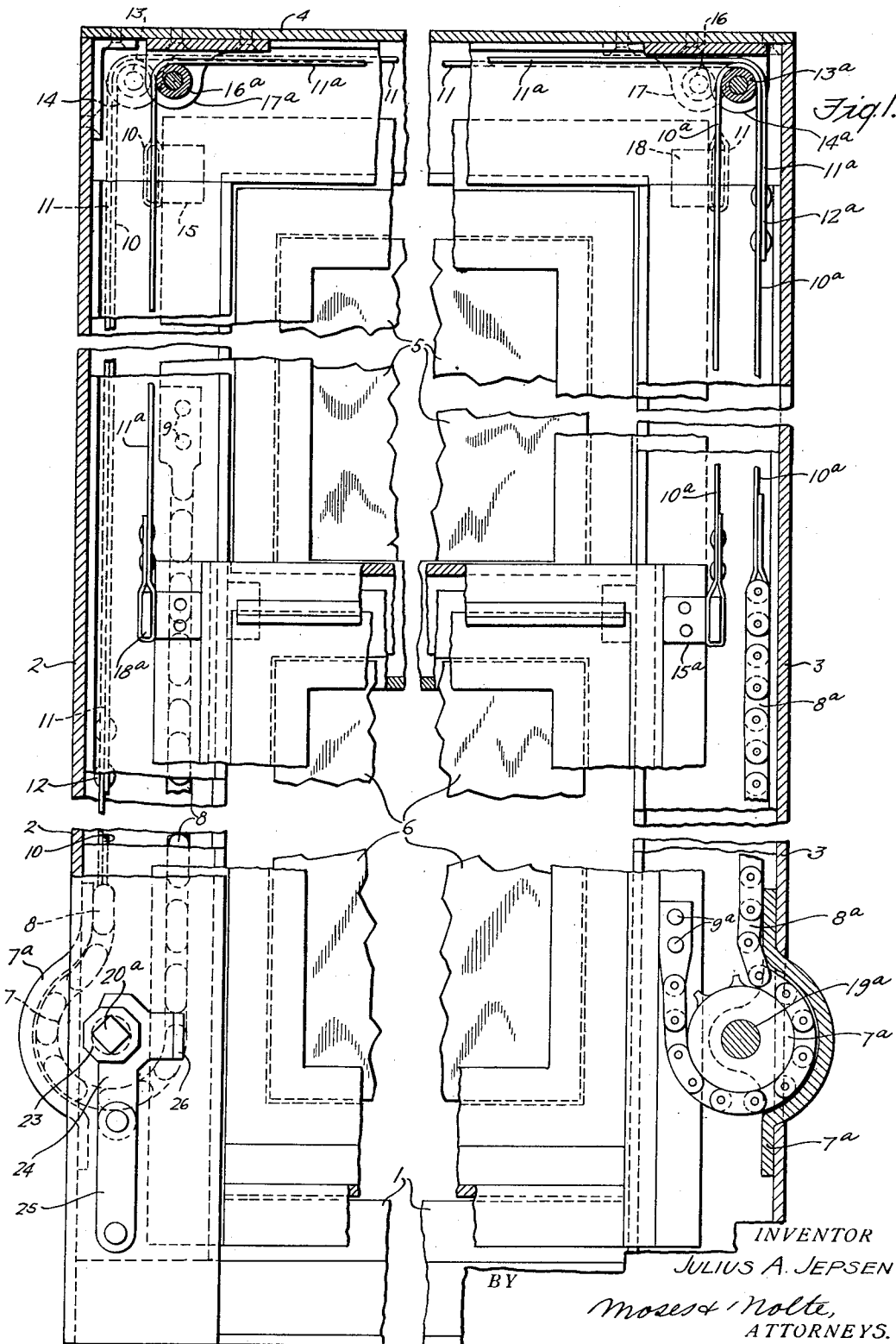
J. A. JEPSEN

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WINDOW OPERATOR

Filed March 21, 1931

3 Sheets-Sheet 1



June 19, 1934.

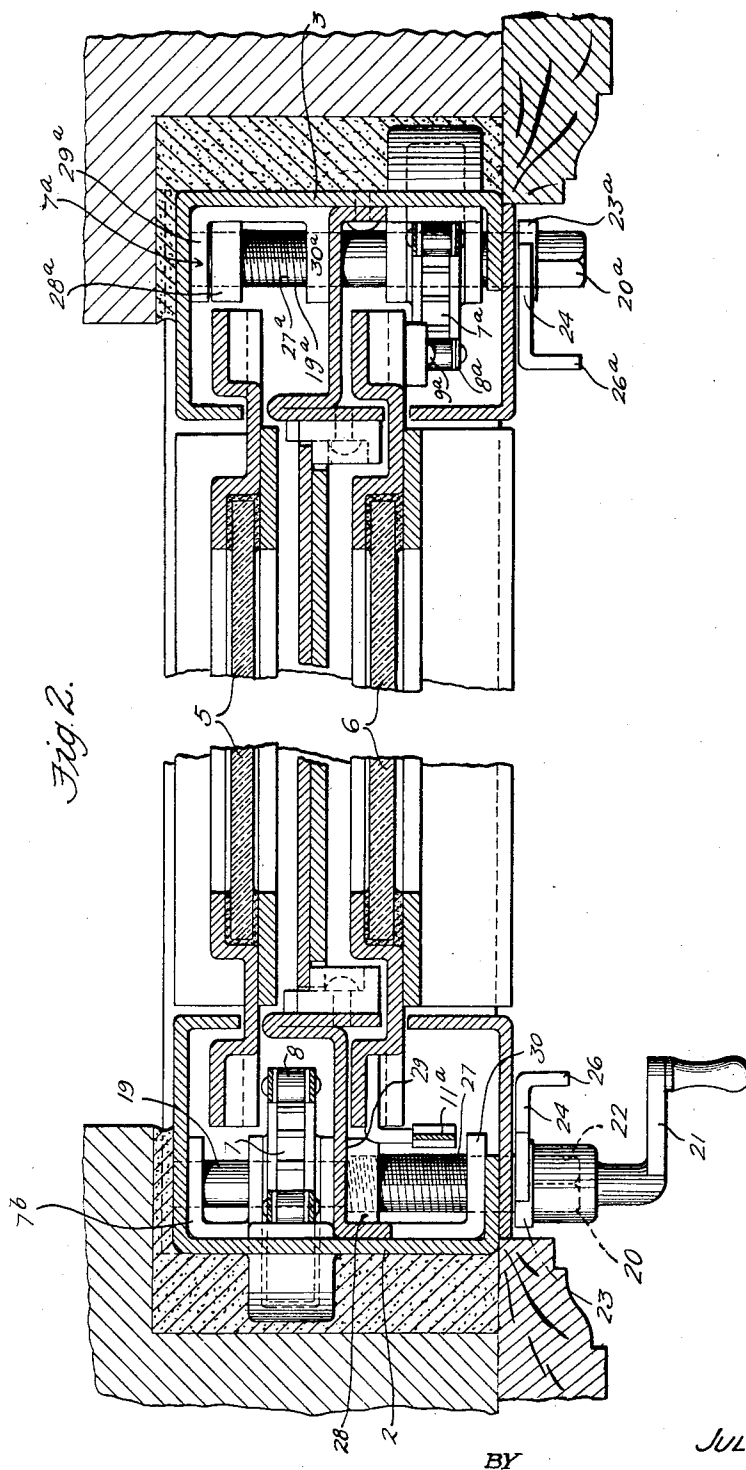
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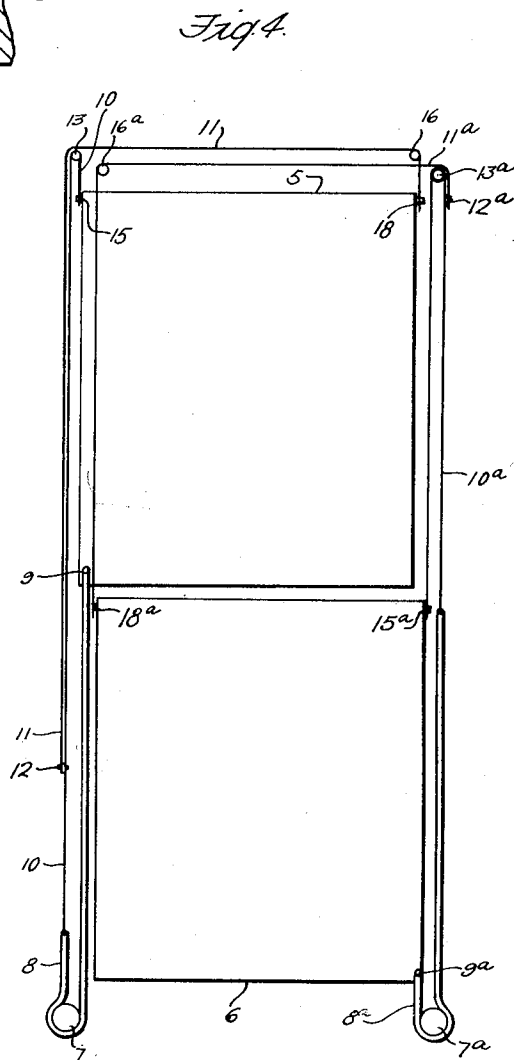
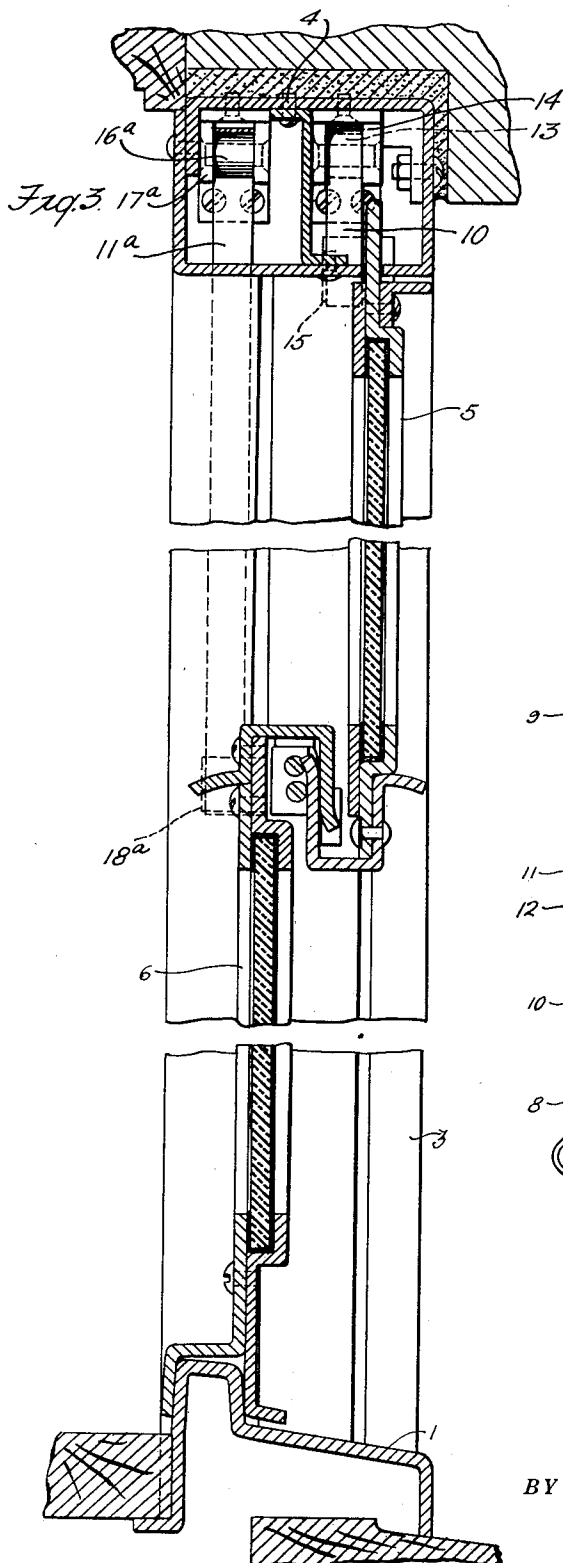
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1,963,790

WINDOW OPERATOR

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Application March 21, 1931, Serial No. 524,269

4 Claims. (Cl. 268—130)

This invention relates to operators for window sashes, more particularly to double hung windows, and has for an object to contrive simple, inexpensive mechanism for positively operating the upper and lower sashes in both directions, independently of one another, and to obviate the necessity for the employment of sash weights.

A further object of the invention is to provide means for limiting the range of operation of the sash operating mechanism so that liability of breaking the relatively weak parts of the operating train, by forcing after a sash has been fully opened or fully closed, will be avoided.

A further object of the invention is to contrive novel and improved means for retaining the sashes in any position to which they may be operated.

Other objects and advantages will hereinafter appear.

In the drawings forming part of this specification:

Figure 1 is a fragmentary, front elevation of a sash and frame assembly, partly broken away, and also broken away intermediate its ends and sides for compactness of illustration;

Figure 2 is a horizontal, sectional view through the lower sash, the structure being broken away intermediate its sides for compactness of illustration;

Figure 3 is a sectional, side elevation, broken away intermediate its ends for compactness of illustration; and

Figure 4 is a diagrammatic view in front elevation illustrating clearly how the various flexible parts of the window operator are directed and connected.

The window frame comprises a sill 1, jambs 2 and 3 and a head 4. An upper sash 5 and a lower sash 6 are vertically slidable in guideways provided in the jambs. Provision is made of a sprocket 7 carried by a bracket 7b fixed in the lower portion of the left hand jamb 2 for driving a chain 8 which, through suitable connecting mechanism, operates the upper sash between open and closed positions. The chain 8 extends upward from the inner side of the sprocket 7 and is fixedly connected to the upper sash near the lower left hand corner thereof by screws 9. The opposite end of the chain extends upward from the outer side of the sprocket and is connected to the lower end of a flat, flexible tape or ribbon 10 of steel or other suitable material of high tensile strength and high flexibility. A second tape 11 lies flat against the ribbon 10 and is secured to the same by rivets 12. The tapes 10 and 11 extend upward together, and together pass, in superposed relation, around a pulley 13 carried by a bracket 14 fixed in the upper left hand corner of the frame. The tape 10 extends downward from said pulley and is secured to the upper sash near the upper left hand

corner thereof by a bracket 15. The other tape 11 extends across the head and around a pulley 16 carried by a bracket 17 in the upper right hand corner of the frame, and thence downward, being attached to the upper sash near the upper right hand corner thereof by means of a bracket 18.

It will be seen that when the sprocket 7 is rotated in a clockwise direction the chain 8 pulls down upon the upper sash, the pull being exerted near the leading end (the lower end) of the sash. The tapes 10 and 11 in this operation hold back on the sash to prevent canting and consequent binding of the sash. When the sprocket 7 is rotated in a counter-clockwise direction, the chain 8 pulls downward upon the connected tapes 10 and 11, causing the distant ends of the tapes to pull the upper sash upward. The pull is applied at both sides of the sash near the leading (the upper) end thereof so that there is little or no tendency of the sash to bind. The chain, however, holds back upon the lower left hand corner of the sash, and further assists in the prevention of binding.

The sprocket 7 is fast upon a shaft 19 journaled in the bracket 7b, which shaft extends forward through the jamb and presents an exposed end portion 20, non-circular in form, upon which an operating crank 21 having a socket 22 in the end thereof may be fitted. The shaft 19 is provided with a polygonal collar 23 just outside the jamb which may be utilized for locking the shaft against rotation, when desired. A latch member 24 adapted to fit the collar 23 is pivotally mounted upon a link 25, which link is in turn pivoted upon the jamb. The latch 24 may be moved clear of the collar 23 whenever it is desired to rotate the shaft 19, but may be placed in embracing relation to the collar 23 in any position of rotation of the collar. A finger piece 26 is provided on the latch 24 for moving the latch between effective and ineffective positions.

In order that the chain, the tapes, and the connections of these members to one another and to the sash may be protected against breakage, provision is made for measuring and positively limiting the range of movement of the shaft. To this end the shaft 19 is provided with a threaded portion 27 upon which a stop nut 28 is threaded. The stop nut 28 has a flat side which runs in engagement with the bracket 7b, and hence is prevented from rotating. As the shaft is operated, therefore, the nut travels along the shaft, being limited in its movement in one direction by engagement with a fixed stop 29 and in the opposite direction by engagement with a fixed stop 30 formed by a portion of the bracket 7b. The parts are so proportioned and designed that the nut engages the stop 30 just when the upper sash has been fully opened and the stop 29 just when

the sash has been fully closed. When the sash has been operated to either of these positions, therefore, the application of further force for continuing the rotation of the shaft in the same direction is positively resisted by the nut and the fixed stop with which it cooperates in that position.

The operating mechanism for the lower sash is substantially a duplicate of that described for the upper sash, and a detailed description is, therefore, deemed unnecessary. In order to make clear the corresponding parts of the lower sash operator, the same reference numerals have been applied to the various corresponding parts with the subscript *a* added.

It will be observed that the upper and lower sash operators are entirely independent of one another, but that they are so arranged and organized that they are mutually non-interfering, and yet may be housed within a frame of usual dimensions. To this end the driving shafts and associated parts are mounted at opposite sides of the frame, and the flexible elements are confined in each instance to the plane of the sash with which they cooperate.

It should be noted that since sash weights are unnecessary with the construction described, the frame and sash assembly is complete when it is set in the masonry of the building, and hence that the masonry and plaster work may be completely finished at once without the necessity for leaving access to the interior of the jambs to enable the sash weights to be hung.

The elimination of the sash weights has other very important advantages. For example, the assembly may be shipped complete without liability of damage, such as would arise if windows requiring weights were shipped with weights assembled in them. The weight of the entire structure is also considerably reduced, with a consequent saving in freight charges and in cost of packing.

While I have illustrated and described in detail certain preferred forms of my invention, it is to be understood that changes may be made therein and the invention embodied in other structures. I do not, therefore, desire to limit myself to the specific constructions illustrated, but intend to cover my invention broadly in whatever form its principle may be utilized.

I claim:

1. In a window assembly, in combination, a frame, a sash, a flexible member connected to the sash for running it up and down, rotary means for driving the flexible member, including a shaft, and a movement limiting device operable by and in proportion to said shaft for preventing the application of excessive tension to the flexible member.

2. In a window assembly, in combination, a frame, a sash, a flexible member connected to the sash for running it up and down, rotary means for driving the flexible member, including a shaft having a threaded portion, a nut threaded thereon, means preventing rotation of the nut, and fixed stops for limiting translatable movement of the nut and thereby limiting the range of rotation of said shaft.

3. In a window assembly, in combination, a frame comprising hollow jamb members, each of which is divided by a partition into parallel

vertical compartments, said frame also having a hollow lintel member and a sill member, upper and lower sashes mounted to slide in said frame, said sashes having side flanges projecting through slots in the frame, the flanges of one sash projecting into one pair of compartments in the jamb members and the flanges of the other sash projecting into the other compartments in the jamb members, an operator for each sash, each operator comprising a driving sprocket, a chain trained around said sprocket and connected at one of its ends to the lower part of a side flange of the corresponding sash inside of the jamb compartment into which said flange projects, a pair of flexible members connected to the opposite end of said chain, and pulley means in the lintel around which the flexible members travel, said flexible members being entirely concealed within said jamb compartments and hollow lintel and being connected respectively to the upper ends of the sash side flanges, one of said driving sprockets being mounted in a jamb member at one side of the frame and in the compartment of said jamb member into which a side flange of the corresponding sash projects, the other of said driving sprockets being located in the jamb member at the other side of the frame and in the compartment thereof into which projects one of the flanges of the second sash, and operating shafts upon which said driving sprockets are mounted, each of said operating shafts projecting through both of the compartments in one of said jamb members, and means for limiting the permissible rotation of each shaft, said means being mounted in the jamb compartment through which said shaft passes other than the compartment in which the driving sprocket on said shaft is located.

4. In a window assembly, in combination, a frame comprising hollow jamb members, each of which is divided by a partition into parallel vertical compartments, said frame also having a hollow lintel member and a sill member, upper and lower sashes mounted to slide in said frame, said sashes having side flanges projecting through slots in the frame, the flanges of one sash projecting into one pair of compartments in the jamb members and the flanges of the other sash projecting into the other compartments in the jamb members, an operator for each sash, each operator comprising a driving sprocket located in one of the jamb members, a chain trained around said sprocket, and connected at one of its ends to the lower part of a side flange of the corresponding sash inside of the jamb compartment into which said flange projects, a pair of flexible members connected to the opposite end of said chain, and pulley means in the lintel around which the flexible members travel, said flexible members being entirely concealed within said jamb compartments and hollow lintel and being connected respectively to the upper ends of the sash side flanges, said flexible members being flat tapes or ribbons running upon a pulley at one side of the upper end of the frame in superposed relation, there being no connection through the sill between the operating mechanism in one jamb member and the operating mechanism in the other jamb member.

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