July 29, 1969 H. P. ARMSTRONG 3,457,675

CORNER PULL-IN OPERATOR

Filed Aug. 7, 1967 2 Sheets-Sheet 1

Fig. 1.

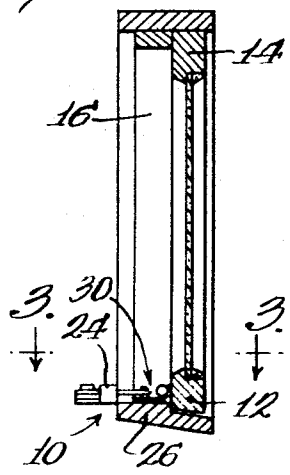


Fig. 2.

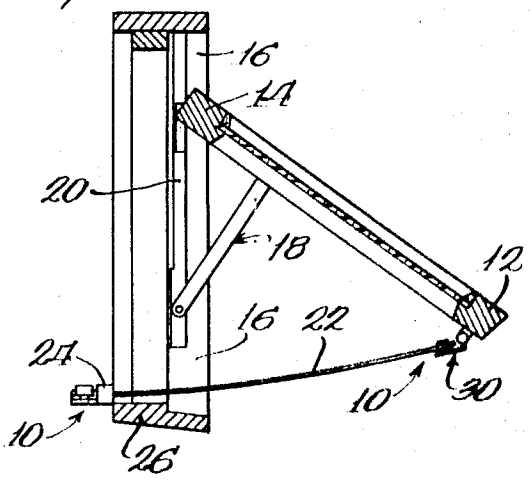
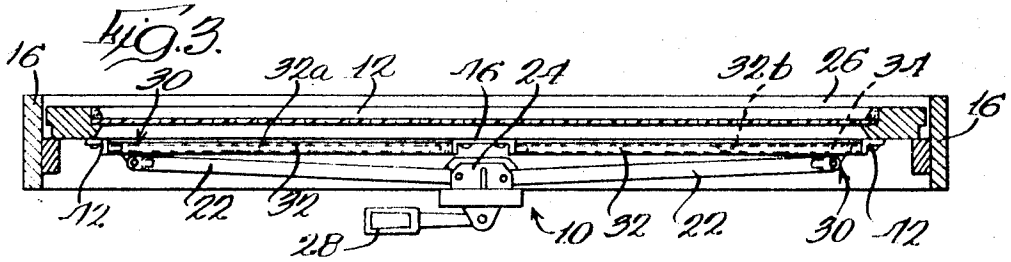


Fig. 3.



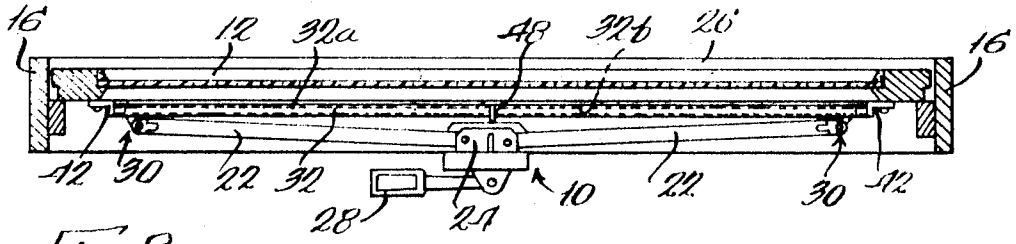


Fig. 8.

Inventor:
Henry P. Armstrong
By Hofgren, Wegner,
Allen, Stellman & McCord
Attys

July 29, 1969 H. P. ARMSTRONG 3,457,675

CORNER PULL-IN OPERATOR

Filed Aug. 7, 1967 2 Sheets-Sheet 2

Fig. 4.

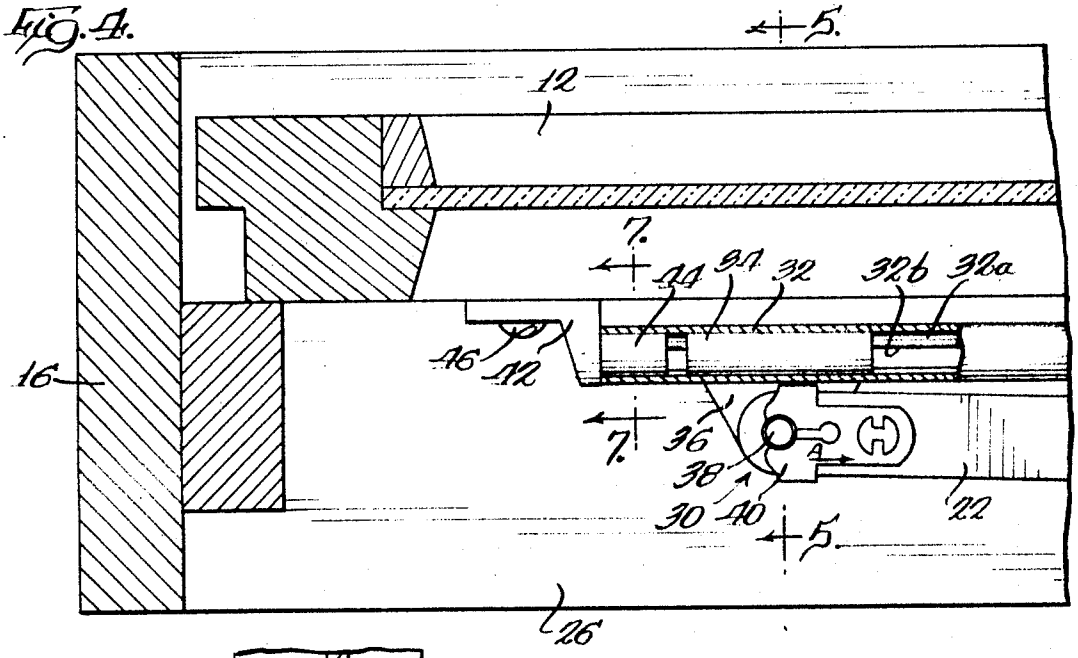


Fig. 5.

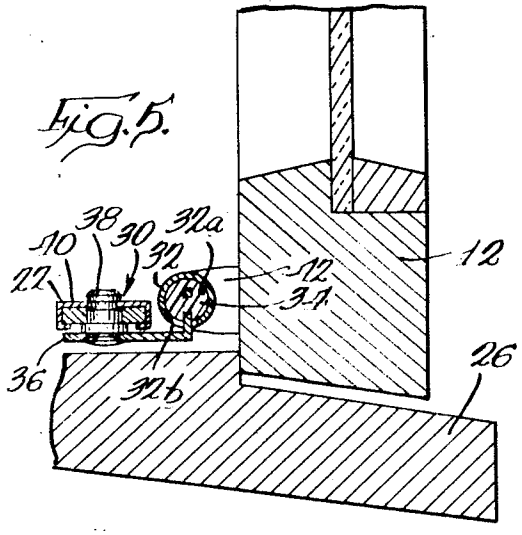


Fig. 6.

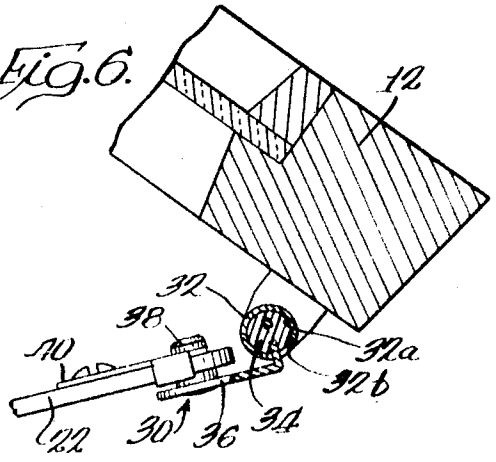
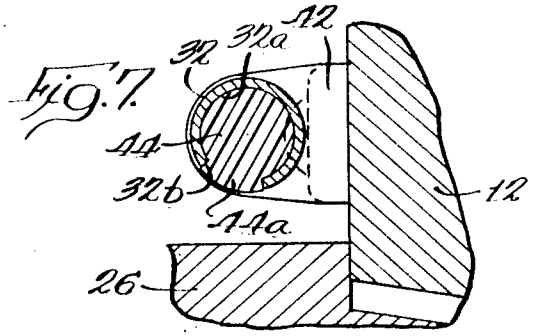


Fig. 7.



United States Patent Office 3,457,675 Patented July 29, 1969

3,457,675

CORNER PULL-IN OPERATOR

Henry P. Armstrong, Islington, Ontario, Canada, assignor to Truth Tool Company, a corporation of Minnesota

Filed Aug. 7, 1967, Ser. No. 658,936
Int. Cl. E05f 9/00
U.S. Cl. 49—356 4 Claims

ABSTRACT OF THE DISCLOSURE

A window operator for windows which have a sash mounted on the window frame to swing about a horizontal axis generally parallel to one rail of the sash. The operator has two horizontal arms pivotally mounted on the window frame to swing together and apart and joined to the free edge of the sash to open and close the window upon such swinging. The arms are joined to the sash by a connection which permits the arms to slide back and forth along a tubular guide member secured to the free edge of the sash. The connection is such that the forces applied by the swinging arms are directed toward the guide member with the operating arms at the same level or in line with the guide member. The guide member is nonrotatably mounted by end brackets in the form of keyhole-shaped plugs extending into the ends of the channel.

Background of the invention

As is known in the art, one type of window operator of the character described includes a tubular guide member extending along the lower window sash for receiving a cylindrical movable member connected by a bracket to the ends of each of the swinging operating arms of the operator. The movable members move back and forth in the tubular guide member as the arms swing toward and away from each other to open and close the window. The brackets which connect the free swinging ends of the operating arms to the movable members are disposed entirely to one side of the operating arms and include a leg extending away from the operating arms for connection with the sliding movable members. The forces exerted by the operating arms are therefore directed to one side of the tubular guide member on the lower window sash and not only result in greater forces necessary to open and close the window, but the connections between the operating arms and the movable members tend to cause binding as the movable members move along the tubular guide member during opening and closing of the window. This invention relates to a connection between the operating arms and the movable members such that the forces of the operating arms are directed toward the tubular guide member on the lower window sash with the operating arm being at the same level or in line with the tubular guide member.

In addition, this invention relates to a novel end bracket construction to nonrotatably mount the tubular guide member to the lower window sash by simply inserting a keyhole-shaped plug into the end of the tubular member.

Summary of the invention

An object of this invention is to provide a new and improved operator for windows having a swinging sash.

Another object of this invention is to provide an operator of the above character with a new and improved connection between the operating arms and the tubular guide member on the free edge of the window sash, the connection directing the operating forces of the arms toward the tubular member.

A further object of this invention is to provide a window operator of the character described wherein the operating arms are maintained at the same level or in line with the tubular guide member on the window sash regardless of whether the window is opened or closed.

Still another object of this invention is to provide a window operator of the character described having improved end brackets to secure the tubular guide member to the window sash.

Detailed description of the drawings

FIG. 1 is a vertical section view of one embodiment of the window and operator of the present invention, illustrating the window in its closed position;

FIG. 2 is a vertical section view similar to that of FIG. 1 with the window in its open position;

FIG. 3 is a horizontal section view taken generally along the line 3—3 of FIG. 1;

FIG. 4 is a horizontal section view, on an enlarged scale, of the left-hand portion of FIG. 3;

FIG. 5 is a vertical section view taken generally along the line 5—5 in FIG. 4, illustrating the window in its closed position;

FIG. 6 is a vertical section view similar to that of FIG. 5 with the window in its open position;

FIG. 7 is a vertical section view taken generally along the line 7—7 of FIG. 4; and

FIG. 8 is a horizontal section view similar to that of FIG. 3, showing a modified form of the invention in which the tubular guide member extends along a substantial portion of the lower window sash.

Detailed description of the invention

Referring to the drawings in greater detail, the invention is shown herein as embodied in an operator, generally designated **10**, for use with awning-type windows having a lower free swinging sash rail **12** and an upper sash **14**. The window is pivotally mounted on the frame **16** of a window by means of a hinge, generally designated **18** (FIG. 2), to swing about a horizontal axis generally parallel to the upper edge of the sash. Preferably, the hinge means **18** includes a sliding connection such as a track or groove **20** vertically along the side walls of the window frame, and the window is provided with a cooperating pin or other device which slides vertically in track **20** such that the plane of the window is swung out, as is well-known in the art. The window may merely be pivoted along its upper edge to tilt outwardly from a normally vertical closed position.

The operator **10** includes a pair of elongated generally horizontal operating arms **22** whose inner ends are pivotally connected to a support or casing **24** of the operator which is fastened to the lower sill portion **26** of the window frame so that the arms are turned about vertical axes by a handle **28** (FIG. 3). The latter is mechanically interconnected to the arms by suitable means disposed within the casing **24** such that the arms swing in unison about their axes but in opposite directions.

The outer ends of the arms **22** are joined to the lower window sash **12** by a connection, generally designated **30**, which permits the ends of the arms to slide laterally back and forth along the lower window sash **12**. When the arms are swung toward each other they push the lower window sash **12** out, thus opening the window. As the arms are swung apart toward the position shown in FIG. 3, the window is drawn closed.

The connection **30** includes a horizontal, tubular guide member **32** with an interior cylindrical surface extending lengthwise thereof. The tubular member also has a slot **32***b* extending lengthwise thereof. The guide member **32** may take other hollow, elongated shapes with slots therein forming channel-like guides. A pair of cylindrical movable members **34** in the form of short rod sections are

disposed within the tubular guide member 32 for connection with the outer ends of the operating arms 22. The cylindrical movable members have a substantial area of contact with the interior surface on the tubular guide member 32 such that the movable members slide back and forth within the guide member on opening and closing the window. The slot 32*b* in the tubular guide member is narrower than the movable members to prevent the movable members from being removed from the tubular guide member.

According to the present invention, the connecting means between the movable members 34 and the outer ends of the operating arms 22 is arranged in a novel manner to direct the opening and closing forces of the operating arms in the direction of or toward the tubular guide member 32 and movable members 34. In other words, the operating arms 22 extending away from the window frame are maintained at a level or in line with the tubular guide member 32 and the sliding movable members 34. The connection on the end of each of the operating arms 22 includes an L-shaped member 36 having a generally horizontal leg extending lengthwise of an in juxtaposition with the operating arm at the free swinging end thereof and a generally upright leg extending across the free end of the operating arm through the slot 32*b* of the tubular guide member 32 into engagement with the cylindrical movable members 34. The upright leg of the L-shaped member 36 is of a sufficiently short length to maintain the operating arm in line with the tubular guide member 32. As shown in the drawings, the horizontal leg is disposed on the underside of the operating arm 22 with the vertical leg extending upwardly through the slot 32*b* of the tubular guide member. Obviously, the connection may be reversed such that the slot 32*b* is disposed on top of the tubular guide member 32 with the L-shaped member 36 having its horizontal leg on top of the operating arm 22 and the vertical leg extending downwardly across the end of the operating arm into the tubular guide member 32 for connection with the cylindrical movable members 34. With such an arrangement as thus presented, not only is a more compact connection provided with shorter and less cumbersome lever arms, but by maintaining the operating arm 22 in line with or pointed toward the tubular guide member 32 and movable member 34, less binding occurs on opening and closing the window.

Referring to FIGS. 4 and 6, the L-shaped members 36 are mounted on the outer ends of the operating arms 22 by means of studs 38 extending through the operating arm. The studs are maintained in position by a known slidable keeper member 40 which is capable of moving in the direction of arrow A (FIG. 4) to release the studs 38 to detachably connect the L-shaped member 36 to the outer end of arms 22.

Referring to FIGS. 4 and 7, end brackets 42 are provided at each end of the tubular guide member 32 for securing the guide member to the lower window sash 12 and prevent rotation of the guide member relative to the sash. The end brackets each include a cylindrical plug portion 44 extending into the end of the tubular guide member 32. The plug portion has an outer cylindrical surface mating with the interior cylindrical surface of the tubular guide member 32. A rib portion 44*a* (FIG. 7) is disposed lengthwise along the plug portion 44 and extends radially outwardly therefrom into the slot 32*b* of the tubular guide member 32 on the window sash 12. Each end bracket 42 is secured by screws 46 (FIG. 4) to the inside of the lower sash rail 12.

Referring to FIGS. 3 and 8, it can be seen that the tubular guide member 32 may comprise a pair of like members on the lower sash 12, one extending in a direction away from each side of the support casing 24 as shown in FIG. 3. However, the tubular guide member may comprise a single continuous tubular member 32*a* extending the entire length of the lower window sash 12 as illustrated in FIG. 8. With the embodiment shown in FIG. 3, a central bracket 46 may be provided with cylindrical plugs, similar to plugs 44 of end brackets 42, extending in opposite directions into the adjacent ends of the two guide members 32. In the embodiment illustrated in FIG. 8, a support member 48 is provided having a circular portion embracing the tubular guide member 32*a* intermediate the ends of the guide member.

The foregoing detailed description has been given for clearness of understanding only and no unnecessary limitations should be understood therefrom as some modifications will be obvious to those skilled in the art.

I claim:

1. In an operator for a window having a frame and a sash mounted on the frame to swing about an axis generally parallel to one edge of the sash, a support attached to said frame, an operating arm pivotally connected at one end to said support to swinging in a plane parallel to said axis, manually operable means for swinging said arm, a hollow elongated member adapted to be secured to the free edge portion of said sash and having an interior surface extending lengthwise of the member, the hollow member having a slot extending lengthwise thereof, a movable member having an exterior surface engaging with the interior surface of said hollow member to move back and forth in the hollow member to open and close said window, the slot in said hollow member being narrower than said movable member to prevent the movable member from being removed from the hollow member, the improvement comprising a bracket mounted on the other end of said arm, said bracket including an L-shaped member having a generally horizontal leg extending lengthwise of and in juxtaposition with said operating arm adjacent the free swinging other end thereof and a generally upright leg extending across said other end of the arm through said slot into engagement with said movable member, said latter leg being of a sufficiently short length to maintain said operating arm pointed toward said hollow member and said movable member.

2. In an operator for a window having a frame and a sash mounted on the frame to swing about an axis generally parallel to one edge of the sash, a support attached to said frame, an operating arm pivotally connected at one end to said support to swing in a plane parallel to said axis, manually operable means for swinging said operating arm, a hollow elongated member adapted to be secured to the free edge portion of said sash and having an interior surface extending lengthwise of the member, said hollow member having a slot extending lengthwise thereof, a movable member having a surface engaging with the surface of said hollow member to move back and forth in the hollow member, connecting means on the other end of said operating arm connecting said arm to said movable member to move said movable member back and forth on said member to open and close said window, the slot in said hollow member being narrower than said movable member to prevent the movable member from being removed from the hollow member while being sufficiently wide to accommodate said connecting means, the improvement comprising end brackets secured to said sash to mount said member to the free edge portion of said sash and prevent rotation of the hollow member relative to the sash, said end brackets each including a plug portion extending lengthwise into one end of said hollow member, said plug portion having a surface mating with the interior surface of said hollow member, and a rib portion along said plug portion extending outwardly into said slot on said hollow member to prevent rotation of the hollow member relative to the end brackets and said sash.

3. An operator as set forth in claim 2 wherein said hollow member is tubular and has interior and exterior cylindrical surfaces, and wherein said plug portion is

cylindrical with an exterior surface mating with the interior cylindrical surface of said tubular member.

4. An operator as set forth in claim 3 wherein said rib portion has means forming an annular surface lengthwise thereof forming a continuation of the exterior cylindrical surface of said tubular member.

References Cited

UNITED STATES PATENTS

1,198,144	9/1916	O'Rourke	49—341
2,899,195	8/1959	Ahlgren	49—324
2,961,234	11/1960	Munro	49—346
3,139,276	6/1964	Hay	49—346 X

DAVID J. WILLIAMOWSKY, Primary Examiner

J. K. BELL, Assistant Examiner

U.S. Cl. X.R.

49—246, 346