Aug. 16, 1960 J. C. BENNETT 2,949,042

JALOUSIE OPERATOR

Filed March 31, 1958 2 Sheets-Sheet 1

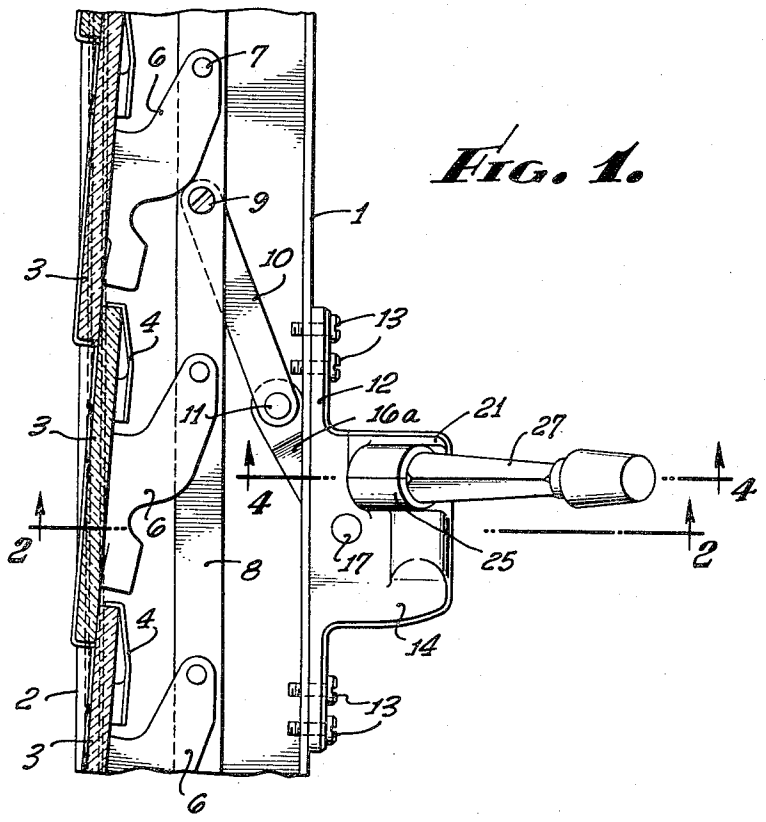


FIG. 1.

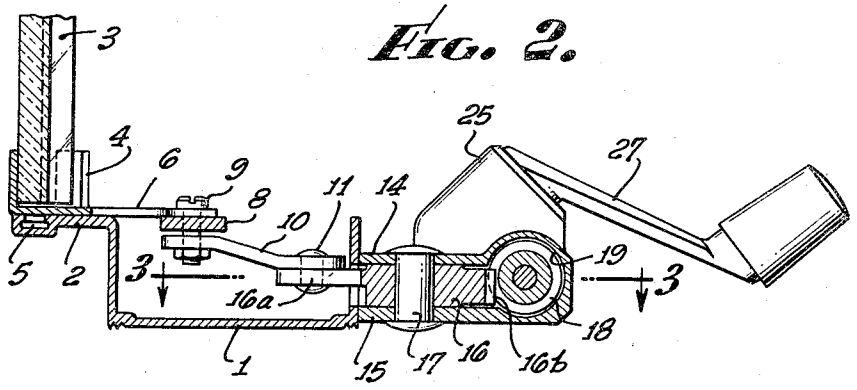


FIG. 2.

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FIG. 3.

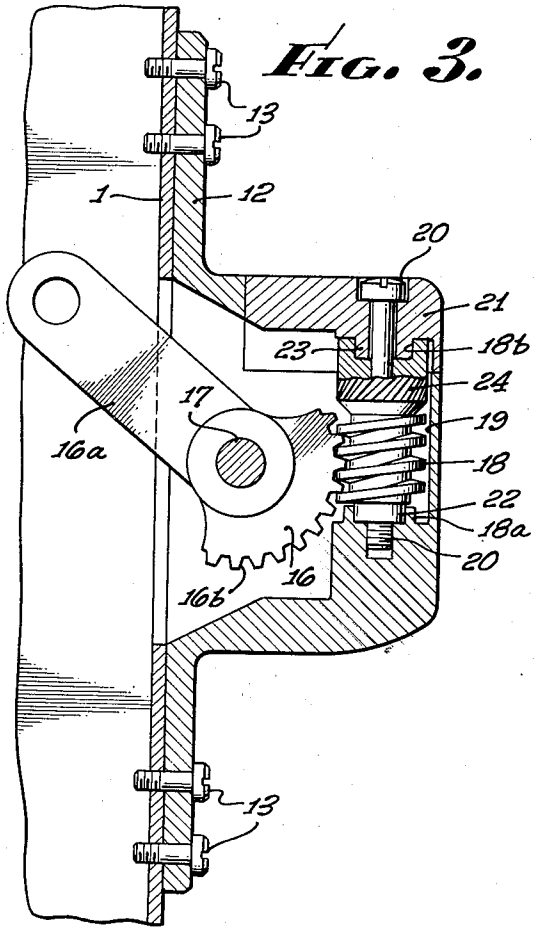


FIG. 5.

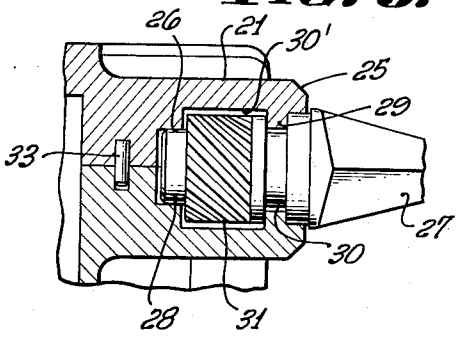


FIG. 6.

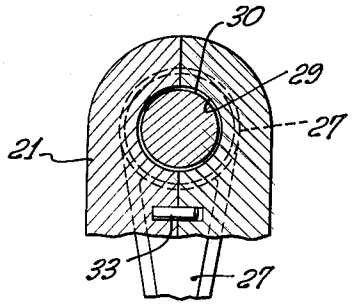
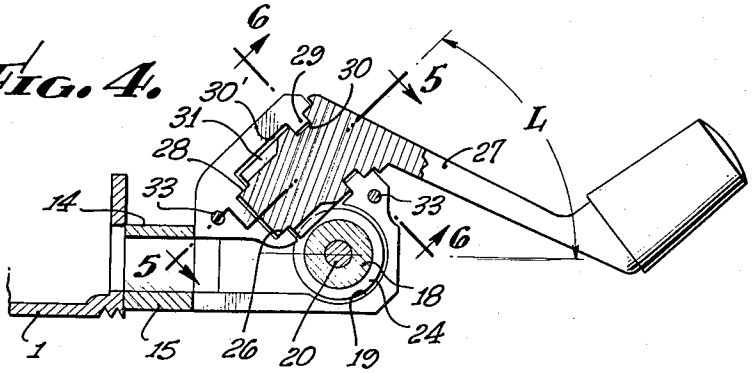


FIG. 4.



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JALOUSIE OPERATOR

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11 Claims. (Cl. 74—425)

The present invention relates to window operators and more particularly to a window operator of the type generally employed for controlling the manipulation of slats or louvers of jalousie type windows.

So-called jalousie windows comprise a plurality of slats or louvers mounted for pivotal movement about horizontal axes, each louver being connected to a travel rod or bar which in turn is connected through a link to an operating arm of a control mechanism which is operative to effect reciprocation of the travel rod or bar so as to effect pivotal adjustments of the louvers.

The control mechanism is conventionally mounted upon the side rail of a window frame or upon the sill of the window frame, and it is highly desirable that the control mechanism not project substantially beyond the window frame. Preferably the operating mechanism is located adjacent the lower extremity of the window when the operator is located on the side rail. In any case, however, it is highly desirable that the operating handle or crank be disposed so that it may be easily operated without interference from any of the supporting structure and without requiring the assumption by a person operating the window of an awkward position.

Heretofore, jalousie operating mechanisms have included a worm driven gear segment on the operating arm, with the worm disposed at an angle of on the order of 20° to 45° from a plane drawn at right angles to the axis of the worm gear segment. Such a structure has resulted in worm gear segments having low mechanical efficiency because of the high helix angle of the segment teeth. In addition point contact between the worm and the worm gear segment has resulted in rapid wear and ultimate shearing of the worm gear segment teeth.

Attempts have been made at alleviating these problems by the provision of hardened steel worms and worm gear segments. However, this is undesirable from the standpoint of cost of manufacture, which cost has not been warranted in view of the continued wear of the steel worm and worm gear segments.

In order to avoid the inherently faulty mechanical arrangement noted above, attempts have been made at decreasing the angular relation of the worm to the worm gear segment while compensating for the change in this angularity by the utilization of a pair of coengaged bevel gears so as to provide the desired operating handle angularity. However, this construction is also subject to certain inherent problems attending the utilization of bevelled gears. The utilization of bevelled gears in a jalousie operator requires relatively precise manufacturing of the assembly so as to assure a proper mounted relationship of the bevel gears, which relationship is rather critical if efficient and smooth operation is to result. Rather precise machining operations are necessary to effect proper positioning of the bevelled gears absent which the operator mechanism may be inoperative or at best quite rough in its operation where the bevel gear teeth do not properly coengage.

In accordance with the present invention the foregoing defects in prior jalousie operators have been overcome

by the provision of a structure wherein the worm gear is disposed in the plane of the worm gear segment and at a right angle with respect to the axis of rotation of the worm gear segment. With such a construction line contact of the worm gear and worm teeth is accomplished with attendant long life of the gearing, efficient transmittal of torque and smoothness of operation.

In order to further improve the mechanical relationship of the parts and further insure smoothness of operation, the worm is driven by a spiral gear carried by a hand operated crank and a cooperative spiral gear coaxially extended with respect to the worm. Precise mounting distances for spiral gears need not be maintained with the result that machining operations are not prerequisite to efficient and smooth operation of the mechanism.

Accordingly, a primary object of the present invention is to provide a jalousie operator which is improved over jalousie operators known heretofore in point of smoothness and ease of operation, durability, and simplicity of manufacture.

Another object is to provide a jalousie operator including a worm gear segment having an operating arm thereon, a worm engaged with the worm gear segment and disposed with its axis lying in a plane substantially parallel to the plane of the gear segment and disposed substantially at a right angle with respect to a plane intersecting the axis of rotation of the gear segment.

Another object is to provide a structure in accordance with the preceding objectives wherein the worm is driven by cooperatively engaged spiral gears on the worm and on a hand operated crank.

With the construction made in accordance with the preceding objectives friction losses which pose a serious problem with respect to previously known jalousie operators are substantially eliminated so that a much larger proportion of torque imparted to the worm is transmitted through the gear mechanism to the operating arm or lever on the worm gear segment, whereas in a structure where the worm is disposed at an angle to the worm gear segment i.e., disposed with its axis in a plane lying at an angle with respect to the plane of the worm gear segment, the force transmitted to the worm gear segment from the worm tends to bind the worm gear segment with the supporting housing.

Still another object is to provide a jalousie operator wherein the worm gear segment is located medially of the holes in the supporting base of the housing. With such a construction the operator may be universally employed at either the right-hand or left-hand side of a window, by simply reversing the assembly.

Other objects and advantages of the invention will be hereinafter described or will become apparent to those skilled in the art and the novel features of the invention will be defined in the appended claims.

In the accompanying drawings:

Fig. 1 is a view partly in elevation and partly in section showing a jalousie operator made in accordance with the invention, and as applied to a jalousie type window;

Fig. 2 is an enlarged sectional view as taken on line 2—2 of Fig. 1;

Fig. 3 is an enlarged sectional view as taken on line 3—3 of Fig. 2;

Fig. 4 is an enlarged sectional view as taken on line 4—4 of Fig. 1;

Fig. 5 is an enlarged sectional view as taken on line 5—5 of Fig. 4; and

Fig. 6 is an enlarged fragmentary view in section as taken on the plane of line 6—6 of Fig. 4.

Like reference characters in the several views of the drawings and in the accompanying description designate corresponding parts.

Referring to Figs. 1 and 2, there are generally shown

representative portions of a jalousie window including a channel section side rail 1 having an outstanding flange 2. It will be understood that a similar side rail will be disposed in opposed relation and in these opposed rails 2 a plurality of louvers or slats 3 are suitably supported in opposing end brackets 4, which are pivotally mounted on trunnions 5 (see Fig. 2). Each of the end brackets 4 includes an outstanding arm or member 6 which is pivotally connected as by means of a rivet 7 or the like, to a vertically extended travel bar or rod 8, whereby vertical movement of the travel bar 8 will effect pivotal movement in unison of the louvers 3 about the respective trunnions 5. Pivotally connected to the travel bar 8, as by means of a screw 9 or the like, is an operating link 10, which is adapted to be connected as at 11, by a rivet or other suitable fastener, to operating means made in accordance with the invention.

The operating mechanism hereof includes a housing having a base 12 adapted to be secured to the channel member 1 as by means of a suitable number of screws 13 or the like. The housing has a pair of opposed generally parallel walls 14 and 15 between which the worm gear segment 16 is pivotally mounted upon a pivot pin or rivet 17. The worm gear segment 16 has projecting therefrom an operating arm 16*a* which is connected to the link 10 by the rivet 11. The worm gear segment 16 is also provided with a plurality of teeth 16*b* adapted for engagement by a helical worm 18 which as best seen in Fig. 2 has its axis disposed in parallel relation to the plane of the worm gear segment 16 so that the worm gear effectively engages the worm gear segment teeth 16*b* with a line contact over a somewhat extended area.

The worm 18 is disposed in a bore 19 in the operator body and is secured therein by means of a screw 20 extending centrally through the worm 18 and about which the worm rotates. The screw 20 also retains in place a closure cap 21 which forms a part of the housing. At one end the worm 18 has a projection 22 engaged in a bearing 18*a* formed at the base of the bore 19, while at its other end the worm 18 is provided with a central recess 18*b* in which is disposed a complemental projection 23 on the end closure 21.

Preferably formed integrally upon the worm 18 is a spiral gear 24 which is adapted to the driven so as to impart rotation to the worm 18 with consequent angular movement of the operating arm 16*a* of gear segment 16.

The operator housing and the end closure 21 thereof are so constructed as to provide an outwardly projecting neck 25 which is intersected by the interface of the end closure 21 and the housing. The neck 25 has a bore 26 in which is disposed for rotation a hand crank 27 having a cylindrical terminal section 28 seating in the bore 26 and an annular flange 29 seating in an annular groove or slot 30, the flange 29 serving to locate and retain the crank 27 in the neck 25. In addition, the neck 25 is milled to provide an enlarged diameter cavity 30' therein so as to accommodate a spiral gear 31 which is preferably formed integral on the crank 27 and which is adapted for driving engagement with the spiral gear 24 on the worm 18.

It should be noted with particular reference to Fig. 4, that the axis of the hand crank mounting section just described is disposed at an angle of approximately 45° relative to the plane on which the axis of the worm 18 is disposed as represented by the angle L so that the crank 27 is disposed at a convenient angle for manipulation by a person operating a jalousie thereby.

In order to assure accurate alignment of the end closure 21 upon the operator housing and accurate alignment of the components contained within the housing by the end closure, a plurality of dowels or positioning pins 33 are preferably disposed between the end closure 21 and the housing.

It will now be apparent that the structure just described is extremely simple to manufacture in that the worm 18 as well as the crank 27 are removably retained in the housing by virtue of a single closure cap which is secured to the housing by a single screw 20. Although it is not necessary that the groove 30 in which the flange 29 of the crank 27 rides be accurately located in its axial relation to the assembly, since a reasonable degree of latitude in the position of spiral gear 31 relative to spiral gear 24 is permissible without adversely affecting the driving relationship thereof. The spiral gears will provide a smooth efficient drive for the worm 18 which in turn, by reason of its right angular relationship to the axis of the worm gear segment 16 and the parallel relationship of the plane on which its axis lies with relation to the plane of the worm gear segment 16, will smoothly and practically completely impart torque therefrom to the worm gear segment 16 through line contact of the worm 18 with the worm gear segment teeth 16*b*.

Therefore, it should also be apparent that all of the objectives stated at the commencement hereof have been fully attained by reason of the improved structure which has been specifically described in detail.

While specific structural details have been shown and described it should be understood that changes and alterations may be resorted to without departing from the spirit of the invention as defined in the appended claims.

I claim:

1. Operating mechanism of the class described comprising: a housing having opposed side walls and an open end; a worm gear segment pivotally mounted in said housing and having an operating arm projecting from the housing; a worm rotatably disposed in said housing in engagement with said worm gear segment; a member closing said open end; said closure member and one side wall of said housing having complemental bearing portions projecting angularly from said housing; an operating handle having an end portion embraced by said bearing portions; said end portion and said worm having coengaged gears thereon for rotating said worm upon rotation of said handle; said bearing portions and said handle end portion having cooperative means including an annular groove and an annular flange disposed in said groove for retaining said handle end portion between said bearing portions.

2. Operating mechanism of the class described comprising: a housing having a base and an open end; a worm gear segment pivotally mounted in said housing and having an operating arm projecting from the housing base; a worm rotatably disposed in said housing in engagement with said worm gear segment; a closure member on said open end of said housing; said housing and closure member having complemental portions defining a neck projecting angularly from said housing; and operating handle having an end portion disposed in said neck; said end portion and said worm having coengaged gears thereon for rotating said worm upon rotation of said handle; said housing and said end closure and said handle end portion having cooperative means including an annular groove and an annular flange disposed in said groove for retaining said handle end portion in said neck; and a fastener extending through said end closure into said housing in substantially parallel relation to said base; said worm being rotatably disposed on said fastener.

3. Operating mechanism of the class described comprising: a housing having a base and an open end; a worm gear segment pivotally mounted in said housing and having an operating arm projecting from the housing base; a worm rotatably disposed in said housing in engagement with said worm gear segment; said worm being disposed with its axis lying on a plane parallel with the plane of said worm gear segment and extending at a right angle and substantially parallel with said base to the axis of the worm gear segment; a member closing said open end; said housing and closure member having complemental bearing portions projecting angularly from said housing; an operating handle having an end portion embraced by said

bearing portions; said end portion and said worm having coengaged gears thereon for rotating said worm upon rotation of said handle; said bearing portions and said handle end portion having cooperative means including an annular groove and an annular flange disposed in said groove for retaining said handle end portion between said bearing portions.

4. Operating mechanism of the class described comprising: a housing having a base; a worm gear segment pivotally mounted in said housing and having an operating arm projecting from the housing base; a worm rotatably disposed in said housing in engagement with said worm gear segment; a closure member on said housing; said housing and closure member having complemental bearing portions defining a neck projecting angularly from said housing; an operating handle having an end portion disposed in said neck; said end portion and said worm having coengaged spiral gears thereon for rotating said worm upon rotation of said handle; said complemental bearing portions embracing the spiral gear on said end portion; said complemental portions and said handle end portion having cooperative means including an annular groove and an annular flange disposed in said groove for retaining said handle end portion in said neck.

5. Operating means of the class described comprising a housing having a supporting base; a worm gear pivotally mounted in said housing and having an operating portion projecting therefrom through said base; a worm rotatably disposed in said housing with its axis substantially parallel with said base and having line contact with the teeth of the worm gear; a spiral gear section on said worm; and an operating handle having a portion rotatably disposed in said housing; said handle portion having a spiral gear drivingly engaged with said spiral gear section on said worm.

6. Operating means of the class described comprising a housing having a supporting base; a worm gear pivotally mounted in said housing and having an operating portion projecting therefrom through said base; a worm rotatably disposed in said housing with its axis substantially parallel with said base and having line contact with the teeth of the worm gear; a spiral gear section on said worm; and an operating handle having a portion rotatably disposed in said housing; said handle portion having a spiral gear drivingly engaged with said spiral gear section on said worm; said handle portion extending into said housing at an angle of about 45° to the plane of the worm gear.

7. Operating means of the class described comprising a housing having a supporting base; a worm gear pivotally mounted in said housing and having an operating portion projecting therefrom through said base; a worm rotatably disposed in said housing and drivingly engaged with said worm gear; a spiral gear rigidly affixed to said worm for driving the latter; a second spiral gear drivingly engaged with said first-mentioned spiral gear; means for securing said worm and said spiral gears in said housing, including a closure for said housing and a member projecting from said closure through said first-mentioned spiral gear and said worm in substantially parallel relation to said base with said first-mentioned spiral gear and said worm rotatably supported on said member; and operating means projecting from said housing and operatively connected to said second worm gear for driving the latter.

8. Operating means of the class described comprising a housing having a base and opposed parallel walls open at the base; a worm gear segment pivotally mounted between said walls and having an operating arm projecting from the open base of the housing; a worm disposed in the housing on an axis lying in the plane of the worm gear segment and extended at a right angle to a plane intersecting the axis of the worm gear segment and substantially parallel to the base of the housing; said worm being coengaged with the worm gear segment and having a spiral gear coaxially thereon; a second spiral gear coengaged with the first mentioned spiral gear and disposed with its axis extending transversely of the worm and at an angle relative to the plane of the worm gear segment; and an operating handle rigidly connected to the second spiral gear and projecting from said housing.

9. Operating means of the class described comprising: a housing having a base adapted to rest upon a surface on which the housing is to be mounted; a worm gear segment mounted in said housing on an axis located substantially medially of the ends of said base; an operating portion projecting from said gear segment through said base; a worm mounted in said housing; a first gear fixed to said worm; a second gear drivingly engaged with said first gear; and operating means projecting from said housing and drivingly connected with said second gear.

10. Operating means of the class described comprising: a housing having a base adapted to rest upon a surface on which the housing is to be mounted; a worm gear segment mounted in said housing on an axis located substantially medially of the ends of said base; an operating portion projecting from said gear segment through said base; a worm mounted in said housing on an axis disposed substantially parallel with said base; a first gear fixed to said worm; a second gear drivingly engaged with said first gear; and operating means projecting from said housing and drivingly connected with said second gear.

11. Operating means of the class described comprising: a housing having a base adapted to rest upon a surface on which the housing is to be mounted; a worm gear segment mounted in said housing on an axis located substantially medially of the ends of said base; an operating portion projecting from said gear segment through said base; a worm mounted in said housing on an axis disposed in the plane of said gear segment and substantially parallel to said base; a first gear fixed to said worm in driving relation thereto; a second gear drivingly engaging said first gear; and operating means projecting from said housing and drivingly connected with said second gear.

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UNITED STATES PATENT OFFICE

CERTIFICATE OF CORRECTION

Patent No. 2,949,042 August 16, 1960

James C. Bennett

It is hereby certified that error appears in the printed specification of the above numbered patent requiring correction and that the said Letters Patent should read as corrected below.

Column 4, lines 71 and 72, strike out "to the axis of the worm gear segment" and insert same after "angle" in line 70, same column 4.

Signed and sealed this 4th day of April 1961.

(SEAL)
Attest: ERNEST W. SWIDER
XXXXXXXXXX
Attesting Officer

ARTHUR W. CROCKER
Acting Commissioner of Patents