Aug. 26, 1969 M. OSTERHOLZ 3,463,219

BLIND FOR WINDOWS OR THE LIKE

Filed Oct. 9, 1967 2 Sheets-Sheet 1

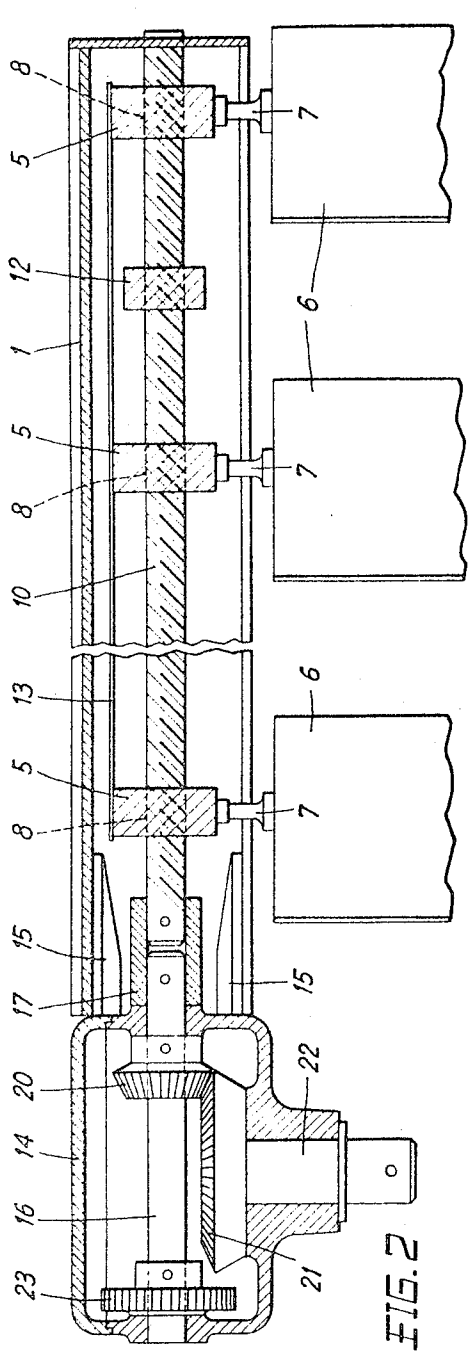

FIG. 2

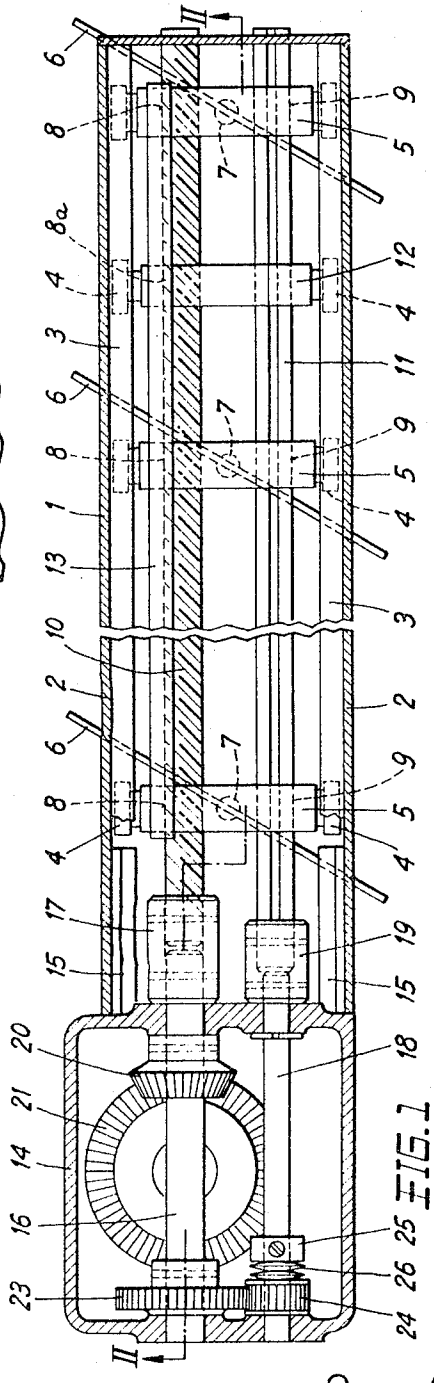

FIG. 1

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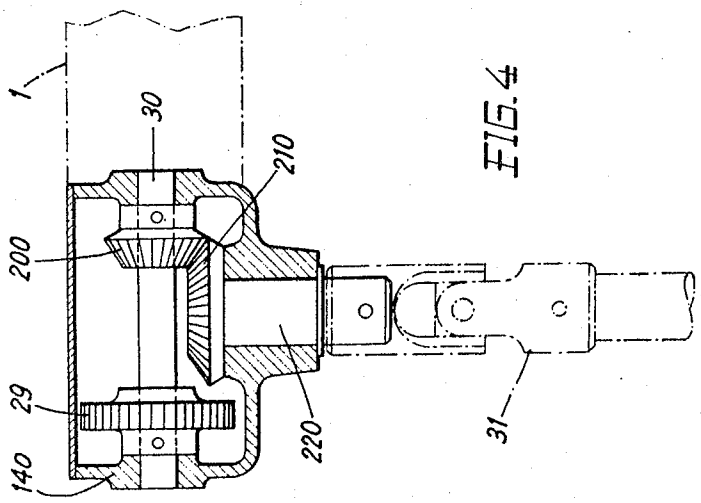

FIG. 4

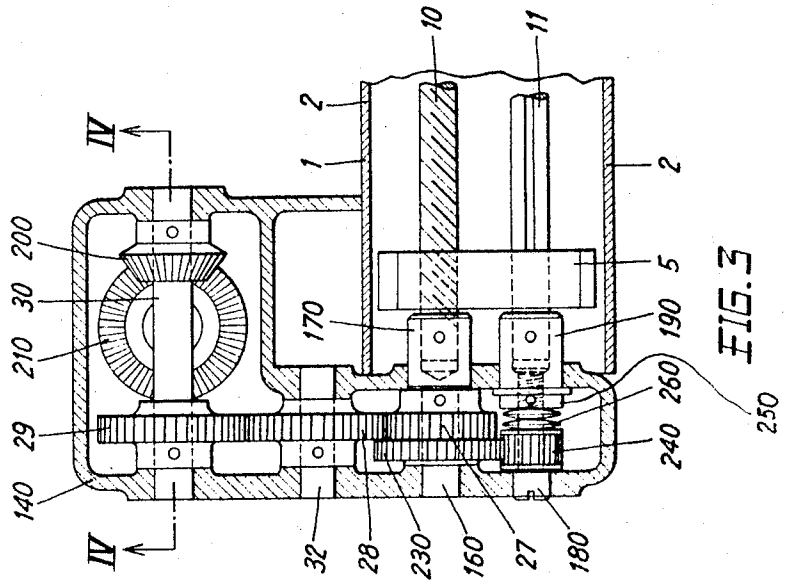

FIG. 3

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BLIND FOR WINDOWS OR THE LIKE

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Int. Cl. E06b 9/36, 9/322
U.S. Cl. 160—172 11 Claims

ABSTRACT OF THE DISCLOSURE

A blind or shade for store windows wherein a horizontal rail which is installed above the window supports trunnions provided at the upper ends of vertical slats which are moved lengthwise of the rail in response to rotation of a feed screw journalled in the rail and which are turnable about vertical axes in response to rotation of a spindle journalled in the rail in parallelism with the feed screw. A friction clutch operates between the feed screw and the spindle so that rotation of the spindle by means of a motor or crank causes rotation of the feed screw.

Background of the invention

The present invention relates to blinds or shades for store windows or the like. More particularly, the invention relates to improvements in blinds of the type wherein the slats preferably extend vertically downwardly from a substantially horizontal support and are turnable with reference to, as well as movable lengthwise toward and away from one end of, the support.

It is already known to provide a blind with a horizontal support in the form of a rail which supports and guides a set of loosely connected holders for trunnions at the upper ends of vertical slats. The holders for the slats are connected to each other by means of a flexible ribbon so that they can be moved between positions at a maximum and minimum distance from each other. The means for moving the holders lengthwise of the rail includes a feed screw which meshes with one of the two outermost holders and causes the latter to push the other holders in front of it when the feed screw rotates in one direction or to entrain the other holders through the intermediary of the ribbon when the feed screw rotates in the opposite direction. In this way, the slats expose the window when the feed screw rotates in the one direction and are spread in front of the full width of the window when the feed screw rotates in the opposite direction.

In such conventional blinds, the slats are turned about vertical axes through the intermediary of a spindle which is rotatable in the rail and drives the trunnions through the intermediary of transmissions installed in each of the holders. The spindle is rotatable independently of the feed screw so that the blind must be provided with a first hand-operated or motor-driven mechanism which rotates the spindle and with a second mechanism which rotates the feed screw. As a rule, such mechanisms include sprocket wheels and chains driven by cranks or by means of suitable motors. Transmissions can be interposed between each crank or motor and the respective sprocket wheel. A serious drawback of such blinds is that the drives for the spindle and feed screw occupy too much room, that the drives comprise a large number of expensive parts, and that an inexperienced operator is likely to confuse the drives by causing rotation of the feed screw while intending to rotate the spindle, or vice versa. In other words, the operator is likely to waste

time in unnecessarily rotating the spindle at a time when it is desired to open or close the blind.

In many instances, the aforementioned mechanisms include cranks which are rotatable by hand. Thus, the blind must be furnished with two cranks, one for the feed screw and the other for the spindle, or a single crank must be disconnected from the spindle in order to rotate the feed screw, or vice versa, which involves much time and effort, particularly since the connections to the spindle and feed screw are located overhead. A blind with separate motors for the spindle and feed screw is too expensive in most instances.

Summary of the invention

It is an object of the present invention to provide a blind with preferably vertical slats which are turnable about their own axes and movable lengthwise of a support, and to construct and assemble the drives which effect lengthwise movement and turning of slats in such a way that operation of one drive automatically effects operation of the other drive, or vice versa.

Another object of the invention is to provide a blind of the just outlined character wherein a single manually operated or motor-driven input member suffices to transmit motion to both drives in such a way that the slats can automatically define between themselves gaps of maximum width when the blind is open and that the slats can overlap to prevent passage of light when the blind is closed.

A further object of the invention is to provide a novel motion transmitting connection between the two drives in a blind of the above outlined type.

An additional object of the invention is to provide a blind wherein the two drives occupy less room than in heretofore known blinds with vertical slats.

A concomitant object of the invention is to provide a blind whose drives can be readily operated by unskilled persons.

Briefly outlined, the invention resides in the provision of a blind or shade for store windows or the like which comprises an elongated support preferably constituted by a hollow horizontal rail adapted to be mounted at a level above or below a window or door, a plurality of elongated slats extending substantially transversely of the support and each having an end portion in the form of a trunnion or the like which is turnably supported in and is movable lengthwise of the support, first drive means which preferably includes a feed screw rotatably mounted in the support and arranged to move the slats lengthwise of the support, second drive means which preferably includes a spindle rotatably mounted in the support in parallelism with the feed screw and arranged to rotate the slats about axes which are substantially normal to the longitudinal direction of the support, and friction clutch means for transmitting motion between the two drive means to rotate the feed screw in response to rotation of the spindle or vice versa.

The friction clutch means may include a first gear rigid with the feed screw, a second gear rotatably mounted on the spindle and meshing with the first gear, a retainer rigid with the spindle and axially spaced from the second gear, and a package of prestressed dished springs or other suitable resilient means for rotating the retainer in response to rotation of the second gear unless the resistance offered by the spindle to such rotation exceeds a predetermined value.

The novel features which are considered as characteristic of the invention are set forth in particular in the appended claims. The improved blind itself, however, both as to its construction and its mode of operation, together with additional features and advantages there-

of, will be best understood upon perusal of the following detailed description of certain specific embodiments with reference to the accompanying drawing.

Brief description of the drawing

FIG. 1 is a horizontal sectional view of the support for slats in a blind which embodies one form of the invention;

FIG. 2 is a vertical sectional view as seen in the direction of arrows from the line II—II of FIG. 1;

FIG. 3 is a fragmentary horizontal sectional view of a support in a modified blind; and

FIG. 4 is a vertical sectional view as seen in the direction of arrows from the line IV—IV of FIG. 3.

Description of the preferred embodiments

Referring first to FIGS. 1 and 2, there is shown a portion of a blind or shade for store windows or the like. The blind comprises an elongated horizontal support **1** in the form of a hollow rail comprising two mirror symmetrical halves and accommodating elongated guides or ways **3** for a series of longitudinal movable holders **5**. The holders **5** are provided with rollers **4** which can travel along the ways **3**. These ways are installed in the flanges **2** of the rail **1**. Each holder **5** serves as a bearing for vertical trunnion **7** constituting the upper end portion of a vertical slat **6**, and each holder **5** is further provided with a horizontal cylindrical bore **8** for an elongated feed screw **10** forming part of a drive which serves to move the holders **5** and the respective slats **6** lengthwise of the rail **1**. Furthermore, each holder **5** is provided with a second horizontal bore **9** which is parallel to the bore **8**. The bores **9** receive a horizontal spindle **11** which forms part of a drive for turning the trunnions **7** with reference to the corresponding holders **5**. A pusher **12** is disposed between the two rightmost holders **5** to push the holders at its left toward the left-hand end of the rail **1** in order to move the slats **6** closer to each other or to push the rightmost holder **5** in a direction to the right and to thereby spread the slats **6** lengthwise of the rail **1**. The pusher **12** is also provided with rollers **4** which travel along the ways **3**. This pusher constitutes a spindle nut in that it is provided with internal threads which mesh with the external threads of the feed screw **10**, i.e., when the feed screw is rotated, the pusher **12** moves to the left or to the right, depending on the direction of rotation of the feed screw. The latter can pass freely through the bores **8** of the holders **5**. The internal threads of the pusher **12** are indicated at **8***a*. The holders **5** are loosely coupled to each other by a flexible band or ribbon **13** of textile material or the like.

The pusher **12** can be omitted if the internal threads **8***a* are provided in the rightmost holder **5**. Rotation of the feed screw **10** in one direction then causes the rightmost holder **5** to travel in a direction to the right and to entrain the other holders through the intermediary of the band **13**. When the rightmost holder **5** is caused to travel in a direction to the left, it pushes the adjoining holder, this holder pushes next-following holder, and so forth, so that the slats **6** are moved closer to each other.

The spindle **11** has longitudinally extending ribs or teeth which alternate with grooves or flutes. The teeth mesh with gears forming part of transmissions provided in each of the holders **5** and serving to rotate the respective trunnions **7** in response to rotation of the spindle **11**. The exact construction of transmissions in the holders **5** is known in the art of blinds and, therefore, such transmissions are not specifically shown in the drawings. For example, each such transmission may include a worm drive or a set of bevel gears. As the trunnions **7** turn, they turn the corresponding slats **6** so that the planes of the slats turn about the axes of the trunnions and the blind permits passage of greater or lesser amounts of light, depending on the width of gaps between the adjoining slats. All of the slats **6** are turned simultaneously and in the same sense.

It will be seen that rotation of the feed screw **10** causes the slats **6** to move nearer to or further away from each other, and that rotation of the spindle **11** causes turning of slats about axes which are normal to the longitudinal direction of the rail **1**.

The left-hand end of the rail **1** is connected with a relatively small housing **14** which accommodates additional components of the aforementioned drives and a simple friction clutch which rotates one of the parts **10**, **11** in response to rotation of the other part. The housing **14** has legs **15** which extend into the open left-hand end of the rail **1** to properly locate the housing on the rail, and the rail is rigidly but preferably detachably connected with the housing. The latter accommodates a shaft **16** which is rigidly connected with the feed screw **10** by means of a coupling sleeve **71**. Thus, the shaft **16** constitutes an extension of the feed screew **10**. A second shaft **18** is journalled in the housing **14** in parallelism with the shaft **16** and is rigidly connected with the left-hand end portion of the spindle **11** by a coupling sleeve **19**. Thus, it can be said that the shaft **18** is an extension of the spindle **11** in the housing **14**.

The shaft **16** is rigid with a bevel gear **20** which meshes with a bevel gear **21** at the upper end of a vertical input shaft **22** which is journalled in the bottom wall of the housing **14**. The shaft **22** can be rotated in a clockwise or counterclockwise direction, either by hand (through the intermediary of a crank or the like) or by means of a suitable motor, not shown.

The aforementioned friction clutch operates between the shafts **16**, **18** and includes a first spur gear **23** rigidly secured to the shaft **16**, a second spur gear **24** rotatably mounted on the shaft **18**, a ring-shaped retainer **25** rigid with the shaft **18** and slightly spaced from one axial end of the gear **24**, and a prestressed package of dished springs **26** interposed between the gear **24** and retainer **25**. The latter is preferably provided with internal threads and meshes within the shaft **18** so that it can adjust the bias of the springs **26**. It is clear that the springs **26** can be replaced by other biasing means, for example, by a resilient cylinder of rubber or the like which can be simply slipped onto the shaft **18** between the retainer **25** and the gear **24**. The latter is held against leftward axial movement and, therefore, when the gear **23** is rotated by the shaft **16**, friction between the springs **26** and parts **24**, **25** will suffice to rotate the shaft **18** and spindle **11** against a certain opposition but the gear **24** will rotate with reference to the shaft **18** when such opposition exceeds a certain magnitude.

The operation is as follows:

If the operator rotates the input shaft **22** in a given direction, the bevel gears **21**, **20** drive the shaft **16** and hence the feed screw **10** which causes the pusher **12** to move toward or away from the housing **14**, i.e., to move the slats **6** nearer to or further away from each other. The shaft **16** also rotates the gear **23** which rotates the gear **24** on the shaft **18**. The gear **24** rotates the retainer **25** through the intermediary of springs **26** and the retainer **25** rotates the shaft **18** and spindle **11**. Such rotation is terminated when the longitudinal edges of slats **6** come into abutment with each other, i.e., the opposition offered by the retainer **25** to rotation then exceeds the friction between the retainer and the springs **26** so that the gear **24** merely turns on the shaft **18** if the feed screw **10** continues to rotate in order to move the pusher **12** toward the one or the other end of the rail **1**. The arrangement is preferably such that the edges of the slats **6** strike against each other when the portion of the ribbon **13** between the two rightmost holders **5** is fully extended, i.e., when the two rightmost slats **6** are located at a maximum distance from each other because the pusher **12** bears against the rightmost slat, and that the edges of the slats **6** also strike against each other when the pusher bears against the next-to-the-rightmost slat **6**. In this way, the operator can select the inclination of slats **6** in the fully extended

position of the ribbon 13 to prevent passage of light between the slats or to admit desired amounts of light. When the input shaft 22 continues to rotate the feed screw 10 while the slats 6 abut against each other, the holders travel lengthwise of the rail 1 but the spur gear 24 rotates with reference to the shaft 18.

FIGS. 3 and 4 illustrate a portion of a second blind which also employs a horizontal rail 1 wherein the holders 5, slats 6, pusher 12, feed screw 10 and spindle 11 are mounted in the same way as in the blind of FIGS. 1 and 2. The lefthand end of the rail 1 is connected with a modified housing 140 which occupies less room, as seen in the longitudinal direction of the rail 1, than the housing 14. This modified housing 140 accommodates two shafts or extensions 160, 180 which are considerably shorter than the shafts 16, 18 and are respectively connected with the feed screw 10 and spindle 11 by coupling sleeves 170, 190. The friction clutch which drives the spindle 11 in response to rotation of the feed screw 10 comprises a first spur gear 230 fixed to the shaft 160 and meshing with a second spur gear 240 which is rotatable on the shaft 180, a retainer 250 which is rigid with the shaft 180, and a prestressed package of dished springs 260 between the retainer 250 and spur gear 240. The bias of the springs 260 can be regulated in response to lengthwise adjustment of the retainer 250 on the shaft 180 or in response to axial movement of the gear 240. The drive which moves the slats 6 lengthwise of the rail 1 further comprises a transmission here shown as a gear train composed of a first gear 27 on the shaft 160, an idler gear 28 on an intermediate shaft 32 in the housing 140, and a third gear 29 on a second intermediate shaft 30 in the housing 140. The shaft 30 further carries a bevel gear 200 meshing with a bevel gear 210 on a vertical input shaft 220 which can be rotated in a clockwise or counterclockwise direction by a detachable crank 31 shown in FIG. 4 by phantom lines. The crank 31 can be replaced by an electric motor or by another suitable prime mover.

The support or rail 1 is normally mounted at a level above a store window or door and the trunnions (not shown) at the lower ends of the slats 6 are preferably rotatable in holders which are movable lengthwise of a second rail mounted at a level below the window or door. However, the second rail is not absolutely needed because the blind is fully operative with a single rail.

Drives which are operated by a crank are normally preferred over chain drives because the crank can be readily detached and stored out of sight. Moreover, a chain drive requires frequent lubrication and occupies more room. Still further, a customer or window shopper is likely to come in contact with the chains or sprocket wheels. Even if the crank remains attached to the input shaft 22 or 220, the appearance of a blind utilizing a single crank is more eye-pleasing than the appearance of a blind wherein the input member is driven by a chain. Curtains used in addition to the blind can be caught in the chain and the chain drive must include suitable tensioning means for the chain.

The improved blind is susceptible of many additional modifications without departing from the spirit of the present invention. For example, the bevel gears 20, 21 or 200, 210 can be replaced by chain drives including a sprocket wheel mounted on the shaft 16 or 30. Such chain drives may be operated manually or by means of a motor. Furthermore, the shaft 16 of FIGS. 1 and 2 or the shaft 30, 32 or 160 may constitute the output shaft of a motor mounted directly in the housing 14 or 140 so that the bevel gears and/or the gear train 27–29 may be dispensed with. Still further, the bevel gears 20, 21 and the input shaft 22 of FIGS. 1 and 2 may be omitted if the spur gear 24 is provided with a hollow shaft which extends from the housing 14 and is directly coupled to a suitable motor. The gear 24 then drives the feed screw 10 through the intermediary of the gear 23 and can drive the spindle 11 through the intermediary of retainer 25 and springs 26. The gear 24 then serves as a bearing for the left-hand end of the shaft 18. Obviously, the just mentioned motor for the hollow shaft of the gear 24 can be replaced by a manually or motor-operated chain drive or the like.

Without further analysis, the foregoing will so fully reveal the gist of the present invention that others can, by applying current knowledge, readily adapt it for various applications without omitting features which fairly constitute essential characteristics of the generic and specific aspects of the above described contribution to the art and, therefore, such adaptations should and are intended to be comprehended within the meaning and range of equivalence of the claims.

What is claimed as new and desired to be protected by Letters Patent is set forth in the appended claims.

I claim:

1. A blind comprising an elongated support; a plurality of elongated slats extending substantially transversely of said support, each of said slats having an end portion turnably supported in and movable lengthwise of said support; first drive means for moving said slats lengthwise of said support; second drive means for turning the end portions of said slats with reference to said support; a single input means for directly driving said first drive means; and friction clutch means for transmitting motion from said first to said second drive means.

2. A blind as defined in claim 1, wherein said support is horizontal and said slats extend substantially vertically downwardly from said support.

3. A blind as defined in claim 2, wherein each of said drive means comprises a horizontal shaft and said friction clutch means rotates one of said shafts forming part of said second drive means in response to rotation of the other shaft forming part of said first drive means.

4. A blind as defined in claim 3, wherein said shafts are parallel to each other and wherein said friction clutch means comprises a first gear rigid with said other shaft, a second gear meshing with said first gear and rotatable on said one shaft, a retainer rigid with said one shaft, and prestressed resilient means interposed between said retainer and said second gear.

5. A blind as defined in claim 4, wherein said retainer and said second gear constitute a pair of stressing means for said resilient means and wherein one of said stressing means is movable axially of said one shaft to adjust the stress upon said resilient means.

6. A blind as defined in claim 1, wherein one of said drive means comprises a feed screw rotatable with reference to said support and the other drive means comprises a spindle rotatable with reference to said support, said one drive means further comprising a first bevel gear rigid with said feed screw, a second bevel gear meshing with said first bevel gear, said input means rotating said second bevel gear to thereby rotate said feed screw, said friction clutch means being operative to rotate said spindle in response to rotation of said feed screw.

7. A blind as defined in claim 1, wherein one of said drive means comprises a feed screw rotatably mounted in said support, a pair of mating bevel gears, said input means rotating one of said bevel gears, and a gear train for transmitting motion from the other bevel gear to said feed screw, the other drive means comprising a spindle rotatably mounted in said support in parallelism with said feed screw and said friction clutch means being operative to rotate said spindle in response to rotation of said feed screw.

8. A blind as defined in claim 1, wherein said first drive means comprises a feed screw rotatably mounted in said support, a plurality of holders loosely connected to each other and movable lengthwise of said support toward and away from one end of said feed screw, each of said holders rotatably supporting the end portion of one of said slats and said holders including a first holder re-

motest from said one end of the feed screw and a second holder adjacent to said first holder, said input means being arranged for rotating said feed screw in clockwise and counterclockwise directions and a nut meshing with said feed screw and located intermediate said first and second holders to push said first holder away from said one end of the feed screw when the latter rotates in one direction and to push said second holder toward said one end of the feed screw when the latter rotates in the other direction.

9. A blind as defined in claim **8**, wherein said slats are turnable through approximately 180 degrees with reference to said holders and wherein said second drive means comprises a spindle rotatably journalled in said support in parallelism with said feed screw and arranged to rotate the end portions of said slats in response to motion transmitted by said feed screw through the intermediary of said friction clutch means.

10. A blind as defined in claim **9**, wherein said first and second holders are movable between a maximum and a minimum distance with reference to each other and wherein said spindle is arranged to rotate said slats through 180 degrees in response to movement of said first and

second holders from a position at a maximum distance to a position at a minimum distance from each other, or vice versa.

11. A blind as defined in claim **1**, further comprising a housing connected to one end of said support, each of said drive means comprising a shaft rotatably mounted in said housing and said friction clutch means being arranged to rotate one of said shafts in response to rotation of the other shaft.

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