July 22, 1941. H. K. LORENTZEN 2,250,106

VENETIAN BLIND HEAD BAR ORGANIZATION

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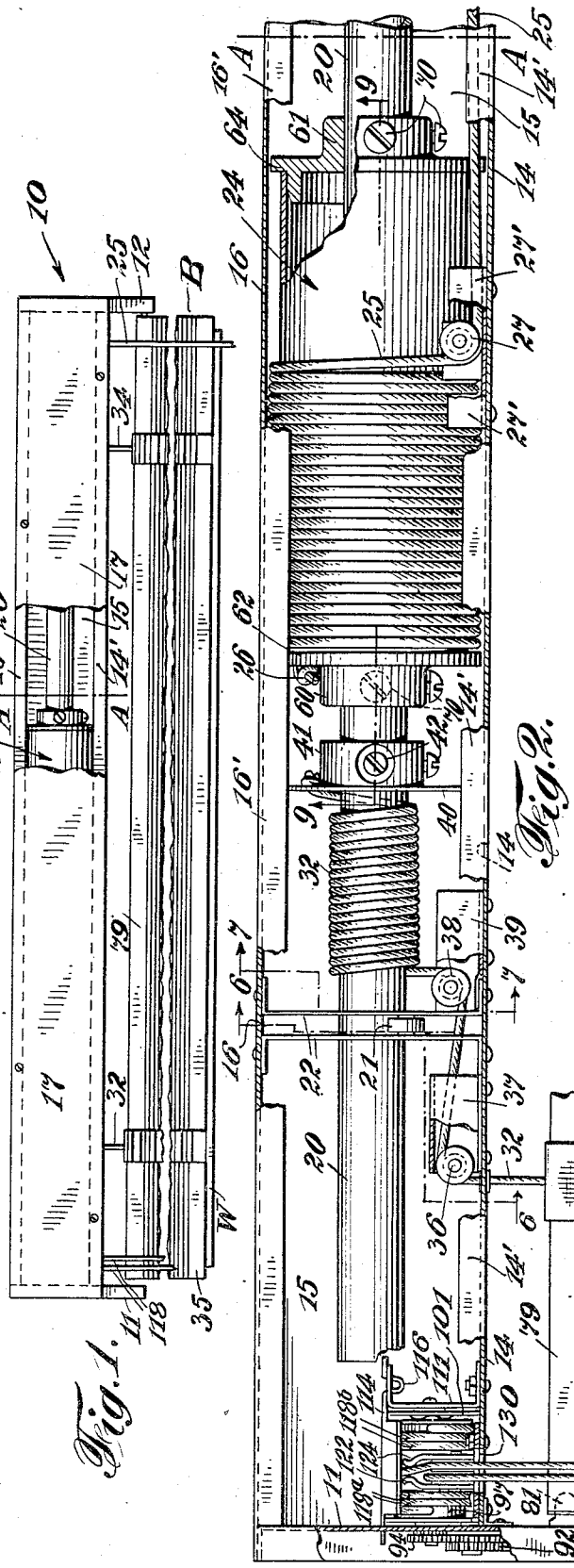


Fig. 1.



Fig. 2.

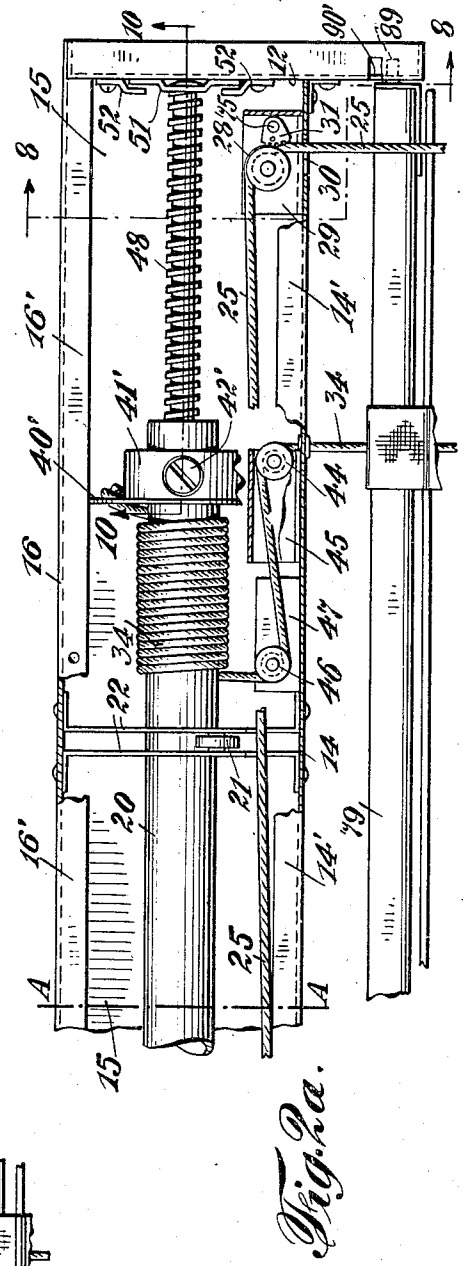


Fig. 2a.

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Filed Nov. 29, 1938 5 Sheets-Sheet 2

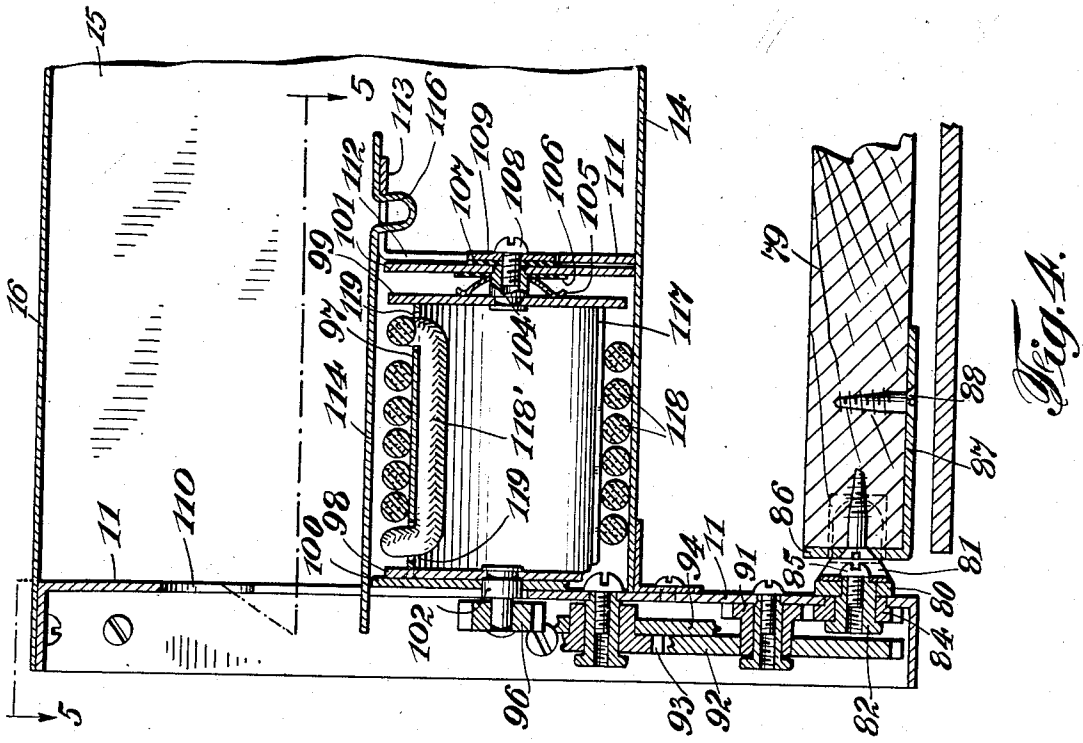


Fig. 4.

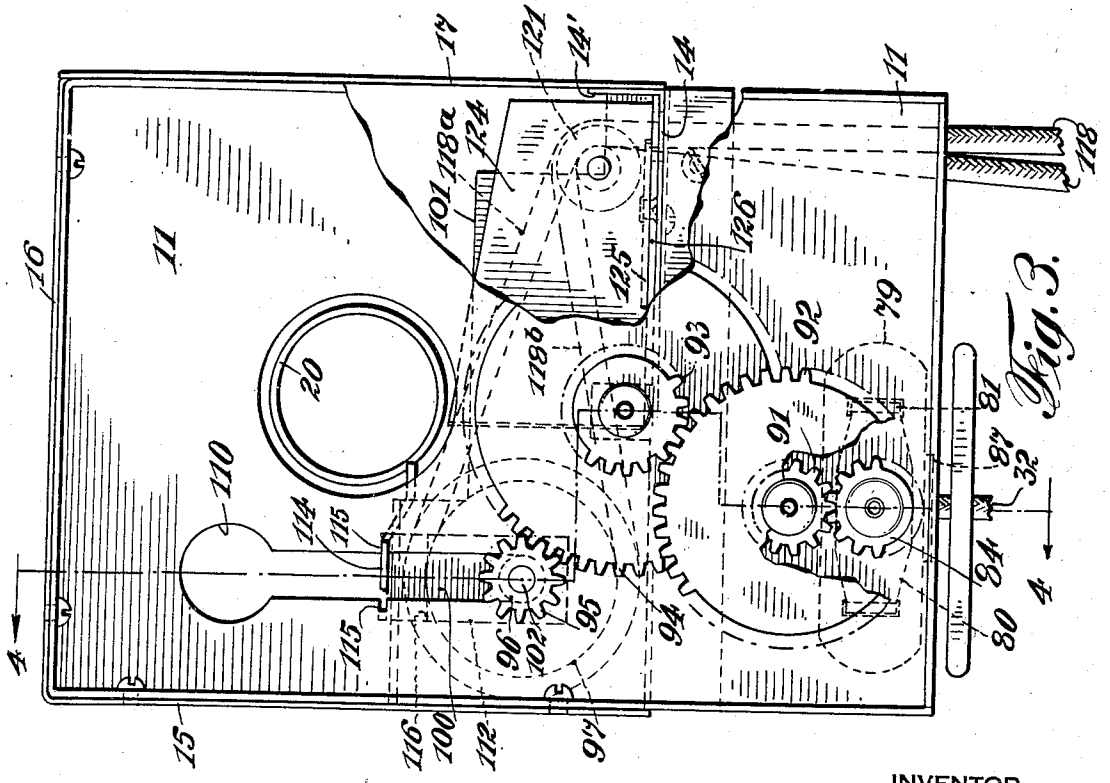


Fig. 3.

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VENETIAN BLIND HEAD BAR ORGANIZATION

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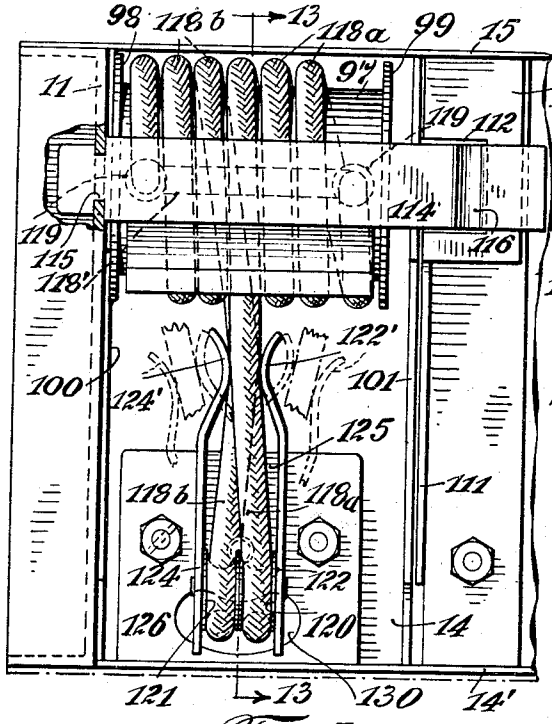



Fig. 5.

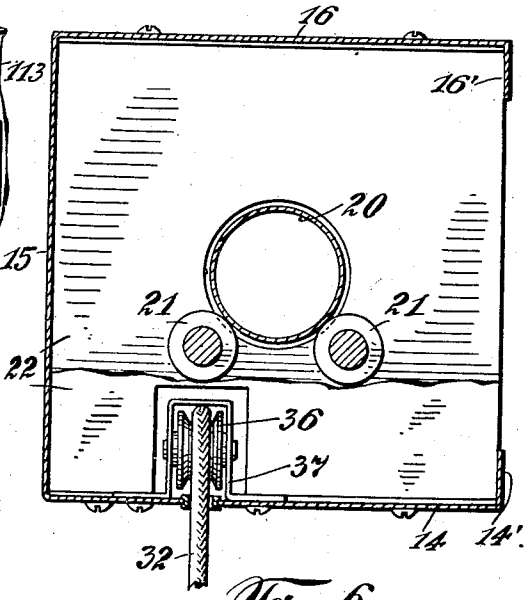



Fig. 6.

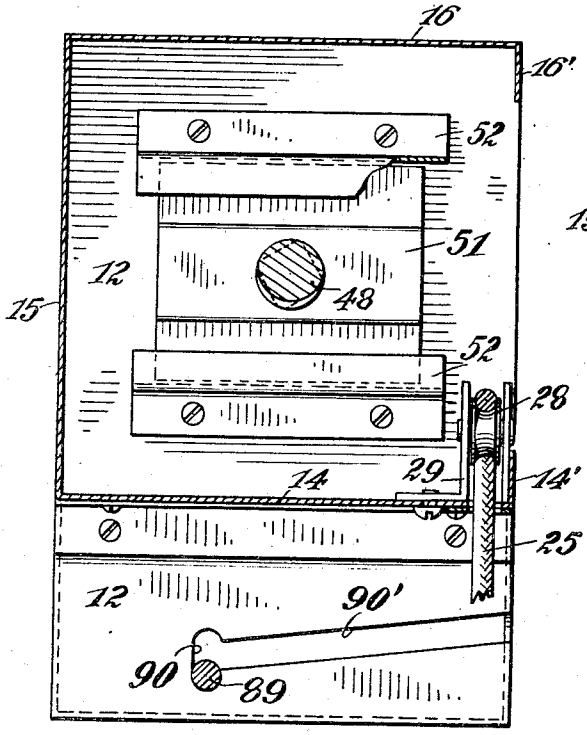



Fig. 8.

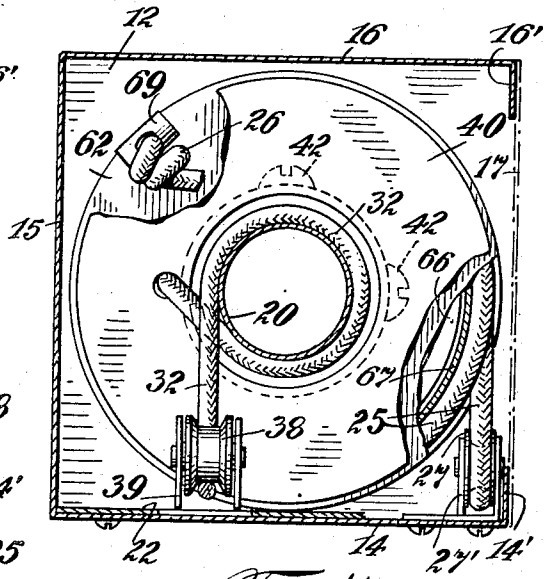



Fig. 7.

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VENETIAN BLIND HEAD BAR ORGANIZATION

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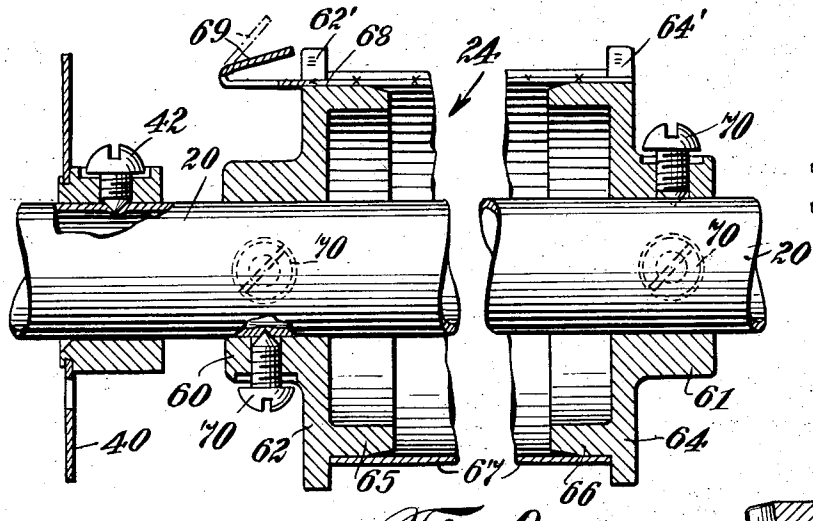



Fig. 9.

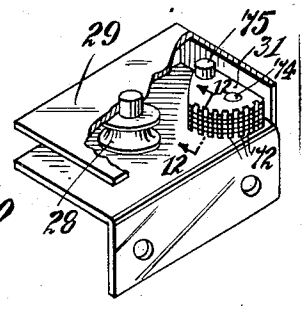



Fig. 11.

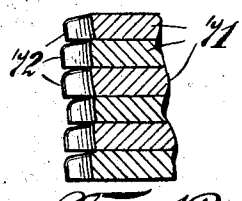



Fig. 12.

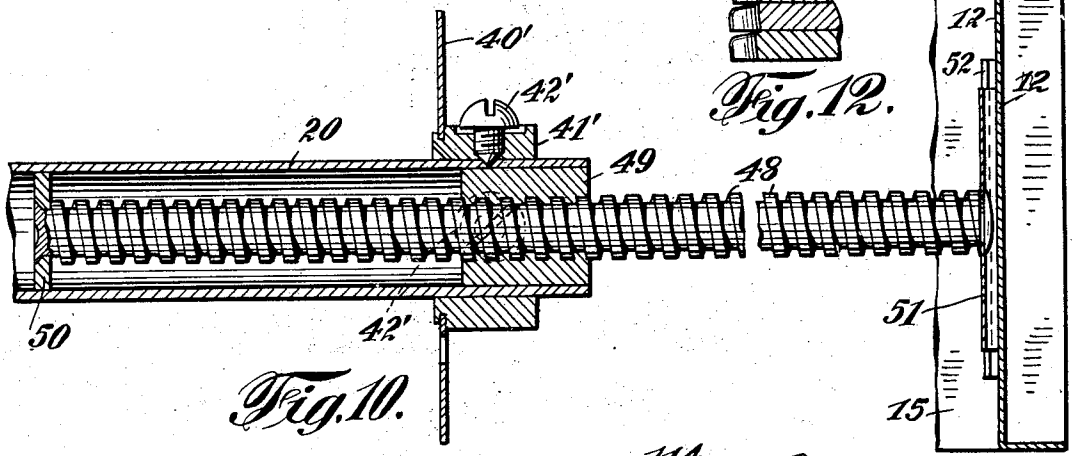



Fig. 10.

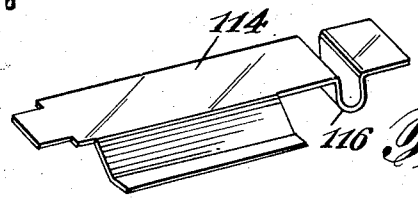



Fig. 14.

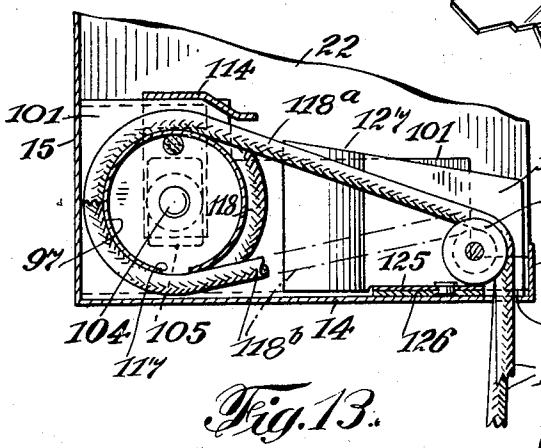



Fig. 13.

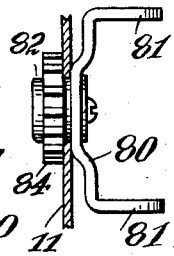



Fig. 15.

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VENETIAN BLIND HEAD BAR ORGANIZATION

Filed Nov. 29, 1938 5 Sheets-Sheet 5

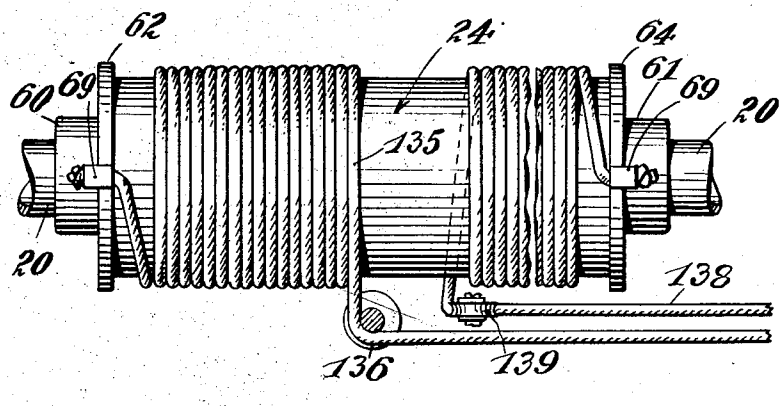



Fig. 16.

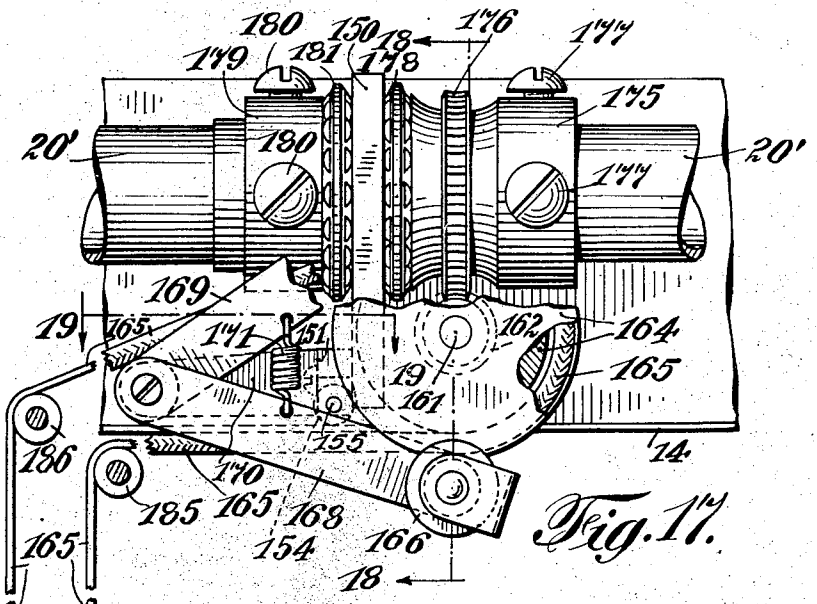



Fig. 17.

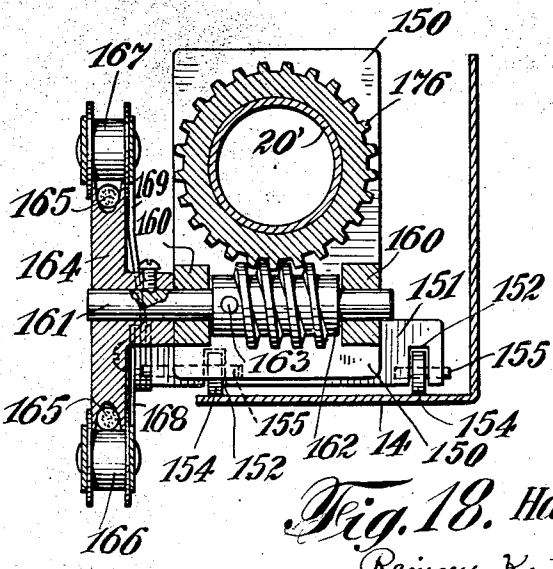



Fig. 18.

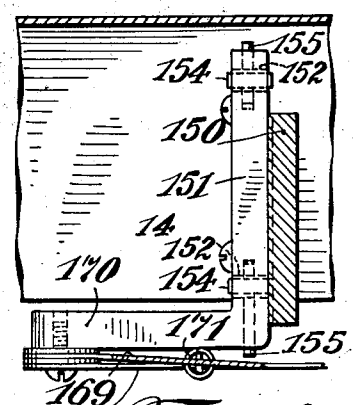



Fig. 19.

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Patented July 22, 1941 2,250,106

# UNITED STATES PATENT OFFICE

2,250,106

## VENETIAN BLIND HEAD BAR ORGANIZATION

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Application November 29, 1938, Serial No. 242,876

24 Claims. (Cl. 156—17)

This invention relates to improvements in head bar organizations for Venetian blinds, and more particularly to such organizations wherein the operating parts are enclosed and substantially concealed.

An object of the present invention is to provide a head bar organization wherein use is made of a reciprocable rotary member upon which the elevator cords are wound and from which they are unwound during the raising and lowering, respectively, of the slats of the blind.

Another object of the invention is to provide new, simple, and efficient supporting arrangements for such reciprocable and rotary member.

Another object of the invention is to provide means within the housing of the organization for causing reciprocation of the rotary member during rotation thereof, which means is floatingly mounted without supporting the reciprocable and rotary member during movement thereof.

Another object of the invention is to provide, in conjunction with a rotatable member upon which the cord for raising and lowering the slats is wound, an actuating drum of increased diameter upon which an operating cord can be wound and from which the same can be unwound.

A further object of the invention is to provide novel and simple constructions for such drums.

A further object of the invention is to provide actuating means comprising a drum upon substantially the same part of which one portion of a cord is wound and another portion thereof is unwound during raising and lowering of the blind slats.

A still further object of the invention is to provide gear operated mechanism in conjunction with a reciprocable and rotary member for raising and lowering the slats of the blind.

An additional object of the invention is to provide a carriage for such gear operating mechanism, which carriage moves along with the reciprocated member during reciprocation thereof.

In carrying out the foregoing and other objects of the invention it is contemplated that a head bar organization of the type disclosed herein will be particularly useful in connection with blinds of long length and of great height, which blinds necessarily are relatively heavy. The housing for the head bar organization is made up of end plates to which are secured top and bottom plates, a rear plate, and a front plate. The operating mechanism for raising and lowering the blind comprises a tubular member mounted for rotation in the housing. In order that this tubular member or roller can be supported with the greatest efficiency, separted pairs of idler rollers are mounted within the housing in positions to act as supports for the tubular member. In order that this member upon which the elevator cord is to be wound can be reciprocated as it is rotated to permit even winding of an elevator cord thereon, use is made of a screw member which is held against rotation and which engages a threaded bushing fastened to one end of the tubular member. This screw member, while being held against rotation, at the same time is secured to the housing in what may be called a floating fashion so that it is self-aligning with the tubular member and thereby does not aid in supporting the tubular member in any fashion. The actuating mechanism for the tubular member in one form of the invention comprises a drum mounted on the tubular member intermediate the ends thereof, which drum is of considerably larger diameter than that of the tubular member. This drum acts as a reel upon which cord is wound during rotation of the tubular member in one direction and from which cord is unwound during rotation of the tubular member in the other direction. Since the drum is disposed intermediate the ends of the tubular member, pulleys are secured in the housing at suitable points to permit the cord which is wound onto the drum to pass out of the housing at a suitable point, preferably near one end thereof. The cords which are used in elevating and lowering the slats of the blind are secured at their respective ends to suitable collars on the tubular member, and at their other ends to the bottom slat of the blind. As the tubular member rotates in one direction these cords are wound upon the drum as it reciprocates, thereby raising the slats of the blind. As the tubular member rotates in the other direction the cords are unwound from the tubular member, permitting the slats of the blind to be lowered. If desired the cords may be wound upon portions of the tubular member disposed longitudinally of the housing from their actual points of entry into the housing so that advantage may be taken of the parts of the tubular member least subject to interference with other parts of the assembly.

In another form of the invention the drum before described may have the two ends or other parts of a cord associated therewith in such

fashion that as a part of the cord is unwound from the drum another part thereof is wound onto substantially the same part of the drum. In order that the drum may be of minimum length for the requirements, this invention provides that the ends or other parts of the cord shall be secured adjacent opposite ends of the drum and the points of take-off and entry upon the drum of the two parts of the cord are substantially in lateral alignment with each other so that the drum is in effect almost completely filled with cord at all times.

In a still further form of operating mechanism for rotating the tubular member, and consequently imparting reciprocation thereto, use is made of a worm gear mounted on the tubular member and engaged by a worm fastened in a carriage which in turn is secured to the tubular member so that as this tubular member is reciprocated the carriage moves along with it. The worm can be rotated by an endless cord passing around a pulley on one end of the worm shaft, which cord is introduced into the housing near one end thereof.

The main drum upon which the cord is wound for rotating the tubular member used in elevating and lowering the blind may be made of a simplified construction comprising two collar members having inwardly directed ring-like flanges to receive thereon a cylindrical shell made up of sheet metal rolled into tubular form and spot-welded or otherwise secured to a metallic strap. This strap can extend beyond the ends of the tubular member and pass through slots in the collars to hold the tubular member against rotation relative to the collars. The collars are secured to the rotating tubular member so that in this fashion the entire drum can be assembled on the tubular member, and preassembly of the parts is therefore not necessary.

Other features and advantages of the invention will be apparent by reference to the following detailed description of the accompanying drawings, wherein:

Fig. 1 is a front view of a cross bar organization embodying the invention;

Fig. 2 is an enlarged front view with the front plate removed of that portion from the left end of Fig. 1 to the line A—A thereof;

Fig. 2*a* is a similar view of that portion of Fig. 1 from the line A—A to the right end thereof;

Fig. 3 is an enlarged end view of the left end of the device showing the gear drum and tilt mechanism incorporated in this invention;

Fig. 4 is a section taken substantially on the line 4—4 of Fig. 3;

Fig. 5 is a section taken substantially on the line 5—5 of Fig. 4;

Fig. 6 is a section taken substantially on the line 6—6 of Fig. 2;

Fig. 7 is a section taken substantially on the line 7—7 of Fig. 2;

Fig. 8 is a section taken substantially on the line 8—8 of Fig. 2*a*;

Fig. 9 is an enlarged broken section taken substantially on the line 9—9 of Fig. 2;

Fig. 10 is an enlarged section taken substantially on the line 10—10 of Fig. 2*a*;

Fig. 11 is a view of the locking dog incorporated in the present invention with a part of the surrounding housing broken away;

Fig. 12 is an enlarged section taken substantially on the line 12—12 of Fig. 11;

Fig. 13 is a section taken substantially on the line 13—13 of Fig. 5;

Fig. 14 is a view of a cord retaining member used in conjunction with the tilting drum;

Fig. 15 is a top view of the coupling member connecting the tilt bar with the gear drum associated with the tilting drum;

Fig. 16 is a view of a modified form of slat raising drum, such modification being a substitute for the drum shown in Fig. 2;

Fig. 17 is a view of another modification of the mechanism for imparting rotation and reciprocation to the actuating member;

Fig. 18 is a section taken substantially on the line 18—18 of Fig. 17, and

Fig. 19 is a section taken substantially on the line 19—19 of Fig. 17.

Referring now to the drawings, and particularly to Figs. 1 to 2*a* inclusive, 10 indicates generally a housing made in accordance with this invention, such housing comprising end plates 11 and 12, a bottom plate 14, a back plate 15, a top plate 16, and a front plate 17, which front plate is shown partially broken away in Fig. 1. The end plates 11 and 12 have outwardly extending flanges for the attachment of certain of the other plates. These flanges extend outwardly from all four edges of each of the plates. As shown in the drawings, the bottom plate 14 is secured to the end plates 11 and 12 above the lower edges of the end plates so that parts of the plates extend downwardly to afford supports for a tilt bar in a manner to be explained in detail later. The plates comprising the housing are all made of sheet metal and can be secured together by screws, rivets, or by spot-welding, or in any other desired manner. The bottom plate 14 has an upwardly extending flange 14' at the front edge thereof, and the top plate 16 has a downwardly extending flange 16' also at the front edge thereof. These flanges make possible the attachment of the front plate 17 by screws, preferably, so that this front plate can be removed at any time for repairs and the like.

Rotatably and reciprocally mounted within the housing is an elongated tubular member 20 utilized in lifting and lowering the slats of a blind associated with the housing. The supporting means for this tubular member 20 comprises pairs of idler rollers 21 pivotally mounted between pairs of partition plates 22 located at spaced intervals along the length of the tubular member 20. Dependent upon the length of the housing 10 and of the tubular member 20 any desired number of pairs of idler rollers can be provided. As shown in the drawings, two pairs are sufficient for a housing of the length illustrated herein, but it will be evident that under certain conditions additional support for this tubular member may be advisable. The partitions 22 are made of sheet metal and preferably have upper and lower flanges for securing the partitions in place between the upper and lower plates 14 and 16 by means of screws, rivets, or by spot-welding, or in any other desired fashion. These plates have openings disposed substantially centrally thereof for the passage of the tubular member 20. Due to this arrangement of supporting idler rollers it follows that the tubular member 20 is supported and aligned entirely by its contact with these rollers.

Rotation of the tubular member 20 is effected through a drum indicated generally at 24, on which can be wound a cord 25. The construction of this drum will be set forth in detail later. As shown in Fig. 2, one end of the cord 25 is fastened to an end of the drum as at 26 so that

the cord cannot become completely separated from the drum. The cord 25 is led under a pulley 27 mounted in a suitable bracket 27' secured to the bottom plate 14. From this pulley 27 the cord passes through the right hand pair of partitions 22 (Fig. 2a) and over a pulley 28 mounted in a bracket 29 near the right hand end of the housing (Fig. 2a). The cord after passing over the pulley 28 extends through an opening 30 in bottom plate 14 and downwardly to be manually operated. In conjunction with the pulley 28 use is made of a locking dog 31 also pivotally mounted in the bracket 29. As shown in Fig. 2a, this dog 31 can move to a position wherein the cord is firmly gripped between the teeth of the dog and the pulley 28 to prevent additional passage of cord into the housing.

Since manipulation of the cord 25 can cause unwinding of this cord from the drum to rotate the tubular member 20 in one direction, it is necessary that means be provided for rotating the tubular member 20 in the reverse direction. For this purpose lift cords 32 and 34 fastened to the bottom slat 35 of a blind associated with the housing are arranged to be wound upon and unwound from the tubular member 20. Referring to Fig. 2 it will be seen that the cord 32 passes through an opening in bottom plate 14 over a pulley 36 mounted in a bracket 37 secured to bottom plate 14, thence through suitable apertures in the partitions 22, and under a pulley 38 mounted in a bracket 39 also secured to the bottom plate 14. The cord 32 has the upper end thereof fastened securely to the disc-like portion 40 extending outwardly from a collar 41 secured to the tubular member 20 by one or more set screws 42.

The other lift cord 34, as shown in Fig. 2a, passes through an opening in the bottom plate 14 over a pulley 44 mounted in a bracket 45 secured to the bottom plate 14 and under a pulley 46 mounted in a bracket 47 also secured to bottom plate 14 into position to be wrapped around the tubular member 20. The upper end of this cord 34 is likewise securely fastened to a disc-like portion 40' of a second collar 41' fastened to the tubular member 20 by one or more set screws 42'. The collars 41 and 41' are identical in construction. Though only two lift cords have been shown, if the length of the blind warrants, additional lift cords may be supplied as may be advisable.

In order that reciprocation can be imparted to the tubular member 20 as it rotates, use is made of a screw 48 threaded into a bushing 49 (Fig. 10), which bushing is securely fastened in one end of the tubular member 20. If desired the inner end of the screw 48 can have a flange member 50 secured thereto to prevent withdrawal of member 48 behind the end of the member 20. The bushing 49 can be held in the end of member 20 against rotation relative thereto in any desired manner. One convenient method of fastening this bushing in place is shown in Fig. 10, wherein it will be seen that one or both of the set screws 42' utilized in securing collar 41' on the member 20, can be tightened with such force as to bind the wall of member 20 against the periphery of bushing 49. The other end of the screw 48 passes through an opening in the mid part of a plate 51, and this end of the screw 48 is staked or otherwise fastened to the plate 51 so that these parts are incapable of relative rotation. The plate 51, as shown in Figs. 2a, 8, and 10, has the central part thereof offset relative to the end parts to provide a channel for the staked end of the screw so that the upper and lower edge portions of this plate can rest flat against the end plate 12. In order that this screw 48 may be mounted in what may be called floating fashion, guideways are provided therefor, which guideways are in the nature of a pair of Z bars 52 secured to the end plate 12 in any desired fashion. These Z bars are spaced apart sufficiently to permit limited vertical motion of the plate 51, and at the same time they do not restrain this plate against horizontal motion. Due to this attachment of the plate 51 to end plate 12, it follows that the screw 48 is not subjected to any strain which might be occasioned if this screw had to support any of the weight of the tubular member 20. Instead of affording such support, this screw 48 is free to become self-aligned with the tubular member 20 as it rotates on the supports formed by the idler rollers 21, but at the same time the screw 48 is held by the cooperation of plate 51 and the socket formed by bars 52 against rotation relative to the housing 10.

The operation of the parts described to this point is substantially as follows: Considering the blind associated with the housing 10 and indicated at B to be in its fully lowered condition, the elevator cords 32 and 34 will be substantially completely unwound from the tubular member 20, and the disc-like portions 40 and 40' of the collars 41 and 41' will be positioned slightly to the right of the pulleys 38 and 46. At the same time the drum 24 will be substantially completely filled with the cord 25 wrapped therearound in a close fitting spiral. Should it be desired to raise the blind B it is necessary only to exert a downward pull on the cord 25 as it extends below the housing 10. Such a downward pull causes rotation of the drum 24 and consequently rotation of the tubular member 20, which rotation winds the cords 32 and 34 upon the tubular member 20. As this member 20 rotates winding the cords 32 and 34 therearound, the tubular member 20 is moved to the right of the housing by the engagement of bushing 49 with the screw 48. Lifting of the blind by downward pull on the cord 25 can be stopped at any desired point, and the blind locked in this position by the action of the dog 31 which will grip the cord in its upward travel as long as the cord is extending substantially truly vertical. When it is desired to lower the blind the cord 25 extending below the housing 10 can be moved to the left and pulled downwardly sufficiently to release the dog 31. So long as the cord is held out of true vertical position and toward the left, it can be released to enter the housing 10. As soon as this release has been effected, the weight of the blind is sufficient to cause an unwinding of the cords 32 and 34, and a consequent winding of cord 25 upon the drum 24. If necessary a weight bar W can be secured to the underside of the bottom bar 35 of the blind B to assure such operation. This rotation of the tubular member 20 as the blind is lowered causes movement of the member 20 toward the left by the cooperation of the screw 48 and the bushing 49. The various parts assembled on the member 20 can be assembled successively as this member is moved through an opening in one end plate of the housing toward the other end plate.

The drum 24 may be made in various forms, but a simple form thereof is shown in Fig. 9. In this figure it will be seen that use is made of two column members 60 and 61 having disc-like portions 62 and 64 from which extend respec-

tively toward each other tubular extensions 65 and 66. The cylindrical part of the drum is formed from a sheet of metal rolled into tubular shell form as shown at 67 and locked in permanent form by spot-welding the ends of the sheet to a metallic strap 68 with the longitudinal edges of the sheet in linear contact. The strap 68 extends beyond the ends of the cylinder 67 and serves to lock this cylinder against rotation relative to the collars 60 and 61. To accomplish this result the disc-like portions 62 and 64 have slots 62' and 64' cut therein, which slots extend to the peripheries of the extensions 65 and 66. The ends of the strap 68 fit in these slots 62' and 64'. If desired one end of the strap 68 can be bent over as shown at 69 to secure one end of the cord 25 to the drum 24 through the agency of the knot 26 in the end of this cord. The tubular shell 67 is made of internal diameter to snugly fit around the extensions 65 and 66. With this arrangement it is possible to assemble the drum directly on the member 20 by slipping first one collar 60 onto the member 20, next fitting the drum 67 around the extension 65, and then slipping the other collar onto the member 20. When the shell 67 has been correctly fitted between the flanges 62 and 64, the collars 60 and 61 can be locked to the member 20 by suitable set screws 70 passing through the collars and engaging the member 20. It is to be understood, however, that other forms of drums can be used.

The locking dog 31 before mentioned is made of novel construction in that instead of being made from a single block of material, this dog is made up of a plurality of laminations 71 (Figs. 11 and 12), which laminations prior to assembly have a plurality of teeth 72 cut in a curved edge of each thereof. These teeth, as shown in Fig. 12, may have their adjacent edges spaced apart a slight amount if desired. Due to this arrangement it follows that the curved edge of the dog 31 is provided with a multiplicity of teeth considered along the length of the curved edge and also across the thickness of the dog. In practice it has been found that such a multiplicity of teeth afford considerably greater gripping force than a plurality of cross teeth cut in a solid member. The laminations can be fastened together by a rivet 74 passing therethrough and also by the pin 75 utilized in pivotally mounting the dog in the bracket 29.

The mechanism for operating the tilt bar 79 of the Venetian blind associated with the head bar organization comprises in part a bar member 80 of suitable metal having end portions 81 bent into substantial parallelism. The bar 80 is keyed onto a stub shaft member 82, which extends through a gear 84, and is journaled for rotation in an opening in the depending part of end plate 11. This stub shaft 82, as shown in Fig. 4, has a flange-like head engaging one surface of the gear 84 and is internally threaded for the reception of a screw 85 which serves to lock the bar 81 onto the shaft. In conjunction with the bar 81 use is made of a head bar plate 86 fitting over the end of the tilt bar 79 and having an angular portion 87 extending under the bar 79 and apertured for the reception of a screw 88 utilized in securing the composite member 86, 87 in place. Suitable slots are cut in the part 86 and into the material of the tilt bar 79 for the reception of the ends 81 of the bar 80. The other end of the tilt bar 79 has a gudgeon pin 89 driven thereinto or otherwise secured thereto, which gudgeon pin is adapted to seat in a slot 90 in the depending portion of end plate 12. By reference to Fig. 8 it will be seen that the slot 90 has a tapered portion 90' extending to the front edge of the plate 12 whereby this pin can be introduced into proper position. When the tilt bar 79 has been first engaged with the bar 61 it can then be secured to the head bar organization by inserting the gudgeon pin 89 into the slot 90 through the inclined part 90', as the result of which the head bar is rotatably mounted about the shaft 82 at one end and the pin 89 at the other end.

The teeth of the gear 84 are in mesh with the teeth 91 of a gear secured for rotation to the end plate 11. Teeth 92 of a gear rotating with the gear having teeth 91 are in mesh with teeth 93 of another gear also pivotally mounted on the end plate 11. Teeth 94 of a second gear rotating with the gear having teeth 93 are in mesh with teeth 95 of a gear 96 which in turn is secured for rotation to the operating mechanism for this train of gears.

This operating mechanism comprises a drum 97 mounted within the head bar organization. As shown in Fig. 4, the drum 97 is made of thin sheet metal with the cylindrical ends thereof fastened to end plates 98 and 99. The drum 97 is part of an assembly of drum and parallel wall-like plates 100 and 101. One end plate 98 has fastened thereto a journal 102 which extends through the wall member 100 and which has the gear 96 secured thereon. The other end plate 99 has a journal 104 secured thereto and passing through the other wall member 101 in spaced relation thereto. Between the end plate 99 and wall 101 is positioned a spring washer 105 which bears against the plate 99 and against a fibre washer 106 resting flatly against one surface of wall 101. A second fibre washer 107 is positioned against the other surface of wall 101, all of these parts being held in place by a screw 108 fitting into the hollowed out journal 104 with the head of the screw resting against a metallic washer 109. The spring 105 with its associated fibre washer serves as a brake to prevent undesired rotation of the drum 97. Inasmuch as this assembly of walls 100 and 101 and drum 97 must be attached to the head bar organization, provision for such attachment has been made in the nature of a keyhole slot 110 in the end plate 11 of the head bar. The enlarged part of slot 110 is of diameter sufficient to permit the passage of gear 96, while the rest of the slot is of a width corresponding to the diameter of the journal 102. Use is also made of a bracket member 111 secured to the bottom plate 14 and having a portion extending upwardly in parallelism with the end plate 11. This upstanding part of the bracket 111 has a slot 112 cut therein from the top to a position near the bottom of the bracket, and this slot extends horizontally into the part 113 of the bracket. The slot 112 serves to receive the washer 109.

The assembly of walls and drum can be made by introducing this assembly into the head bar housing at the front thereof; then extending the gear 96 through the notch of the keyhole slot 110 until this gear clears the end plate 11. The assembly may then be moved downwardly into the space between end plate 11 and bracket 111. When the wall members 100 and 101 contact the bottom plate 14 the assembly can be locked in place by a latch member 114 one end of which is inserted into a slot 115 formed by cutting notches in the edges of the keyhole slot and then

the latch 114 is locked sufficiently securely in place by forcing a spring loop 116 thereof into the continuation of slot 112 as shown clearly in Fig. 4.

The drum 97 is provided with a longitudinal slot 117 (Fig. 4) of width slightly greater than the diameter of a cord 118 associated with the drum. In addition to slot 117 the drum is provided with two openings 119 in end portions thereof substantially diametrically opposite the slot 117. Due to the provision of this slot and the openings 119 it is possible to pass the two ends of the cord 118 through the two openings 119 with the mid portion of the cord underlying the shell of drum 97 as indicated at 118'. Since the cord is in effect secured to the drum at the ends thereof it is possible to operate the cord in such fashion that while one end part thereof is being wound upon the drum the other end part thereof is being unwound from the drum. Consequently the drum is substantially completely filled with cord at all times and the maximum desired rotation of the drum can be accomplished with a minimum length of cord space thereon.

In normal operation of the drum, the cord 118 is so wrapped around the drum from each end thereof that when the tilt bar 79 is in a horizontal position one end of the cord extends substantially from the mid point and at the top of the drum 97 while the other end of the cord extends substantially from the mid point and from the bottom of the drum. This condition is shown in Fig. 5 wherein it will be seen that one end 118*a* extends from the top of the drum while the other end 118*b* extends from the bottom of the drum, with cord 118*a* crossing the cord 118*b* and passing over a pulley 120 mounted in a bracket which will be described later. The other cord 118*b* passes over a pulley 121 mounted in the same bracket and on the same shaft as the pulley 120. These pulleys are of the idler type so that one can rotate in one direction while the other rotates in the other direction. The bracket in which these pulleys 120 and 121 are mounted is made up of two upstanding arms 122 and 124 connected at the bottom by a flat strip of metal 125 integral with the arms. This flat strip 125 is pivotally secured to a plate 126 which in turn is fastened to the bottom plate 14. The two upstanding arms 122 and 124 have their top edge portions tapered upwardly toward the rear as shown at 127 in Fig. 13. As these arms near their inner ends and approach the drum 97, they are bent inwardly as shown at 122' and 124' to provide a passage of substantial hourglass form, which passage has its restricted part of a width substantially equal to the diameter of the cord 118. Due to the pivotal arrangement of these arms it follows that they are free to follow the cord as a portion of the cord is unwound from the drum, and simultaneously another portion wound upon the drum.

The cords 118*a* and 118*b* pass from the pulleys 120 and 121 through the bottom of the housing; matched arcuate slots 130 being provided in both the plate 126 and the bottom plate 14. These slots are of such overall length as to accommodate the cords in the extreme positions assumed by the pulleys upon movement of the guide portions of this supporting bracket.

Assuming that the cord is in the position shown in Fig. 5 which corresponds to the position in which the tilt bar is horizontal, if the cord 118*a* is pulled downwardly by an operator it will cause unwinding of a part of the cord from the drum rotating the drum to rotate the tilt bar through the gear train. When all of the cord portion 118*a* has been unwound from the drum the tilt bar will be in its extreme angular position in one direction. Simultaneously with the unwinding of the part 118*a* from the drum, the part 118*b* is wound upon the drum so that the drum remains substantially filled with cord. During this passage of the cord the guide formed by the two arms 122 and 124 moves over to the left hand dotted line position shown in Fig. 5. A reverse movement of the tilt bar can be accomplished by pulling the other cord 118*b*, causing this part of the cord to be unwound from the drum, and simultaneously causing the part 118*a* to be wound upon the drum. A full movement or rotation of the drum to accomplish this reverse tilting of the tilt bar results in the guide members moving from the dotted position at the left in Fig. 5 to the dotted position at the right in Fig. 5. This guide arrangement assures that part of the cord will be guided to that part of the drum from which the other part of the cord is being removed.

In Fig. 16 a modified arrangement for rotating the member 20 has been shown. This arrangement incorporates the advantages inherent in the drum arrangement just described in connection with the tilting mechanism. In Fig. 16 the drum 24 is constructed in the same manner as that described in connection with preceding figures, with the exception that the metal strip 68 used in this drum has two bent over parts 69 instead of a single part as shown in Fig. 9. Due to the provision of these two parts 69 it is possible to fasten the two ends of a cord to the respective ends of the drum. One end of the cord 135 passes over a pulley 136 suitably mounted in the housing and over a pulley 137, and from the bottom of the housing; a locking dog 31 similar to that previously described being associated with this pulley 137. The other end 138 of the cord passes over a pulley 139 mounted with its axis at right angles to the pulley 136 and very close thereto. The cord 138 then passes over a pulley 140 and through the bottom of the housing. Due to this arrangement, as the cord portion 135 is pulled downwardly by an operator this part of the cord is unwound from the drum 24 causing rotation thereof. Simultaneously the other part 138 of the cord is wound upon the drum. The reverse movement of the two cords will cause reverse movement of the drum, with the result that when one part of the cord has been completely unwound from the drum the other part thereof is wound upon the drum to substantially completely fill it. Thus for the desired rotation of the drum the minimum length thereof can accommodate the amount of cord necessary to accomplish rotation in both directions. If desired a weight 141 connected to a pulley 142 can be utilized for keeping both portions of the cord under tension at all times, since the pulley 142 rests in the loop of the cord depending from the housing. Other arrangements may be used for the same purpose.

In Figs. 17, 18 and 19 a modified arrangement for imparting rotation to a member 20', similar to member 20 previously described, is illustrated. This arrangement is made up of a traveling carriage formed of an upright thick plate 150 having an opening therein for the passage of the member 20'. This plate 150 extends downwardly to a point close to but out of contact with the bottom bar 14. To the lower end part of the plate

150 is secured a thick bar 151 having recesses 152 cut therein, in which recesses are mounted rollers or wheels 154 by means of pins 155. These rollers or wheels permit movement of the carriage plate 150 along with the rotating member 20' as this member is reciprocated. Extending horizontally from opposite edges of the plate 150 are two narrow flanges 160 having aligned apertures therein for the passage of a shaft 161. Secured on this shaft 161 is a worm 162, which worm can be locked to the shaft by a set screw 163 or by some other suitable arrangement. Due to the locking of the worm 162 on the shaft and since the worm is of length approximately corresponding to the distance between the flanges 160, the shaft is substantially incapable of axial movement. To the outer end of shaft 161 is secured a pulley 164 of relatively large diameter. This pulley serves to receive a cord 165 in the peripheral groove of the pulley. The cord is held in intimate contact with the groove of the pulley by two idler pulleys 166 and 167 mounted on the ends of two arms 168 and 169 respectively. The other ends of the two arms 168 and 169 are pivotally secured to a rigid arm 170 extending laterally from the bottom of the carriage roller bar 151 in the opposite direction from the members 160. A spring 171 is fastened between the two arms 168 and 169 to force them together so that the pulleys 166 and 167 are in intimate contact with the periphery of the pulley 164. These two pulleys 166 and 167 have flanges to engage the opposite surfaces of the pulley 164 so that the two idler pulleys are always held in proper relation to pulley 164.

Secured to the member 20' is a collar 175 having as a part thereof teeth 176 shaped to mesh with the worm 162. One or more set screws 177 may be utilized to fasten this collar on the member 20'. The end of collar 175 closest to the carriage bar 150 is separated from this bar by an anti-friction bearing assembly 178, which assembly makes use of ball bearings. A second collar 179 is secured to the member 20' by one or more set screws 180, and this second collar is separated from the opposite surface of the carriage bar 150 by a second anti-friction element 181 employing ball bearings.

The operation of this embodiment of the invention is substantially as follows: The cord 165 passing around pulley 164 has its ends joined together so that it is in effect endless. This cord passes out of the housing over two separated pulleys 185 and 186. As this cord is manipulated to rotate the pulley 164 in one direction, such rotation of the pulley causes rotation of worm 162 and consequent rotation of the worm gear 176. Since this gear is fastened to the tubular member 20', this member likewise rotates. Reciprocation is simultaneously imparted to the member 20' in the manner previously described in connection with the first embodiment of the invention. Due to the positioning of the anti-friction elements between the collars 175 and 179 and the carriage bar 150, the member 20' and these two collars can rotate relative to the carriage bar and at the same time move the carriage bar along with the member 20'. The rollers 154 previously mentioned permit the carriage bar to move along the bottom plate of the housing, but if desired the front roller 154, or indeed either roller, may be omitted since a single roller under certain conditions would suffice.

I claim:

1. A Venetian blind head bar organization comprising, a housing, a rotatable and reciprocable member in said housing to receive elevator cords, means positioned at spaced intervals intermediate the ends of said member and arranged to contact said member in spaced relation to the periphery thereof to support said member, means for rotating said member, and means for causing reciprocation of said member in response to the rotation thereof.

2. A Venetian blind head bar organization comprising, a housing, a rotatable and reciprocable member in said housing to receive elevator cords, means positioned at spaced intervals intermediate the ends of said member and arranged to contact said member in spaced relation to the periphery thereof to support said member, means for rotating said member, and a screw engaging said member, said screw being secured to said housing with sufficient freedom of movement to cause it to be self-aligning with said member, and to cause reciprocation of said member in response to the rotation thereof.

3. A Venetian blind head bar organization comprising, a housing, a rotatable and reciprocable member in said housing to receive elevator cords, pairs of idler rollers at spaced intervals along said member to support the same, means for rotating said member, and means for causing reciprocation of said member in response to the rotation thereof.

4. A Venetian blind head bar organization comprising, a housing, a rotatable and reciprocable member in said housing to receive elevator cords, pairs of idler rollers at spaced intervals along said member intermediate the ends thereof to support said member, means for rotating said member, and a screw engaging said member, said screw being secured to said housing with sufficient freedom of movement to cause it to be self-aligning with said member and to cause reciprocation of said member in response to the rotation thereof.

5. A Venetian blind head bar organization comprising, a housing, a rotatable and reciprocable member in said housing to receive elevator cords, means positioned at spaced intervals intermediate the ends of said member and arranged to contact said member in spaced relation to the periphery thereof to support said member, a drum on said member, said drum being of considerably larger diameter than said member, a cord adapted to be wound upon and unwound from said drum to cause rotation of said drum and said member, and means for causing reciprocation of said member in response to the rotation thereof.

6. A Venetian blind head bar organization comprising, a housing, a rotatable and reciprocable member in said housing to receive elevator cords, means positioned at spaced intervals intermediate the ends of said member and arranged to contact said member in spaced relation to the periphery thereof to support said member, a drum on said member, said drum being of considerably larger diameter than said member, a cord adapted to be wound upon and unwound from said drum to cause rotation of said drum and said member, and a screw engaging said member, said screw being secured to said housing with sufficient freedom of movement to cause it to be self-aligning with said member, and to cause reciprocation of said member in response to the rotation thereof.

7. A Venetian blind head bar organization

comprising, a housing, a rotatable and reciprocable member in said housing to receive elevator cords, pairs of idler rollers at spaced intervals along said member to support the same, a drum on said member, said drum being of considerably larger diameter than said member, a cord adapted to be wound upon and unwound from said drum to cause rotation of said drum and said member, and means for causing reciprocation of said member in response to the rotation thereof.

8. A Venetian blind head bar organization comprising, a housing, a rotatable and reciprocable member in said housing to receive elevator cords, pairs of idler rollers at spaced intervals along said member intermediate the ends thereof to support said member, a drum on said member, said drum being of considerably larger diameter than said member, a cord adapted to be wound upon and unwound from said drum to cause rotation of said drum and said member, and a screw engaging said member, said screw being secured to said housing with sufficient freedom of movement to cause it to be self-aligning with said member to cause reciprocation of said member in response to the rotation thereof.

9. A Venetian blind head bar organization comprising, a housing, a rotatable and reciprocable member in said housing to receive elevator cords, means positioned at spaced intervals intermediate the ends of said member and arranged to contact said member in spaced relation to the periphery thereof to support said member, a drum on said member, a cord secured to said drum at spaced points adjacent to the respective ends of the drum, part of said cord being adapted to be wound upon substantially the same part of the drum from which another part of the cord is unwound to cause rotation of the drum and said member, and means for causing reciprocation of said member in response to the rotation thereof.

10. A Venetian blind head bar organization comprising, a housing, a rotatable and reciprocable member in said housing to receive elevator cords, means positioned at spaced intervals intermediate the ends of said member and arranged to contact said member in spaced relation to the periphery thereof to support said member, a drum on said member, a cord secured to said drum at spaced points adjacent to the respective ends of the drum, part of said cord being adapted to be wound upon substantially the same part of the drum from which another part of the cord is unwound to cause rotation of the drum and said member, and a screw engaging said member, said screw being secured to said housing with sufficient freedom of movement to cause it to be self-aligning with said member, and to cause reciprocation of said member in response to the rotation thereof.

11. A Venetian blind head bar organization comprising, a housing, a rotatable and reciprocable member in said housing to receive elevator cords, pairs of idler rollers at spaced intervals along said member to support the same, a drum on said member, a cord secured to said drum at spaced points adjacent to the respective ends of the drum, part of said cord being adapted to be wound upon substantially the same part of the drum from which another part of the cord is unwound to cause rotation of the drum and said member, and means for causing reciprocation of said member in response to the rotation thereof.

12. A Venetian blind head bar organization comprising, a housing, a rotatable and reciprocable member in said housing to receive elevator cords, pairs of idler rollers at spaced intervals along said member intermediate the ends thereof to support said member, a drum on said member, a cord secured to said drum at spaced points adjacent to the respective ends of the drum, part of said cord being adapted to be wound upon substantially the same part of the drum from which another part of the cord is unwound to cause rotation of the drum and said member, and a screw engaging said member, said screw being secured to said housing with sufficient freedom of movement to cause it to be self-aligning with said member to cause reciprocation of said member in response to the rotation thereof.

13. A Venetian blind head bar organization comprising, a housing, a rotatable and reciprocable member in said housing to receive elevator cords, means positioned at spaced intervals intermediate the ends of said member and arranged to contact said member in spaced relation to the periphery thereof to support said member, a cord actuated gear arrangement operatively associated with said member for rotating the member, and means for causing reciprocation of said member in response to the rotation thereof.

14. A Venetian blind head bar organization comprising, a housing, a rotatable and reciprocable member in said housing to receive elevator cords, means positioned at spaced intervals intermediate the ends of said member and arranged to contact said member in spaced relation to the periphery thereof to support said member, a cord actuated gear arrangement operatively associated with said member for rotating the member, and a screw engaging said member, said screw being secured to said housing with sufficient freedom of movement to cause it to be self-aligning with said member, and to cause reciprocation of said member in response to the rotation thereof.

15. A Venetian blind head bar organization comprising, a housing, a rotatable and reciprocable member in said housing to receive elevator cords, pairs of idler rollers at spaced intervals along said member to support the same, a cord actuated gear arrangement operatively associated with said member for rotating the member, and means for causing reciprocation of said member in response to the rotation thereof.

16. A Venetian blind head bar organization comprising, a housing, a rotatable and reciprocable member in said housing to receive elevator cords, pairs of idler rollers at spaced intervals along said member intermediate the ends thereof to support said member, a cord actuated gear arrangement operatively associated with said member for rotating the member, and a screw engaging said member, said screw being secured to said housing with sufficient freedom of movement to cause it to be self-aligning with said member to cause reciprocation of said member in response to the rotation thereof.

17. A Venetian blind organization comprising, a cord operated member for actuating part of said organization, said member comprising a drum, a cord secured to said drum at spaced points adjacent the respective ends thereof, said cord being so wrapped around and guided relative to said drum that unwinding of a part of the cord from the drum to cause rotation thereof causes simultaneous winding of another part of the cord upon substantially the same part of the

drum from which the first mentioned part is unwound.

18. A Venetian blind organization comprising, a cord operated member for actuating part of said organization, said member comprising a drum, a cord secured to said drum at spaced points adjacent the respective ends thereof, means for guiding parts of said cord to and from said drum, said cord being so wrapped around said drum and said guide means being so disposed that unwinding of a part of the cord from the drum causes simultaneous winding of another part of the cord upon substantially the same part of the drum from which the first mentioned part is unwound.

19. A drum of the character described, comprising a pair of collars, said collars having disc-like portions and annular flange portions extending axially of the disc-like portions and directed toward each other, a cylindrical metal shell fitting around said flanges between said disc-like portions, means for holding said shell against rotation relative to said collars, said parts being locked together by securing said collars on an axially disposed member.

20. A drum of the character described, comprising a pair of collars, said collars having disc-like portions and annular flange portions extending axially of the disc-like portions and directed toward each other, a cylindrical metal shell fitting around said flanges between said collars, the longitudinal edges of said shell being secured to a metallic strap, said disc-like portions having slots receiving the ends of said strap to hold said shell against rotation relative to said collars, said parts being locked together by securing said collars on an axially disposed member.

21. A Venetian blind head bar organization comprising a housing, a member mounted for rotation and reciprocation therein to operate the elevator cords of a blind, said member having a gear thereon, a carriage mounted in said housing for longitudinal movement relative thereto along with said member as it reciprocates, and a cord operated gear carried by said housing and meshing with the gear on said member for imparting rotation to said member.

22. A Venetian blind head bar organization comprising a housing, a member mounted for rotation and reciprocation therein to operate the elevator cords of a blind, said member having a gear thereon, a vertical carriage plate mounted in said housing for longitudinal movement relative thereto, said member passing through said plate, means on said member acting through anti-friction devices for causing said plate to move in said housing as said member reciprocates, and a cord operated gear carried by said housing and meshing with the gear on said member for imparting rotation to said member.

23. A Venetian blind head bar organization comprising a housing, a member mounted for rotation and reciprocation therein to operate the elevator cords of a blind, a pair of spaced collars on said member, one of said members having a gear thereon, a carriage plate mounted in said housing for longitudinal movement relative thereto, said member passing through said plate, said plate being located between said collars and spaced from each thereof by anti-friction elements whereby said plate moves longitudinally in the housing as said member reciprocates, and a cord operated gear carried by said housing and meshing with the gear on said member for imparting rotation to said member.

24. A Venetian blind head bar organization comprising a housing, a member mounted for rotation and reciprocation therein to operate the elevator cords of a blind, said member having a gear thereon, a carriage mounted in said housing for longitudinal movement relative thereto along with the reciprocation of said member, a worm carried by said housing and meshing with the gear on said member, a cord operated pulley operatively connected to said worm whereby rotation of said pulley causes rotation of the worm and gear, and means for retaining cord in intimate contact with said pulley.

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