July 29, 1952 F. GRIESSER 2,604,939

VENETIAN BLIND

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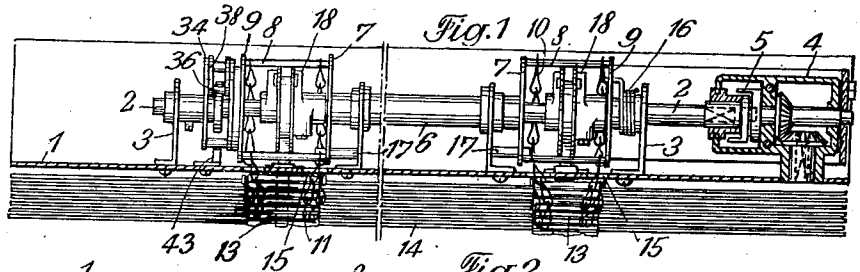


Fig. 1

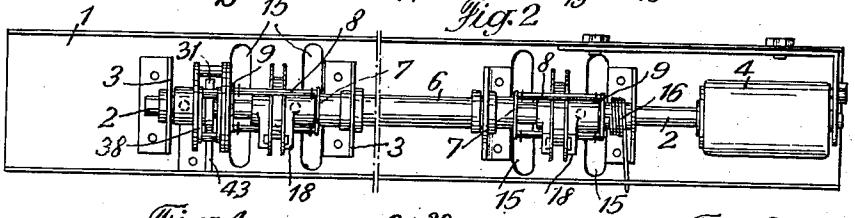


Fig. 2

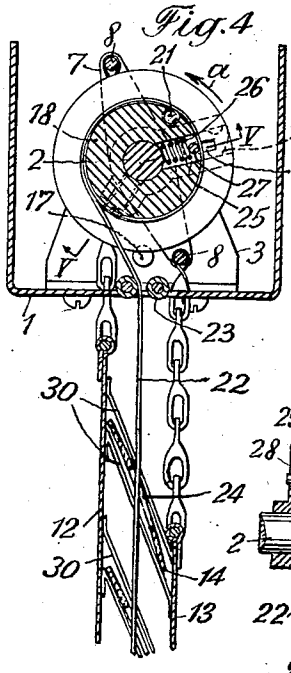


Fig. 4

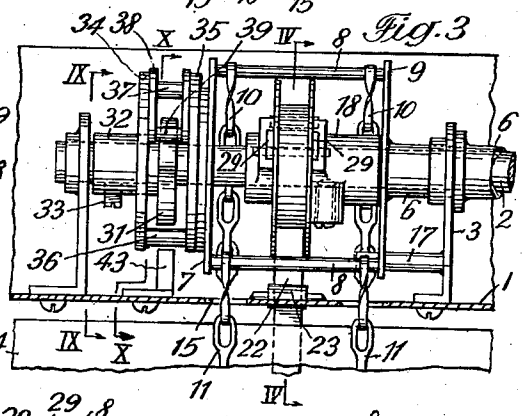


Fig. 3

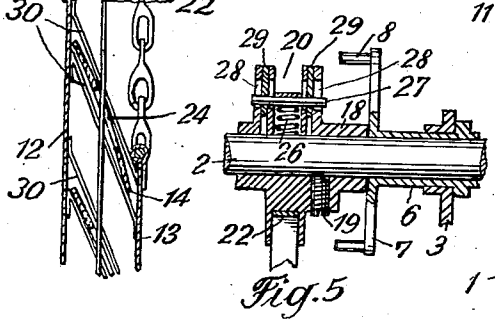


Fig. 5

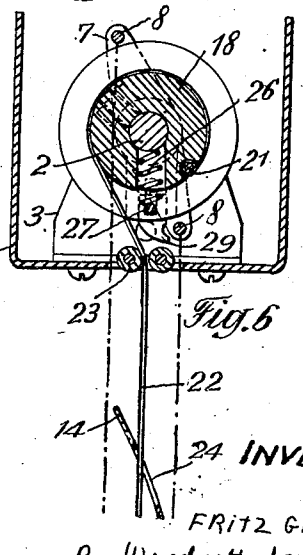


Fig. 6

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Fig. 7

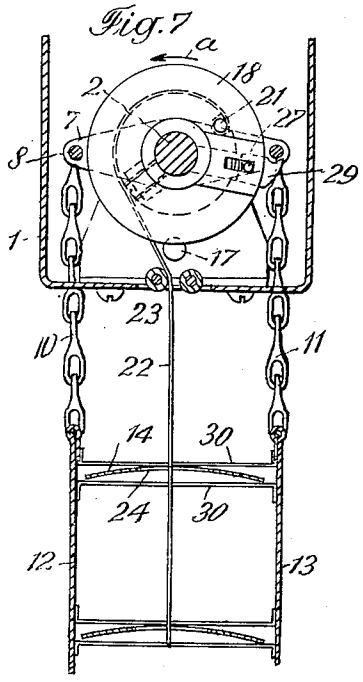



Fig. 8

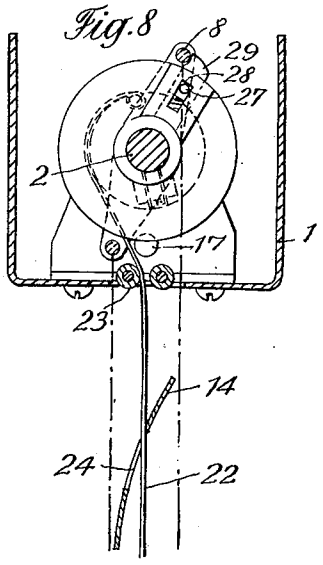



Fig. 9

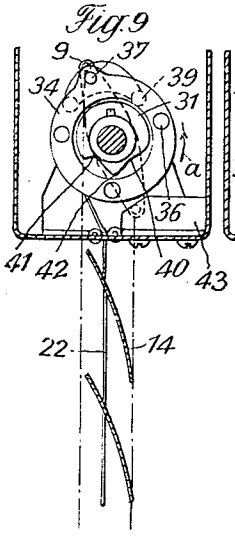



Fig. 10

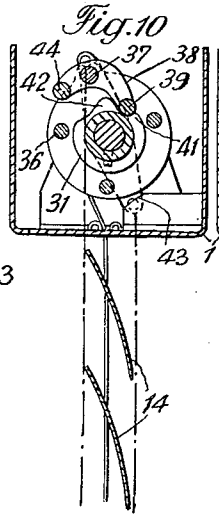



Fig. 11

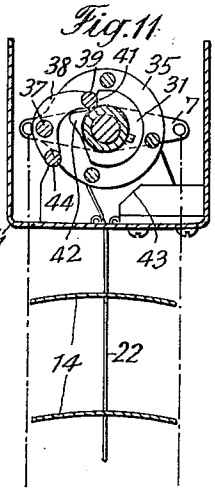
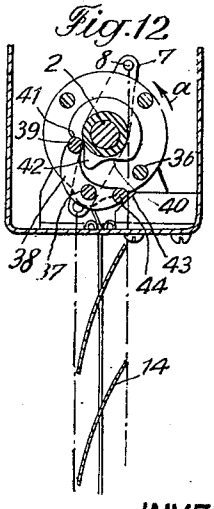



Fig. 12




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Fig. 13

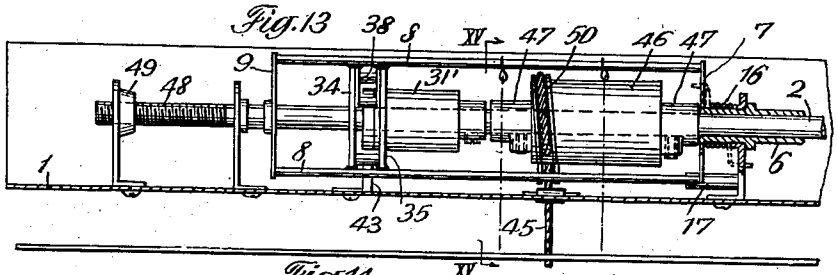



Fig. 14

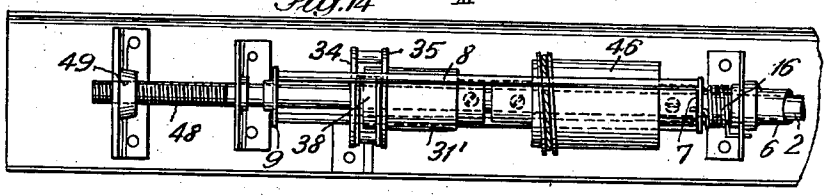



Fig. 15

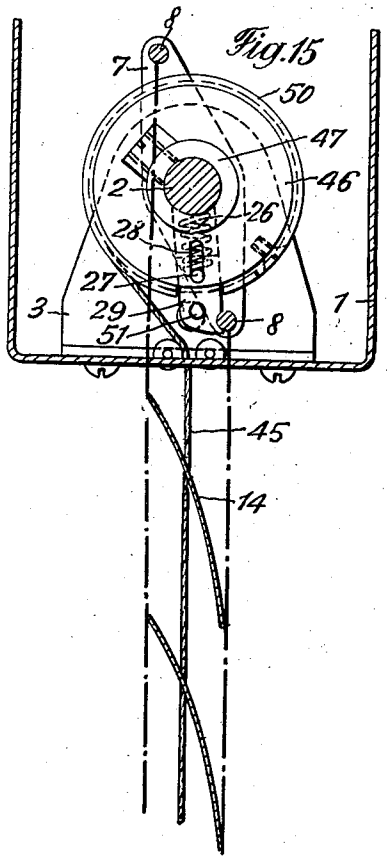
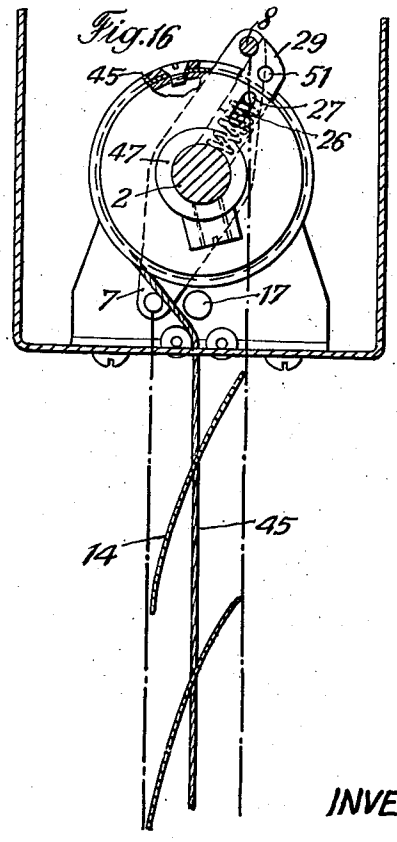



Fig. 16




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Fig. 18

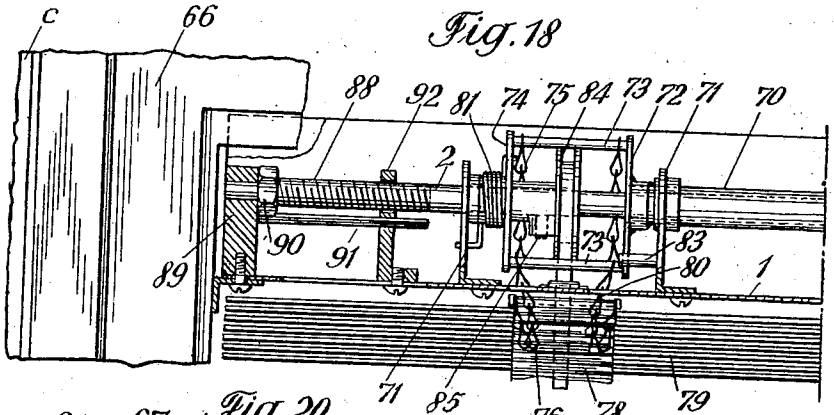
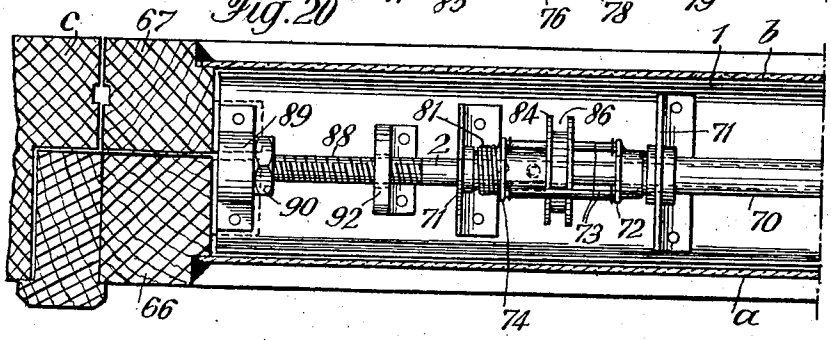



Fig. 20



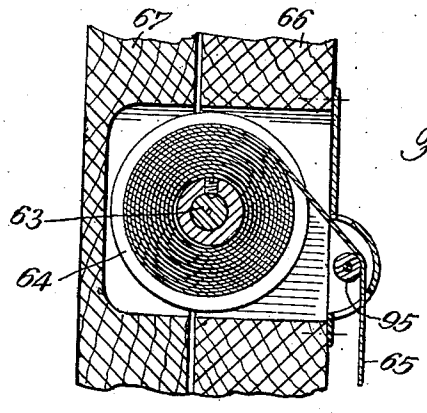




Fig. 25

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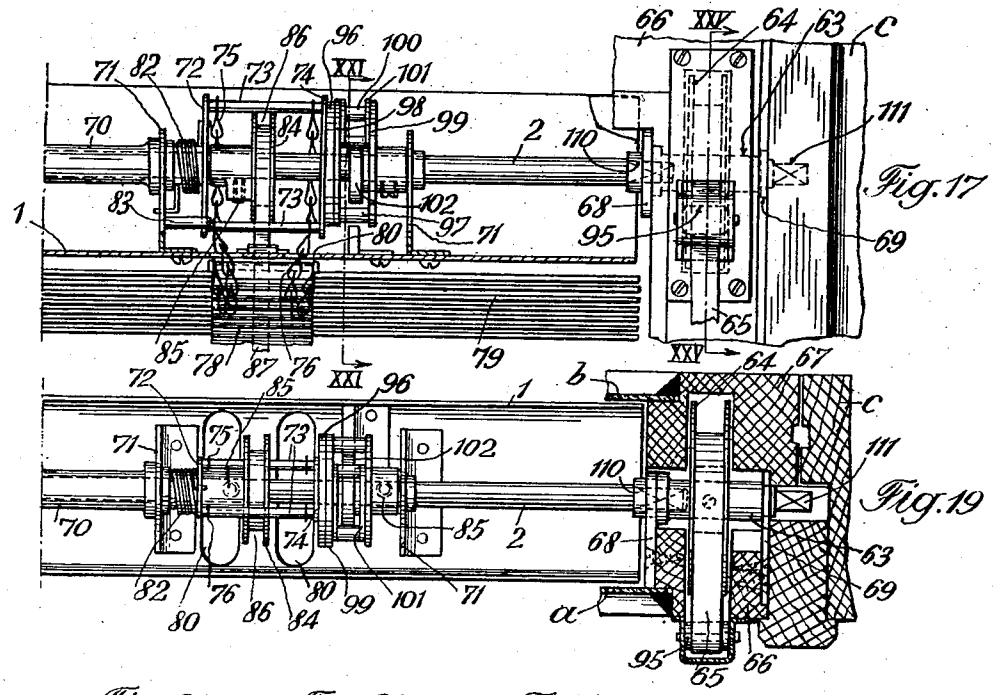


Fig. 17



Fig. 19

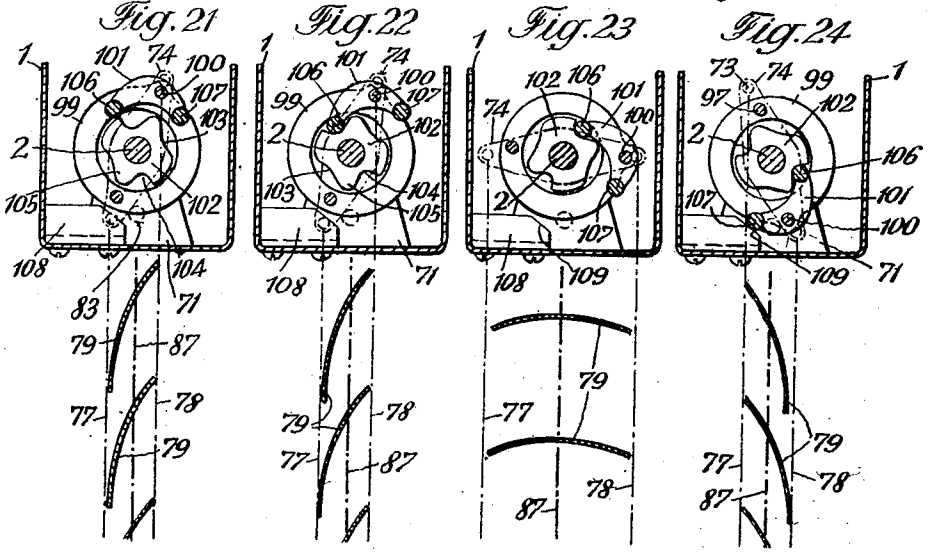


Fig. 21 Fig. 22 Fig. 23 Fig. 24

INVENTOR.

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By Wenderoth, Lind & Ponack

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Patented July 29, 1952

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# UNITED STATES PATENT OFFICE

2,604,939

## VENETIAN BLIND

Fritz Griesser, Aadorf, Switzerland, assignor to Rolladenfabrik A. Griesser A.-G., Aadorf, Switzerland

Application September 27, 1950, Serial No. 187,020
In Switzerland March 9, 1950

7 Claims. (Cl. 160—171)

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This invention relates to Venetian blinds of the type in which the laths are carried by supporting bands suspended from pivoting frames movable to bring the laths from horizontal or open to inclined or closed position, and in which a pull member suspended on a winding drum, is attached to the lowermost lath and may be wound on, or unwound from a winding shaft in order to raise or lower the blind.

In Venetian blinds of this type different operating means are provided for actuating the winding shaft to raise and lower the blind, and for actuating the pivoting frames to adjust the lowered laths into horizontal or inclined position, this adjustment being usually effected by means of operating pull strings depending at the side of the blind.

It is the main object of this invention to provide a single operating mechanism for effecting both the raising and lowering of the blinds, and the adjustment of the position of the different laths, this adjustment of the laths being also effected by actuation of the winding shaft used to raise or lower the blinds.

According to the invention a coupling device is provided which is released by the pull member when the laths are lowered to couple the pivoting frames to which the lath carrying bands are suspended with the winding shaft, so that further operation of this shaft causes a rocking movement of the pivoting frames. Further, clutch means are provided which are operative when the blind is in intermediate position between fully raised and fully lowered position, to automatically connect the pivoting frames to the winding shaft, so as to enable adjustment of the lath position by means of the winding shaft also when the blind is in an intermediate position.

With these and other objects in view, my invention will fully appear from the following specification, reference being had to the accompanying drawings, showing preferred embodiments of the Venetian blind operating mechanism according to the invention.

In the drawings,

Fig. 1 is a vertical longitudinal section through a portion of a casing in which the operating mechanism is lodged;

Fig. 2 is a plan view of this casing;

Fig. 3 is a fragmentary view of a portion of Fig. 1 on an enlarged scale;

Fig. 4 is a transverse section along the line IV—IV of Fig. 3;

Fig. 5 is a section along the line V—V of Fig. 4;

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Fig. 6 is a similar section as Fig. 4, showing the parts in another operating position;

Figs. 7 and 8 are similar sections as Fig. 4, showing other operating positions;

Figs. 9 and 10 are transverse sections along the lines IX—IX and X—X, respectively, of Fig. 3;

Figs. 11 and 12 are similar sections as Fig. 10, showing the laths in open and in closed position;

Fig. 13 is a longitudinal section through a portion of the casing carrying the operating mechanism according to a modified form of the invention;

Fig. 14 is a plan view of this casing;

Figs. 15 and 16 are sections along the line XV—XV of Fig. 13, showing two different working positions;

Fig. 17 shows a further modification in which the casing carrying the operating mechanism is mounted in the upper portion of a window frame, an end portion of the casing being shown in longitudinal, vertical section;

Fig. 18 shows in similar manner the opposite end portion of the casing;

Figs. 19 and 20 are plan views of the two casing end portions, with the window frame shown in horizontal section;

Fig. 21 is a section along the line XXI—XXI of Fig. 17;

Figs. 22, 23 and 24 are similar sections as Fig. 21, showing the parts in other operating positions.

Fig. 25 is a section along the line XXV—XXV of Fig. 17.

In Figs. 1 and 2, 1 indicates a channel-shaped, upwardly open casing in which a throughgoing shaft 2 is rotatably mounted in bearing brackets 3. The shaft 2 may be driven manually in both directions, for example by a not represented crank shaft, through the intermediary of a gear 4 and a friction clutch 5 of the kind preventing rotation of shaft 2 under the influence of the torque acting on the shaft owing to the weight of the laths 14 but allowing rotation of shaft 2 in either direction when actuating said crank shaft or the like. A gear and friction clutch of this type has been described in detail in my copending application Serial No. 159,407 dated May 2, 1950, now U. S. Patent 2,579,144. A sleeve 6 is pivotally mounted on the shaft 2, and both ends of this sleeve carry diametrically opposed arms 7. Each arm 7 is rigidly connected by means of longitudinally directed pins 8 which are symmetrically located with respect to the shaft 2, with a second arm 9

also pivotally mounted on shaft 2. Two chains 10 and 11 are suspended on each of the diametrically opposed pins 8, the lower end of each chain being connected to one of the lath supporting bands 12 or 13 (Fig. 4). The chains extend through transversal slots 15 in the bottom of the casing 1. A spiral spring 16 wound around shaft 2 has one end abutting against the casing 1, while the other end acts against one arm 9, thereby continuously applying a torque on the two swing frames 7, 8, 9 which are rigidly interconnected by the sleeve 6, and are thus applied against a fixed abutment 17 carried by the casing 1.

Between the two arms 7 and 9 of each swing frame a winding roll of drum 18 is mounted on the shaft 2, and rigidly connected with the shaft by a set screw 19 (Fig. 5). The drum 18 is provided with a peripheral groove 20. On the bottom of the groove at 21 is fastened one end of a steel tape 22, which can be wound up around the drum. The steel tape extends downwardly between two guide rolls 23 which are disposed in an opening of the bottom of the casing, and traverses a slot 24 provided in each lath 14, and is attached to the lowermost lath in known manner.

In a radial opening 25 of the drum 18 is lodged a spiral spring 26 bearing, by its inner end on the shaft 2, while the outer end acts against a pin 27, which is radially movable in slots 26 of the drum 18. The pin 27 carries two bolts 29 which are located within the circumference of the drum 18 when the spring 26 is compressed, as shown in Fig. 5. The pin 27 is normally maintained by the wound up steel tape against the inner end of the slot 28, and the spring 26 is compressed. Only in case the blind is completely lowered and the steel tape fully unwound, the pin 27 is released by the steel tape and the spring 26 then urges the pin 27 outwardly against the outer end of the slots 28 into the position shown in Fig. 6; the bolts associated with the pin 27 also move outwardly and extend now beyond the circumference of the drum 18.

Fig. 4 shows the position of one of the swing frames when the blind is partially lowered. The bolts 29 are locked within the circumference of the drum 18, and as the steel tape partly is wound up on the drum, the pin 27 which carries the bolts is held against the inner ends of the radial slots 28 by the tape 22. Owing to the spiral spring 16 (Figs. 1 and 2) the swing frame 7, 8, 9 is maintained in the position shown in Fig. 4. The laths 14 which are carried by the cross straps 30 of the supporting bands 12 and 13 are held in a downwardly and inwardly inclined position, the left side of the laths in Fig. 4 and in Figs. 6 to 12 representing the outer side of the window. When the gear 4 and the shaft 2 is turned further in the direction of the arrow $a$, until the laths reach their lowermost end position, as indicated in Fig. 6, the steel tape 22 is so far unwound from the drum 18 that the pin 27 is released from the tape. The bolts 29 are now in the shown position and project beyond the circumference of the drum 18. The arms 7 are still in the same position as shown in Fig. 4, in which position the spring 16 tends to maintain it. When now the shaft 2 is turned further, the bolts 29 will engage the lower pin 8 and will impart rotation to the swing frame 7, 8, 9 as a whole around the axis of shaft 2 against the action of the spring 16. When the arms 7 and 9 reach their horizontal position as shown in Fig. 7, the chain 10 has been lowered and the chain 11 raised, and the lath supporting tapes 12 and 13 have been correspondingly lowered and raised, the cross straps 30 having thus been brought to a horizontal position, so that the laths 14 also assume their horizontal or normally open position. When the shaft 2 is turned further in the same direction (arrow $a$), the swing frame 7, 8, 9 finally reaches the position shown in Fig. 8, where one of the arms 7 abuts against the fixed stop 17, so that the shaft 2 can no longer be turned. The laths 14 have now reached their correct closing position, being downwardly inclined from the inner side towards the outer side of the window.

The swing frame 7, 8, 9 remains in any intermediate position between the positions according to Fig. 6 and Fig. 8, into which it can be swung by actuation of the gear 4, because the friction clutch 5 prevents any rotation of the shaft 2 in a direction opposed to the arrow $a$, so that the laths may occupy any intermediate position between the end positions shown in Fig. 6 and Fig. 8.

In the position according to Fig. 8 the arm 7 of the swing frame abuts against the fixed stop 17 and prevents further rotation of the winding shaft in the direction of the arrow $a$ which would cause a raising of the blind in the wrong direction of rotation of the shaft. In order to raise the blind it is necessary to rotate the winding shaft 2 in the opposite direction, the steel tape 22 thus being wound up on the drum 18 in the correct direction of rotation.

When the blind shall be raised from the position shown in Fig. 7 or Fig. 8, i. e. the blind shall be opened, the gear 4 will be actuated in opposite direction and the shaft 2 will turn in a direction opposite to the arrow $a$. The swing frame 7, 8, 9 also rotates in opposite direction as a result of the action of spring 16, and the laths turn from the position shown in Fig. 8 over the position shown in Fig. 7 to the position shown in Fig. 6. The frame 7, 8, 9 then remains in the position according to Fig. 6, as it abuts against the stop 17. When now the drum 18 also rotates from the position of Fig. 6 in clockwise direction, the pin 27 which carries the bolts 29 is pressed radially inwardly by the tape 22 and the bolts are pushed back into the position according to Fig. 4. The steel tape which is winding up on the drum 18 pulls the laths upwardly into raised position as shown in Fig. 1, and when the gear 4 is no longer actuated, the shaft 2 is automatically locked owing to the action of the friction clutch 5.

It will be observed, that the bolts 29 of the winding drum 18, which in fully lowered position of the blind engage one of the pins 8 of the swing frame, only permit adjusting of the laths 14 when the blind is fully lowered. In order to enable adjustment of the position of the laths also in any intermediate position of the blind between fully lowered and fully raised position, provision of a mechanism which will now be described has been made.

As shown in Figs. 3 and 9 to 12, the shaft 2 carries a cam 31 disposed laterally of one of the swing frames 7, 8, 9, the cam being formed on a sleeve 32 fixed to the shaft 2 by a set screw 33. Two annular discs 34 and 35 are rigidly connected with the arm 9 of the swing frame by means of rivets or screws 36. A pawl 38 is pivotally mounted on a pin 37 carried by the annular discs 34 and 35, one end 39 of the pawl coacting with the cam 31. The pin 37 which carries the pawl, is secured to the discs 34 and 35 in such a position relative to the arms 7 and 9, that in the normal position of the swing frame 7, 8, 9, when

due to the pressure of the spring 16 it is maintained in a position according to Fig. 4 or Fig. 6, this pin is located above the shaft 2, as shown in Figs. 9 and 10. The end 39 of the pawl is heavier than the end 44 of the pawl, so that in the position of Figs. 9 and 10 the end 39 of the pawl owing to its weight rests on the circumference of the cam 31.

The cam 31 is provided with a recess 40 and a notch 41 separated from each other by a nose 42. When upon lowering of the laths the shaft 2 turns in the direction of the arrow *a* in Fig. 9, the end 39 of the pawl at first slides over the circular circumference of the cam and then over the recess 40 and up to the nose 42. In case the shaft 2 is turned rapidly and the laths are quickly lowered into their lowermost position, the end 39 of the pawl will jump over the notch 41 and arrives from the nose 42 immediately on to the circular circumference again of the cam and the blind normally lowers into its lowermost position, as has been described by reference to Figs. 4 and 6, at each revolution of shaft 2 and cam 31 the end 39 of the pawl jumping over the notch 41 without falling into it.

When, however, the shaft 2 and the cam 31 turn slowly in the direction of the arrow *a* the end 39 of the pawl after passing the nose 42, engages with the notch 41 of the cam as shown in Fig. 10; the turning cam transmits the movement of rotation to the pawl 38 and as the pawl is secured to the swing frame 7, 8, 9, this latter is also turned. In the position according to Fig. 11, the arms 7 and 9 of the swing frame have been turned into their horizontal position, corresponding to the open position of the laths 14. The blind may remain with the laths in this position, the friction clutch 5 preventing a backward rotation of the swing frame and a corresponding rotation of the shaft in the direction opposite to the arrow *a*. When the shaft 2 is further turned until the position according to Fig. 12, the cam 31 will have turned the pawl 38 and the swing frame 7, 8, 9 so far, that the laths 14 have reached their normal closing position. The blind also can remain in this position, the friction clutch 5 preventing a rotation in the opposite direction, and the end 39 of the pawl cannot disengage from the cam notch 41. When, however, the shaft 2 is now turned further in the direction of the arrow *a* as shown in Fig. 12, the backward end 44 of the pawl arrives into contact with an inclined surface 43 provided in the casing 1. This inclined surface causes the end 44 of the pawl to move radially inwards; the pawl is pivoted around its journal 37 and the opposite end 39 of the pawl will disengage from the notch 41 of the cam. Owing to the action of the spring 16 (Fig. 1) the released swing frame 7, 8, 9 together with the pawl 38 is swung back into the position according to Fig. 9, and also the laths 14 will return again to the position shown in Fig. 9. By further turning the shaft 2 the blind may further be lowered, and when the notch 41 again engages with the end 39 of the pawl, the already described operation of swinging movement of the pivoted frame 7, 8, 9 is repeated once upon each revolution of the shaft 2 on the cam 31. Accordingly, in a number of intermediary positions between fully raised and fully lowered position of the blind, the laths may be brought into their horizontal or any inclined position.

It has been seen that in the described Venetian blind, by the sole actuation of the drive means for lowering and raising the laths, these latter



may also be adjusted into their horizontal or any inclined position; there are no additional draw cords required, by means of which the laths up to now have been adjusted into their opened or closed positions.

Figs. 13 to 16 show a modified arrangement of a Venetian blind operating mechanism. In order to raise and to lower the laths 14 a cord or a cable 45 is used instead of a steel tape. As this cable due to its thickness can not be wound up in superposed layers as in the case of a thin steel tape, a long drum 46 will be used for winding up the cord, this drum being of such axial length, that when the blind is fully raised, the cord or cable is wound on the drum surface in a single layer of adjacent spiral windings. The drum 46 rotates with the winding shaft 2 and at both ends it is secured against axial movement by a sleeve 47 which is clamped to the shaft 2. The first cable winding is guided on the drum by a helical groove 50, which prevents a slipping of the cable over the edge of the drum. One end of shaft 2 is provided with a screw thread 48 and carried by a bearing formed as a threaded nut 49. When the shaft 2 is turned, it screws into the nut and accordingly is axially displaced and the drum which simultaneously rotates with the shaft also is axially moved. The cable 45, according to the direction of rotation of the drum, is unwound from the drum or wound up on the drum, whereby the cable depending from the drum and having its lower end attached to the lowermost lath, remains in the same transverse vertical plane, the laths only being moved vertically up and down. The end of shaft 2 opposite to the threaded end 48 and which is not shown, is coupled with a gear 4, as in the first example (Fig. 1), the coupling of shaft 2 with the gear being formed in such a way that the shaft during its axial displacement continuously remains in driving engagement with the gear.

A sleeve 6 on the shaft 2 again connects the two swing frames 7, 8, 9 serving to suspend the chains of the lath supporting tapes, which however are not shown, only one of the two swing frames has been shown. The spiral spring 16 which is wound around the sleeve 6 acts against the arm 7 of the frame and tends to hold the frame in the position shown in Fig. 15. For the adjustment of the laths the drums 46 are constructed in the same way as the drums 18 of Figs. 4 and 6. Two bolts 29 are connected with the pin 27, which is slideably arranged in a radial slot 28 of the drum 46. The bolts 29 also are movable in radial slits and the spring 26 which acts on the pin 27 tends to push the bolts out of the drum. However, as long as the cable 45 is wound up in the helical groove 50, the bolts 29, by means of the cable 45 which passes over a pin 51 carried by the bolts, are retained in the interior of the drum. As soon as the laths have reached their lowermost position, as shown in Fig. 15, the bolts 29 are released from the cable and are pushed out of the drum by the spring 26. By further turning the shaft 2 the bolts engage with the pin 8 of the swing frame and turn this latter, whereby the laths 14 are brought into their open position, or into the closed position as shown in Fig. 16. In this position the arm 7 abuts against the stop pin 17 secured to the casing 1, thereby preventing a further rotation of the shaft 2. Raising of the blind therefore cannot be accomplished in the wrong direction of rotation of the shaft 2, but the operator is obliged, after having lowered the blind

to turn the shaft 2 in the opposite direction in order to raise the laths.

In order to be able to adjust the laths also in intermediate positions between the raised and the lowered position of the blind, a drum shaped cam 31' is fixed to the shaft 2, the cam profile over the length of the drum being similar to that of the cam 31 in Figs. 9 to 12. This cam turns together with the shaft 2 and also takes part in its axial movement. Two discs 34 and 35 are welded to the longitudinal pins 8 of the swing frame, these discs carrying a pivoted pawl 38 similar to that shown in Figs. 3 and 9 to 12. This pawl cooperates with the cam 31' in the same manner as had been described with reference to Figs. 9 to 12; upon each revolution of the shaft 2, when the blind is slowly lowered, the cam 31' over part of one revolution, turns together with the shaft and causes the frame 7, 8, 9, to pivot, to thereby adjust the laths to the desired position, until a further rotation of the shaft 2 causes the pawl to engage the inclined surface 43, which produces the release of the pawl, from the cam 31' and the return of the frame 7, 8, 9 into its normal position as shown in Fig. 15, by the action of spring 16. The cam 31' also takes part in the axial movement of the shaft 2, and during the lowering or raising of the blind, the cam moves across the rings 34 and 35, the pawl 38 being continuously in engagement with the cam.

In the modification illustrated in Figs. 17 to 20, 1 again indicates a casing in which the winding shaft 2 is located. According to Figs. 17 and 19 one end of the shaft 2 is formed with a square end engaged in a corresponding axially extending square socket of a shaft 63 carrying a winding drum 64 for a draw tape 65. To the frame part 66 of a two part window frame 66, 67 are secured steel sheets 68, 69 which carry the drum shaft 63 and also the winding shaft 2. The shaft 2 carries a rotatable sleeve 70 guided by brackets 71 and having on both ends rigid arms 72. Each arm 72 is rigidly connected by two pins 73 which are symmetrically located, with respect to the shaft 2 with a second arm 74; the arm 72, pin 73 and arm 74 form together a swing frame as in the previous examples, the two swing frames being rigidly connected by the sleeve 70. Two chains 75 and 76 are suspended from each pin 73, on the lower ends of which chains the lath carrier bands 77 and 78 being fixed. The chains extend through transversal slots 80 in the bottom of the casing 1. Two springs 81 and 82 which are wound around the shaft 2 or the sleeve 70 bear with one of their ends against fixed brackets 71 and with the other end act against the arms 74 or 72, so as to continuously exert pressure on the swing frames 72, 73, 74 and tend to apply them against the fixed abutments 83.

Between the two arms 72 and 74 of each swing frame is disposed a winding drum 84 secured to shaft 2 by means of a set screw 85. The drum 84 is provided with a peripheral groove 86, on the bottom of which the end of a steel tape 87 is fastened, which tape can be wound up around the drum 84 by rotation of the shaft 2. The steel tape 87 passes through the bottom of the casing 1 and through a slot in each lath 79 in order to be attached to the lowermost lath in known manner.

As may readily be seen in Figs. 18 and 20, the left hand end of shaft 2 is provided over a certain length with a screw thread 88 and is rotatably mounted in an end flange 89 of the casing 1. A nut 90 is engaged on the screw threaded portion 88, and is maintained against rotation by a guide bar 91. An abutment 92 is provided for limiting the stroke of the nut 90 which is axially moved during rotation of the shaft 2, this abutment accordingly acting to stop the movement of rotation of shaft 2 when the blind arrives in its lowered position. The corresponding end of the casing is secured to the window frame 66 and 67.

When the blind is lowered the draw tape 65 is wound up on the drum 64 according to Fig. 25, the end of the tape passing over a guide roll 95 to the inner side of the window frame, where it will be held in a usual clamping device at the lower part of the frame. The blind can be lowered when loosening this clamping device, i. e. when releasing the drawtape 65, under the action of the weight of the laths, the draw tape being wound up on the drum 64 when the blind is so lowered.

In order to adjust the position of the laths 79 in any intermediate position of the blind between a fully lowered and a fully raised position, a pawl and ratchet device is provided in the casing 1.

According to Figs. 17 and 19 a connecting disc 96 is secured to the arm 74 of the corresponding swing frame, and carries two annular discs 98 and 99 connected to each other by pins 97. A pawl 101 is pivotally mounted on a pin 100 carried by the discs 98 and 99. The shaft 2 furthermore carries a cam disc 102 between the annular discs 98 and 99, the cam disc being provided with two diametrically opposed recesses 103 and two diametrically opposed notches 104, separated by each other by a nose 105 (Figs. 21 to 24). The end 106 of the pawl 101 is coacting with the cam disc 102. A release abutment 108 is provided in the casing 1 having an inclined face 109 situated in the path of the end 107 of the pawl.

The operation of the described pawl device is as follows: Assuming that the blind is in its completely raised end position and shall be lowered by releasing the draw tape 65. Owing to the weight of the laths the winding shaft 2 turns in counterclockwise direction (Figs. 21 to 24), and the steel tape 87 unwinds from the drum 84. The end 106 of the pawl then slides through the notch 104 (Fig. 21), over the nose 105 and through the recess 103, and arrives on the circular peripheral part of the rotating cam disc 102 without causing a movement of rotation of the pawl 101. The blind thus may be lowered until its lowermost position, without the laths 79 being affected by this movement of the cam 102; the laths during lowering of the blind remain in their normally closed position (Figs. 21 and 22), in which they are kept by the swing frame 72, 73, 74, which is subjected to the action of spring 82.

When the blind is to be raised, the shaft 2 is turned in clockwise direction by exerting a pull on the draw tape 65 to unwind it from the drum 64. When the shaft 2 is rapidly turned, i. e. the blind will quickly be raised, the end 106 of the pawl jumps over the notches 104 in the cam 102 and pass from the nose 105 immediately to the successive circular peripheral part of the cam. The blind can thus be completely raised without the cam causing any adjusting movement of the laths, since the pawl is not engaged by the cam.

When, however, the shaft 2 and the cam disc 102 will be turned slowly in clockwise direction

(Figs. 21 to 24), the end 106 of the pawl after passing over the nose 105 will engage with the corresponding notch 104 of the cam disc 102 as shown in Fig. 6. The rotating cam disc 102 now transmits the movement of rotation to the pawl 101, and since this latter is rigidly connected with the swing frame 72, 73, 74, this frame will turn in clockwise direction against the action of the spring 82. In the position shown in Fig. 23 the swing frame arms 72, 74 have reached their horizontal position, and the laths 79 have been moved from closed to open position. The blind may be left in this position, since the draw tape 65, maintained by its clamping device prevents a return movement of the swing frame and a corresponding rotation of shaft 2 in counterclockwise direction. When, however, the shaft 2 is further turned in clockwise direction by pulling the draw tape 65, until the position according to Fig. 24 is reached, the cam disc 102 has turned the pawl 101 so far, that the laths are closed again by being inclined in a direction opposite to that shown in Figs. 21 and 22. The blind also can remain in this position when the tape 65 is clamped. When now the shaft 2 is turned further in clockwise direction, the end 107 of the pawl 101 engages with the inclined face 109 of the release abutment 108. This inclined face 109 presses the end 107 of the pawl radially inwards, the pawl 101 rocks about its pivot pin 100 and the opposite end 106 of the pawl disengages from the notch 104 of the cam disc 102. The released swing frame 72, 73, 74 together with the pawl now swings back under the action of springs 81 or 82 into the position shown in Fig. 21 where the laths 79 are in their normally closed position.

It results from the above description that adjustment of the position of the laths 79 can only be effected when the blind is raised, but such adjustment can be obtained in any position of the blind between the fully lowered and the fully raised position. The described blind accordingly is lowered under the action of its weight when the tape 65 is released, and is raised by unwinding quickly the draw tape 65, while by slowly unwinding the tape, the position of the laths 79 may be adjusted.

It results from the drawing, that the blind is arranged between the glass plates *a* and *b* of a double window, the winding shaft 2 having its square end 110 carried by and removably coupled with the tape drum shaft 63 aligned with the winding shaft 2. The driving mechanism and the laths may be mounted in the casing 1 itself carried by the two part window frame 66, 67, independently of the fixed window frame *c* (Figs. 17 to 20). The whole blind assembly may be mounted in the window frame 66, 67 and then the glass plates are fixed in the frame and afterwards the complete window with the built in blind mounted in the fixed frame *c*. The described blind accordingly can be advantageously used for pivoting windows. The square end 111 of the drum shaft 63 serves for the purpose of adjusting the driving members when the blind is being assembled, and before the window frame 66, 67 is mounted into the fixed frame *c*.

Adjustment of the laths into the desired position is effected by actuating the drive members serving to lower and to raise the blind, that is in the previous case the draw tape 65, and no additional lath operating means, as for example a draw cord or the like is required.

I claim:

1. A Venetian blind having a lath operating shaft, winding drums on said shaft, a flexible steel tape depending from each winding drum and extending through the laths and attached to the lowermost lath, swing frames loosely mounted on said operating shaft, a pair of lath carrying ladder bands depending from each swing frame, a coupling device for temporarily connecting the swing frames for rotation with the shaft, said coupling device comprising slidable bolts mounted within said winding drums and maintained in inoperative position by said flexible steel tape wound up on the drum, and spring means urging said bolts out of the winding drum into coupling position when the blind is lowered and the tape unwound from the winding drum.

2. A Venetian blind having a lath operating shaft, winding drums on said shaft, a flexible pull member depending from each winding drum and extending through the laths and attached to the lowermost lath, said pull members being wound on or off the winding drums upon rotation of the shaft in one or the other direction, swing frames loosely carried by said shaft, a pair of lath carrying ladder bands depending from each swing frame, a fixed abutment for limiting the pivoting movement of the swing frames on the operating shaft, spring means acting on said swing frames to maintain the frames applied against said fixed abutment, a cam disc fixed to the operating shaft, said cam disc having on the periphery thereof a projection, a notch and a circular surface portion in successive order, a pawl pivotally mounted on one of said swing frames and cooperating with said cam disc, one end of said pawl being heavier than the other end thereof, said projection on said cam disc engaging the heavier end of the pawl to turn said pawl with the cam disc upon rotation of the shaft to turn said swing frames together with the shaft against the action of said spring means and move said ladder bands for adjusting the position of the laths, an inclined surface positioned in proximity to said cam disc, the lighter end of said pawl coacting with said inclined surface and for releasing said pawl from engagement with said cam disc after a predetermined angular movement of said swing frames.

3. A Venetian blind having a rotatable operating shaft, winding drums on said shaft, a flexible pull member on each winding drum, a series of laths operable to be lowered and raised and to be adjusted into horizontal or inclined position, swing frames pivotally mounted on said operating shaft, a pair of lath supporting ladder bands depending from each swing frame, said pull members being adapted to be wound on or off said winding drums to raise or lower said laths, driving means for rotating said operating shaft, and coupling means on said shaft adapted to connect said swing frames for rotation with the operating shaft, said coupling means becoming automatically operative upon slow rotation of the shaft but remaining inoperative upon rapid rotation of the shaft, the same driving means being operative to raise and lower the blind and to adjust the lath position, said operating shaft having a screw threaded end portion engaged in a nut, said shaft being axially moved upon rotation thereof by coaction of the threads and nut whereby said flexible pull member is wound up in adjacent layers on said winding drum.

4. A Venetian blind as claimed in claim 3, wherein one end of said operating shaft is coupled to a driving gear transmitting driving motion

to said shaft for raising or lowering the blind and for adjusting the lath into horizontal or inclined position.

5. A Venetian blind as claimed in claim 3 and comprising a casing supporting said operating shaft, a two-part window frame carrying said casing, driving means carried in said window frame, and means for removably connecting said operating shaft and said driving means.

6. A Venetian blind as claimed in claim 3 and comprising a casing supporting said operating shaft, a two-part window frame carrying said casing, a drive shaft mounted in said frame and coupled with said operating shaft, a tape drum secured to said drive shaft, and a draw tape wound up on said drum, whereby raising and lowering of the blind and adjustment of the position of the laths is obtained by actuation of said tape.

7. A Venetian blind having a rotatable lath operating shaft, a swing frame mounted for pivoting movement on the shaft, a winding drum secured to the shaft, a flexible pull member depending from the winding drum and extending through the laths and attached to the lowermost lath, lath carrying ladder bands suspended on said swing frame, a pawl and ratchet device operable to turn said swing frames for adjusting the position of the laths, said device including a cam disc mounted for rotation with said operating shaft, said cam disc having on the periphery thereof a projection, a notch and a circular



surface portion in successive order, a pawl for coaction with said cam disc pivotally mounted on said swing frame, one end of said pawl being heavier than the other end thereof, said heavier end of said pawl coacting with and coupling said pawl to said cam disc upon rotation of the operating shaft and causing said swing frame to turn with the shaft, said pawl upon rapid rotation of said operating shaft jumping over said notch without becoming engaged with said cam disc, while upon slow rotation of said shaft, the pawls fall into said notch to be coupled with the cam disc and transmit the movement of rotation of said shaft to said lath carrying swing frame, an inclined surface positioned in proximity to said cam disc, the lighter end of said pawl coacting with said inclined surface and releasing said pawl from engagement with the cam disc after a predetermined movement of rotation of said swing frame.

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