July 11, 1939. L. S. MORSE ET AL 2,165,292

VENETIAN BLIND

Filed Nov. 18, 1936 2 Sheets-Sheet 1

Fig. 1.

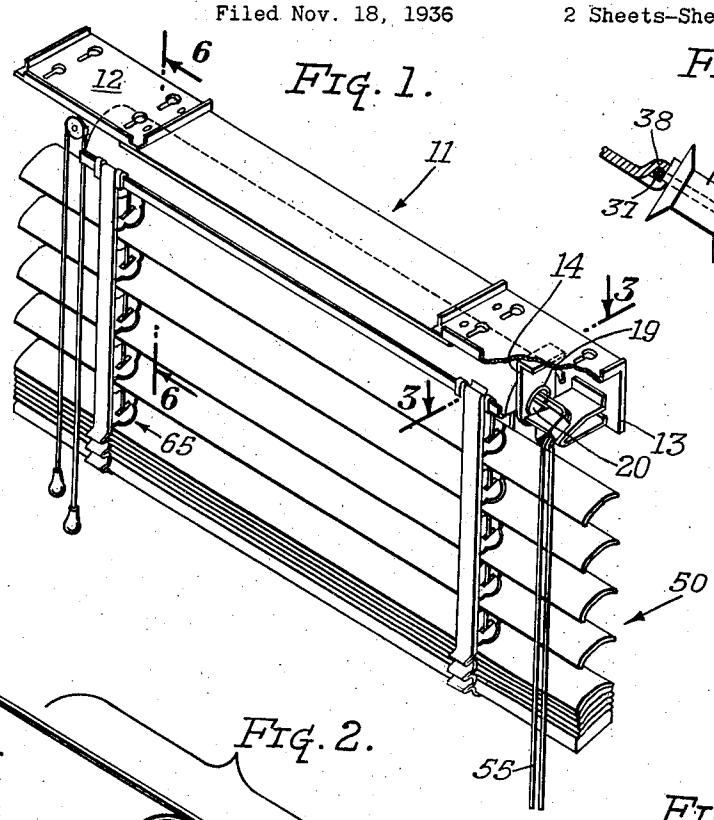


Fig. 5.

Fig. 7.

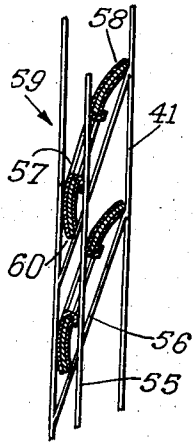


Fig. 2.

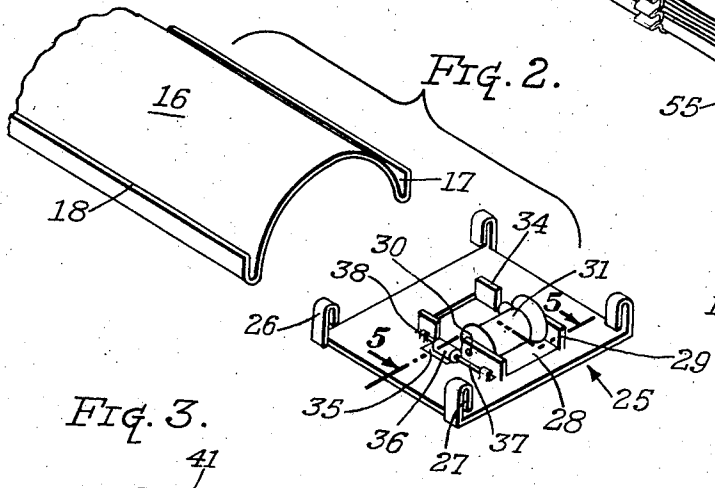


Fig. 6.

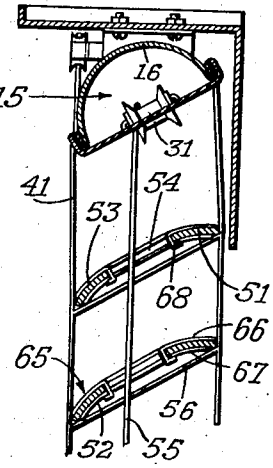


Fig. 3.

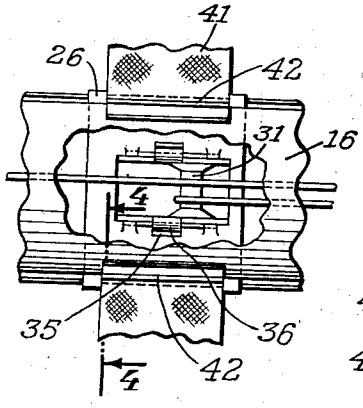
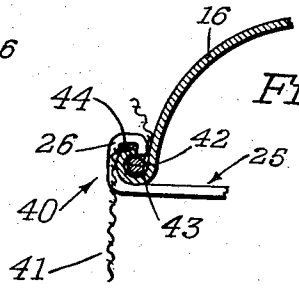


Fig. 4.



Inventors.
Lulan S. Morse
Clarence W. Morse
By Hazard & Miller
Attorneys.

July 11, 1939. L. S. MORSE ET AL 2,165,292

VENETIAN BLIND

Filed Nov. 18, 1936 2 Sheets-Sheet 2

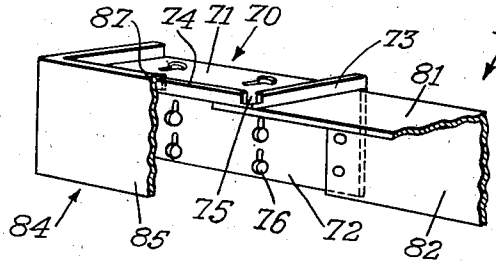


Fig. 8.

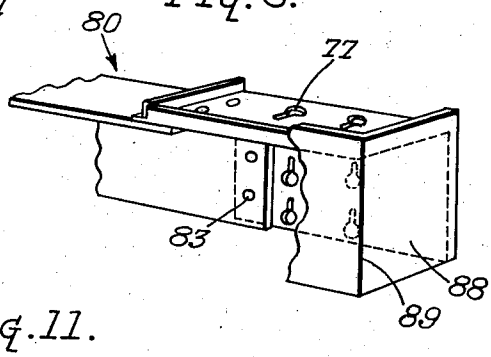


Fig. 9.

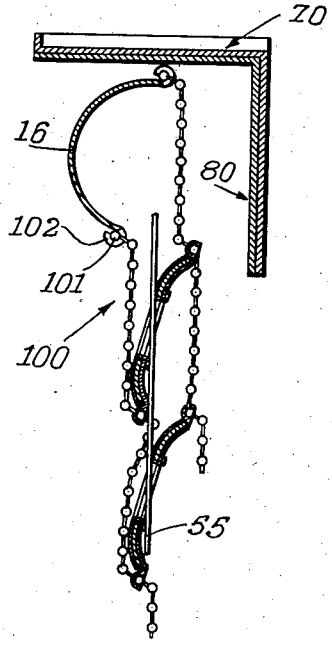


Fig. 11.

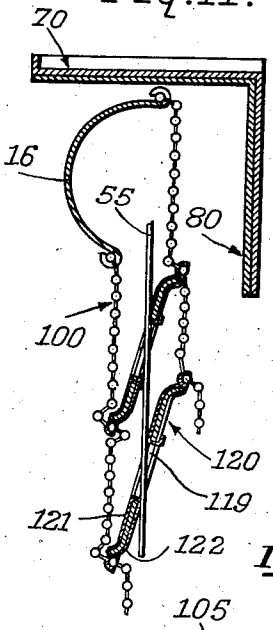


Fig. 10.

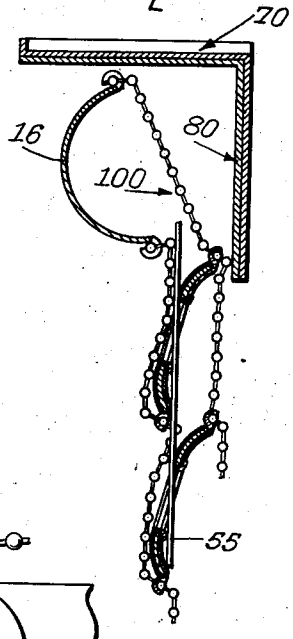
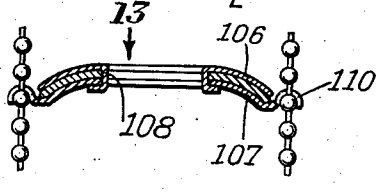


Fig. 12.



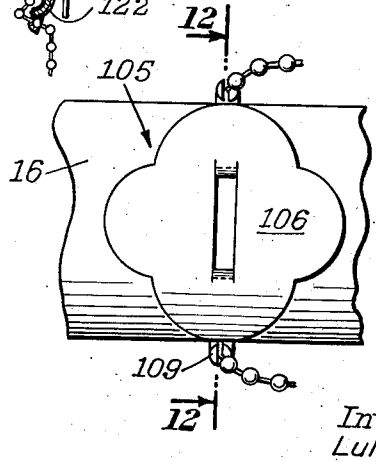
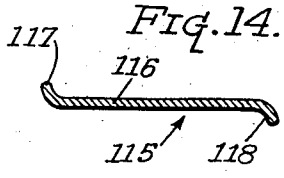


Fig. 13.

Fig. 14.



Inventors.
Lulan S. Morse
Clarence W. Morse
By Hazard and Miller
Attorneys.

Patented July 11, 1939

2,165,292

UNITED STATES PATENT OFFICE

2,165,292

VENETIAN BLIND

Lulan S. Morse and Clarence W. Morse,
Santa Monica, Calif.

Application November 18, 1936, Serial No. 111,384

22 Claims. (Cl. 156—17)

Our invention pertains as to one of its main features in a combinational construction of the tilting top rail and devices for attaching the tapes suspending the slats of the Venetian blind from this tilting rail. Our invention also comprehends in this arrangement pulley and guide leads for the cords used to lift and lower the slats of the Venetian blind.

One of the objects and features of our invention is in the assembly of the tilting top rail and the pulley and guide roll carrier for the cords so arranged that this assembly may be attached to the tilting rail in a desired position depending on the width of the Venetian blind and the particular spacing of the suspension tapes. By our construction therefore, it is quite a simple matter to make up the blinds either for narrow or wide windows and to vary the spacing apart of the suspension tapes and the lifting and lowering cords.

In Venetian blind construction it is usual to have the lifting and lowering cords for the slats pass vertically through slots in the slats between the suspension tapes on the front and back of the blind. By this arrangement the cords are not readily visible, that is, they are obscured by the tapes. Hence by our assembly construction we also attach the tapes to the tilting rail with the same assembly used for the guide pulleys and guide rollers for the lifting and lowering cords. A feature of our invention in this respect employs a tilting rail with parallel channels along opposite edges. A plate having hooks at opposite edges is secured to the tilting rail by engaging the hooks with the ends of the channels and sliding the plate into proper position, the hooks thereby suspending the plate from the tilting rail.

A detail feature of our invention relates to securing the pulley supporting plate and the tapes to the tilting rail this being done by crimping the marginal edges of the tilting rail at the flanges in order to crimp or squeeze the upper end of each tape in position to form a firm attachment of the top of the tapes to the tilting rail. This also prevents further movement or slippage of the pulley supporting plate on the tilting rail. A convenient manner to form a grip for the end of the tapes is to have the tape extend around a short rod which fits in the groove or channel of the tilting rail, this rod being firmly secured in place when the channel is crimped.

Another detailed feature of our invention relates to the pulley set up to prevent chafing and wear of the lifting and lowering cords. In this construction the pulley supporting plate is perforated to provide for the downward lead of the cords. A main pulley in the form of a spool with a relatively long peripheral surface between end flanges is mounted transversely on the plate in the opening so that its axis tilts or is inclined as the tilting rail and the slats are inclined. In this arrangement the lifting and lowering cords passing over the pulley will slide between one flange and the other but always be maintained vertical in relation to the suspended slats. In order to prevent chafing small friction reducing rollers are located adjacent the edge of the slot through the pulley carrying plate, the axes of these rollers being longitudinal, hence when the tilting rail is inclined or tilted considerably the cord passing over the main pulley contacts the anti-friction rollers and avoids chafing on the plate at the opening.

Another and main object of our invention is the construction of a Venetian blind in which all of the parts may be made of metal, that is, using thin metal slats. These have a suspending arrangement whereby the slats when tilted may be forced outwardly towards a window frame and thus form an effective fire-proof screen at a window. With this construction we may use the usual fiber cords which if they burn or char through will automatically allow the slats of the blind to drop. Hence if the slats are elevated, that is, the blind contracted and left tilted, then should the cords burn, the blind will drop and form the fire screen.

Another object and feature of our invention is constructing the slats of metal of a thin section and in order to give sufficient strength to the slats, these are preferably arched from side to side in which the concave side may be downwardly or in another arrangement the slats may have slight upwardly and downwardly curled edges on their opposite sides. As the slats are quite thin, it is desirable to have re-inforcing grommets which are preferably secured to the slats adjacent the openings for the lifting cord as this is the weakest place of the slat. These grommets may be utilized for securing a suspension chain where chains are used or for attaching the suspension tapes. It is within the province of our invention to make the tapes in the form of a flat hinged chain. However on ine form of our invention we show the chain of a ball and link type as this readily swivels at the place of attachment to the grommets. Where chains are used, it is preferable to attach the chains to the slats instead of having the slats supported by cross tapes or cross members between the suspending tapes or chains.

Another characteristic of our invention is in

having the thin metal slats either having an arcuate curve from side to side or with the edges bent up or down so that such blinds may be used when tilted to an extreme, to more completely exclude the light than the ordinary Venetian blinds made with wood slats.

Our invention is illustrated in connection with the accompanying drawings, in which:

Fig. 1 is a perspective view of a Venetian blind partly broken away to expose certain features of our invention.

Fig. 2 is a perspective view of the disassembled parts of the tilting rail and pulley plate assembly.

Fig. 3 is a plan of a section of the tilting rail partly broken away, the tapes being illustrated as spread apart for clearness of illustration.

Fig. 4 is a detail transverse section on the line 4—4 of Fig. 3 in the direction of the arrows.

Fig. 5 is a detail transverse section on the line 5—5 of Fig. 2 in the direction of the arrows, the guide pulleys being illustrated as tilted to show the function of the anti-friction rollers.

Fig. 6 is a vertical transverse section on the line 6—6 of Fig. 1 in the direction of the arrows showing the tilting rail and the slats in the tilted or inclined position.

Fig. 7 is a partial section similar to Fig. 6 illustrating the slats tilted to a considerable degree.

Fig. 8 is a perspective view of the top rail removed from the assembly.

Fig. 9 is a vertical section similar to Fig. 6 presenting a modification employing suspension chains instead of suspension tapes, certain parts being omitted.

Fig. 10 is a section similar to Fig. 9 showing the slats forced towards the window frame.

Fig. 11 is a section similar to Fig. 9 illustrating a different type of slat.

Fig. 12 is a transverse section on the line 12—12 of Fig. 13 showing the manner of attaching the suspension chains of the construction of Fig. 9.

Fig. 13 is a plan of the slat of Fig. 12 taken in the direction of the arrow 13.

Fig. 14 is a cross section of the type of slat used in Fig. 11.

In our invention we employ a top rail 11 which is illustrated as having a horizontal cover portion 12 and a vertical web 13, this thus forming an angle. Depending brackets 14 positioned at each end form a tilting support and mounting for the tilting rail assembly designated by the numeral 15, which includes an arch shaped sheet metal strip 16, this having longitudinal guide channels 17 formed by upwardly turned longitudinal flanges 18. The strip is shown as approximately a semi-cylinder as this makes a convenient form of construction permitting the hub 19 to be attached to the end of the strip, such hub having a center opening 20 for passage of the operating cords. The rail is tilted by known mechanism and therefore this will not be described.

In conjunction with the strip 16 of the tilting rail assembly we employ a pulley supporting plate 25. This is illustrated as rectangular with corner hooks 26, these being formed by bending the metal upwardly at the corners, thus two adjacent strips form reverse short notches 27 to interfit with the flanges 18. It will be seen by this construction that the plate 25 may be fitted over the end of the strip 16, the hooks operating in the guide channels 17 and this assembly may be slid longitudinally of the strip to the desired position.

Another characteristic of the plate 25 is in providing a central opening 28, such being illustrated as rectangular with upwardly turned bearing ears 29 at each side through which extends the axle 30 of the guide pulley 31. It is to be noted that this pulley is constructed with a central cylindrical section 32 somewhat like a spool and the beveled flanges or end ribs 33. There are an additional pair of upturned lugs 34. The plate has side openings 35 merging with the opening 28 and the anti-friction rollers 36 fit in the cut-out section 35, each of these rollers having an elongated shaft or axle 37 held in place by upwardly placed fingers 38 holding the axle between the fingers and the lugs 34 and the ears 29. The purpose of these rollers is to engage the operating cord for the slats to prevent this chafing when the tilting rail assembly is tilted at a sharp angle.

The attaching assembly 40 for the tapes 41 comprise short rods 42 around which an upper end portion 43 of the tapes extends or is partially wound. There is one rod for each tape and it is fitted in the channel 17 inside of a marginal flange 18 and also located as to its ends between the hooks 26. When the pulley supporting plate 25 with the depending tape is properly adjusted for the width of the blind on the strip 16 the flange 18 is crimped as indicated at 44 and thus securely attaching the upper end of the tape to the strip 16. This also retains the short rod 42 in place and at the same time prevents endwise shifting or slipping of the pulley supporting plate 25 with the pulley and guide rollers assembled thereon.

Another feature of our invention resides in the construction of the slats 50. Such slats are arched in transverse section as indicated at 51 so that there is a concave surface 52 facing downwardly and a convex surface 53 upwardly. The slats have the usual slots 54 for passage of the lifting and lowering cord 55. Fig. 3 shows the manner in which the two cords pass over the pulley 31 in which one cord is illustrated as leading downwardly through the opening 25 and the other cord extending to the other side of the window to lead downwardly through a similar pulley and friction roller assembly. The slats are supported in the usual manner by cross strands 56 attached to the tapes 41. These strands are placed to one side of the vertical drop portion of the lift and lowering cord 55.

It will be noted that by this construction of the slats 50 being transversely arched that they can be made of thin metal, such as thin sheet metal. A characteristic of the slats is that the top portion 57 is flat with the curve giving the arch at the marginal edge portions 58. This construction permits a close nesting of the slats when they are raised by the lifting cord to fit close together for giving a full light opening at a window, however in addition, another purpose is in forming a more complete exclusion of light when the slats are tilted as shown in Fig. 7. In this illustration the light is presumed to be coming from the direction of the arrow 59 and on account of the slats being arched the marginal edge 60 of an upper tilted slat may be positioned closer to the top portion 57 of the next lower slat than would be ordinarily the case if flat slats were used. It is highly desirable in Venetian blinds that when tilted to their extreme limit to exclude the light there there be as small a slot as possible between an upper slat and the adjacent slat next below. Sometimes the Venetian

blinds are installed in rooms where it is desired in daytime to obscure the light for projection of motion pictures, the ordinary type of Venetian blind allowing too much light to enter the room.

An additional characteristic of having the slats arched is that in tilting slats to for instance say a more or less extreme position as shown in Fig. 7, the curved marginal portion 58 has a somewhat rolling action on the vertical tapes 41. The marginal edge 60 has a sliding action on the cross strands 56. This distributes the wear of these strips instead of having it concentrated at the junction line of the cross strands and the vertical tapes 41, which would be the case if the slats were flat. The wear with flat slats is particularly concentrated at one point when the slats are thin such as sheet metal and formed flat. moreover the arched slats do not accumulate dust as readily as the flat slats and give a more even reflection of light when they are open to a position so that they do not allow the direct passage of light but give a reflection off the upper flat surface 57 and the marginal arched portions 58. Thus even if the slats are tilted so that direct sunlight will pass through the space between adjacent slats, which is the case when the flat upper side is parallel to the direction of the light as indicated at 59, however the marginal edges 58 reflect from the outer side towards the source of light, the light striking these curved edge portions and causes a diffusion by various reflections. Thus the glare of direct sunlight is more diffused with the arched slats than with the flat slate.

As it is desirable to form the slats of thin sheet metal, we find it advisable to employ a grommet assembly 65 to each slat at the slots 54. In this construction there is an upper grommet 66 and a lower grommet 67 corresponding respectively to the convex and concave side of the slat. The upper grommet is illustrated as having downwardly bent fingers 68 engaging the ends of the slat and bent over the grommet on the underside of the slat. These grommets may be welded or soldered to the slat or retained by the fingers 68. It will be obvious that if desired the suspension tapes 41 may be made of a flat metal chain or flexible metal bands so that the blind when lowered and tilted for instance as shown in Fig. 7 or in a reverse direction, will form a fire screen at a window. Also if desired, the suspension tapes or straps may be connected to the individual slats instead of employing cross strands such as 56. With this construction it is desirable to have the lifting and lowering cords formed of fiber which will burn and thus automatically cause the dropping of the slats should these be raised. However if complete fireproof construction is desired, metal cords may be utilized. Also metal cords may be used to operate the tilting rail assembly.

In Fig. 8 is presented the detail construction of the top rail 11. In this assembly it is desirable to have similar end angles 70, each of which has a horizontal flange 71 and a vertical web 72. The horizontal flange has bent up end edges 73 and a bent up front edge 74, there being notches 75 at the two front corners. These are made similar and in the vertical web have a series of perforations 76, these having round holes and a slot. Similar perforations 77 are also in the flange 71 and may be used for mounting the top rail on a window frame or the like by having nails or screws with heads insertable through the round part of the perforations and engaging the slots. A filler angle 80 has a horizontal flange 81 and a vertical web 82. This angle fits in the end angles 70 and is secured by rivets 83. In addition an apron or skirt 84 has a front section 85 extending along the front of the top rail, this being secured by a hooklike reverse bend 87 at the top. There are also transverse end sections 88 secured in the same manner, there being a right angular corner 89. The purpose of the notches 75 is to allow a right angle bending of the hook device 87 and the vertical portions of the apron. Such apron encloses the tilting rail and the assembly mounted thereon obscuring this when viewed from the front.

In the construction of Figs. 9, 10, 12 and 13 we illustrate a modification in which suspension chains 100 are utilized to suspend the slats from the tilting rail 15. The type of chain illustrated is a ball and link type in which an upper ball or the upper end of the chain indicated at 101 is fitted in the channel 17 formed by the longitudinal flanges 18, there being a slot 102 cut in the flange for inserting a chain. For this construction we modify the grommet assembly 105 which is illustrated as having an upper grommet 106 and a lower grommet 107 conforming respectively to the convex and concave side of the slat. The upper grommet has tongues 108 extending through the slot in the slat. These grommets are of such shape as to strengthen the slats at the slots. The lower grommet section has a socket 109 with a short slot 110 for inserting the chain, the socket engaging a ball of the chain. Thus in this construction the slats are suspended by the chains and there is a swivel action of the connection of the chains to the individual slats when such slats are tilted from a horizontal to a steeply inclined position in either direction. The lifting and lowering cords pass through the slot in the grommet and in the slats.

In Figs. 9 and 10 the pulley supporting plate 25 is omitted for sake of clarity of illustration but it will be seen that as the tilting rail assembly including the arch shaped metal strip 16 is tilted bringing its opposite edges out of line past the vertical towards the window frame, that is with the lower edge pressed towards the vertical web 13 of Fig. 1 or the webs 72 and 82 of Fig. 8, that the assembly of slats is also pressed close to a window frame structure against which the vertical web of the top rail is fitted. With this construction it is intended that the top rail and the whole assembly with the tilting rail and the slats is of sufficient length in a horizontal direction to extend past the window opening and over the window stiles on the inside of a window. Therefore our blind when formed entirely of metal, that is, as to the top rail, the tilting rail and the slats, forms an effective fire screen giving a much improved protection against outside fires entering a building through the windows or a fire in the building extending outwardly through the windows. As above mentioned, when the screen is constructed to form a fire screen, it is desirable when the slats are lifted into their uppermost position that they be left tilted or steeply inclined. Then if the drop cords burn the slats are automatically dropped in case of a fire.

In the construction of Figs. 11 and 14, we show a modified form of slat designated by the assembly numeral 115. Such type of slat has a flat main section 116 with one edge 117 turned upwardly and the opposite edge 118 turned downwardly. These slats are also made of thin sheet metal and have slots 119 for the drop cords. At these slots there is a grommet assembly 120 hav-

ing preferably an upper grommet element 121 and a lower grommet element 122. These may be attached to the slats as described in connection with Figs. 6 or 12 and have similar sockets for attaching the suspension chains. This construction of slats with the up and down turned marginal edges gives a relatively stiff slat when made of thin sheet metal and in addition the slats may be tilted or inclined at a steep angle in reference to the vertical and form a relatively close closure for exclusion of light whether this is coming from the outside through a window or from a light in the room passing outwardly. This type of slat of Figs. 11 and 14 also forms an effective type of fire screen. It will be apparent that both the arch type of slats of Figs. 1, 6, 7, 9, 10 and 12 or the type of Figs. 11 and 14 nest closely when the slats are pulled upwardly or housed together.

One of the advantages of making the slats of the blind of thin metal convex and concave in cross section is that a long strip of such metal may be painted in the manufacture and wound into a coil. In winding into coil the concave sides face towards the center of such coil and when tightly wound the strip flattens out but when unwound from the coil the strip assumes the concave convex shape. Hence on this long strip being unwound from the coil, slats may be cut off at the requisite length for the particular blind to be constructed. This materially reduces the waste in slat material for if material is merchandised in definite lengths and then has to be cut into shorter lengths for individual blinds there is usually considerable waste. The ordinary temper of steel strips to make them sufficiently strong for a Venetian blind provides a metal which may be made into a coil and uncoiled for cutting into individual slat lengths.

Various changes may be made in the details of the construction without departing from the spirit or scope of the invention as defined by the appended claims.

We claim:

1. In a Venetian blind, a tilting rail assembly including a structure having longitudinal channels, a pulley supporting device having complementary members to engage the said channels for positioning said device in a desired location on the said structure, said device having a guide pulley for operating cords of the blind.

2. In a Venetian blind as claimed in claim 1, the said device having an opening, the guide pulley being adapted to guide a cord through said opening together with anti-friction rollers located at opposite ends of the pulley to engage a cord when the tilting rail assembly is tilted with an inclination to the horizontal.

3. In a Venetian blind as claimed in claim 1, means to secure the supporting tapes for the blind to the said structure at the portion of the guide channel between the said complementary members of the said device.

4. In a Venetian blind, a tilting rail assembly comprising a longitudinal strip having guide channels adjacent its marginal edges, a pulley supporting device having complementary channel devices to engage the channels of the strip whereby the said device may be positioned longitudinally of the strip, the said device having a pulley for guiding a lifting and lowering cord.

5. In a Venetian blind as claimed in claim 4, the said device having anti-friction rollers positioned at opposite ends of the pulley to engage the cord when the tilting rail with the said device is considerably inclined in regard to the horizontal.

6. In a Venetian blind as claimed in claim 4, the tilting rail and the said device having suspension tapes for the slats of the blind secured thereto, the upper ends of the tapes being secured to the channel by a crimp of the channel, the said crimp preventing longitudinal shifting of the said pulley device.

7. In a Venetian blind, a tilting rail assembly including a longitudinal strip of sheet material having a guide channel at each longitudinal marginal edge, a pulley supporting plate having hook-like devices to engage the said channels, the marginal portion of the strip at the channels being adapted to be crimped to secure the said plate from longitudinal slippage, the plate having a pulley for guiding a lowering and lifting cord for the slats of the blind.

8. In a Venetian blind as claimed in claim 7, the said pulley having a central cylindrical section with beveled flanges whereby in tilting the said assembly the cord may slip from one flange to the other on the cylindrical section.

9. In a Venetian blind as claimed in claim 7, the said pulley having a central cylindrical section with beveled flanges whereby in tilting the said assembly the cord may slip from one flange to the other on the cylindrical section, and anti-friction rollers positioned with their axes transverse to the pulley and in proximity to the said flanges whereby when the assembly is tilted to a considerable degree in reference to the horizontal, the cord passing downwardly for lifting and lowering the slats is adapted to engage one or other of the anti-friction rollers.

10. In a Venetian blind as claimed in claim 7, a pair of tapes for suspending and tilting the slats of the blind, each tape at its upper end being secured in the crimp of the flange of the said strip.

11. A Venetian blind comprising in combination a top rail, a tilting rail assembly including a strip of sheet material having a pair of marginal guide channels, means to mount said strip for tilting partial rotation as to the top rail, a pulley supporting plate having hooks to engage the channel, said plate having an opening with a pulley mounted therein, a lifting and lowering cord passing over said pulley and extending downwardly through the said opening, slats, tapes suspending the slats from the tilting rail assembly, the cord being secured to a structure for lifting and lowering the slats.

12. A Venetian blind as claimed in claim 11, the pulley being journaled in bearing ears on opposite sides of the said opening and anti-friction rollers positioned at opposite sides of the opening at right angles to the pulley and adjacent the ends of the pulley to engage the cord passing downwardly through the opening when the tilting rail assembly and the slats are tilted to a considerable degree.

13. A Venetian blind as claimed in claim 11, the tapes being suspended from the tilting rail assembly by rods with the upper end of the tape extending around the rods, each rod being secured in one of the channels of the said strip between a pair of hooks on the plate.

14. A Venetian blind as claimed in claim 11, the tapes having cross strands, the slats being arched with the concave side downwardly, the marginal edges of each slat engaging a cross strand, the main portion of each slat being spaced above a strand and the marginal edges having a slipping

action on the strands as the tilting rail assembly is tilted from a horizontal position.

15. A Venetian blind as claimed in claim 11, each pair of tapes having a series of cross strands, a slat supported on each strand, each slat being arched from end to end with the concave side downwardly, each slat having a curved marginal portion convex on its upper surface, the upwardly arched portion of each slat being spaced from a supporting cross strand and the curved portion of the marginal edge being adapted to have a rolling action on a tape when the tilting assembly is tilted to a considerable degree.

16. A Venetian blind comprising in combination a metal tilting rail assembly having suspension chains secured to its opposite edge portions, a series of metal slats, means to secure each slat adjacent its marginal edge to opposite chains, each slat having a slot, a lifting and lowering cord, a guide means in the tilting rail for said cord, the cord extending downwardly through the slots of the slats and means to tilt the tilting rail and hence to tilt or incline the slats, adjacent slats being adapted to overlap whereby the slats form a fire screen, the tilting rail being mounted in a top rail, said top rail having a structural portion adapted to be positioned contiguous to the inside face of a window frame, the tilting rail being tiltable to move the lower edge thereof past a vertical line through the axis of rotation of said tilting rail to thereby position the slats when lowered by the said cords and tilted to form a screen contiguous to the inside face of a window.

17. A Venetian blind comprising in combination a plurality of thin metal slats each having a socket structure projecting from its opposite marginal edge, suspension chains extending downwardly on opposite sides of the series of slats, each chain having a connection to each socket structure, the chains thus being positioned outside of the marginal edge of the slats, means to raise and lower the slats in a sequence and means to tilt the series of slats simultaneously.

18. A Venetian blind as claimed in claim 17, each socket being somewhat spherical shaped and having a slot and each chain having a ball fitted in each socket and with a link extending through the said slot.

19. A Venetian blind comprising in combination a tilting rail including a longitudinal metal strip with upturned flanges at its opposite marginal edges forming longitudinal channels, there being slots in the flanges, suspension chains extending downwardly from the opposite sides of the strip and each having its upper end fitted in one of the channels with a portion of the chain extending through one of the slots, a plurality of thin metal slats one above the other, each having a socket structure projecting from its marginal edges, each socket structure having a slot, each chain having a portion thereof extending through one of the latter slots and having another element of the chain engaging the socket structure whereby the series of slats are suspended from the tilting rail, means to tilt such rail to simultaneously change the inclination of the slats and means to raise and lower said slats in a sequence.

20. A Venetian blind as claimed in claim 19, each of the slats being curved in cross section, convex on the upper side and concave on the lower side, the socket structures being connected to grommets attached to the upper and lower surface of each slat, each grommet having an opening for the passage of means for raising and lowering the slats.

21. In a Venetian blind, a series of slats each formed of thin sheet metal curved in cross section but convex on the upper surface and concave on the lower surface, each slat having a slot therethrough, a grommet having upper and lower elements conforming to the convex and concave sides of the slat with securing means at the slot, each grommet providing a stiffening construction for each slat and an opening for passage of a lifting and lowering means for the slats.

22. In a Venetian blind, a series of slats each formed of thin sheet metal, each slat having one or more transverse slots, a grommet secured to each slat adjacent a slot, each grommet having an upper and a lower plate-like structure contacting the upper and lower surfaces of the slat and each grommet having one or more tongues extending through the slot of the slat and attaching the grommet to the slat, one of the plate-like parts of the grommet having a socket-like projection extending beyond the marginal edge of the slat to which such grommet is attached, such socket having means for attaching a metal chain.

LULAN S. MORSE.
CLARENCE W. MORSE.