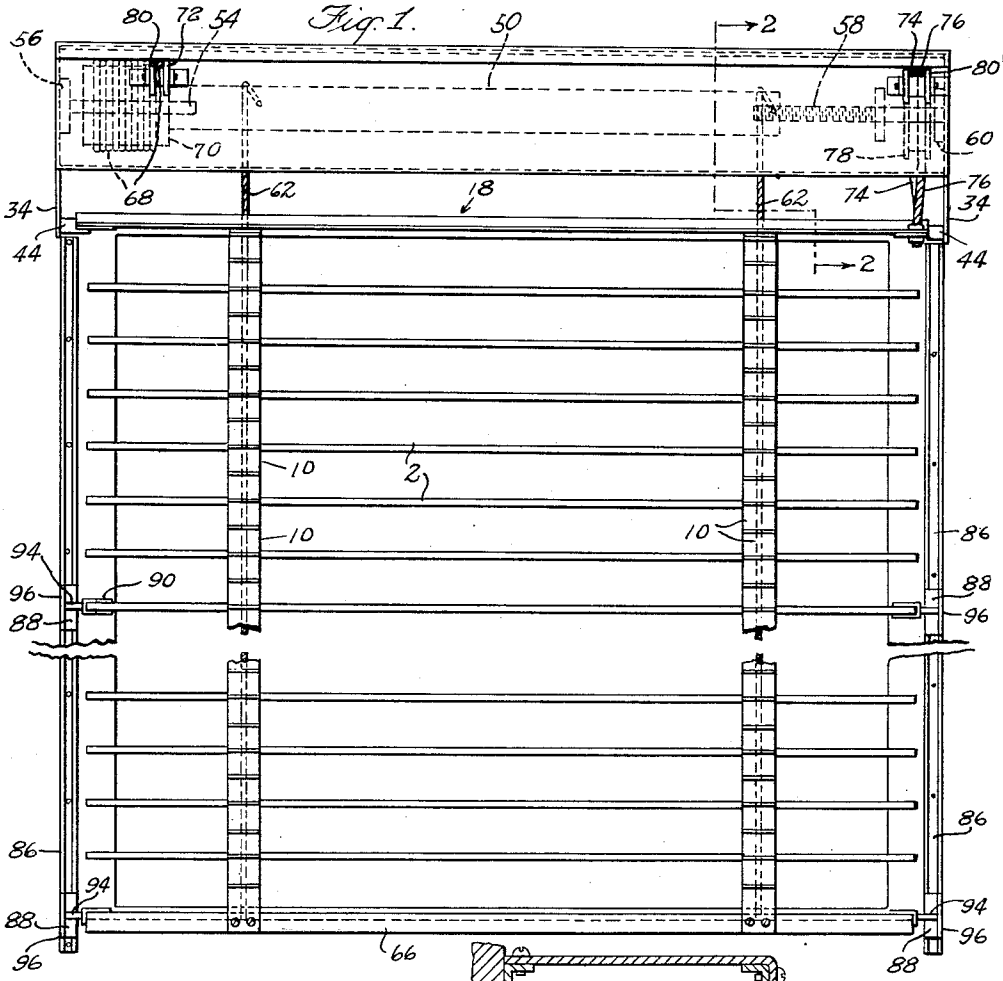
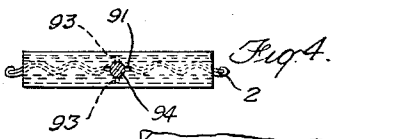
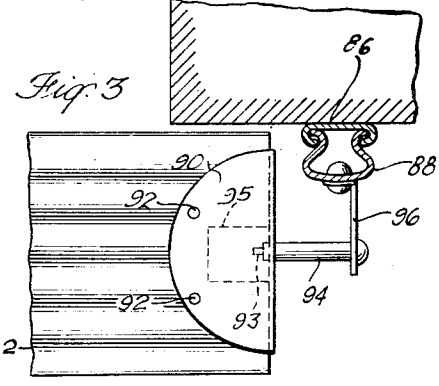
April 21, 1931. W. E. DUNCANSON 1,801,911

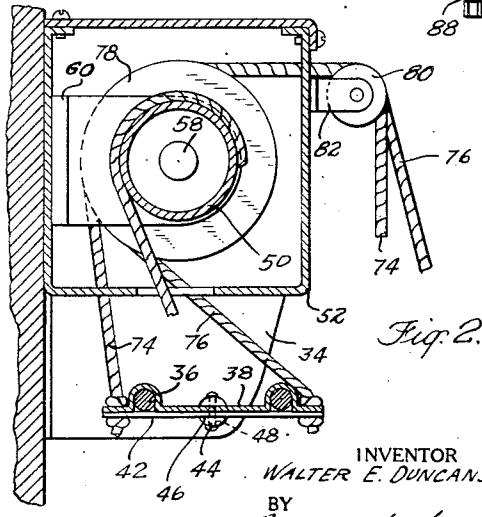
VENETIAN BLIND

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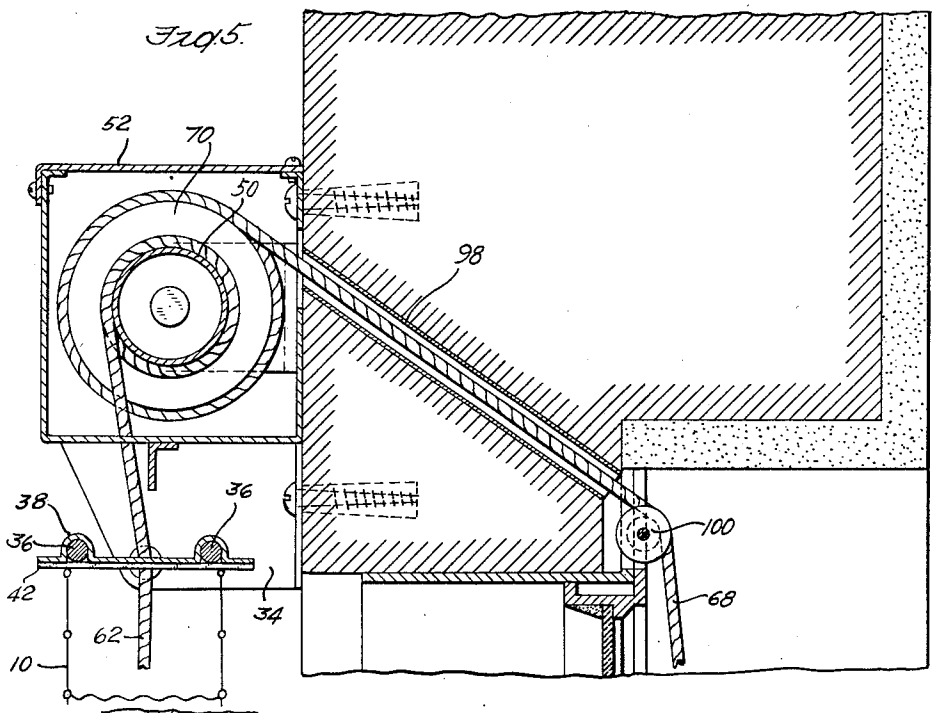
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VENETIAN BLIND

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Fig. 5.



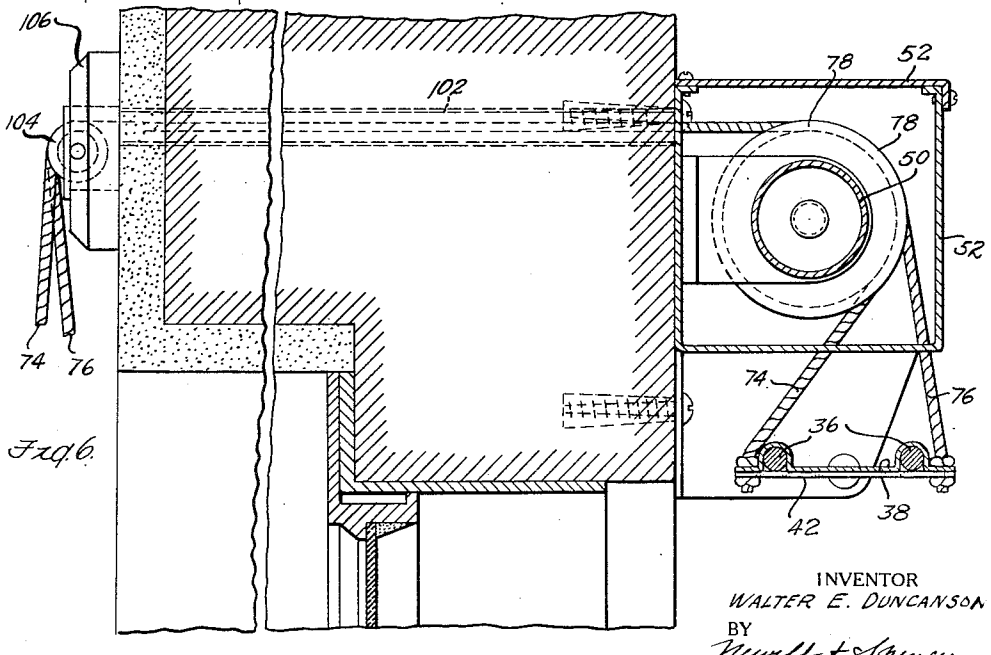


Fig. 6.

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Fig. 7.

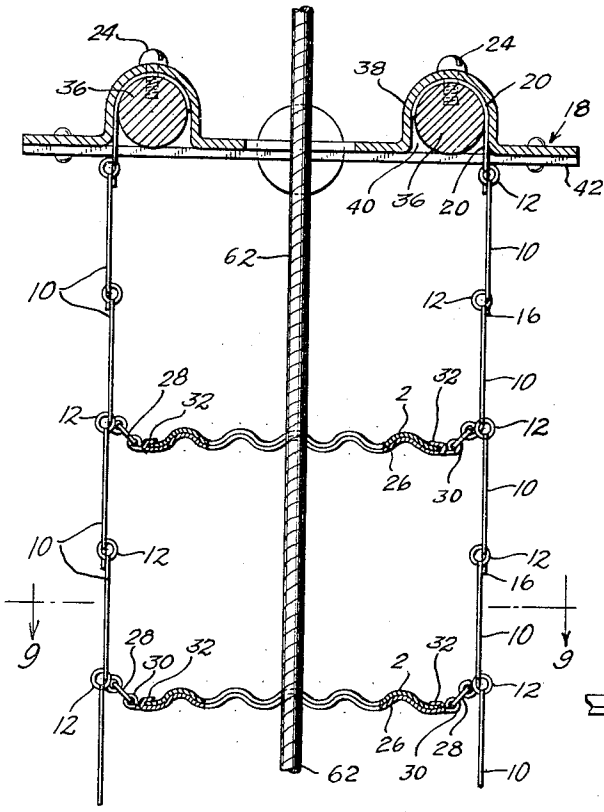


Fig. 8.

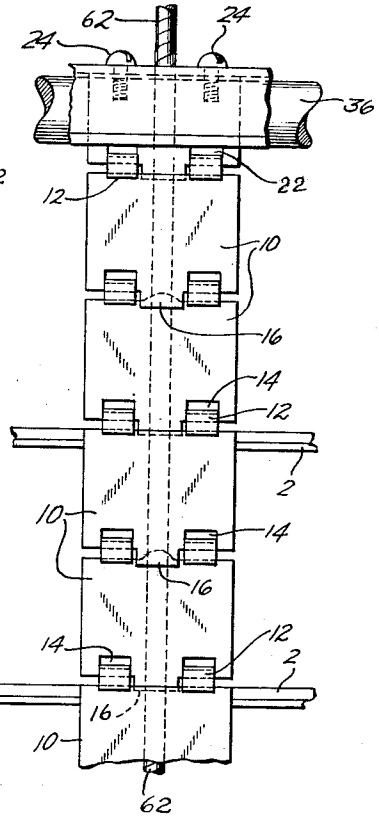


Fig. 9.

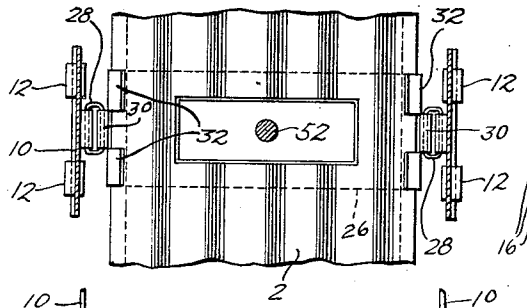
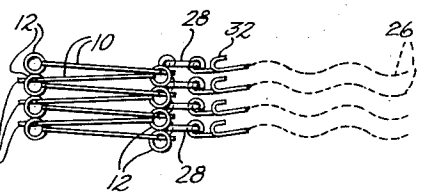


Fig. 10.



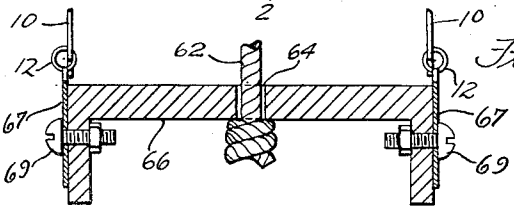


Fig. 11.

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UNITED STATES PATENT OFFICE

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VENETIAN BLIND

Application filed September 21, 1929. Serial No. 394,201.

This invention relates to Venetian blinds.

The ordinary Venetian blind construction comprises a series of thin slats made of wood and connected and supported by ladder tapes made of woven fabric. The slats are suspended by ladder tapes from a suitable supporting bar arranged at the top of the window frame. On account of the materials from which the ordinary Venetian blind is constructed, such blinds constitute a serious fire hazard during the progress of a fire in a building adjacent the windows to which such blinds are applied. Blinds of the Venetian type are sometimes mounted upon the outside of windows and when mounted in this position the fire hazard is particularly great.

Ordinary Venetian blinds having wooden slats are seriously affected by exposure to the weather and such blinds deteriorate rapidly, particularly in the summer when the windows are open. The wooden slats are liable to be caused to warp out of normal shape by the action of the sun and moisture thereon and the fabric ladder tapes are caused to rot by these agencies. Outside Venetian blinds are especially exposed to the weather.

The principal objects of the present invention are to improve the construction and mode of operation of Venetian blinds and to produce a Venetian blind which is highly fire-resistant so that it will form a protection against the spreading of a fire rather than a fire hazard.

Another object of the invention is to produce a blind of the Venetian type which is not subject to rapid deterioration when exposed to severe weather conditions.

With the above and other objects in view the inventor has produced a Venetian blind, the principal parts of which are constructed of metal.

An important feature of the invention consists in the provision in a Venetian blind of highly resilient metallic slats formed of thin gauge metal and made sufficiently stiff to prevent sag when suspended in the usual manner in operating position. The resilience of the slats prevents them from becoming permanently bent and distorted out of proper shape and the forming of the slats of thin gauge metal enables them to be brought together so as to occupy a relatively small space when the blind is raised.

The invention also comprises various other novel and improved features of construction and combinations of parts hereinafter described and particularly pointed out in the claims, the advantages of which will be readily understood and appreciated by those skilled in the art.

As to common subject matter the present application is a continuation of applicant's pending application Serial No. 275,002, filed May 4, 1928.

The invention will be clearly understood from the accompanying drawings illustrating the invention in its preferred form and the following detailed description of the constructions therein shown.

In the drawings—

Figure 1 is a view in front elevation illustrating a Venetian blind embodying the invention, mounted upon the inside of a window frame;

Figure 2 is a sectional view taken substantially on the line 2—2 of Figure 1;

Figure 3 is a detail plan view partly in section illustrating certain of the parts for holding the slats of the blind in position with relation to the window frame;

Figure 4 is a detail view in end elevation illustrating one of the slats and certain of the guiding devices associated therewith;

Figure 5 is a transverse sectional view illustrating a blind embodying certain features of the invention mounted upon the outside of a window frame, this view illustrating particularly the devices for raising and lowering the blind;

Figure 6 is a transverse sectional view sim-

ilar to Figure 4 illustrating particularly the devices for tilting the slats;

Figure 7 is a transverse sectional view illustrating particularly the slats and the devices for supporting the same;

Figure 8 is a view in side elevation of the construction shown in Figure 7;

Figure 9 is a detail sectional view taken substantially on the line 9—9 of Figure 7;

Figure 10 is a detail view in side elevation illustrating certain of the devices for supporting the slats with the slats in raised position; and

Figure 11 is a detail sectional view illustrating the construction of the lowermost bar of the blind and certain associated parts.

In the construction shown in the drawings, the blind comprises a series of thin slats indicated at 2 connected together in parallel relation and arranged to be supported at the top portion of a window frame. These slats are preferably made of sheet metal which is not subject to corrosion and in actual practice sheet aluminum has been found to give satisfactory results. The aluminum from which the slats are made is preferably formed from a special formula producing a composition which will give the slats a high degree of resiliency. It is important that the slats shall be highly resilient in order that the resiliency of the metal may cause the slats to return to their normal straight condition after they have been bent either in the normal operation of the blind in actual service or through the occurrence of an accident. The slats are preferably made of thin gauge metal so as to reduce to a minimum the space occupied by the group or bundle of slats when the slats are brought close together upon raising the blind. These metallic slats have the requisite strength, flexibility and resilience as compared with the conventional wooden slat of the same length and width.

Sheet aluminum is used in the manufacture of the slats of the present blind on account of its lightness which is about one-third that of iron or steel. The light weight of aluminum renders it highly desirable as a material for the manufacture of the slats for such blinds. In actual practice sheet aluminum having a gauge of 24 U. S. standard has been employed and has been found to give satisfactory results. When aluminum of this gauge is employed, slats of a width when completed, of substantially 2⅜ inches with longitudinal corrugations and with turned-over margins to reinforce the slats, may be made in which the weight of the slats is less than 1⅕ ounces for each foot in the length of the slat. The aluminum composition which has been found to give the best results in the manufacture of slats for Venetian blinds has approximately 98¾ per cent of commercial aluminum with its usual impurities, and 1¼ per cent of manganese. This composition is given a temper between ¾ hard and hard. This composition is called 3 S by the principal producer, the Aluminum Company of America, and with the above temper is called 3 S 10 in this company's tables, the numeral 10 indicating the temper of the composition. In this alloy the required temper is produced by cold working the metal after annealing. With the special aluminum composition employed in connection with the present blind, slats of sheet aluminum of the dimensions above referred to may be constructed in which slats of the ordinary lengths may be bent out of alignment for at least 1 inch for each foot in the length of the slats and will return to their normal straight condition after the bending force has ceased.

The slats may be constructed of narrow strips of sheet aluminum formed into such shape at certain points as to reinforce the same. As shown in the drawings of this application the marginal portions of the strip are bent over so as to overlap the body of the strip and the strip is provided with longitudinal corrugations, this construction increasing considerably the resistance of the slat to traverse bending. The reinforcing of the slats in the manner described enables very thin gauge metal to be employed and reduces the liability of the slats sagging out of their normal straight condition when in use.

The slats are connected with each other and are suspended from a suitable tilting bar. The connecting means for the slats is constructed and arranged so that the slats are suspended in parallel relations and tilted in unison about parallel axes by the tilting movement of the tilting bar. The slats are connected preferably by means of a series of sheet metal links 10 pivotally connected together so as to fold relatively into adjacent positions, the links forming supporting chains or tapes. These links are preferably made of non-corrosive metal so that they are not affected by the weather. Each of the links is pivotally connected to the adjacent link by means of projections 12 on one link passing through slots 14 in the adjacent link and bent about the portions of the latter link between the slots and the adjacent edge of said link. In order to limit the relative pivotal movement of the links in one direction, each of the links is provided with a lug or projection 16 overlapping the adjacent link so as to engage the same when the two links are relatively straightened.

The chains of metallic links or tapes are suspended from a tilting bar 18 by means of sheet metal plates 20 each having slots 22 to receive the projections 12 on the adjacent link 10 by which the link is pivotally connected to the plate. These plates are bent over the tilting bar and secured thereto by screws 24.

In the construction shown in the drawing, the blind is provided with four chains of links or metal tapes, two chains or tapes being secured on each side of the tilting bar and depending therefrom. The number of tapes may be varied to suit the requirements for different sizes of blinds.

The slats 2 are supported in parallel positions between the metallic tapes which are suspended on opposite sides of the tilting bar. The mechanism for supporting the slats from the tapes in the preferred construction comprises a series of cross plates 26 connecting each tape depending from the forward side of the tilting bar with the corresponding tape depending from the rear portion thereof. The cross plates 26 are also preferably formed of sheet metal and may be made of the same material as the links 10 so that they are not subject to corrosion. The ends of each of these cross plates are connected with the forward and rear metallic tapes by means of links 28, each pivotally connected with the end of the cross plate and with one of the links 10 respectively. These links 28 may be conveniently constructed of wire. The cross plates preferably conform to the cross sectional shape of the slats so that the slats will nest therewith. This enables the slats to be brought into closely adjacent positions when the blind is raised. When the slats are corrugated transversely as shown in this application the cross plates are also corrugated to fit the slats as shown in Figure 10.

As shown in the drawings, each link 28 is pivotally connected with the end of a cross plate 26 by means of a projection 30 on the cross plate bent about the adjacent portion of the link. The stop projections 16 on the alternate links 10 are made of sufficient length to be bent about the links 28 to connect the links with the tapes. The portions of the projections 16 extending about the links 28 are located on the inner sides of the links 10 from which they project as shown in Figure 7. The result of this construction is that when one of the slats is lifted the side links 10 connected with the cross bars secured to said slat will be swung outwardly, thereby causing the links to fold relatively during the continued movement of the slat.

The cross plates 26 are secured to the slats so that the cross plates are constrained to move with the slats. To this end the cross plates are provided with projections 32 which are bent over and pressed securely down on the margins of the slats so as to attach the slats securely to the cross plates. With this construction, the slats are at all times securely held in equally spaced relation and in parallel planes. When any force is applied directly to a slat, tending to lift the slat or to tilt the same, this force is transmitted through the cross plates to the ladder tapes, and through the tapes to the slats below that to which the force is applied. Any vertical or angular movement imparted to a slat will be transmitted to all the slats below the same. Thus the connections between the slats prevent the independent tilting or vertical movement of the slats and the fluttering of the slats and the slapping of the slats against each other in the wind such as occurs in the ordinary blind construction is effectively prevented. The slats, however, may be readily flexed when desired by a force applied between the cross plates.

With the above metallic tape construction, when the blind is raised, the links of the tape will pivot relatively in opposite directions and fold together into substantially the position shown in Fig. 9. When the blind is lowered, the links will occupy substantially the relative positions shown in Figs. 1, 7 and 8.

The tilting bar 18 is pivotally suspended between spaced plates 34 forming part of a head frame for supporting the blind on the upper part of a window casing. The tilting bar comprises parallel spaced rods 36 and a plate 38 spanning the rods and connecting the same. The plate is provided with recesses 40 for the reception of the rods and the plate is connected to the rods at the ends of the same by means of bars 42 extending beneath the rods and attached at their ends to the plate. To the ends of the tilting bar are attached pivot pins 44 engaging in openings in the depending plate 34 to support pivotally the tilting bar. Each of the pins is provided with a slot 46 in which engages one end of the plate 38 and the bar 42 and the pin is attached in position by means of a rivet 48 passing through the pivot pin and through the plate 38 and bar 42. Preferably all of the parts of the tilting bar are of metallic construction.

As shown in the drawings of this application, the blind is raised and lowered by means of a traverse roller. In the construction shown in Figs. 1 and 2 the blind is mounted upon the inside of a window frame. As shown in these figures, the blind is provided with a traverse roller indicated at 50 rotatably supported in a casing 52 attached to the window frame, or to the building wall immediately above the window opening. The traverse roller is pivotally supported at one end by a pin 54 mounted on a bracket 56 attached to one end of the casing 52, this pin engaging loosely in a suitable bore in one end of the roller. The other end of the roller is supported by a threaded rod 58 mounted on a bracket 60 and attached to the other end of the casing 52, this rod engaging in a suitably threaded opening in the other end of the roller. The blind is lifted by means of lifting cords 62, the upper ends of which are attached to the traverse roller. These lifting

cords pass from the traverse roller downwardly through openings in the casing 52 and also through slots formed in the tilting bar 18 and in the several slats. At their lower ends the lifting cords pass through openings 64 in the lowermost bar 66 of the blind and are knotted below this bar to prevent their being drawn upwardly through these openings.

The bar 66 is channel-shaped in cross-section and is suspended from the metallic tapes by plates 67 secured to the bar by plates 69 and having projections 12 for connecting the same with the lowermost links 10.

The traverse roller 50 is rotated to raise and lower the blind by means of an operating cord 68. This operating cord passes about a drum 70 attached to the traverse roller and is secured at one end to this drum. From the drum 70 the operating cord 68 passes forwardly through an opening in the casing 52 and over a pulley 72 and thence extends downwardly to a point where it may be readily reached by an operator.

The mechanism for actuating the tilting bar 18 to tilt the blind comprises tilting cords 74 and 76 attached to the tilting bar on opposite sides of the axis thereof, as clearly shown in Fig. 2. From the tilting bar these tilting cords pass upwardly through an opening in the bottom of the casing 52 and then extend over a pulley 78 journaled on the outer end portion of the threaded rod 58.

From this pulley the tilting cords extend forwardly through an opening in the casing, then over a pulley 81 journaled on a bracket 82 secured to the casing and from this pulley extend downwardly to a point within reach of an operator.

In the construction shown in Figure 1 the blind is provided with devices for preventing the slats from being forced away from the window frame as by the action of the wind. These devices comprise guides attached to the window frame and members carried by certain of the slats for engaging these guides. In the construction shown these guides indicated at 86 consist of sheet metal plates or bars having their margins reversely bent so as to provide opposed guiding flanges. These guides are attached to the side members of a window frame as shown in Figure 1. Engaging within the channel formed by the marginal flanges on each of the guides 86 are cooperating slide members 88 which are attached to certain of the slats. These members 88 each consists of a section of resilient sheet metal bent into the form shown in Figure 3, so as to provide oppositely disposed arms for engagement with the side flanges of one of the guide members 86.

The devices for securing each of the members 88 to one of the slats comprises a plate 90 bent about one end of a slat and attached thereto by fastening devices 92 and a pin 94 projecting from said plate and attached at its inner end thereto. The outer end of the pin 94 is connected with the guide member 88 by means of a connecting plate 96 secured at its outer end to the pin and at its inner end to the member 88. The plate 90 is provided with a slot 91 extending in the direction of the plane of the slat and the pin 94 carries at its inner end a plate 93 shaped to pass through this slot. The slat is cut away between the sides of the plate 90 as indicated at 95 in Fig. 3 and the pin 94 is detachably secured in position by inserting the plate 93 through the slot 91 and then turning the pin to locate said plate in a position substantially perpendicular to the slot. The pin 94 may be removed from the slat by relatively turning the pin and slat into a position such that the plate 93 will pass through the slot 91, and then moving the pin 94 axially to draw the plate through the slot.

As shown in the drawing the slide members 88 are attached to every sixth slat. The number of these slide members employed however, may be varied to suit the requirements for any installation.

Figs. 5 and 6 show the blind attached to a building wall on the outside thereof and above a window. This construction differs from that shown in Figs. 1 and 2 principally in the means for locating and guiding the cord for actuating the traverse roller and the cords for tilting the slats. As shown in Fig. 5 the cord 68 for actuating the traverse roller passes from the drum 70 through an opening at the rear of the casing 52 and through an inclined tube 98 extending from the outside to the inside of the building wall surrounding the window frame. Upon the inside of the frame the cord passes over a pulley 100 attached to said wall and thence downwardly within reach of the operator. The tilting cords 74 and 76 pass from the pulley 78 rearwardly through an opening in the casing 52 and through a horizontal tube 102 extending from the outside to the inside of the building wall frame. On the inside of the frame the cords pass over a pulley 104 rotatably mounted on a block 106 attached to said wall. From this pulley the tilting cords extend downwardly to a point within reach of an operator.

The casing 52 is preferably made of sheet metal. The traverse roller, the devices for supporting the same, the pulleys for guiding the cord 68 and the devices for supporting said pulleys are preferably of metallic construction. The tilting cords 74 and 76 and the lifting cords 62 are preferably metallic cables consisting of wires twisted into cable form. The parts which are exposed to the weather may be made of any suitable metal which is not subject to corrosion. Bronze has been found to be well adapted for this purpose. The parts which are not exposed to the weather may be made of iron or steel.

The metal links 10 of the ladder tapes are preferably made of sheet bronze and are coated with nickel to give them an attractive appearance.

The Venetian blind construction above described, in which the principal parts thereof are made of metal, does not itself constitute a fire hazard since it will not burn, but it also forms an efficient protection against the spread of a fire. The blind is also strong and durable, will stand up well even when subject to comparatively rough usage, and is not subject to rapid deterioration even when exposed to sun, rain or other severe weather conditions.

The relatively thin metallic slats of the blind, when the blind is raised, are located in very compact relation and occupy very little space. This is a marked advantage since it enables a maximum part of the window opening to be exposed.

It is to be understood that the invention is not limited to the particular construction and arrangement of parts of the illustrated embodiment of the invention, but that the invention may be embodied in other forms within the scope of the claims.

Having explained the nature and object of the invention, and having specifically described a construction embodying the invention in its preferred form, what is claimed is:

1. A slat for Venetian blinds made of sheet metal having a gauge of less than 20 U. S. standard and a specific gravity of less than 4 and provided with reinforcement against transverse bending.

2. A slat for Venetian blinds made of sheet metal having a gauge of substantially 24 U. S. standard and a specific gravity of less than 3 and reinforced to reduce the normal transverse flexibility of the metal.

3. A slat for Venetian blinds made of sheet metal consisting of more than 90 per cent of aluminum and having a gauge of less than 20 and reinforced to stiffen the metal against transverse bending.

4. A slat for Venetian blinds made of sheet metal having a gauge of less than 20 U. S. standard and a specific gravity of less than 4, and having turned-over lateral margins to reinforce the same.

5. A Venetian blind comprising in combination a series of slats made of sheet metal having a gauge of less than 20 U. S. standard and a specific gravity of less than 4, and having turned-over lateral margins to reinforce the same, ladder tapes, and cross-plates hinged to the ladder tapes and having projections bent over the reinforced margins of the slats to connect the slats to the cross-plates.

6. A Venetian blind having in combination a series of slats, a metallic tilting bar comprising a sheet metal plate, means extending longitudinally of the plate to reinforce the plate, additional means extending transversely of the plate to reinforce the same, means for supporting the slats from said bar and means for pivotally supporting the bar.

7. A Venetian blind construction comprising, in combination, a tilting bar for tilting the slats, a series of corrugated transversely flexible resilient metallic slats, corrugated metallic cross members fastened to each side of each slat, said cross members being arranged to nest with the slats to diminish greatly the size of the bundle of slats when the slats are in raised positions, means comprising sheet metal side tapes secured to the tilting bar and links connecting the tapes with the cross members on both sides of the slats for tiltably supporting and causing a uniform tilting movement of the slats in both directions when the slats are tilted, and means for raising and lowering the slats.

8. A Venetian blind construction comprising, in combination, a tilting bar for tilting the slats, two or more sets of flat metallic tapes, corrugated metallic cross pieces, links for connecting the cross pieces with said tapes to control the cross pieces from the tapes, a series of parallel corrugated transversely flexible slats made of resilient aluminum to maintain the slats normally substantially straight and in substantially parallel relations, means constructed to be clenched to the slats to fasten the slats to the cross pieces and prevent the disarrangement of the slats by the wind and to control and cause the margins of the slats to move in unison vertically in both directions when the tapes are moved to tilt the slats, and means for raising and lowering the slats.

9. A Venetian blind construction, having in combination, a series of corrugated transversely flexible sheet metal slats made of a resilient aluminum composition so as to return automatically to a substantially straight condition after being transversely bent and each having a portion at each margin folded over upon the body of the slat to reinforce the slat and provide a rounded finished edge, flat metallic outwardly folding tapes, means comprising corrugated cross members rigidly secured to said slats, and links for connecting the slats with the tapes, said tapes, cross members and links being arranged to support and control the movement of the slats and to permit the slats to nest in closely packed formation when the slats are moved to fully raised positions, and means for raising and lowering the slats.

10. A Venetian blind construction, having in combination, a tilting bar, a series of light transversely flexible corrugated resilient aluminum slats, each having reversely bent margins, a pair of outwardly folding flat metallic tapes connected with each of the reversely bent margins of each of the slats for support-

ing the slats from the tilting bar, means comprising corrugated cross members secured to the slats and links pivotally connecting the tapes with the reversely bent margins of the slats for causing the nesting of the slats when the slats are raised, said tapes, links and cross members being arranged to support the slats so as to cause uniform angular movements of the tilting bar, and means for raising and lowering the slats.

Signed at New York, N. Y., this 16th day of Sept., 1929.

WALTER E. DUNCANSON.