

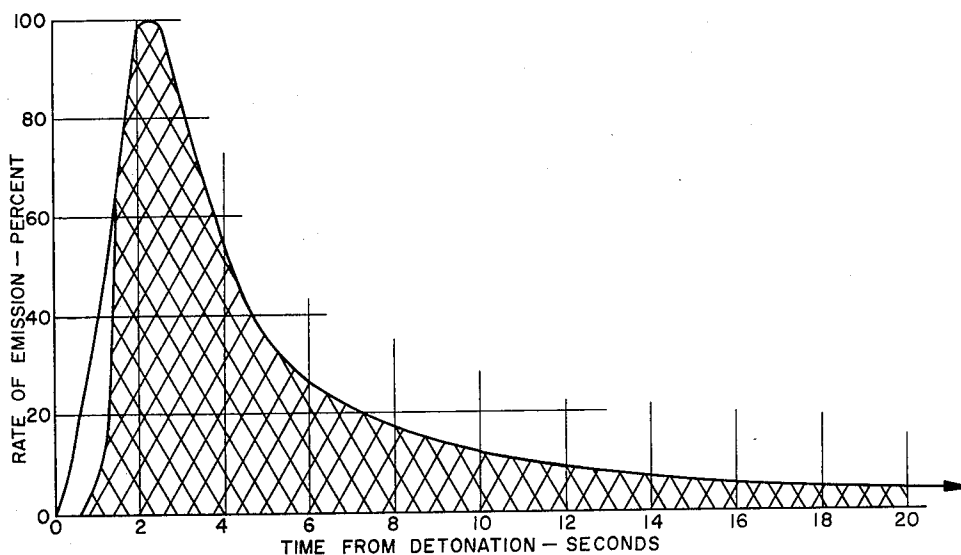
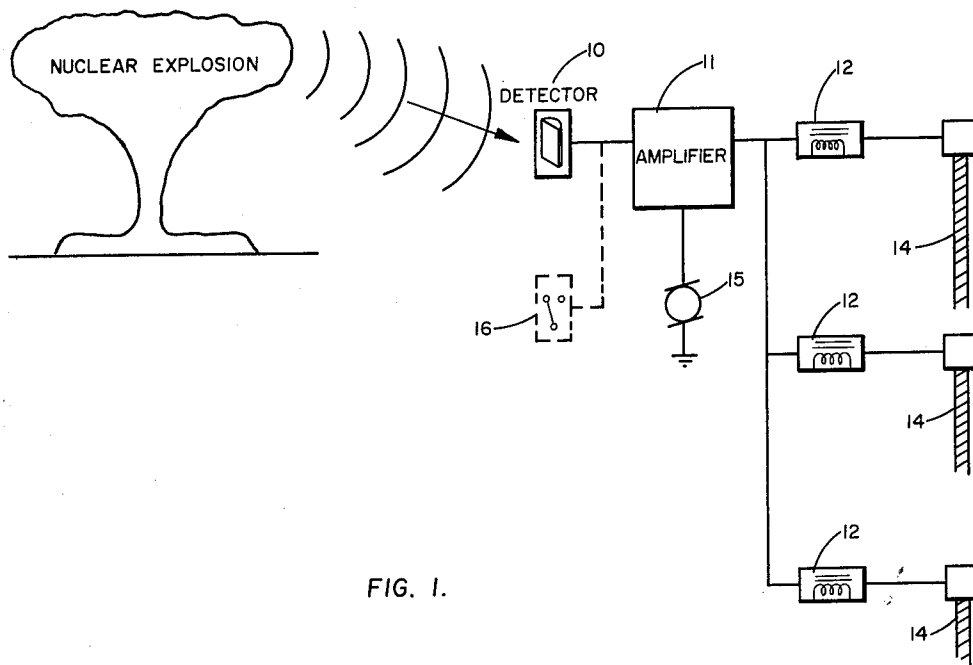
May 3, 1966

R. J. ZABLODIL ET AL
AUTOMATIC VENETIAN BLINDS

3,249,148

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3 Sheets-Sheet 1



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3 Sheets-Sheet 2

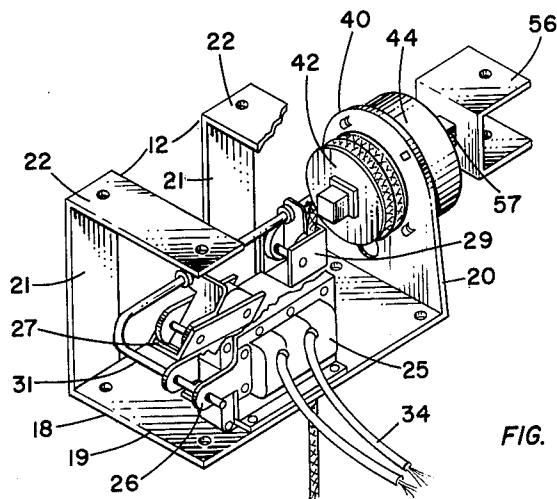


FIG. 3.

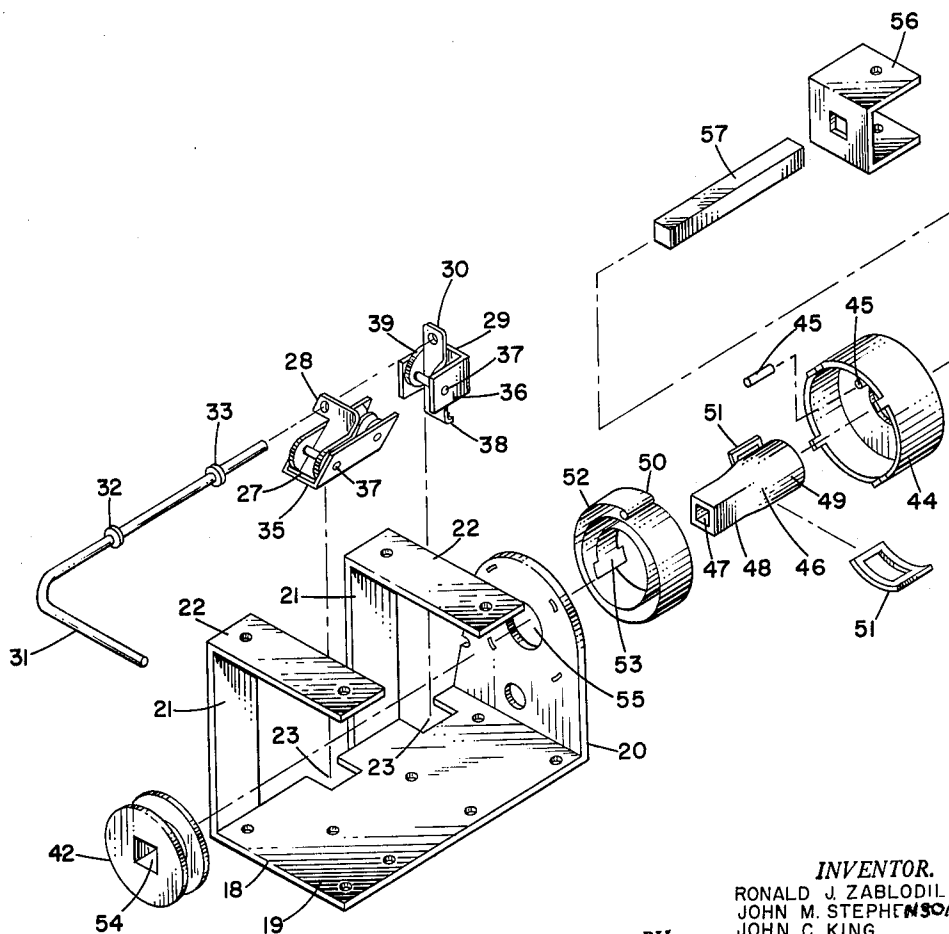


FIG. 4.

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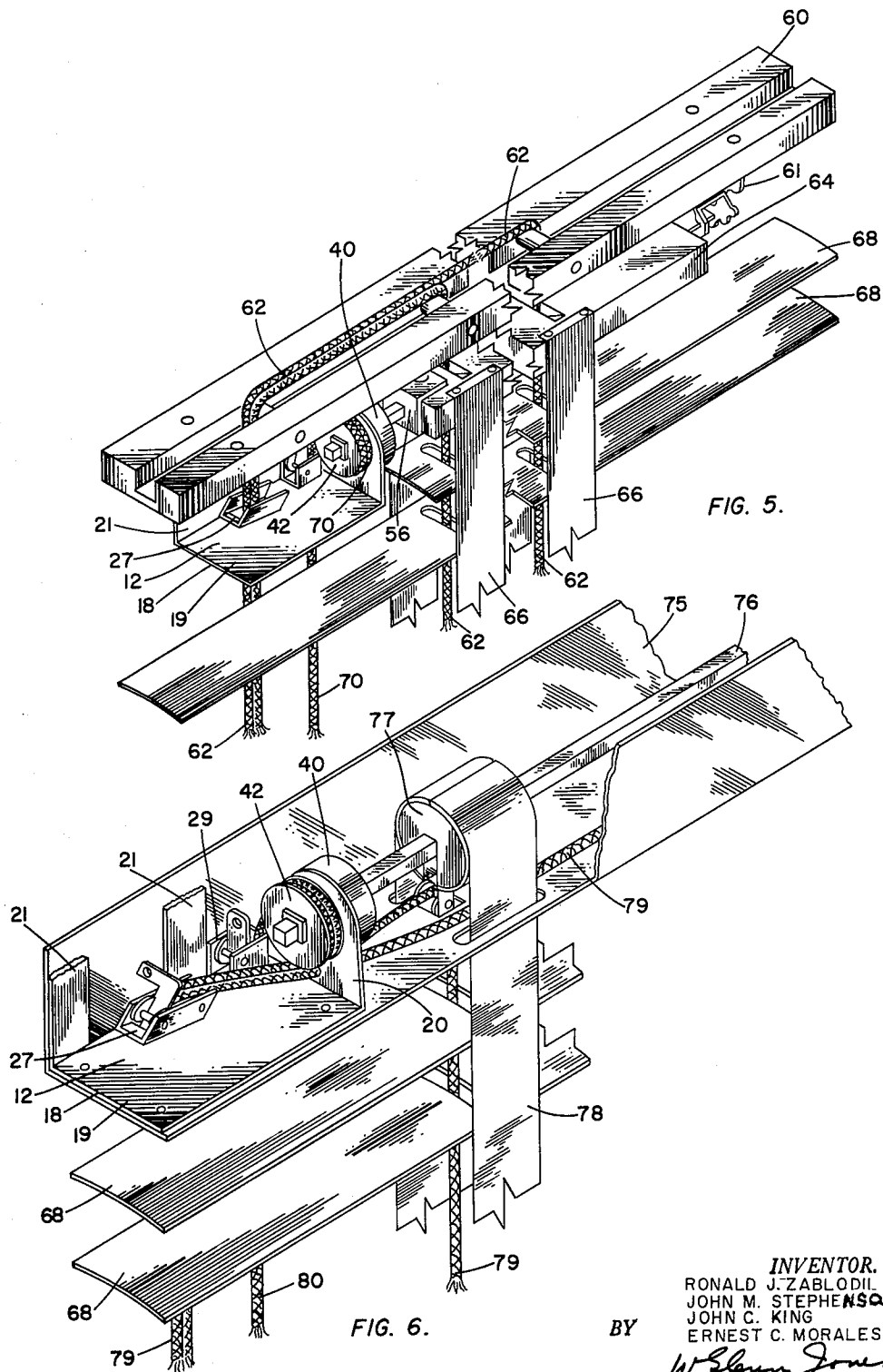
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1

3,249,148

AUTOMATIC VENETIAN BLINDS

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2 Claims. (Cl. 160—3)

The invention described herein may be manufactured and used by or for the Government of the United States of America for governmental purposes without the payment of any royalties thereon or therefor.

This invention relates generally to automatically operated window blinds and particularly to Venetian type window blinds that are lowered and closed automatically under certain emergency conditions.

In the event of war or other local catastrophes, the many window openings in modern buildings are a considerably vulnerable part. This is particularly true in the event of the explosion of nuclear, as well as ordinary large size bombs; local explosions of chemicals or other rapidly combustible materials; and/or the close presence of a large intense fire. All of these sources of released energy are generally accompanied by an excessive thermal radiation as well as strong blast effects.

It has been found, for instance, that the thermal radiation from a fairly distant nuclear bomb explosion can enter a glass windowed aperture and cause severe and painful burns on human or animal occupants in the room behind the aperture and can cause combustible materials such as furniture, window hangings, pictures, rugs and papers to catch fire, resulting in at least considerable damage to the building if not complete destruction. The blast effects can cause death or painful lacerations by shattering the glass and showering the room's occupants by forcibly driven shards therefrom.

Where the windows are fitted with interior Venetian blinds, preferably of the modern metal type having glass fibre tape and cord fittings, ample protection against the above perils may be afforded when the blinds are closed and lowered. In the event the Venetian blinds are open and perhaps partially or completely raised, some means must be supplied to close and lower them in time to afford the desired protection.

The principal object of this invention, therefore, is to provide a modern Venetian blind designed to be closed and lowered automatically in the event of the occurrence of any of the above mentioned perils.

Another object of this invention is to provide means for the automatic closing and lowering of Venetian blinds installed in a building in the event of an external explosion.

A further object of this invention is to provide an auxiliary apparatus that can be used to modify existing blinds and thus provide the automatic features set forth above.

Other objects and advantages of this invention will be better understood after study of the following detailed description and accompanying drawings wherein:

FIGURE 1 is a schematic diagram indicating one use of the invention;

FIG. 2 is a graph indicating the strength and duration of thermal radiation from a nuclear blast;

FIG. 3 is a perspective view of the principal operating mechanism of the invention;

FIG. 4 is an exploded view of part of the mechanism shown in FIG. 3;

FIG. 5 is a partial perspective view of the mechanism applied to one type of Venetian blind; and

FIG. 6 is a partial perspective view of the mechanism applied to another type of Venetian blind.

2

FIGURE 1 illustrates, in general, the operation of the invention. The nuclear blast triggers a detecting or sensing unit 10 whose output is fed into an amplifier 11. The output of the latter is then fed into the principal operating mechanism or control units 12 which, in turn, control the closing and dropping of the Venetian blinds 14. A source of E.M.F. 15 is provided to electrically power the electrical units. A switch device 16 is provided for use instead of the detector unit 10.

The detector or sensing unit 10 may be either a photoelectric type of device, pressure responsive, or an infrared type, responsive to thermal radiation. A combination of all three types would be ideal. The amplifier 11 may be of a standard type equipped with power relays for passing operating current to the control units 12. The Venetian blind 14 may be made especially or may be adapted from standard units. The switch 16 may be manually operated whereby all the Venetian blinds in the building may be operated simultaneously in the event of a red alert or switch 16 may be tied into a general civil defense warning system whereby all the blinds in all of the buildings may be operated by a warning signal from the local civil defense headquarters. The source of E.M.F. 15 may be of any desired type adapted to furnish requisite electrical power to the operating units.

FIG. 2 illustrates a typical thermal radiation received from a five megaton atomic bomb burst. The total area under the curve represents the percentage of total radiation received at any given distance from the bomb burst as a function of time in seconds. The unhatched portion under the front of the curve represents the thermal radiation passing through the window before the blind operates, i.e., before the blind closes and drops. The hatched area represents the thermal radiation halted by the closed and extended blind. It will be noted from the graph that the blind must operate fully in less than two seconds, preferably in a shorter time. Actual tests of the invention indicate an operating period of less than one and one-half seconds.

With reference to FIGS. 3, 4, 5, and 6, the operating mechanism or control unit 12 comprises a bracket or frame 18 consisting of a base portion 19, a vertical transverse standard 20 and a pair of vertical arms 21 extending upwardly from the base portion 19. Vertical arms 21 are further provided with upper horizontal extensions 22 having fastening holes for affixing the unit to the basic portions of the Venetian blinds proper. Notches or apertures 23 are provided in the base portion 19 for passage of the blind operating cords.

Affixed to base portion 19 are the operating solenoid 25 and the cord locks 27 and 29. As will be noted, these cord locks are installed over the apertures 23 and operate to grip or release the cords passing therethrough as will be later explained in more detail. An operating arm 31 is provided to connect the solenoid armature 26 with the operating levers 28 and 30 of the cord locks 27 and 29. Operating arm 31 carries stop washers 32 and 33 which washers, after assembly, are fixed to arm 31 to operate the cord lock levers 28 and 30 so as to release the cords passing therethrough. Solenoid leads 34 are provided to connect the solenoid coils to the power relays in the amplifier.

The cord locks 27 and 29 are very similar to those found on standard commercial blinds. They consist principally of U-shaped brackets 35, 36 adapted to be secured into or adjacent to apertures 23 in the base portion 19. Pivoted levers 28 and 30 are rotatably suspended therein by pins 37. As previously described, these levers are adapted to be rotated in one operating direction by the stops 32 and 33 on arm 31 or in a close-

3

ing direction by the upward movement of the cords passing therethrough. Both levers are provided with serrated portions 38 on their lower ends for gripping the cords and holding them stationary under certain conditions of operation. The stop against which lever 30 in cord lock 29 operates is usually installed on the lower side of base 19 (not shown) of this lever 30 may operate against the facing side of the aperture 23 associated therewith.

Vertical transverse standard 20 serves as a support for the Venetian blind slat closing mechanism portion 40 of the invention. A pulley 42 is mounted on the inner or solenoid side of the vertical standard and a spring operating mechanism is mounted on the outer or slat side thereof. This latter mechanism consists of a spring casing 44 which is adapted, as shown, to be secured to the standard 20. Casing 44 is provided with a centrally disposed circular aperture for the reception of sleeve 46 and an inner pin 45 adapted to receive and secure the outer formed end 50 of coiled spring 52, thus anchoring spring 52 in its casing 44.

Sleeve 46 is provided with a square or rectangular bore 47, a square or rectangular formed end 48, a cylindrical formed end 49 and a clip 51. This latter clip 51 is secured by soldering or brazing to the cylindrical outer section of the sleeve 46 and serves to anchor the inner formed end 53 of the spring 52 thereto as well as acting as a retainer for holding sleeve 46 in place between the outer fixed end of the casing 44 and the standard 20. Pulley 42 is provided with a square or rectangular bore 54 adapted to receive the correspondingly shaped end of the sleeve 46. A radial set screw (not shown) may be provided in this pulley 42 for securing it to the corresponding end of the sleeve 46. Thus, in assembling the spring actuated portion of the slat closing mechanism 40, sleeve 46 is inserted into the center portion of the spring 52 and spring end 53 is inserted into the clip 51. The spring and sleeve assembly is then inserted into the casing 44 with spring end 50 meshing with pin 45. The casing is then brought up and secured to the standard 20. Sleeve 46 protrudes through the orifice 55 in standard 20 and is secured in bore 54 of the pulley 42.

In order to connect pulley 42 to the main or basic slat of the Venetian blind, main slat receiving bracket 56 is secured to square or rectangular bar 57. This bar 57 is sized to be inserted into the square or rectangular bore 47 of sleeve 46. Since bracket 56 will be secured to the main or basic slat and that part will be suitably rotatably supported at the other end of the blind structure, bar 57 will be retained in place in sleeve 46 without any further fixing.

With reference to FIGS. 5 and 6, the control unit 12, represented only partially as indicated for purposes of clarity, is shown installed in one type of commercially available Venetian blind. While the description will continue as conversions to two available types of blinds, it is to be understood that new blinds with our control unit built into place could be easily manufactured.

In FIG. 5, main upper base 60 is adapted to being screwed or otherwise affixed to the ceiling of a room adjacent to the window. This base 60 is slotted to accept two cords which are used in the normal fashion to raise or lower the blinds. These two cords then pass downwardly together through the cord lock 27, after the control unit 12 is installed. By pressing these cords from one side to the other, they may be locked in place or released manually to adjust the desired height of the blind. The automatic release does not disturb the normal manual manipulation.

Basic slat 64 is normally rotatably supported at both ends from brackets extending downwardly from the base 60. A worm and gear arrangement 61 is usually provided to rotate this basic slat which, by means of tapes 66, rotate the other slats 68 to a corresponding degree. Since this arrangement is well known, no further description will be needed. In our conversion, however, the left hand

4

basic slat bracket is removed, the basic slat and one or two of the lower slats shortened, and the control unit 12 is installed by fastening the upper horizontal extensions 22 to the underside of base 60. Slat bracket 56 is secured to the left end of the basic slat 64. The worm portion of the worm and gear arrangement 61 is removed. The cord usually associated with this worm and gear arrangement is removed and re-installed in conjunction with pulley 42. Its upper end is wrapped around the pulley and its free end is threaded downwardly through the cord lock 29. Thus, the usual two cords utilized for adjusting the angle of the slats is reduced to but one cord 70. Prior to inserting the bar 57 through the sleeve 46, cord 70 is pulled downwardly to rotate the pulley 42 two or three times so as to put spring 52 under tension. Holding cord 70 in this location, bar 57 is pushed to the left and inserted in sleeve 46. Upon releasing cord 70, spring 52 will rotate basic slat 64 to a more or less vertical position which, by rotating all of the lower slats to a corresponding position, effectively closes the blind. By then pulling down on cord 70 and pressing it from side to side, it will be locked or released manually in the normal way and the angle of the slats adjusted to the desired position. Except for urging the slats to a closed position when cord 70 is released, the blind functions normally and responds unrestrictedly to manual operation. The only difference between this conversion and new manufacture is that, in the latter case, the basic and necessary lower slats are furnished foreshortened and the worm and gear arrangement 61 is omitted.

In operation, the slats of the Venetian blind may be adjusted as desired with respect to degree of closure and degree of coverage of the window opening. Cords 70 and 62 are positioned as may be necessary to accomplish this adjustment and are locked in place by the usual manual manipulation of cord locks 29 and 27. Upon receipt of the triggering impulse emanating from the atomic blast or other source of high thermal radiation, the detector or sensing unit transmits a signal pulse to the amplifier. The amplified signal is then passed to the central unit 12 and energizes the solenoid 25; the armature 26 is retracted, moving operating arm 31 to the right and the stop washers 32 and 33 are forced against their respective cord lock levers 28 and 30 which serves to release the cords 62 and 70. Release of cords 62 allows the blind to drop to its fullest extent thus covering the window space. Release of cord 70 allows spring 52 to function and basic slat 64 returns to its normal near-vertical position. As the basic slat rotates, it of course rotates all of the dependent slats 68 by means of the ladder tapes 66. It has been found, by experiment, that the Venetian blind may be fully closed and extended in less than one and one-half seconds.

The Venetian blind structure shown in FIG. 6 merely differs in certain minor structural details from the type described above. Here the basic supporting structure comprises a metallic channel 75 which may be properly secured to the head board of the window framing. A suitably supported rotatable square metal axle 76 is provided which supports two or more tape drums 77 (only one of which is shown). Tape 78 is secured to this drum and serves to rotate the lower supported slats 68 in the usual manner in accordance with the degree of rotation of the drum. The usually provided worm and gear arrangement is removed and a control unit 12 is substituted therefor. Since the open channel 75 has no top horizontal portion, the upper horizontal extensions 22 of vertical arms 21 may be removed as indicated.

The raising and lowering of the blind is accomplished in the usual manner by cords 79 which are now threaded downwardly through control unit cord lock 27. Cord 80 controls the rotation of axle 76 as previously described in connection with cord 70 of FIG. 5. As before, prior to the insertion of axle 76 into the slat closing mechanism 40, cord 80 is pulled downwardly to put a tension on spring 52 which, of course, serves to close the slats, i.e.,

5

to cause them to assume a near-vertical position when cord 80 is released. Obviously, the operation of this type of blind in response to a triggering impulse is identically similar to that described above.

As previously indicated, while most commercially available Venetian blinds are so constructed, it is preferable that all parts be made of metal and that the cords and tapes be made from fibre-glass or other non-combustible material.

It is to be understood that the embodiments of the invention described above and shown in the accompanying drawings are illustrative only. Many modifications may suggest themselves to those skilled in the art. Such modifications may well fall within the spirit of the invention and the scope of the appended claims wherein we claim:

1. In an automatically closing Venetian blind structure for building windows having an upper base adapted to be secured adjacent to the upper portion of said window, a main slat rotatably supported and depending from said base, a plurality of ladder tapes secured to and depending from said main slat, a plurality of slats supported by said ladder tapes whereby, when said main slat is rotated, said tape supported slats will be rotated to a corresponding degree, a plurality of cords depending from said base and connected with the lowest of said tape supported slats for raising and lowering said blind, a releasable cord lock including a pivoted lever associated with said plurality of cords for holding said blind in a raised position with respect to the bottom of said window, a single cord connected to said main slat adapted to rotate said main slat from a horizontal position to a near-vertical position whereby said blind may be opened or closed, means connected to said base for biasing the main slat to the near-vertical closed position; a releasable cord lock associated with said single cord for holding said cord in a selected position against the biasing effect of the biasing means whereby said slats can be maintained in an opened condition, and an electro-mechanical control unit supported by said base and means connecting said control unit with said cord locks, said control unit being adapted, upon the receipt of an electrical impulse, to open said cord locks, thereby causing the blinds to be lowered and allowing the biasing means to close the main slat and said tape supported slats.

2. In combination with a modified standard Venetian blind having an upper base adapted to be secured adjacent

6

to the upper portion of a building window, a main slat rotatably supported and depending from said base, a plurality of ladder tapes secured to and depending from said main slat, a plurality of slats supported by said ladder tapes whereby, when said main slat is rotated, said tape supported slats will be rotated to a corresponding degree, a plurality of cords depending from said base and connected with the lowest of said tape supported slats for raising and lowering of said blind, a first cord lock associated with said plurality of cords for holding said blind in a raised position with respect to the bottom of said window, a single cord connected to said main slat adapted to rotate said main slat from a horizontal open position to a near-vertical closed position and a second cord lock associated with said single cord for holding said cord in a selected position whereby said slats are maintained in an opened condition, an electro-mechanical control unit supported by said upper base comprising:

an electro-magnet having retractable armature means; operating arm means connecting said armature means with said cord locks for simultaneously opening said first and second cord locks and releasing the cords associated with said cord locks when said armature means is retracted;

electrical impulse means adapted to deliver an electrical impulse to said electromagnet for retracting said armature means under selected conditions; and tensioned spring means supported by said control unit, said spring means being secured to said main slat and connected with said single cord for maintaining said main slat in a near-vertical position when said second cord lock is inoperative.

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