Feb. 11, 1969 HIROSHI KAWAMURA 3,426,653

FOLDING LOUVERED CLOSURES

Filed Oct. 16, 1967

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FIG 1

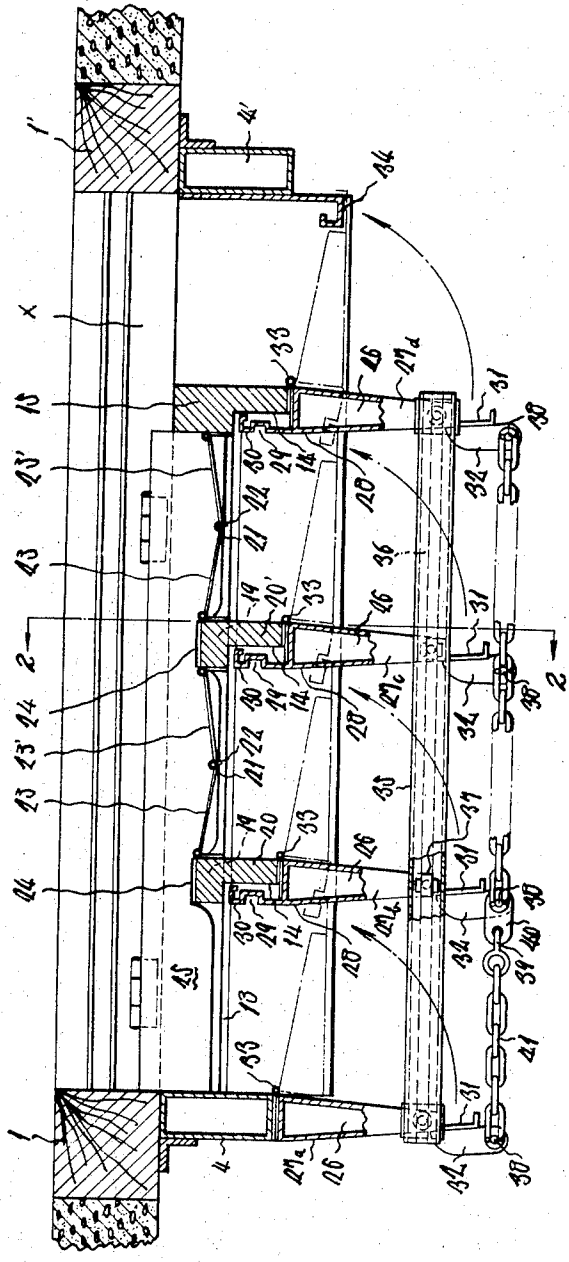

FIG 3

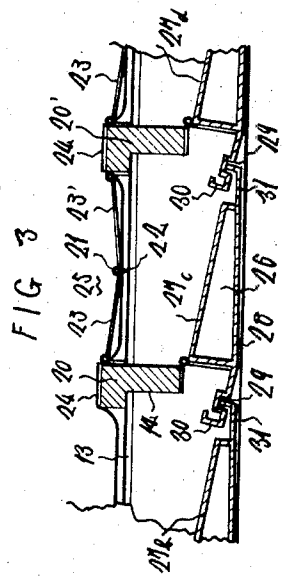

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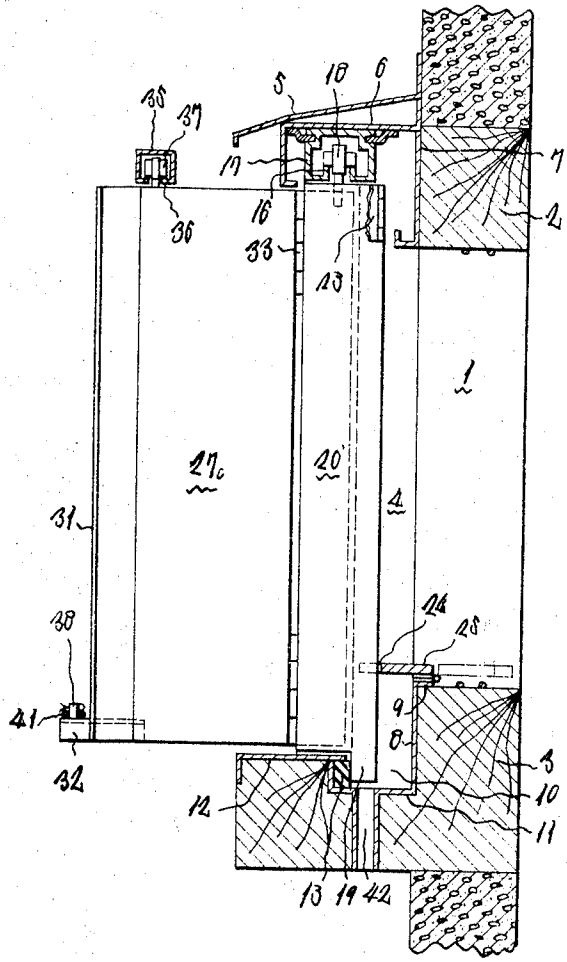
FIG 2



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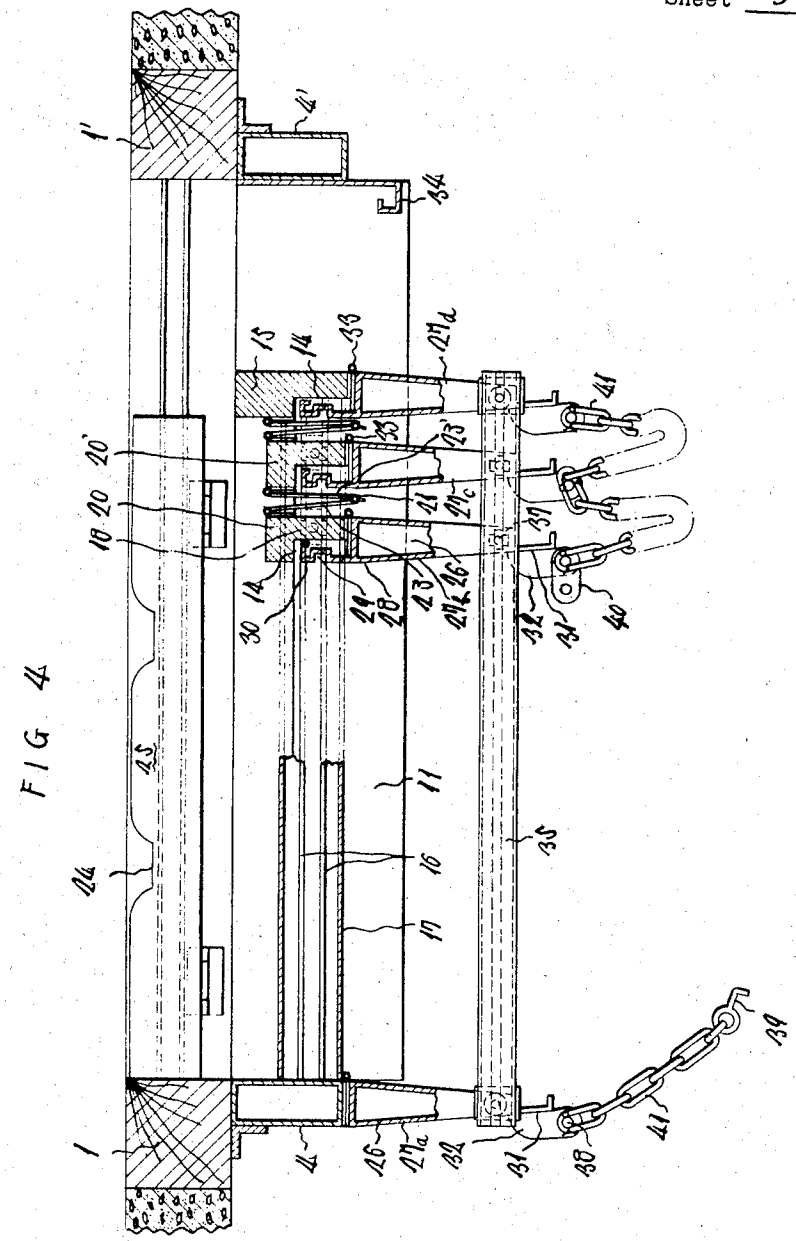

FIG 4

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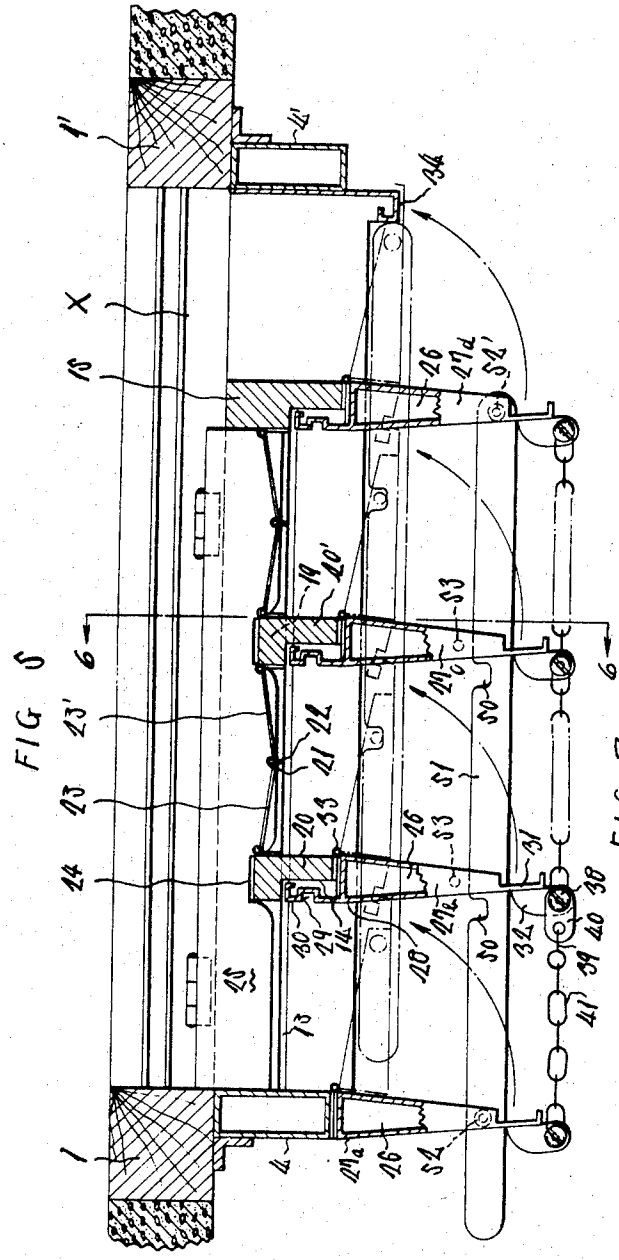

FIG 6

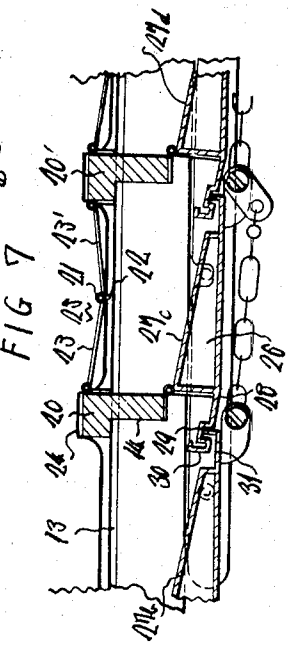

FIG 7

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FIG 6

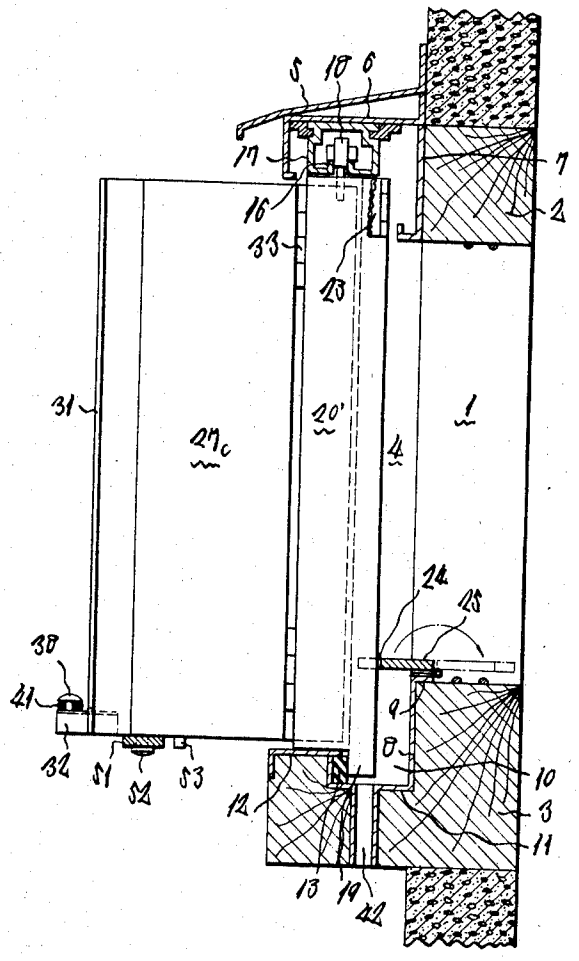

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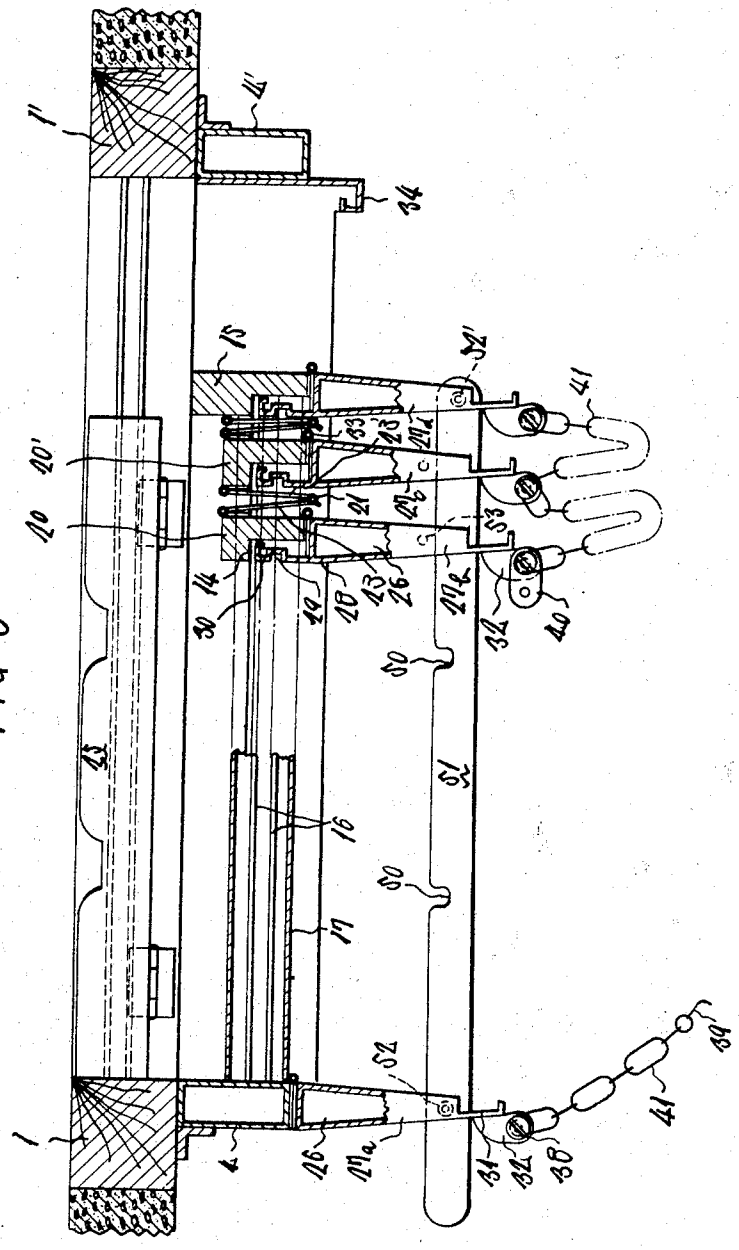
FIG 8



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Patented Feb. 11, 1969

3,426,653

FOLDING LOUVERED CLOSURES

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U.S. Cl. 98—121 5 Claims
Int. Cl. F24 *13/08*; E06b *7/084*

ABSTRACT OF THE DISCLOSURE

A louvered attachment for windows, doors and the like, the louvers thereof being pivotally mounted for opening and closing of the same and being slidably supported so that they can be folded to one side of the window, door, etc., and thus substantially removed from the opening of the window, door, etc.

Disclosure

This invention relates to improvements in folding louvered closures.

Since the louvered attachment of this invention will be primarily used in connection with windows, and in order to avoid undue encumbrance of this disclosure, the invention will be described accordingly. It is, however, to be understood that the louvered attachment of this invention is readily adaptable for use in doors and other structures in which the same might be useful, and the invention is not to be constructed as being limited to use in connection with windows.

Louvered attachments for windows frequently included axially rotating louvers which may be rotated to various degrees of closure. However, such previously provided attachments are not constructed to enable the louvers to be folded to one side of the opening of the window. The primary object of this invention is to provide a louvered attachment having rotatable louvers which can be regulated to change the angle of opening thereof from fully opened to fully closed and in which the louvers can be folded to one side of the window.

A further object of this invention is to provide a louvered attachment having rotatable louvers which may be locked in operative position for concurrent opening and closing thereof and are releasable from such locked position for sliding to one side of the window.

Other objects and advantages of this invention will become apparent during the course of the following detailed description, taken in connection with the accompanying drawings, forming a portion of this specification, and in which drawings:

FIG. 1 is a horizontal sectional view of one form of my louvered attachment.

FIG. 2 is a vertical view taken substantially along line 2—2 of FIG. 1.

FIG. 3 is a fragmentary horizontal sectional view similar to FIG. 1 and showing the louvers in a fully closed position.

FIG. 4 is a horizontal sectional view similar to FIG. 1 and showing the louvers folded to one side of a window.

FIG. 5 is a horizontal sectional view of a modified form of my invention.

FIG. 6 is a vertical sectional view taken substantially along line 6—6 of FIG. 5.

FIG. 7 is a fragmentary horizontal sectional view similar to FIG. 5 and showing the louvers in a fully closed position.

FIG. 8 is a horizontal sectional view similar to FIG. 5 and showing the louvers folded to one side of a window.

As shown in the drawings, wherein similar reference characters designate corresponding parts throughout the several views, the invention is designed so that it can be mounted in a conventional window opening. A conventional structure is shown, including side frames **1** and **1'** and upper and lower thresholds **2** and **3**, defining a window opening.

The form of invention as shown in FIGS. 1–4 preferably includes a polygonal frame of suitable material such as aluminum stainless steel, etc., including side boards **4** and **4'**, and upper and lower frame channels **6** and **11**. Side boards **4** and **4'** and upper and lower frame channels **6** and **11** are respectively positioned for attachment to side frames **1** and **1'**, and upper and lower thresholds **2** and **3**.

As shown in FIG. 2, upper frame channel **6** has a fixing board at the foot thereof and an eave **5** projecting outwardly thereover.

Lower frame channel **11** includes a fixing board **8**, a lower ditch portion **10** having a lodging member **9** adjacent one side thereof, and, at the other side thereof, a plate **12** which projects outwardly from ditch **10**. Ditch portion **10** may have a drain aperture **42**. An elongated rubber member **13** is mounted on one side of ditch **10**, adjacent plate **12**.

A vertical lattice member **15**, having a cut-out portion **14** on one side thereof is fixed to upper and lower frame channels **6** and **11** adjacent to side board **4'**.

A plurality of lattice members **20** and **20'** are mounted intermediate vertical lattice member **15** and side board **4**. Each lattace member **20** and **20'** has a lower projecting pin **19** fitted to slide along rubber member **13** and an upper pivot roller **18** engaging rail **16** of railing lattice **17**.

Hinge members **21**, each having plate portions **23** and **23'** pivotally connected together, are pivotally mounted adjacent the upper portion of and between lattices **15** and **20** and lattices **20** and **20'**. Hinge members **21** have a projection **22** which limits the pivotal movement thereof so that they may freely open or shut in only one direction.

Control plate **25** is hingedly mounted on lodging member **9** of frame channel **11**. Control plate **25** has a plurality of cutout guide portions **24** which engage lattices **20** and **20'**, pushing the same against rubber member **13** and provide proper spacing of lattices **20** and **20'**.

Wing members or louvers **27***a*, **27***b*, **27***c* and **27***d* are respectively attached to side board **4**, lattice **20**, lattice **20'** and lattice **15** by hinges **33**. For the sake of brevity, wing members **27***a*, **27***b*, **27***c*, and **27***d* may hereinafter be referred to collectively as wing members or louvers **27**. Each wing member includes a hollow body portion **26** of suitable material such as aluminum, stainless steel, etc., and is of substantially right triangular cross section. Body portions **26** of wings **27***b*, **27***c*, and **27***d* include a face board portion **28** having an elongated flange portion **30** provided with an elongated notch-like depressed portion **29**, and body portion **26** of each wing includes a flange member **31** extending from the outermost end of face board **28**. Each flange member **31** is provided with a plate member **32**.

A closing board **34** is mounted on side board **4'**.

Wing members **27***a* and **27***d* are pivotally interconnected to an interlocating shaft **35** and wing members **27***b* and **27***d* are each provided with a roller **37** which ride within rail **36** of shaft **35**.

Plate members **32** of wings **27***b*, **27***c* and **27***d* are connected by pins or screws **38** to a chain **41**. Another chain **41** is attached at one end thereof to a pin or screw **38** of plate member **32** of wing **27***a* and is provided at the other end thereof with hook-like portion **39**. Plate member **32** of wing **27***b* is provided with a plate **40** to which hook **39** may be interconnected.

In the closing of louvers **27**, from the full line position as shown in FIG. 1 to the dot and dash position of FIG. 1

and the showing of FIG. 3, louver 27*a* or 27*d* is pulled toward side X of the window. Since louvers 27*a* and 27*d* are pivotally connected to interlocating shaft 35, and are supported by hinges 33 at the innermost side thereof, pulling of either louver 27*a* or 27*d* toward side X of the window causes interlocking shaft 35 to move inwardly toward the window, which causes the other louvers to also pivot about their hinges 33 to a closed position, as shown by the arrows in FIG. 1. When louver 27*d* is pulled, transmission of this movement through chains 41 also assists in closing of the other louvers.

As shown in FIG. 3, when the louvers are closed, flange member 31 of each louver 27*a*, 27*b* and 27*c* nests respectively within notch-like portion 29 of flange portion 30 of each louver 27*b*, 27*c* and 27*d*, and flange member 31 of louver 27*d* abuts closing board 34, providing a complete closure over the window in shutting out noise, light, and providing protection against fire, theft or storms. It is obvious that an appropriate lock could be provided for maintaining louvers 27 in the closed position.

In opening of louvers 27, louver 27*a* or 27*d* may be pushed outwardly, away from side X of the window, in reverse action from the closing thereof. In addition to the completely open or closed state of louvers 27, it is also obvious that the same can be positioned at intermediate angles, to provide a sun blind effect.

In the folding of louvers 27 to one side of the window, control plate 25 is rotated to the position as shown in FIG. 4, relieving pressure of lattices 20 and 20′ against rubber member 13 and enabling the same to move free of confinement within guide portions 24 of control plate 25; hook 39 is unhooked from plate 40; and lattice 20 is moved toward lattice 15. Rollers 18 and 37 of lattices 20 and 20′ permit respective guided movement of lattices 20 and 20′ along rail 16 of railing lattice 17 and rail 36 of interlocking shaft 36. Lattice 20 is also guided by folding of hinge member 21 between lattices 20 and 20′ moving toward lattice 20′ and causing lattice 20′ to move toward lattice 15, the same being also guided by folding of hinge member 21 between lattices 20′ and 15. This folding can also be accomplished by pulling on chain 41 which extends between louvers 27*b*, 27*c* and 27*d*, as is obvious.

The closing of louvers 27 of the form of invention as shown in FIGS. 1–4 may be accomplished only by moving louver 27*a* or 27*d*, since louvers 27*b* and 27*c* are rollers mounted with respect to interlocating rod 35, and any pulling on louver 27*b* or 27*c* may cause dislocation of rollers 37 from rail 36. The modification of FIGS. 5–8 overcome this defect.

In the modification of FIGS. 5–8, interlocking rod 35 and rollers 37 are eliminated, the parts thereof otherwise being identical, and identical reference characters have therefore been applied.

In the modifications, wing members 27*a* and 27*d* are respectively pivotally interconnected at 52 and 52′ to a transmission rod 51, transmission rod 51 is provided with a plurality of spaced notches 50, and wing members 27*b* and 27*c* are provided with pins 53 which cooperate with notches 50 as will be subsequently described.

As previously stated, the louvers of the modification can be shut by pulling any louver, pulling the same toward side X of the window. Pulling on louver 27*a* or 27*d* will pull transmission rod 51 toward the window causing cooperation closure of louvers 27*a* and 27*d* as previously described in connection with the embodiment first described, the movement of transmission rod 51 toward the window causing notches 51 thereof to engage pins 53 of louvers 27*b* and 27*c*, thereby cooperatively closing the same with louvers 27*a* and 27*d*. Chains 41 will also cooperate in pulling louvers 27*a*, 27*b* and 27*c* closed when closing force is applied to louver 27*d*. If the louvers are closed by pulling louver 27*b* or 27*c* toward side X of the window, the same will act through chains 41, pulling louver 27*a* closed and moving transmission rod 51 inwardly, as previously described.

The louvers of the modification can be opened by pushing outwardly on any louver, the same acting in reverse of the closing action previously described, through chains 41 and transmission rod 51 in the opening thereof.

Since louvers 27*b* and 27*c* are not directly connected to trasmission rod 51, there is no likelihood of distortion of transmission rod 51 when a force applied to louver 27*b* or 27*c* is used to open and close the louvers.

The louvers of the modification are folded to one side of the window in substantially the same manner as previously described in connection with the first embodiment. In this case, however, there is no engagement of louvers 27*b* and 27*c* with transmission rod 51, providing further assurance that the same will not act to distort transmission rod 51.

What is claimed is:

1. In a folding louvered closure for positioning across the openings of windows, doors and the like, the combination of a frame circumscribing an aperture substantially identical to the opening across which the folding louvered closure is to be positioned, a plurality of louvers, louver support means for pivotal mounting of said louvers in a spaced apart relationship across the aperture of said frame in juxtaposition whereby said louvers may be rotated in one direction to provide a substantial closure for the aperture of said frame and rotated in another direction to provide a relatively free thruway through the aperture of said frame, means interconnecting said louvers for substantially contemporaneous rotation thereof, the endmost of said louver support means being in a fixed position with respect to said frame and said louver support means intermediate said endmost louver support means comprising movable lattices, said frame including rail means and said movable lattices including roller means engaging said rail means for slidably supporting said movable lattices on said frame in juxtaposition whereby said movable lattices and the louvers mounted thereon may be slidably folded and unfolded toward and away from one of said endmost louver support means, and control means operable to a first position in maintaining said movable lattices in a spaced apart position across the aperture of said frame and with respect to said endmost louver support means and operable to a second position in enabling folding and unfolding of said movable lattices toward and away from one of said endmost louver support means.

2. The combination as specified in claim 1 wherein said control means comprises an elongated control plate having a plurality of guide portions which engage said movable lattices in maintaining the same in a spaced apart position with respect to each other and with respect to said endmost louver support means, and hinge means for rotatably mounting said control plate on said frame for releasing engagement of said control plate with said movable lattices and permitting the same to be folded toward one of said endmost louver support means.

3. The combination as specified in claim 2 wherein said frame includes upper and lower frame channels, said upper channel including said rail means, and said lower channel including an elongated rubber member, said elongated rubber member being positioned with respect to said movable lattices and said control plate for urging of said movable lattices against said rubber member by engagement of said guide portions of said control plate with said movable lattices.

4. The combination as specified in claim 1 wherein said means interconnecting said louvers for substantially contemporaneous rotation thereof comprises an interlocating shaft having an elongated rail, pivot means for interconnecting each said endmost louver support means adjacent opposite ends of said interlocating shaft, roller means mounted on said movable lattices and engaging said rail of said interlocating shaft, said louvers including chain means interconnected across the outermost ends thereof when the same are positioned in a spaced apart

relation with respect to each other, said chain means being separable for folding of said movable lattices toward one of said endmost louver support means.

5. The combination as specified in claim 1 wherein said louvers include chain means interconnected across the outermost ends thereof when the same are positioned in a spaced apart relation with respect to each other, said means interconnecting said louvers for substantially contemporaneous movement comprises a transmission rod having a plurality of spaced notches, pivot means for interconnecting each said endmost louver support means adjacent opposite ends of said transmission rod, and each louver of said movable lattices includes pin means positioned for operable abutment within a notch of said transmission rod on rotation of said louvers to provide a substantial closure for the aperture of said frame, said

chain means being separable for folding of said movable lattices toward one of said endmost louver support means.

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U.S. Cl. X.R.

160—172