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Hill et al.

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[45] **Nov. 26, 1974**

[54] **SELF-ACTING LOCK FOR ARTICULATED, ROLLING GRILLES**

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[73] Assignee: **Cookson Company**, San Francisco, Calif.

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[52] **U.S. Cl.** **292/231,** 160/133

[51] **Int. Cl.** **E05c 3/02**

[58] **Field of Search** ..... 160/133, 229; 292/53, 231, 292/345, 304, DIG. 49

[56] **References Cited**

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2,940,520 6/1960 Cookson, Jr. et al. ..... 160/133 X

3,601,175 8/1971 Wardlaw 160/133

Primary Examiner—Richard E. Moore

Attorney, Agent, or Firm—Flehr, Hoback, Test, Albritton & Herbert

[57] **ABSTRACT**

A lock for a rolling grille effective for barring a closure is concealed in the grille guide structure and actuates upon attempts to unbar the closure by applying opening forces to the grille. The opening forces serve to pivot lock-links laterally of the grille into engagement with a lock abuttment in the grille guide structure. In the normal operating mode of the grille, the lock-links are disposed in a retracted condition.

5 Claims, 7 Drawing Figures

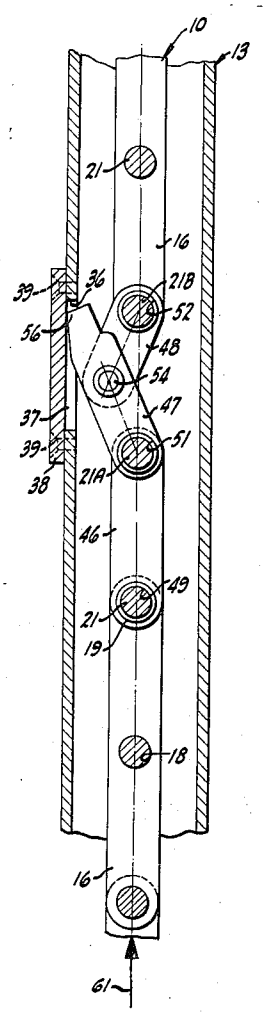
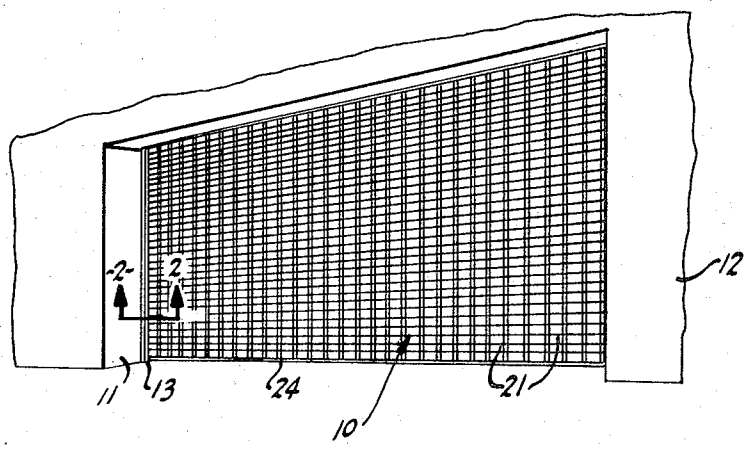


FIG-1



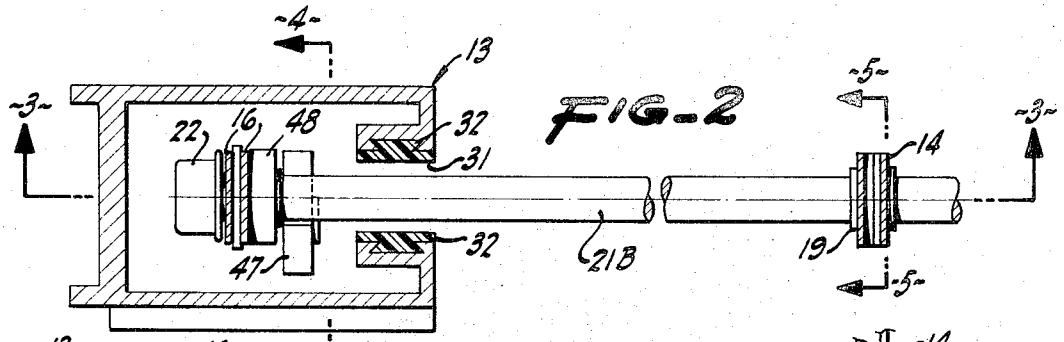


FIG-2

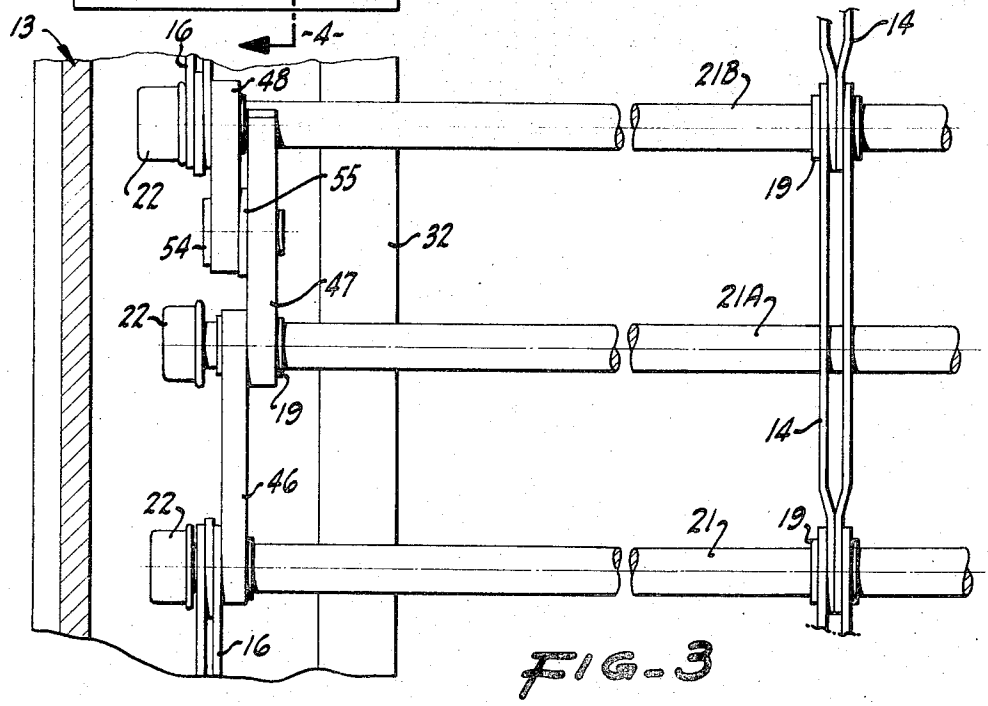


FIG-3

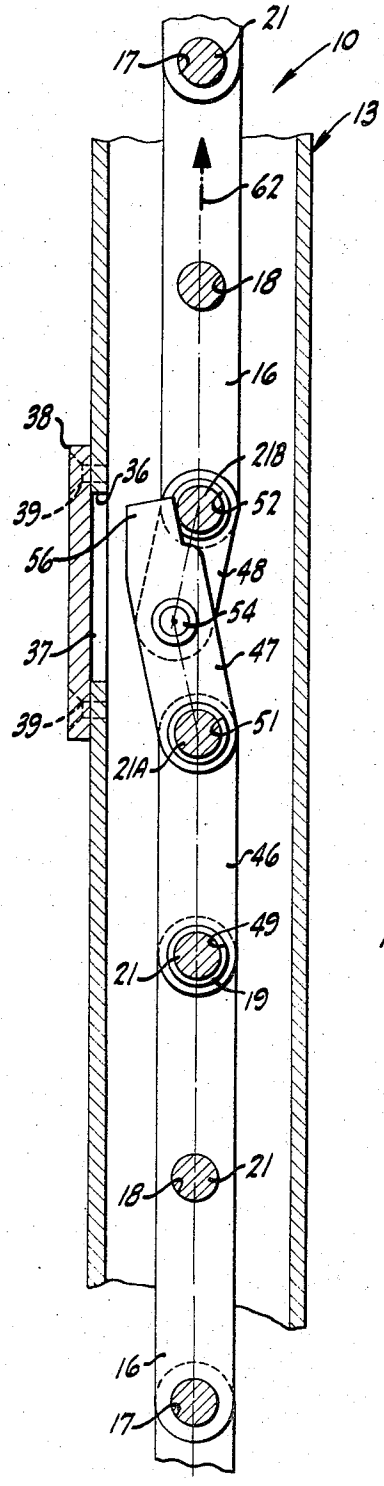


FIG-4

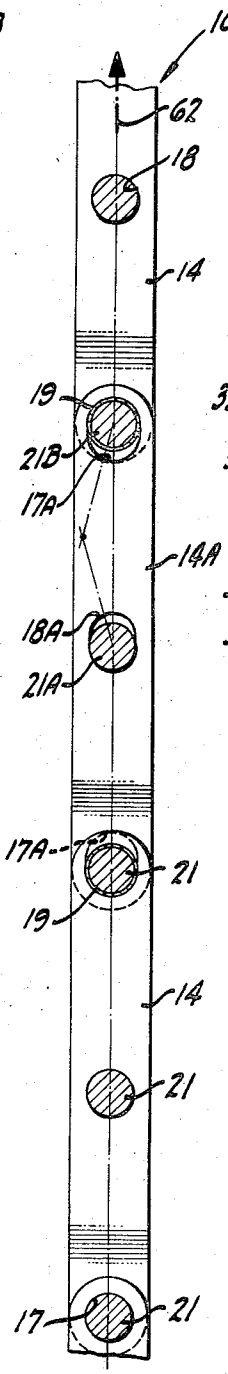


FIG-5

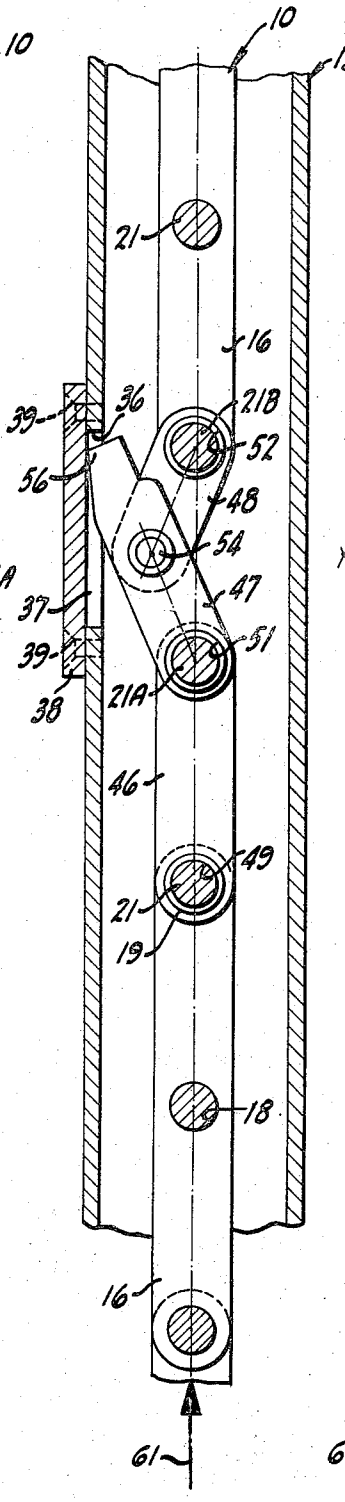


FIG-6

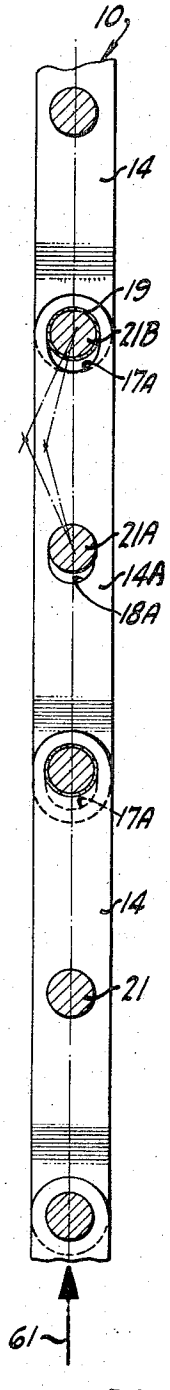


FIG-7

SELF-ACTING LOCK FOR ARTICULATED, ROLLING GRILLES

BACKGROUND OF THE INVENTION

This invention pertains generally to grilles and more particularly to articulated rolling grilles having self-acting locking provisions.

Rolling grilles are constructed in a variety of patterns, but generally include a coil box, frequently mounted overhead, from which the grille is unrolled to extend across an opening so as to effect closure of the opening in the building. The arrangement and design of the grille which are necessary for the coiling and unrolling operations, gives a measure of slack when the grille is in the fully extended or closing condition. The slack may sometimes be sufficient so that an intruder could raise the foot piece, or lower portion of the grille, a distance great enough so that a person could crawl beneath the foot piece and move through the opening into or out of the building. Locks, including cylinder locks and padlocks, were used to secure grilles in a closed position. But, by reason of their design, such locks were visible and exposed to acts of vandalism and could be broken.

SUMMARY OF THE INVENTION AND OBJECTS

In summary, the invention pertains to an articulated, rollable closure for an opening in a building including in the combination a guide structure adapted for installation on opposite sides of the building opening. The guide structure has portions defining a guide slot operative to maintain the movement of the closure along a defined path. The guide structure includes a lock abuttment arranged on one side of the path. An articulated, rollable closure includes a plurality of at least two rod-like elements spaced along said path with the end portions of the rods extending into the slots of the guide structure. Lock means arranged on at least one end of the rod-like elements includes pivotly interconnected lock-links and pivot-links. The ends of the links mount upon the ends of the rod-like elements. The lock-link has a projection extending away from the pivot axis and disposed on one side of the path adjacent to the lock abuttment. The intermediate links are arranged on the rod-like elements laterally of the lock-links and are configurated to connect said first and second rod-like elements in a manner permitting them to be moved relatively towards each other. The lock and pivot links are responsive to convergent movements of the first and second rod-like elements to pivot said projection of the lock-link outwardly of the path for engagement with the lock abuttment.

A BRIEF DESCRIPTION OF THE DRAWINGS

FIG. 1 is a perspective view of an articulated rolling grille embodying the present invention.

FIG. 2 is an enlarged sectional view taken along line 2—2 of FIG. 1.

FIG. 3 is a view taken along the line 3—3 of FIG. 2.

FIG. 4 is a view of the end and locking links taken along the line 4—4 of FIG. 2.

FIG. 5 is a view of the intermediate links taken along the 5—5 of FIG. 2.

FIG. 6 is a view like FIG. 4 but showing the self-acting condition of the locking links in the present invention.

FIG. 7 is a view like FIG. 5 but showing the intermediate links when the locking links are in the locking condition of FIG. 6.

DESCRIPTION OF THE PREFERRED EMBODIMENT

A preferred embodiment of the invention is shown in FIG. 1 of the drawings, where an articulated rolling grille **10** is shown in the closed condition barring an opening **11** in a building **12.** The rolling grilles of the general type shown include an overhead coil box (not shown) with respect to which the grille structure is rolled and unrolled, through motor driven or manual operation, along a generally vertical path established by vertically upstanding guides **13** disposed on each side of the opening **11.** In large part the grille **10** may be constructed as shown in U.S. Pat. No. 3,601,175 granted Aug. 24, 1971, to the Cookson Company, San Francisco, Calif. 94107, the assignee of the inventor, Russell Wardlaw. More particularly, the grille **10** consists of a plurality of intermediate links **14** and end links **16,** FIGS. **1, 3–5.** The end links **16** and intermediate links **14** are substantially identical in size and shape and may each be arranged in pairs, FIG. **2.** Each link is provided with three holes, two end holes **17** and a medial or central hole **18,** FIGS. **4–7.** The axis of the holes extend in a direction at right angles to the plane of the links and one end of each of the links **14, 16** is offset with respect to the remainder of the link so that when the links are interconnected a chain of links will be aligned. However, as is readily apparent, the links may be straight if desired and mounted so that every other link in a chain is in alignment. Or the links may be configurated with a vee-shaped, medial bent portion so that when joined together in pairs, the intermediate links may define a diamond pattern.

The offset ends of the intermediate links **14** are placed face-to-face and are mounted between the ends of two adjacent links in the chain so that the holes **17, 18** are in alignment.

The intermediate links **14** are pivotally connected at their ends by spool-like, flanged ferrule connectors **19** through which the grille rods **21** extend. The end links **16** may be arranged in pairs with the offset end portion being overlapped with the straight end portions of the next adjacent pair of end links. The connectors **19** interconnect the links **16** at the overlapped ends and grille rods **21** extend through the connectors **19** and thereby define the chain of links. The grille rods **21** extend laterally between the end links the full width of the grille **10** and the ends of the rods which project outwardly of the end links receive end keepers or cap fasteners **22** which mount upon the rod ends in a press fit.

From the above, it will be understood that the grille **10** is an arrangement of links and grille rods disposed at right angles to each other and a chain of end links **16** is arranged at each side of the grille **10** and a plurality of chains of intermediate links **14** are disposed at laterally spaced intervals along the rods **21** between the end links.

A foot piece **24** is arranged at the free end or lowermost portion of the grille **10,** FIG. **1.** It will be observed that the end links and the side portions of the grille are

received within the two guides 13 so that the grille 10 may be moved between the open and close position by either power or manual means.

The guides 13 are fixedly secured in a vertical condition to the building 12 on opposite sides of the opening 11. The guides may be of a box-like hollow-shape in lateral cross section, and have a slot or opening 31 slightly wider than the diameter of the grille rods 21 but narrower than the width of the ends links, those relationships being illustrated in FIG. 2.

The portions of the guides on opposite sides of the opening 31 may be provided with a wear strip 32 of non-metallic material. The slot or opening 31 between the wear strips 32 defines a path in which the grille 10 will travel between the open and close condition.

Referring to FIG. 4, a lock abuttment 36 is formed on one wall of the guide 13. The abuttment is defined by a discontinuity in the wall structure of the guide and extends laterally of the path traveled in the grille. One procedure for forming the abuttment 36 is to form a slot 37 in one wall of the guide and then to mount a cover 38 with fasteners 39 over the opening. The arrangement of the guides along the opening of the building is such that the covers 38 are concealed from view, and of course, the locking abuttment 36 is completely concealed from view after the assembly is installed.

A set of locking links is disposed in the chain of end links to cooperate with the abuttment in the guide. Preferably, one set of locking links is disposed on each side of the grille 10, and each includes a half-link 46, a lock-link 47, and a pivot link 48, FIGS. 3, 4 and 6. The half-link 46 is provided at its ends with holes 49 spaced apart the standard distance or pitch between two consecutive grille rods, the end portions of which are received in the holes. The lock-link 47 at one end is provided with a hole 51, through which the end portion of a first grille rod 21A extends. Similarly, the pivot link 48 is provided at one end with a hole 52 through which the end portion of a second grille rod 21B extends. A pivot connection is established between the lock-link 47 and the pivot link 48 by a spacer 55 and fastener 54 disposed a distance along the respective links greater than one-half of the standard pitch between adjacent grille rods so that the lock and pivot links are arranged in an over-center pivot connection, as shown in FIGS. 4 and 7. In other words, the distance between the pivot axis 54 and the center of the first grille rod 21A is more than one-half of the distance between the first and second grille rod 21A, 21B. The lock-link 47 includes an extension 56 projecting outwardly of the pivot connection 54 and terminates in a shoulder 56 which serves to engage the lock abuttment 36 when the lock links are placed in the locking mode, as shown in FIG. 6.

The intermediate links 14A disposed laterally of the set of locking links 47–48 are arranged to permit the first and second grille rods 21A–21B to converge in response to forces applied to the grille 10 as indicated by the arrows 61, FIGS. 6 and 7. Forces 61 would typically be found to occur when a potential intruder would attempt to raise the grille 10 by lifting the grille so as to raise the foot piece 24 for gaining entry into the building 12. The intermediate links 14A are provided with end holes 17A which are elongated along the longitudinal axis of links 14A. The medial holes 18A in the intermediate links 14A are similarly shaped, as shown in FIGS. 5 and 7. The longer dimension of the holes 17A, 18A may be as much as three-fourths to one-half greater than the diameter of the grille rods 21, and it will be understood that the elongated holes 17A, 18A permit the first and second grille rods 21A, 21B to converge as illustrated in FIGS. 6 and 7 so that the extension 47A of the lock-link may be pivoted laterally of the path of grille movement for engagement with the lock abuttment 36.

OPERATION

The principle of operation of the invention is that the grille 10 is installed in the building 12 so that it may be retracted and extended with respect to the opening of the building to be secured. Conventional locks such as padlock or cylinder lock structures may be arranged between the foot piece 24 of the grille and the building floor. Possibly, the conventional lock structures may be opened by unauthorized persons who would then attempt to raise the grille 10 by lifting it. Such lifting forces upon the grille are indicated by the arrow 61, FIGS. 6 and 7. The locking links in response to such forces assume the position as shown in FIG. 6 and the extension 56 engages the stationary abuttment 36. During conventional retraction an extension of the grille forces are applied as indicated by the arrow 62, and the parts assume the condition illustrated in FIGS. 4 and 5. Here the extension 56 of the lock-link 47 is disposed against the second grille rod 21B, thereby clearing the locking abuttment 36 arranged in the guide structure.

It will be understood that although the preferred embodiment of the invention illustrated and described herein pertains to a grille structure including an overhead mounted coil box, the locking apparatus of the subject invention is also useful with a floor mounted coil box as well as with a vertically mounted coil box from which the grille may extend along a horizontal path. It will be seen from the foregoing that there has been disclosed an articulated rolling grille structure including a self-actuating lock mechanism which occupies a passive, non-locking mode during conventional opening and closing of the grille and which is projected into an active locking mode upon attempted intrusion into the building by opening forces applied to the free end of the grille structure.

What is claimed is:

1. Self-acting lock structure for articulated, rolling grilles of the type adapted to be rolled up at one end for unbarring a closure, the combination comprising guide structure adapted to be fixedly secured on opposite sides of the opening with which the grille is associated, and serving to maintain the movement of the grille in a defined path, said guide structure being configurated to conceal from view the side portions of the grille and including lock abuttment means disposal laterally to one side of the path of grille movement and internally of the guide structure, a plurality of links extending in the direction of grille movement, a plurality of parallel disposed grille rods extending laterally of said links across the opening, the links being mounted upon said rods and interconnected forming chains of links, said chains of links including end-links and intermediate links, all having rod receiving holes therein through which said grille rods extend, said chain of end-links including a set of locking links, including a pivot link and a lock-link, said lock-link having a hole in one end and a first one of said grille rods being received in said hole,

said pivot link having a hole in one end and a second one of said grille rods being received in said hole, means pivotally interconnecting said pivot link to said lock-link in an over-center pivot connection, said lock-link including an extension projecting away from said pivot connection and engaging said second grille rod when the grille is rolled and unrolled from said one end, and said extension being disposed so as to clear said lock abuttment means in the guide structure, the intermediate links laterally aligned with said set of locking links having rod receiving holes greater in size than the rod diameter permitting movement of the grille rods with respect to the intermediate links serving to shorten the distance between said first and second grille rods when lifting forces are applied to the other end portion of the grille, serving to move said first grille rod towards the second grille rod, the arrangement of said locking links and said pivot connection being such that converging movement of the first and second grille rods shifts said pivot connection laterally outwardly and presents the extension on said lock-link for engagement with said lock abuttment means so as to deter further movement of the grille structure with respect to the guide structure in response to movement forces applied at said other end of the grille.

2. The structure defined in claim **1** wherein said intermediate links are laterally aligned with said locking links, each have rod receiving holes therein including a medial hole and two end holes, said first and second ones of said grille rods extending through said medial hole and one of said end holes respectively, said locking links including a half-link having at both its ends holes spaced apart a distance equivalent to the distance between the medial hole and the end hole of said intermediate links, said half-link being mounted at one end upon said first one of said grille rods, the other end receiving the end portion of the next consecutive grille rod so that the distance between the last named grille rod and the second one of said grille rod is equivalent to the distance between the end holes of said intermediate links.

3. In an articulated, rollable closure for an opening in a building the combination comprising, guide structure adapted for installation on opposite sides of the building opening, said guide structure having portions defining a guide slot operative to maintain the movement of the closure along a defined path, and further including a lock abuttment arranged on one side of said path, an articulated, rollable closure including a plurality of at least two rod-like elements spaced along said path and the end portions of which extend into the slots of the guide structure, lock means arranged on at least one end of said rod-like elements, and including pivotally interconnected lock-link and pivot-link, the ends of said links being mounted upon the ends of said rod-like elements, said lock-link having a projection extending away from the pivot axis in the direction for retracting the closure, and disposed on the side of said path adjacent to said lock abuttment, intermediate link means arranged on said rod-like elements laterally of said lock means and connecting together said first and second rod-like elements in a connection permitting said elements to be moved relatively towards each other, said lock and pivot links being responsive to convergent movements of said first and second rod-like elements to pivot said projection of said lock-link outwardly of said path for engagement with said lock abuttment.

4. The structure defined in claim **3** wherein said lock means on said closure is enclosed within said guide structure.

5. The structure defined in claim **3** wherein said lock means forms components of a chain of links enclosed within said guide structure, said lock means being disposed in a passive, non-locking condition when said closure is extended and retracted from a coil box or the like on one side of the building opening, and said lock means being actuated into an active locking condition with said lock abuttment when opening forces are applied to said closure on the side opposite from said one side.

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