Aug. 11, 1959 M. B. ZOLL 2,898,988

ROLLING METAL GRILLE TO SERVE AS A CLOSURE DEVICE FOR A BUILDING

Filed Nov. 20, 1956 3 Sheets-Sheet 1

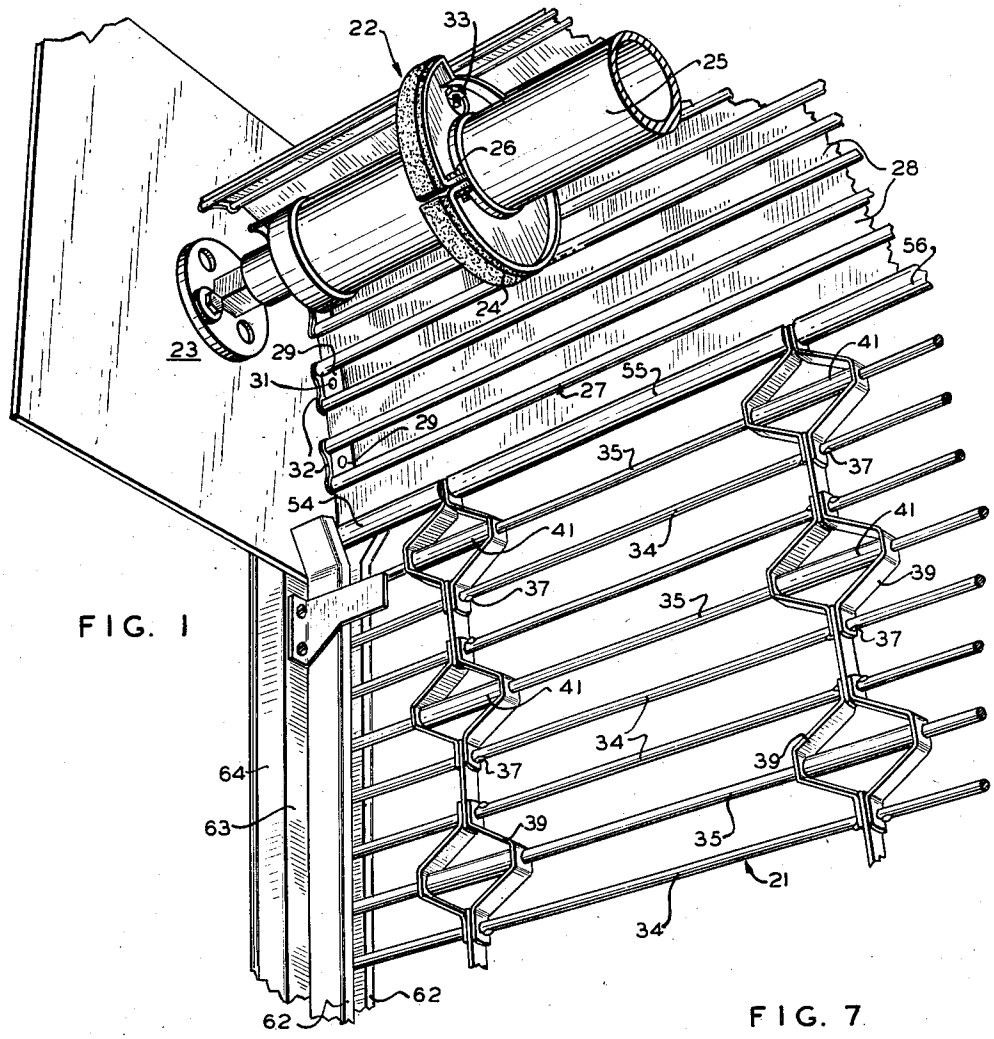



FIG. 1

FIG. 7

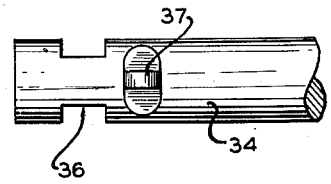



FIG. 8

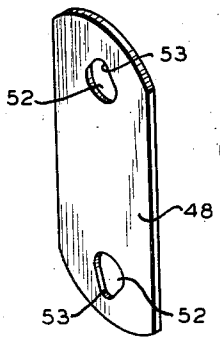
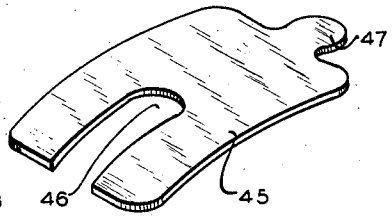



FIG. 9




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Aug. 11, 1959 M. B. ZOLL 2,898,988

ROLLING METAL GRILLE TO SERVE AS A CLOSURE DEVICE FOR A BUILDING

Filed Nov. 20, 1956 3 Sheets-Sheet 2

FIG. 3

FIG. 2

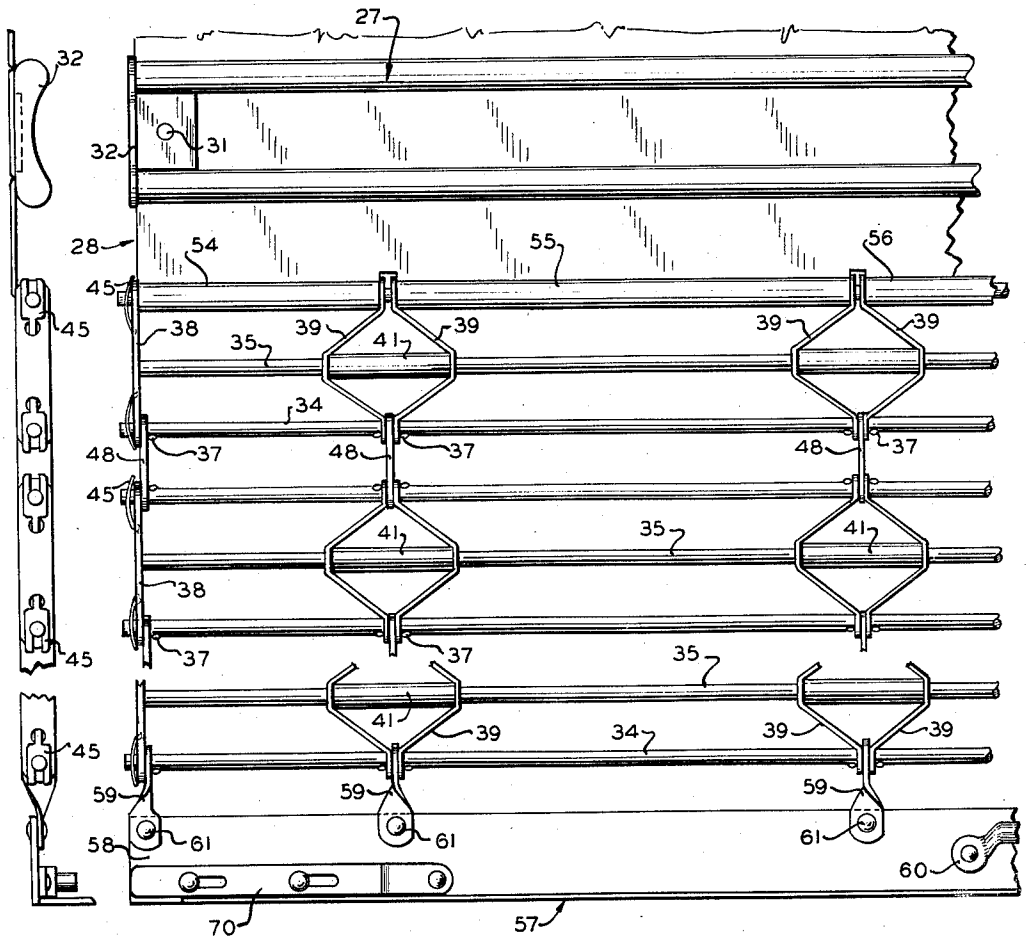



FIG. 5

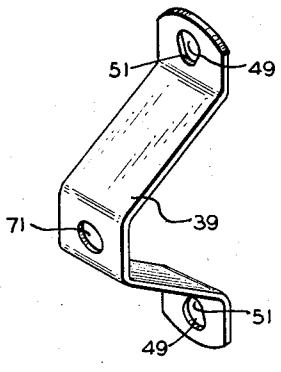
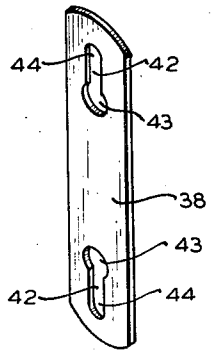



FIG. 6



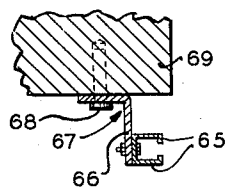




FIG. 4

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Aug. 11, 1959 M. B. ZOLL 2,898,988

ROLLING METAL GRILLE TO SERVE AS A CLOSURE DEVICE FOR A BUILDING

Filed Nov. 20, 1956 3 Sheets-Sheet 3

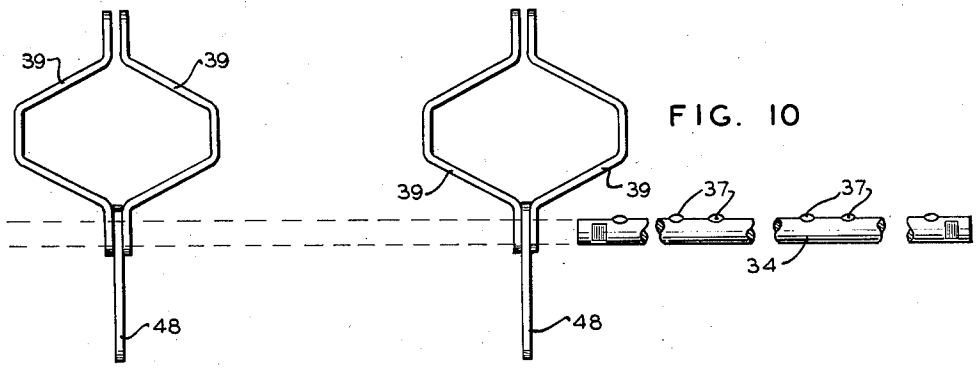



FIG. 10

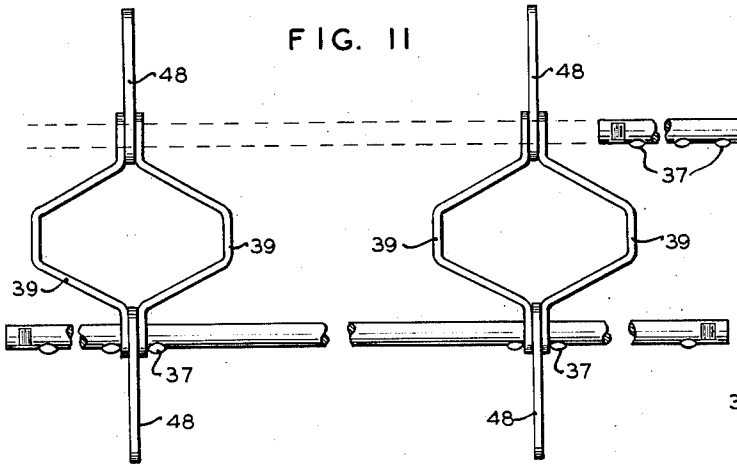



FIG. 11

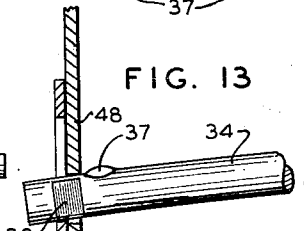
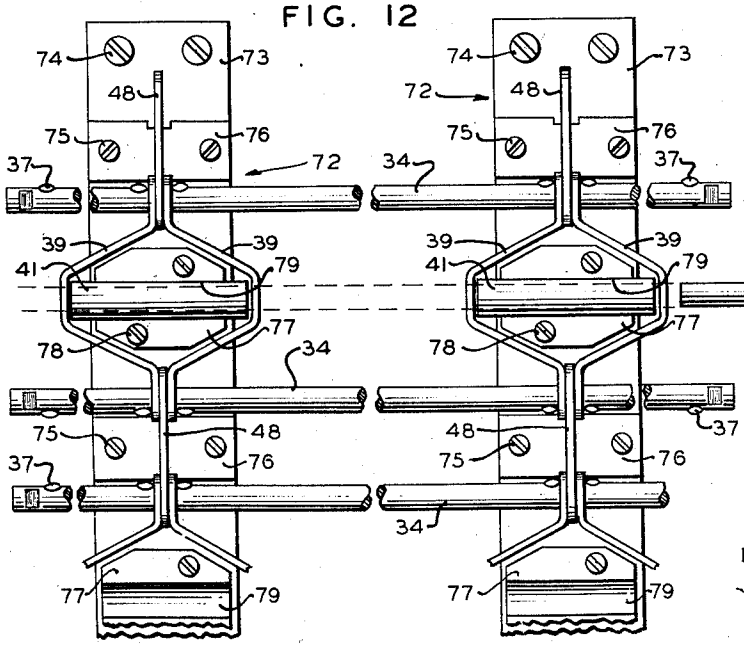



FIG. 13




FIG. 12




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United States Patent Office 2,898,988 Patented Aug. 11, 1959



2,898,988

# ROLLING METAL GRILLE TO SERVE AS A CLOSURE DEVICE FOR A BUILDING

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Application November 20, 1956, Serial No. 623,398

16 Claims. (Cl. 160—229)

This invention relates to closures in the form of flexible metal grilles which are adapted to be rolled up to an overhead position.

Such closures may be used by themselves or as a screen protection for doors, windows and the like, safety mechanism being desirably provided to prevent the grille from being lifted up from the outside by unauthorized persons. The advantages of my new rolling grille include the possibility of its being rolled up with ease about a small winding radius and the connection of the individual parts of the screen being protected against manipulation from the outside, and the provision for allowing a clear view and a ready passage of light through the screen.

An object of my invention is to provide a rolling metal grille consisting of a plurality of rod-like members interconnected by lattice-like members and hinged relatively to one another so as to form a reticulated curtain.

Another object of my invention is to provide a grille having laterally extending rods, together with means for supporting these rods against sagging when they are coiled in their overhead position.

A further object of my invention is to provide a closure member having improved and advantageous characteristics, especially as to rapidity and economy of manufacture, coupled with considerable strength and security for protection of openings and the closure of corridors.

A still further object of my invention is to provide a closure or protective cover for doorways, store fronts, windows and the like, comprising a flexible grille, desirably formed of durable metal, such as steel, aluminum or stainless steel, which is adapted to be rolled about a horizontal reel, and having characteristic features to insure its facile and certain operation as it is being raised and lowered.

These and other objects and advantages will become apparent from the following detailed description when taken with the accompanying drawings. It will be understood that the drawings are for purposes of illustration and do not define the scope or limits of the invention, reference being had for the latter purpose to the appended claims.

In the drawings, wherein like reference characters denote like parts in the several views:

Figure 1 is a perspective view of a portion of a reel, the upper portion of a metal grille windable thereon and embodying my invention, and connecting means between said reel and grille.

Figure 2 is a fragmentary elevational view of a rolling metal grille embodying my invention.

Figure 3 is an end view from the left of the rolling metal grille of Figure 2.

Figure 4 is a horizontal sectional view of one of the guiding members for an edge portion of such a grille.

Figure 5 is an enlarged perspective view of one of the longer intermediate connecting links for connecting rods of a grille embodying my invention.



Figure 6 is an enlarged perspective view of one of the longer end links for connecting rods of such a grille.

Figure 7 is an enlarged plan view of an end portion of a notched rod or bar forming a portion of such a grille.

Figure 8 is an enlarged perspective view of one of the shorter links employed for connecting both the end and intermediate portions of adjacent bars of a grille embodying my invention.

Figure 9 is an enlarged perspective view of one of the bowed resilient metal leaf locking members for the grille embodying my invention.

Figure 10 is a diagrammatic view of certain elements of my grille during the first step of assembling them in accordance with my invention.

Figure 11 is a view corresponding to Figure 10, but showing the parts during a subsequent stage of assembly.

Figure 12 is a view corresponding to Figure 10, but showing certain of the parts held in a jig and as positioned during a still later stage of the process of assembly.

Figure 13 is an enlarged fragmentary sectional view, with parts in elevation, showing how certain of the bars forming my grille are bent to provide for assembling the end connecting plates therewith, after which they are allowed to snap back into assembled position.

Referring to the drawings in detail, and first considering Figure 1, there is shown a metal grille, generally designated **21**, which is connected to and rollable on a reel **22**, only a portion of which is shown. The reel **22**, one form only of which is illustrated, is mounted with its axis generally horizontal for pivoting about its ends, as between supporting plates **23**. The reel, in the present embodiment, is shown as having a plurality of collars **24**, only one of which is illustrated, mounted on a hollow shaft portion **25**. Each collar may be formed of a plurality of parts secured together about the shaft **25**, as by means of bolts **26**.

The grille **21** may have its upper portion directly connected to the collars **24**, but is preferably connected to an intermediate flexible closure portion **27** consisting of a plurality of slats **28**. The slats **28** are articulated with respect to one another, as by having their side edges flanged and bent into embracing relationship with cooperatively formed side edges of the adjacent slats. The embraced side edge portion of a slat forms, in effect, a connecting pivot portion. Undesired longitudinal displacement between the slats is prevented by keepers **29** connected, as by rivets **31**, to alternate slats. Each keeper **29** has an end flange **32** overlying the hinging connections between the parts to thereby prevent relative shifting.

The upper edge portion of the flexible slat arrangement may be connected to the collars **24** as by means of bolts **33**. By virtue of this arrangement, the grille, or reticulated portion of the closure device, has a continuous foundation on which it is rolled upon turning of the reel **22** in a desired way. As showing various forms of reels about which such grilles may be wound, Patents Nos. 1,985,828, 2,037,458, 2,095,690, and 2,350,288 are referred to.

In the present embodiment, the grille embodying my invention is formed as a series of normally horizontal rods or bars **34** and **35**, equally spaced and generally uniformly cylindrical. The bars **34** are of uniform selected length. The length of the bars **35** depends on that of the bars **34**. These bars are assembled in groups of three, the outer members **34** of each group being somewhat longer than the intermediate member **35** of each group, and also somewhat differently constructed as will be explained. The outer members **34** of each group are formed as illustrated in Figures 2, 3 and 7, that is, they have their end portions notched, as indicated at **36**, and

they are provided with a series of preferably rounded knobs 37 projecting from one side only thereof, and spaced as shown most clearly in Figure 2. The intermediate bar 35 of each group of three, however, is plain and shorter than the outer bars 34, in that it is of a length corresponding with the distance between the slots 36 in said outer bars 34, rather than corresponding with the entire length of the outer bars.

Two bars 34 and one bar 35 are, in the present embodiment, connected together to form a group of three. A plurality of these groups of three are, in turn, connected together to form a grille assembly of any desired length and width, the length depending on the number of bars and the width depending on the length of the bars 34. The outer bars 34 are connected at their ends by relatively long side bars or links 38, and intermediate thereof by relatively long and desirably angular links 39. If the links 39 are relatively light or thin, intermediate portions of adjacent links are desirably spread by means of hollow cylindrical members 41 mounted on the intermediate rod 35. However, if these members 39 are relatively heavy or stiff, the members 41 may be omitted or as an alternative, if it is desired to sacrifice appearance and thereby obviate the spaced diamond shaped portions formed by cooperative pairs of the members 39, these members may be straight like the members 38 rather than angular as illustrated in Figure 2.

The relatively long bars or plates 38 are desirably formed as shown most clearly in Figures 2, 3 and 6, that is, they each have a slot 42 near each end. Each slot 42, however, is not of uniform width, but rather relatively narrow toward the ends of the member 38 and enlarged toward the center of the bar, as indicated at 43, so as to allow for axial insertion of a rod 34 therethrough. Subsequent movement of said rod brings its slotted portion 36 into the relatively narrow portion 44 of its slot 42. The purpose of this construction is to allow for insertion of the rods 34 through the widened portions 43, and then movement to the narrow portions 44 of the slots 42, to thereafter prevent undesired removal of said links or plates 38 from the notched end portions of said bars 34.

After assembly, undesired movement of said bars 34 toward the enlarged portions 43 of the slots 42 is prevented by spring keepers, locking or retaining members 45, desirably formed of spring steel bowed convexly outwardly, and preferably or approximately uniform curvature as shown in detail in Figures 2 and 9. These retaining members 45 are notched relatively deep, that is, for approximately one half of the wider part at one end, as indicated at 46, while narrowed at the other end to provide a relatively short tab 47. Locking action is effected, as viewed in Figure 3, by having the notched portion 36 of each outer rod 34 received in the slot 46 of its keeper 45, and having the tab 47 sprung into the enlarged portion 43 of corresponding slot 42.

This arrangement keeps the associated rod 44 in its outermost position by forming a permanent stop, and preventing inward movement thereof to a position where it could be released. However, these spring members 45 are readily removable, as by using a screw driver or the like to pull out the tab portions 47 from the enlarged portions 43 of the slots 42, to thereby allow withdrawal of said members 45 from locking engagement with the rods 34.

Longitudinal displacement of the bars 34 with respect to the connecting members 38 and 39 is prevented by the knobs 37 when these knobs are in position illustrated in Figure 2. It will thus be seen that such knobs are then disposed on opposite sides of a pair of connecting plates 39 and adjacent the inner faces of the end plates 38. The paired knobs 37 on opposite sides of the plates 39 hold these plates in embracing relationship with the adjacent end portions of the shorter connecting members or plates 48, which connect both end and intermediate portions of adjacent rods 34, and thereby combine the groups of three rods, that is, two of 34 and one of 35, into a grille of desired length.

All of the connecting plates 39 and 48 are, of course, apertured at their ends to receive the bars 34. However, these apertures are not circular but, as shown most clearly in Figures 5 and 8, those designated 49 in the members 39 are laterally enlarged or elongated toward one another, as indicated at 51, while those designated 52 in the members 48 are laterally enlarged or elongated away from one another, as indicated at 53. These elongations are such that when the knobs 37, projecting from one side of each of the members 34 are in registry with the elongations or extensions 51 and 53 and, therefore, turned to a position 18° from that viewed in Figure 2, these knobs are slidable longitudinally through the apertures 49 and 52, whereas when out of registry, for example, in the position illustrated in Figure 2, they are prevented from usch sliding movement and are thereby held in locked position.

In contrast with the construction of the bars 34, those designated 35 are plain and held in place simply by engaging the facing or adjacent surfaces of the end connecting members 38. The top bar 34 of the grille may be connected to the slatted portion 27 thereabove, if such is used, as by forming the lower or adjacent slat 28 with a lower curved edge portion formed as sections, one section 54 lying between a plate 38 and the adjacent plate 39, the next section 55 lying between the second plate 39 and the third plate 39, and the third section 56 lying between the fourth plate 39 and the next connecting member, etc. Each of these sections 54–6 has its lower edge portion articulated with respect to the upper bar 34 as being bent therearound, as shown mostly clearly in Figure 1 or in Figures 2 and 3.

The bottom edge of the grille is desirably terminated by a rigid metal member such as angle iron 57, the upstanding flange 58 of which is suspended from the lower bar 34 by a series of metal connecting plates 59. The upper portions of these plates 59 are alined or coplanar with the plates 48 and apertured to receive the bar 34, while the lower portions thereof are desirably twisted, as illustrated in Figures 2 and 3, and connected to said upper flange 58 as by suitable means such as rivets 61. The flange 58 desirably carries a handle 60 and a pair of slide bolts 70 for holding the grille closed.

When in service, unauthorized disconnection of the end plates 38 and 48 from the bars 34 and 35 is prevented by having the said end portions guided in a suitable protective and guiding groove formed, desirably as viewed in Figure 1, by two channel members 62, the upper end portions of which diverge diagonally upward, with one flange of each mounted on the outer face of the web 63 of a supporting post 64, which may be a channel iron. An alternative is, as viewed in Figure 4, having a pair of channels 65 mounted on the outstanding flange 66 of an angle iron 67 secured, as by means of bolts 68, to the vertical post 69 defining the side of an opening, such as a door or window, and formed of any desired structural material including concrete.

Referring now to Figures 10 to 13, inclusive, as disclosing views at stages of a novel mode of assembling the parts of my grille. Such assembly may be effected without necessitating the use of tools, other than the parts of the grille itself. The longer plates 38 may be applied to the notched ends of the bars 34 to function as wrenches to turn them to a desired position. If desired, a jig 72, as shown in Figure 12, may be used for holding some of such parts in position during such assembly. There is shown in Figure 10 four of the angular members 39 and two of the connecting plates 48. As there illustrated, one of the bars 34, in a position reversed as compared with that of Figure 2, is moved to the left through the receiving apertures 49 and 52 in the respective members 39 and 48 to the position illustrated in Figure 11,

whereupon the bar 34 is turned about its axis to move the knobs 37 from the upwardly facing position of Figure 10 to the downwardly facing position of Figure 11, to thereby lock said bar 34 in a position preventing longitudinal movement thereof with respect to the members 39 and 48.

The next operation is, as viewed in Figure 11, the insertion of the other member 34 while positioned with its knobs 37 pointing downwardly, by movement to the left as viewed in Figure 11 until the position of Figure 12 is reached. Then the bar 34 is turned to reverse the position of its knobs 37, that is, from a downward pointing position to an upward pointing position, where said knobs lock the bar 34 in position in the receiving apertures 49 in the members 39 and in the receiving apertures 52 in the members 48. Thereafter is the operation of inserting the intermediate bar 35 through the receiving intermediate apertures 71, which may be circular, in the plates 39, and through the hollow cylindrical spreader members 41, if used, to the position of Figure 13. The ends thereof are there prevented from displacement by engaging the inner surfaces of end plates 38, only one of which is illustrated.

The application of the end plates 38 and 48 is as illustrated in Figure 13. The shorter plates 48 are first applied, followed by the application of the longer plate 38 over one end of one of the bars 34 and movement thereof so that the notched portion of said bar is received in the narrow part of its slot 42 to thereby prevent it from slipping off. To insert the other bar 34 of the group in the slot 42 of the longer plate 38, requires bending of the bars 34 (or one of them) so that the end of said other bar is receivable in the enlarged portion 43 of the end plate slot 42 when in position of Figure 13. After such reception, the bars are allowed to spring back and carry the notched portion of said other bar 34 into the narrow portion 44 of its receiving slot 42. After this the parts are permanently locked in position by application of the bowed leaf spring retainers 45 to complete the structure as viewed in Figures 2 and 3.

It will also be understood that assembly of the parts, as previously described, may be facilitated by the use of a jig 72, as shown in Figure 12. Such a jig desirably consists of a series of properly spaced plates 73 secured to a suitable table or other support (not shown) by screws or the like 74. Mounted in properly spaced positions on these plates, as by means of screws or the like 75 are blocks 76 adapted to snugly receive therebetween the shorter connecting plates 48 assembled in proper position with the angular members 39. The latter may also be placed by fitting them around properly positioned blocks 77 of the right size with suitable tolerances, and connected to the plates 73, as by means of screws or the like 78. Each block 77 has an upwardly-opening generally semicylindrical socket 79, of a size to snugly receive one of the hollow cylindrical members 41. Thus the parts 39, 41 and 48 may be held in the relative locations with respect to one another, which they are to have in the finished grille, while the bars 34 and 35 are inserted and the former then turned to locking positions.

Having now described my invention in detail in accordance with the Patent Statutes, those skilled in this art will have no difficulty in making changes and modifications in the individual parts or their relative assembly in order to meet specific requirements or conditions. Such changes and modifications may be made without departing from the scope and spirit of the invention, as set forth in the following claims.

I claim:

1. A closure device for a building comprising a series of metal bars arranged generally parallel to one another, means spacing end and intermediate portions of pairs of said bars comprising metal plates with their end portions apertured for receiving said paired bars, longer slotted end and apertured intermediate metal plates alternating with said first-mentioned metal plates, with intermediate portions of said intermediate plates receiving the intermediate of a set of three bars and end portions receiving the other two bars of said set on either side thereof, said bars on either side thereof each being one of the paired bars spaced by said first-mentioned metal plates, the end portions of the end two of each set of three bars being laterally notched, with their notched portions fitting in the corresponding slots in the end metal plates, and means cooperating with said notched end portions for holding the slotted end plates thereon.

2. A closure device for a building comprising a series of metal bars arranged generally parallel to one another, means spacing end and intermediate portions of pairs of said bars comprising metal plates with their end portions apertured for receiving said paired bars, longer slotted end and apertured intermediate metal plates alternating with said first-mentioned metal plates, with intermediate portions of said intermediate plates receiving the intermediate of a set of three bars and end portions receiving the other two bars of said set on either side thereof, said bars on either side thereof each being one of the paired bars spaced by said first-mentioned metal plates, the end portions of the end two of each set of three bars being laterally notched with their notched portions fitting the corresponding slots in the end metal plates, and bowed spring metal members, one end of each of which is bifurcated to straddle the notched end of the associated bar and the other end portion of which is formed as a tab of reduced width sprung into the end of the bar-receiving slot in the end plate to hold said bar spaced in the outermost end of said slot to retain the slotted end plates thereon.

3. A closure device for a building comprising a series of metal bars arranged generally parallel to one another, means spacing end and intermediate portions of pairs of said bars comprising metal plates with their end portions apertured for receiving said paired bars, longer slotted end and apertured intermediate metal plates alternating with said first-mentioned metal plates, with intermediate portions of said intermediate plates receiving the intermediate of a set of three bars and end portions receiving the other two bars of said set on either side thereof, said bars on either side thereof each being one of the paired bars spaced by said first-mentioned metal plates, hollow cylindrical members carried on the bar which passes through the apertures in the intermediate of said longer metal plates to space intermediate portions of said plates therealong, leaving the end portions close together on the bars on either side thereof and straddling the corresponding bar-receiving ends of the first-mentioned plates, thereby presenting a diamond-shaped structural appearance, the end portions of the end two of each set of three bars being laterally notched, with their notched portions fitting in the corresponding slots in the end metal plates, and means cooperating with said notched end portions for holding the slotted end plates thereon.

4. A closure device for a building comprising a series of metal bars arranged generally parallel to one another, means spacing end and intermediate portions of pairs of said bars comprising metal plates with their end portions apertured for receiving said paired bars, longer slotted end and apertured intermediate metal plates alternating with said first-mentioned metal plates, with intermediate portions of said intermediate plates receiving the intermediate of a set of three bars and end portions receiving the other two bars of said set on either side thereof, said bars on either side thereof each being one of the paired bars spaced by said first-mentioned metal plates, hollow cylindrical members carried on the bar which passes through the apertures in the intermediate of said longer metal plates to space intermediate portions of said plates therealong, leaving the end portions close together on the bars on either side thereof and straddling the corresponding bar-receiving ends of the first-mentioned plates,

thereby presenting a diamond-shaped structural appearance, the end portions of the end two of each set of three bars being laterally notched, with their notched portions fitting in the corresponding slots in the end metal plates, the bar disposed between the said notched bars, and which carries the hollow cylindrical members, being shorter than the end two of said set of three and held in position by its ends abutting unslotted intermediate portions of said longer end plates, and means cooperating with said notched end portions for holding the slotted end plates thereon.

5. A closure device comprising a series of metal bars arranged generally parallel to one another and disposed substantially uniform distances apart, means spacing end and intermediate portions of pairs of said adjacent bars comprising metal plates with their end portions apertured for receiving said paired adjacent bars, longer slotted end and apertured intermediate metal plates alternating with said first-mentioned metal plates, with intermediate portions of said intermediate plates receiving the intermediate of a set of three bars and end portions receiving the other two bars of said set on either side thereof, said bars on either side thereof each being one of the adjacent paired bars spaced by said first-mentioned metal plates, hollow cylindrical metal portions carried on the intermediate of said set of three bars, each hollow cylindrical portion spacing intermediate portions of an adjacent pair of said longer intermediate plates therealong, leaving the end portions close together on and straddling the adjacent end portions of the intermediate of said first-mentioned metal plates on the bars on either side thereof, thereby presenting a diamond-shaped structural appearance, the end portions of the end two of each set of three bars being laterally notched, with their notched portions fitting in the corresponding slots in the end metal plates, metal leaf bowed spring members locking said slotted end plates in position after said fitting, one end of each of which spring member being bifurcated to straddle the adjacent notched end portion of the bar, and the other end of each of which has a tab of reduced width sprung into the end of the slot in its end plate to hold its bar spaced in the outermost end of said slot, and the bar disposed between the said notched bars, and which carries the hollow cylindrical members, being shorter than the end two of said set of three and held in position by its ends abutting unslotted intermediate portions of said longer end plates.

6. A grille comprising three metal bars arranged generally parallel to one another and disposed substantially uniform distances apart, end and apertured intermediate metal plates with intermediate portions of said intermediate plates receiving the intermediate of said three bars and end portions of said intermediate plates receiving the other two bars, hollow cylindrical metal portions carried on the bar which passes through the apertures in the intermediate portions of said metal plates, spacing intermediate portion of said plates therealong, leaving the end portions close together on the bars on either side thereof, the end portions of the end two of said three bars being laterally notched, said end plates each having two slots therein, one adjacent each end, the end portions of said slots being narrow enough to anti-turningly receive the notched end portions of said end bars and the mutually adjacent portions of said slots being enlarged to allow for axial passage of said end bars, the notched portions of said end bars being anti-turningly received in the corresponding slots in the end metal plates, each of the end two of said bars having a series of projections disposed along one side only thereof, the apertures in the end portions of said intermediate plates having corresponding lateral extensions to allow axial passage of said end bars when in one position and prevent such passage because of said projections when said bars are rotated from that position about their axes, bowed metal leaf spring members locking said slotted end plates in position, one end of each spring member being bifurcated to lie along a face of an end plate and anti-turningly straddle the adjacent notched end portion of the bar in said plate, and the other end of each of which has a tab of reduced width sprung into the enlarged end portion of the slot in the end plate to hold its bar in the outermost end portion of said slot, and thereby prevent turning of said bar from a position where it interlocks with all of said plates, and the bar disposed between the said notched bars and which receives the hollow cylindrical members, being of a length corresponding approximately with the distance between the notches in the end bars and held in position by its ends abutting intermediate portions of said slotted end plates between the slots therein.

7. A grille comprising three metal bars arranged generally parallel to one another and disposed substantially uniform distances apart, end and apertured intermediate metal plates with intermediate portions of said intermediate plates receiving the intermediate of said three bars and end portions of said intermediate plates receiving the other two bars, hollow cylindrical metal portions carried on the bar which passes through the apertures in the intermediate portions of said metal plates, spacing intermediate portions of said plates therealong, leaving the end portions close together on the bars on either side thereof, the end portions of the end two of said three bars being laterally notched, said end plates each having two slots therein, one adjacent each end, the end portions of said slots being narrow enough to anti-turningly receive the notched end portions of said end bars and the mutually adjacent portions of said slots being enlarged to allow for axial passage of said end bars, the notched portions of said end bars being anti-turningly received in the corresponding slots in the end metal plates, each of the end two of said bars having a series of projections disposed along one side only thereof, the apertures in the end portions of said intermediate plates having corresponding lateral extensions to provide clearance for said projections and allow axial passage of said end bars when in one position and prevent such passage because of said projections when said bars are rotated from that position about their axes, bowed metal leaf spring members locking said slotted end plates in position, one end of each spring member being bifurcated to lie along a face of an end plate and anti-turningly straddle the adjacent notched end portion of the bar in said plate, and the other end of each of which is formed as a tab of reduced width sprung into the enlarged end portion of the slot in the end plate to hold its bar in the outermost end portion of said slot, and thereby prevent turning of said bar from a position where it interlocks with all of said plates.

8. A grille comprising a pair of metal bars arranged generally parallel to one another, end and apertured intermediate metal plates with end portions of said intermediate plates receiving said bars, the end portions of said bars being laterally notched, said end plates each having two slots therein, one adjacent to each end, the end portions of said slots being narrow enough to anti-turningly receive the notched end portions of said end bars and the mutually adjacent portions of said slots being enlarged to allow for axial passage of said bars, the notched portions of said bars being anti-turningly received in the corresponding slots in the end metal plates, each of said bars having a series of projections disposed along one side only thereof, the apertures in the end portions of said intermediate plates having corresponding lateral extensions to allow axial passage of said bars when in one position and prevent such passage because of said projections when said bars are rotated from that position about their axes, bowed metal leaf spring members locking the slotted end plates in position, one end of each spring member being bifurcated to lie along a face of an end plate and anti-

turningly straddle the adjacent notched end portion of the bar in said plate, and the other end of each of which has a tab of reduced width sprung into the enlarged end portion of the slot in the end plate to hold its bar in the outermost end portion of said slot and thereby prevent turning of said bar from a position where it interlocks with all of said plates.

9. The method of assembling metal bars to form a grille comprising forming lateral notches adjacent the ends of said bars, forming a series of laterally projecting knobs along one unnotched side only of each of said bars, forming intermediate connecting plates for said bars with apertures having lateral extensions to allow axial passage of the knobs on said bars when in one position and prevent such passage when said bars are rotated from that position about their axes, and assembling the bars with said intermediate plates by passing said bars axially through the corresponding apertures in the plates, turning them to bring the knobs out of registry with said extensions, and then applying means receiving said portions with notches so that said bars are locked in position.

10. The method of assembling metal bars to form a grille comprising forming lateral notches adjacent the ends of said bars, forming a series of laterally projecting knobs along one side only of each of said bars, forming intermediate connecting plates for said bars with apertures having lateral extensions to allow axial passage of the knobs on said bars when in one position and prevent such passage when said bars are rotated from that position about their axes, forming end plates each with a slot adjacent each end and of a width corresponding with that of the notched portions of the bars, the adjacent ends of the slots in each end plate being enlarged to permit axial passage of said bars therethrough leaving the remote end portions relatively narrow, and assembling the bars with said intermediate and end plates by passing said bars axially through the corresponding apertures in the intermediate plates and then turning them so that they are locked in position, passing each end plate over the end of one bar and then bending a pair of said bars into position so that the notched end of the other bar passes through the enlarged end portion of the other slot in the end plate, and then allowing said pair of bars to spring back so that their notched end portions are anti-turningly received in the remote narrow end portions of said slots.

11. The method of assembling metal bars to form a grille comprising forming lateral notches adjacent the ends of two of said bars which lie on opposite sides of a third bar, forming a series of knobs along one side only of each of said first-mentioned bars, forming intermediate connecting plates for all of said bars with the end apertures in said plates having lateral extensions to allow axial passage of the knobs on said bars when in one position and prevent such passage when said bars are rotated from that position about their axes, forming end plates each with a slot adjacent each end of a width corresponding with that of the notched portions of the bars, the adjacent ends of the slots in each end plate being enlarged to permit axial passage of said bars therethrough, leaving the remote end portions relatively narrow, and assembling all of said bars, the first two with the intermediate and end plates by passing said bars axially through the corresponding apertures in the intermediate plates and then turning them so that they are locked in position, the third bar being passed through the intermediate apertures in said intermediate connecting plates with its ends simply abutting the adjacent surfaces of the end plates, passing each end plate over the end of one of the two notched bars, then bending said notched bars into position so that the notched end of the other bar passes through the enlarged end portion of the other slot in the end plate, then allowing them to spring back so that they are anti-turningly received in the remote narrow end portions of said slots, and then locking said bars in said narrow end portions of said slots.

12. The method of making a grille comprising assembling metal bars and connecting plates therefor, each of said bars having a series of laterally projecting knobs along one side only and notched adjacent an end along another side, each of said plates having apertures each with a lateral extension to allow axial passage of the knobs on said bars when disposed in one relative position and prevent such passage when said bars are rotated from that position about their axes; by passing said bars axially through said plate apertures when said knobs register with said extensions and then turning said bars to move their knobs out of such registry and then applying means receiving said notched portion so that said bars are then locked in position with respect to said plates.

13. The method of making a grille comprising assembling metal bars and connecting intermediate and end plates therefor; each of said bars having lateral notches adjacent each end and a series of laterally projecting knobs along one side only, said intermediate plates having apertures each with a lateral extension to allow axial passage of the knobs on said bars when in registry with said extensions and prevent such passage when said bars are rotated about their axes from registry, said end plates each having a slot adjacent each end and of a width corresponding with that of the notched portions of the bars, the adjacent ends of the slots in each end plate being enlarged to permit axial passage of a bar therethrough, leaving the remote end portions relatively narrow; said method including the steps of passing said bars axially through the apertures in said intermediate plates while said knobs are in registry with said extensions, turning said bars to move their knobs out of such registry so that they are then locked in position with respect to said plates, passing an end plate over each end of one bar, bending the end portions of a pair of said bars toward one another, fitting the notched ends of the other bar of said pair through the enlarged end portion of the other slots in said plates at each end of said pair of bars, and then allowing said pair of bars to spring back so that their notched end portions are anti-turningly received in the remote narrow end portions of said slots.

14. A closure device for a building comprising a pair of metal bars arranged generally parallel to one another and metal plates connecting and spacing corresponding portions of said bars, each bar having a series of knobs projecting laterally along one side only and the connecting plates having apertures with lateral extensions which permit axial passage of said bars through said plates only when the knobs and said extensions are in registry, a metal bar without knobs, shorter than said pair of bars and disposed therebetween, said pair of bars holding said plates assembled by being finally positioned in said apertures with their knobs out of registry with said plate aperture extensions and means spanning the end portions of said pair of bars and confining the shorter metal bar therebetween.

15. A grille comprising three metal bars arranged generally parallel to one another and disposed substantially uniform distances apart, end and apertured intermediate metal plates with intermediate portions of said intermediate plates apertured for receiving the intermediate of said bars and end portions of said intermediate plates apertured for receiving the other two bars, the end portions of the end two of said three bars being laterally notched, said end plates each having two slots therein, one adjacent each end, the end portions of said slots being narrow enough to anti-turningly receive the notched end portions of said end bars, and the mutually adjacent portions of said slots being enlarged to allow for axial passage of said end bars, the notched portions of

said end bars being received in the end portions of the corresponding slots in the end metal plates, said intermediate bar being shorter than the other two bars and held in position by its ends abutting unslotted intermediate portions of said end plates, and means cooperating with said notched end portions for holding the end plates in place.

16. A closure device for a building comprising a pair of metal bars, means spacing end portions of said bars, comprising metal plates with their end portions formed with apertures extending longitudinally thereof for receiving said bar end portions, said bars having laterally notched end portions fitting the corresponding apertures in the metal plates, and bowed metal leaf spring members one end portion of each of which being bifurcated by a relatively deep notch straddling the adjacent notched end portion of a bar and the other end portion of each being formed as a relatively short tab of reduced width



sprung into the end of a slot in said plates to hold its bar spaced a predetermined distance from the associated bar and retain the slotted end plates in place.

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