Nov. 12, 1940. E. C. McGUIRE ET AL 2,220,939

FOLDABLE CLOSURE

Filed Oct. 15, 1937 2 Sheets-Sheet 1

FIG. 1

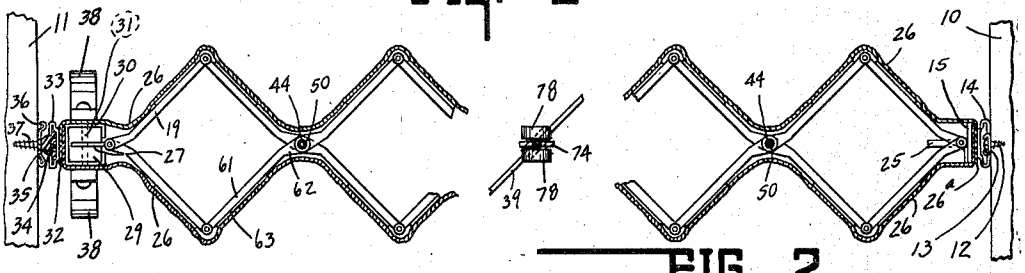


FIG. 2

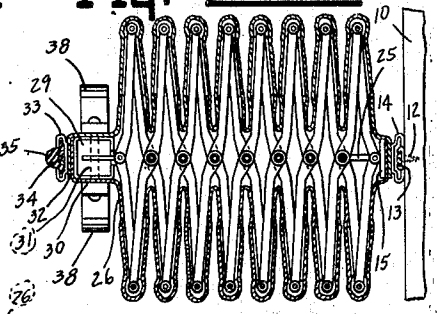


FIG. 4

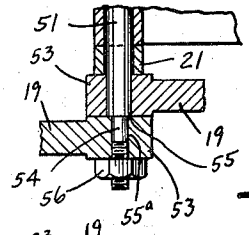


FIG. 5

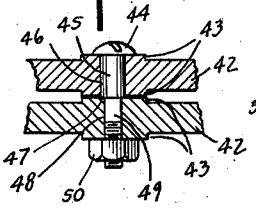
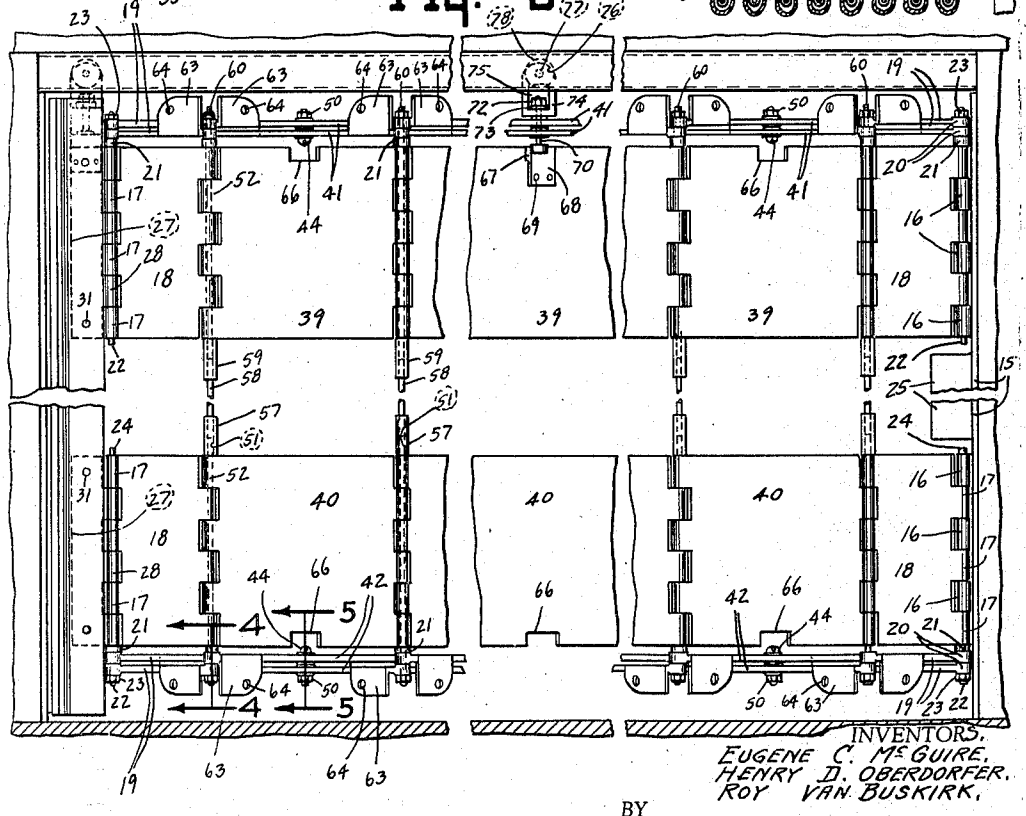


FIG. 3



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Filed Oct. 15, 1937 2 Sheets-Sheet 2

FIG. 6

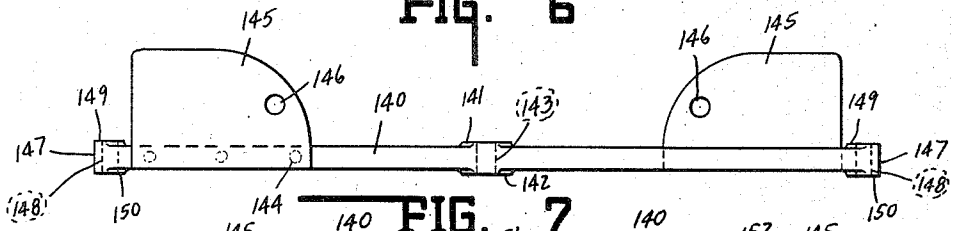


FIG. 7

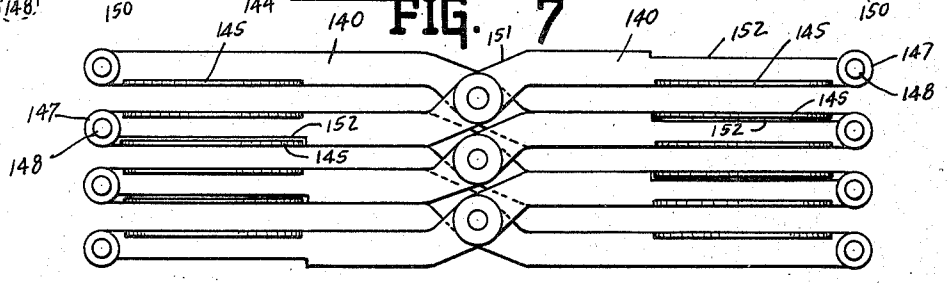


FIG. 8

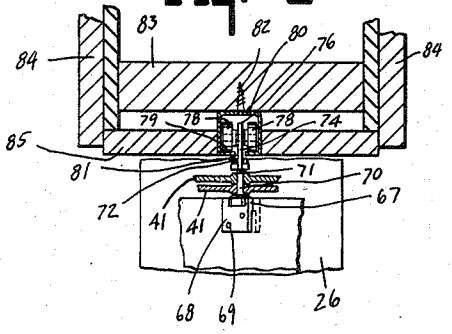


FIG. 9

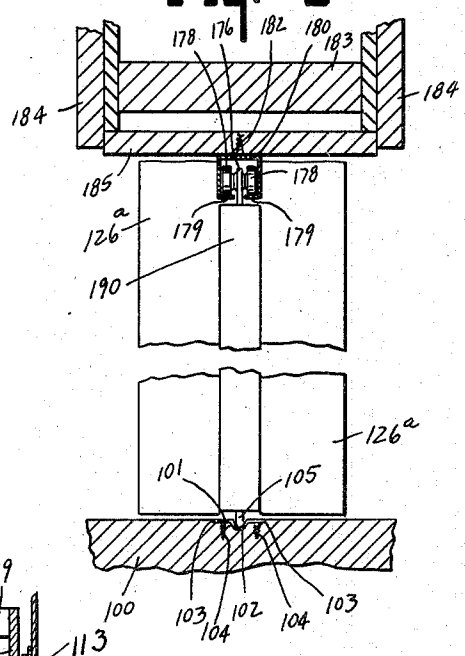


FIG. 10

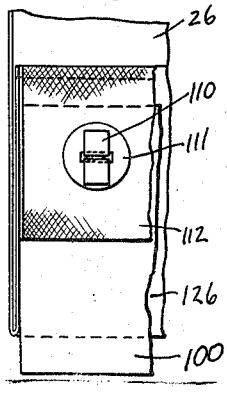


FIG. 11

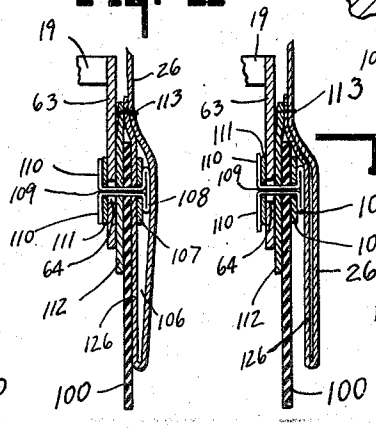


FIG. 12

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Patented Nov. 12, 1940 2,220,939

UNITED STATES PATENT OFFICE

2,220,939

FOLDABLE CLOSURE

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Application October 15, 1937, Serial No. 169,208

7 Claims. (Cl. 20—20)

This invention relates to a flexible door for a partition.

Structures of this character include a metallic frame work of articulated character for extension to partially or completely close an opening, the articulated frame work being covered by a flexible covering, the latter being supported by the frame work and movable therewith. The frame work and covering may also be collapsed into a relatively small volume adjacent the side of the opening.

Herein the invention is shown applied to a single flexible closure which, when extended, is adapted to completely close an opening, although it is understood that if the opening be sufficiently wide, two closures may be extended from opposite sides of the opening into complete closure closing relation.

The chief object of this invention is to simplify a closure structure of the general character mentioned, as well as its supporting arrangement and its locking arrangement when extended.

Another object of the invention is to provide an articulated frame work which is capable of substantially complete collapse into minimum volume.

Another object of the invention is to simplify the anchoring arrangement for mounting of the flexible covering upon the articulated frame work.

The chief feature of the invention consists in the formation of the respective posts of the closure support, the construction of the articulated frame work, the means for securing and/or supporting the flexible covering upon the latter and the means for facilitating the extension and collapse of the collapsible closure, whereby all of the foregoing objects are accomplished.

Other features of the invention will be set forth more fully in detail hereinafter.

The full nature of the invention will be understood from the accompanying drawings and the following description and claims:

In the drawings,

Fig. 1 is a transverse sectional view of one form of the flexible closure in the extended and closure closing position, intermediate portions being broken away and portions of the flexible covering being omitted for clearness.

Fig. 2 is a somewhat similar view of the same parts shown in Fig. 1, certain parts, however, being omitted, the illustrated parts being shown in the collapsed position.

Fig. 3 is a view similar to Fig. 1 but is an elevational view of the respective parts, the covering being omitted.

Fig. 4 is an enlarged sectional view taken on line 4—4 of Fig. 3 and in the direction of the arrows and of the hinge and tong connections.

Fig. 5 is a view similar to Fig. 4 taken on line 5—5 of Fig. 3 and in the direction of the arrows and of the tong connection.

Fig. 6 is a side elevational view of the tong structure, illustrating more especially a flexible covering anchorage.

Fig. 7 is a top plan view of a modified tong structure showing the same in completely collapsed relation.

Fig. 8 is a transverse vertical sectional view through the outer portion of the flexible closure and an overhead support therefor, as well as a modified connection therebetween.

Fig. 9 is a view, similar to Fig. 8, of a modified form of overhead support structure for a flexible structure and the lower portion illustrates a floor guiding arrangement therefor.

Fig. 10 is an enlarged elevational view of the tong support anchorage, the flexible covering and connection therebetween.

Fig. 11 is a transverse section thereof.

Fig. 12 is a view similar to Fig. 11 but of a slightly modified form of the invention, wherein greater accessibility for curtain attaching or detaching is incorporated.

In Fig. 1 of the drawings, 10 indicates one side wall of an opening and 11 an opposite wall. Therebetween and closing the opening, is a flexible closure or folding door construction. If the distance between walls 10 and 11 be sufficient, two curtains may be utilized, each of which would be anchored to a wall and be extensible toward the other wall into meeting engagement with each other, or retracted toward the supporting wall, as shown in Fig. 2, when collapsed. Herein, however, the width of the opening is represented as that which can be conventionally accommodated by a single curtain or folding door which is operatively secured to one wall and is extensible into closing position across the full width of the opening for detachable association with a fixture carried by the opposite wall 11.

Extending from top to bottom of the opening and suitably secured by a plurality of spaced screws 12, is an anchor strip, or a plurality of spaced clips, 13 which is yieldingly associated with a channel type strip 14, in turn suitably secured to an end member 15. The foregoing constitutes a latch and catch connection longitudinally coextensive with the side of the opening. The end member 15 includes near the top and bottom spaced tubular portions 16 in alignment

with each other and adapted to receive complementary tubular portions 17 on the semi-hinges 18, to which reference will be had hereinafter.

Positioned above the semi-hinge are the semi-tong members 19, each of which terminates in an enlarged and apertured end 20. A sleeve or spacer 21 is in alignment therewith and the aforesaid is in alignment with the tubular portions 16 and 17. A rod or hinge pin 22 mounts a nut 23, or the like, upon its upper end, as shown. The lower portion of the end member 15 is similarly provided with tubular portions 16 and the lower semi-hinge 18 includes complementary tubular portions 17. The semi-tongs 19 are positioned beneath the semi-hinge in inverted position relative to the upper semi-tongs. The hinge pin 22 mounts the nut 23 at the lower end and also supports the spacing sleeve 21 and has a projecting portion at its upper end, as indicated by the numeral 24.

Member 15 includes a reenforcing and stiffening rib 25, the upper edge of which terminates immediately adjacent the lower edge of the upper semi-hinge 18 and the lower end of said rib terminates immediately adjacent the upper edge of the lower semi-hinge 18. Member 15, etc., constitutes the anchor post.

A flexible covering 26, one for each side of the foldable curtain or door, has its ends 26*a* interposed between end member 15 and the anchoring member 14, and the same are all secured together in any suitable manner.

The opposite end of the foldable curtain or door is provided with semi-hinges 18 and having the tubular portions 17. Associated therewith are the butt portions 27 having the complementary tubular portions 28 and above the upper semi-hinges are positioned the semi-tongs 19, spaced therefrom by the sleeve 21, the same being associated together by the rod 22 mounting the nut 23 at its upper end. Similarly, the lower butt and lower semi-hinge are hingedly connected together by a rod 22 having the projecting portion 24 at its upper end. Positioned beneath the lower hinge are the lower semi-tongs 19 reversed with respect to the upper semi-tongs and reversed relative to the semi-tongs 19 at the opposite end of the closure. These tongs are spaced from the lower semi-hinge 18 by the sleeve 21 and all of the aforesaid is secured together by the nut 23.

The movable post of the foldable curtain includes an end member 29 which may be made of two pieces or a single slotted piece. or the like, in order to receive the butts 27. The same is encased by the substantially tubular member 30 and the entire arrangement—that is, butts, member 29 and member 30—is secured together by the rivets 31. The covering 26 on each side of the curtain, extends over opposite sides and the free ends overlap as at 32.

An end member 33 extends substantially the full length of the curtain and is secured to the tubular member 30 and/or the member 29 therein as by spaced screws 34, or the like. Member 33 is channeled shaped and yieldingly retains a cushion or bumper member 35 adapted to bear against a parallel bumper plate 36 suitably secured by spaced screws 37, or the like, to the wall 11.

The movable post structure herein described may include a lock or latch and the bumper plate 36 may be provided with a socket or catch for receiving the lock or latch. This permits the curtain to be locked in the closed position if, as and when desired, but since the aforesaid is common practice, an illustration thereof has been omitted for clearness from the present drawings but it is to be understood the same may be applied to the structure shown herein, if, as and when desired. It will be noted that the bumper mounting member 33 when anchored to the main portion of the end member or post structure, simultaneously anchors the opposite ends of the covering 26, before mentioned.

As shown clearly in Figs. 1 and 2, but omitted from Fig. 3, because the figure is broken away at the midportion, there are illustrated handle structures 38 suitably secured to opposite sides of the movable post, so that the foldable curtain may be readily moved into extended or collapsed position.

Reference will now be had more especially to Figs. 1 to 5, inclusive, respectively, wherein one form of curtain structure proper is specifically illustrated.

The articulated mechanism includes an upper series of hinge plates 39 hingedly connected together, as hereinafter set forth, as well as a lower series of hinge plates 40 similarly connected together. Above the upper series of hinge plates and below the lower series of hinge plates, is a lazytong, indicated generally by the numerals 41 and 42 respectively. These tongs are of full length and are of the same length as the length of the hinge plates 39 and 40. The tongs cross each other at the midportion of the hinge plates and at the crossing point are enlarged laterally as at 43. These collar enlargements 43 on each of the tong members eliminate the requirement of a washer therebetween.

The tong members are pivotally connected together at their central portions by a screw bolt 44 having an enlarged cylindrical portion 45 receivable by the bore 46 in the enlarged and central portion 43 of the innermost tong, reference being had to the top or bottom tong constructions. The same enlargement forms shoulder 47 which bears against the collar 43 of the outermost tong 42. The latter is apertured as at 48 and the reduced portion 49 of the bolt projects therethrough and is threaded to receive the nut 50 thereon. In this manner, the bolt 44 has a pivotal relation relative to the outermost tong and may be threaded into and therefore, be rigid with the innermost tong when desired.

The pivotal connection between adjacent ends of the tongs as well as the hinge connection between hinge plates, is not only illustrated clearly in Fig. 3 but the details thereof are illustrated more especially in Fig. 4. In these figures, there is provided a hinge pin 51 which terminates slightly above the upper edge of the lower hinge plate 18. The hinge pin projects through the abutting interfitting tubular portions 52 of the hinge plates and extends through the apertured and laterally enlarged end 53 of the tongs 19, see Fig. 4. The same also applies to the tongs 42. The lower end of the hinge pin is reduced as at 54 forming a shoulder 55 which bears on the enlargement 53 of the lower and outer half tong 19. The hinge pin reduction 54 is threaded and extends through the bore 55*a* of the latter tong 19 and the nut 56 rigidly locks the assembly together.

A sleeve 57 rests on the upper edge of the lower hinge plate 18 or 40 and telescopes the upper end of the pin 51 and provides a socket for the reception of the lower end of a spacing and frame stiffening rod 58, the upper end of which has

riveted to it the lower end of a sleeve portion 59. It may, if preferred, be press fitted or otherwise rigidly secured to the lower end of the hinge pin 60 which extends through the tubular portions 52 of the upper hinge structure 39 and through the enlarged ends of the tongs or half tongs 41 or 19, respectively, thus pivotally uniting the half tongs together, pivotally uniting the hinge plates together and mechanically uniting both arrangements—that is, the lazytong and hinge plate arrangements for simultaneous and similar movement.

The assembly may be affected by first mounting rod 51 in the lower mechanism, then taking a rod 58 of substantially the same diameter and of the required length with the sleeve 59 secured thereto at its upper end and positioning the same in alignment, it being understood sleeve 57 is slidably supported on the rod 58. When the rods 51 and 58 are in alignment, the sleeve 57 is permitted to telescope the upper exposed or projecting end of the rod 51. Following this assembly, the hinge pin 60 is passed through the ends of the tongs 19 and 41 of the upper series and through hinge structures. If, as and when desired, the washers or spacing sleeves 21, previously described, may be omitted, and the spacing function thereof may be supplied by vertically enlarging the tongs at the hinge portions.

Each tong, as shown clearly in Figs. 1 and 2, has its longitudinal portion 61 offset appreciably from the central or intermediate portion 62. Each tong includes a wing or fin 63, the latter having an anchoring aperture 64. Each half tong 19 is also provided with a wing of the aforesaid character. The lazytong structure resulting from the assembly of these tongs, is shown in the extended or expanded position in Fig. 1 and in the collapsed position in Fig. 2. In Fig. 1, the flexible covering 26 extends over and masks the upper and lower lazytongs and the upper and lower hinge plate structures. As shown clearly in Fig. 2, the covering, when the structure is collapsed, similarly masks the aforesaid but is enfolded between adjacent portions of adjacent tongs.

Each of the full width hinge plates is slotted as at 66. Nested in the slot on one or more of the upper hinge plates, is a trolley structure, shown more particularly in Figs. 3 and 8.

A U-shaped base structure 67 nests in the notch 66 and has wings 68 that straddle the plate. Spot-welding, screws, rivets, or the like 69 secure the trolley base to the hinge plate at its midpoint. This point has no transverse movement but only has movement longitudinally of the plane of the opening in the extension or collapse of the folding structure.

Projecting upwardly from said base 67 is a pivot pin 70 which takes the place of the screw bolt 45, in that it forms a pivot for the adjacent tongs 41. The upper end of the pin 70 is threaded as at 71 and a nut 72 bearing on a washer 73 suitably secures to the pin a trolley structure including a hanger 74 having the chamber or recess 75 exposing the nut 72. An upwardly extending plate portion 76 mounts an axle 77 that carries at opposite ends rollers 78. The rollers 78 roll upon the parallel portions 79 of a partially tubular structure 80 having the slot 81 therein, in which is positioned the hanger 74. This trolley trackway is suitably secured as at 82 to a member 83 that extends across the top of the opening.

If a concealed form of trackway is desired, the wall above the opening, indicated generally by the numeral 84 at each side of the opening, is extended and is closed by the portions 85 that are flush with the track portions 79.

In Fig. 9 there is illustrated a modified form of the invention. In this form of the invention the overhead trackway is relatively exposed and similar numerals of the one hundred series indicate like parts. In this figure, the pull post structure is indicated generally by the numeral 190. Projecting upwardly therefrom is a stem 176 carrying an axle that projects oppositely therefrom which mounts the rollers 178 that roll on the track portions 179 of the slotted tubular overhead track 180. Inasmuch as Fig. 9 is broken away, the handle connections at opposite sides of the pull post are omitted. If, as and when desired, the curtain support shown in Fig. 9 may be applied to the structure as shown in Figs. 1 to 3, inclusive.

Also as shown in Fig. 9, the floor 100 may receive a lower track plate 101 grooved as at 102 and recessed as at 103 into the floor and secured thereto as at 104. A guide pin 105 may project downwardly from the pull post 190 and ride or slide in said groove. If desired, the pull post may mount a roller instead of a pin and this would roll on the grooves. Whenever desired, or required, one or more or each of the lower bolts 45 may be extended sufficiently to have the lower end ride in groove 101. This variation is within the scope of this disclosure because the upper central portion of Fig. 3 as well as Figs. 8 and 9 illustrates the equivalent addition to the upper pivot aligned therewith.

Reference will now be had to Figs. 10 and 11 wherein one form of mounting the flexible covering is illustrated. In said figures, the wing or fin portion 63 of the tong 19 is apertured as at 64. The fabric 26 has a portion 126 turned back upon itself to form a loop 106 which nests a washer 107 against which bears the head 108 of a "paper" fastener, or like device, having the divided legs 109 with lateral extensions 110 bearing on the washer 111 positioned adjacent one side of the wing or fin 63.

A relatively heavy canvas braid or strip 112 is suitably secured to the overlapped portion 126 of the fabric or flexible covering as by the sewing or stitching 113. Thus, the head 108 of the fastener bears on the washer 107, which bears on the inturned portion 126 of the covering and fastener portions 109 extend through the aperture in the washer, register in holes in the fabric strip and the inturned portion of the covering and then extend through the aperture 64 in the fin 63, and through the washer 111 to anchor the construction together with a detachable anchorage.

A modified form of cover anchorage and one which is considerably simpler to mount, is illustrated in Fig. 12. In this form of the invention, the same numerals are applied to like or similar parts, the difference being that in place of the loop 106 nesting the head of the fastener 108 and the washer 107, the washer 107 herein bears directly on the fabric strip 112 and the head and washer are interposed between the fabric strip and the turned back portion 126 of the cover. This permits all of the fastenings to be readily attached to or detached from the wings.

The heavy canvas braid or strip 112 serves more or less as a cover stiffening element and may, if desired, be projected downwardly to a greater extent than shown in Figs. 10, 11 and 12.

It, therefore, serves as a reenforcing member for the bottom and top of the flexible covering.

Whenever it is desired to "soundproof" the construction there is applied at the top thereof, or at the bottom, or preferably at both ends a continuous strip, substantially as long as the covering is wide when extended and of a width sufficient to just wipe or sweepingly contact the upper frame or ceiling or the floor.

In Figs. 10 and 11, such a rubber-like strip 100 is nested between the braid portion 112 and the fold portion 126 of the covering. Said sweep 100 is anchored to the linkage arrangement by anchoring members 108, 109 and 110 to the several adjacent ears 145 (see Figs. 3 and 6). Two strips at the top and two at the bottom of the closure may be employed although one at each end usually is sufficiently effective for soundproofing purpose.

In Fig. 12 the strip 100 is illustrated as similary nested and mounted. It may, however, in either instance be interposed between the braid portion 112 and ear 63.

In Figs. 6 and 7, a modified form of the tong invention is illustrated. In Fig. 6, the numeral 140 indicates a tong member having the central lateral enlargements 141 and 142 centrally apertured as at 143. Near the end of the tong is suitably secured, by casting integral therewith, uniting the same, or by spot welding as at 144, a fin member 145 having the staple receiving opening 146 for flexible cover anchorage. Each end of the tong terminates in an embossment 147 apertured at 148 and laterally enlarged as at 149 and 150. This form of the invention differs from that shown in Figs. 1 and 2 in that each tong is offset to a slightly greater degree as at 151 and each tong also is provided with a notch 152 that nests the adjacent wing of the adjacent tong when the tongs are collapsed. This permits the lazytong structure to substantially completely collapse and to a greater degree than the collapse shown in Fig. 2.

While the invention has been illustrated and described in great detail in the accompanying drawings and preceding description, the same is to be considered illustrative and not restrictive in character.

Various modifications of the invention herein disclosed will readily suggest themselves to persons skilled in this art and the same are all considered to be within the broad scope of the invention, reference being had to the appended claims.

The invention claimed is:

1. In a flexible closure, the combination with two end members of approximate closure height, an upper series of articulated hinge plates, a lower and spaced series of articulated hinge plates, an upper lazytongs above the hinge plates, and a lower lazytongs below the hinge plates, of a wing on each end of each tong of the lazytongs and projecting oppositely from the adjacent hinge mechanism, and flexible covering means secured to said wings for enclosing the lazytongs and articulated mechanisms and foldable and extensible therewith.

2. In a flexible closure, the combination with two end members of approximate closure height, an upper series of articulated hinge plates, a lower and spaced series of articulated hinge plates, an upper lazytongs above the hinge plates, and a lower lazytongs below the hinge plates, of an elongated latch and catch connection between a wall opening and one of said members and substantially coextensive with the latter for detachably supporting the closure in plumb relation at one side of the opening.

3. In a flexible closure structure, a lazytongs including a plurality of superposed pairs of tongs positioned side by side, each tong having its end portions in parallelism but offset, adjacent ends of adjacent pairs of tongs being pivotally connected together, midportions of each pair of tongs having pivotal connection.

4. In a flexible closure structure, a lazytongs including a plurality of superposed pairs of tongs positioned side by side, each tong having its end portions in parallelism but offset, adjacent ends of adjacent pairs of tongs being pivotally connected together, midportions of each pair of tongs having pivotal connection, each tong at each end including oppositely directed aligned projections.

5. In a flexible closure structure, a lazytongs including a plurality of superposed pairs of tongs positioned side by side, each tong having its end portions in parallelism but offset, adjacent ends of adjacent pairs of tongs being pivotally connected together, midportions of each pair of tongs having pivotal connection, each tong from adjacent each end and directed toward the midportion and on each of the opposite sides including an anchoring projection, the adjacent tong immediately adjacent the projection including a notch sufficient for projection accommodation or nesting to permit substantially complete collapse of the lazytong.

6. In a flexible closure, the combination with two end members of approximate closure height, an upper series of articulated hinge plates, a lower and spaced series of articulated hinge plates, an upper lazytongs above the hinge plates, a lower lazytongs below the hinge plates, of a wing on each end of each tong of the lazytongs and projecting oppositely from the adjacent hinge plates, a trolley structure, a trolley structure support secured to the hinge plate arrangement, said lazytongs including a pivot forming means, said means including a U-shaped member straddling a hinge plate, the latter including a notch adjacent the lazytongs pivot, said U-shaped member being nested in the hinge plate notch, and having its arm portions upon opposite sides of notched hinge plate with the plate therebetween, and flexible covering means secured to said wings for enclosing the lazytongs and articulated hinge plates as well as the U-shaped member, said covering means being foldable and extensible with the lazytongs and articulated hinge plates.

7. In a flexible closure structure, tongs including a plurality of superposed pairs of tongs positioned side by side, each tong having its end portions in parallelism but offset, adjacent ends of adjacent pairs of tongs being pivotally connected together, midportions of each pair of tongs having pivotal connection, each tong at each end including oppositely aligned projections and each tong from adjacent each end and directed toward the midportion and on each of the opposite sides of the tong including an anchoring projection, the adjacent tong immediately adjacent the last mentioned projection including a notch sufficient for adjacent projection accommodation or nesting to permit substantially complete collapse of the lazytong.

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