Jan. 15, 1929. 1,698,996

C. H. NORDELL

FOLDABLE CURTAIN

Filed June 17, 1927 2 Sheets-Sheet 1

Fig. 1

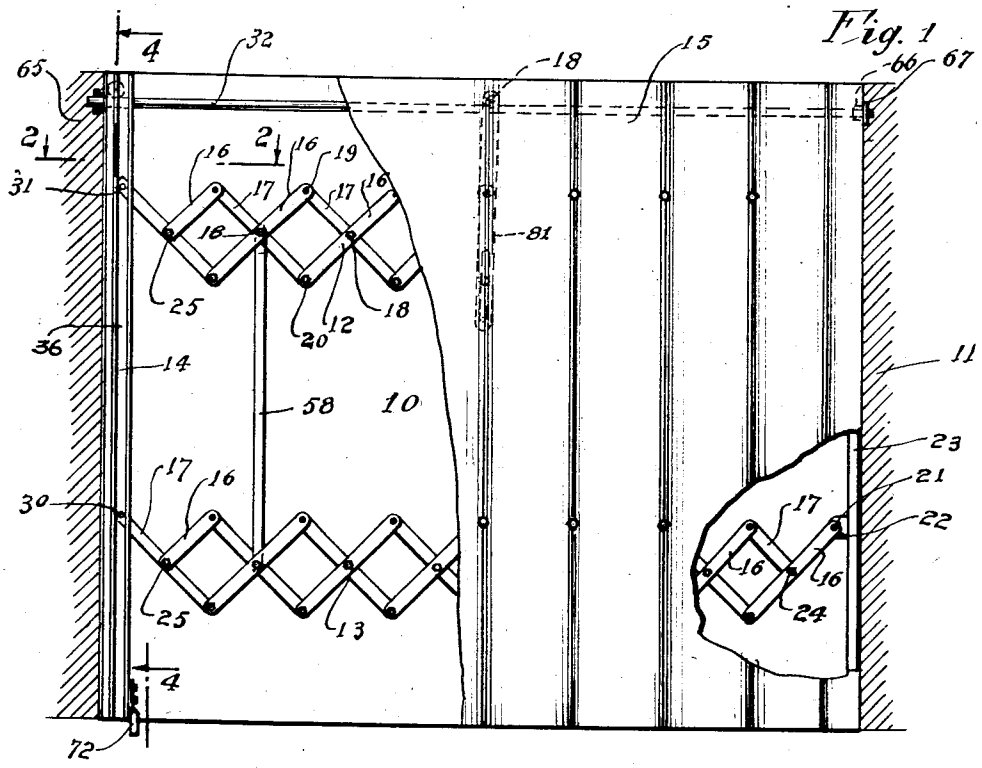
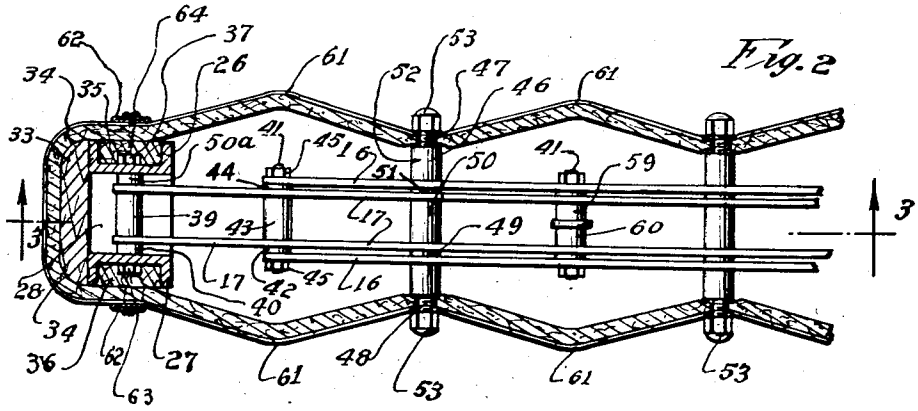


Fig. 2



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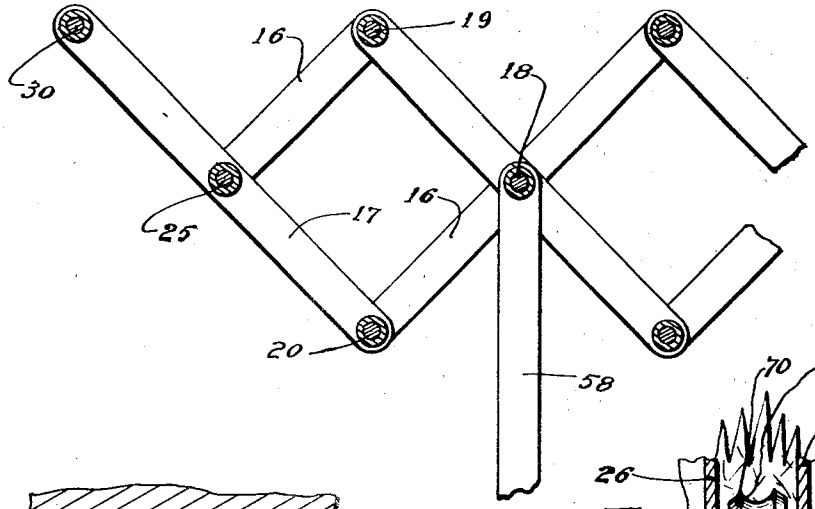
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Filed June 17, 1927 2 Sheets-Sheet 2

Fig. 3



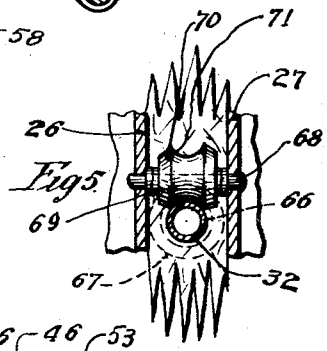


Fig. 5

Fig. 6

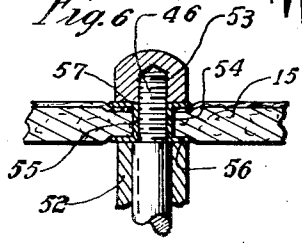
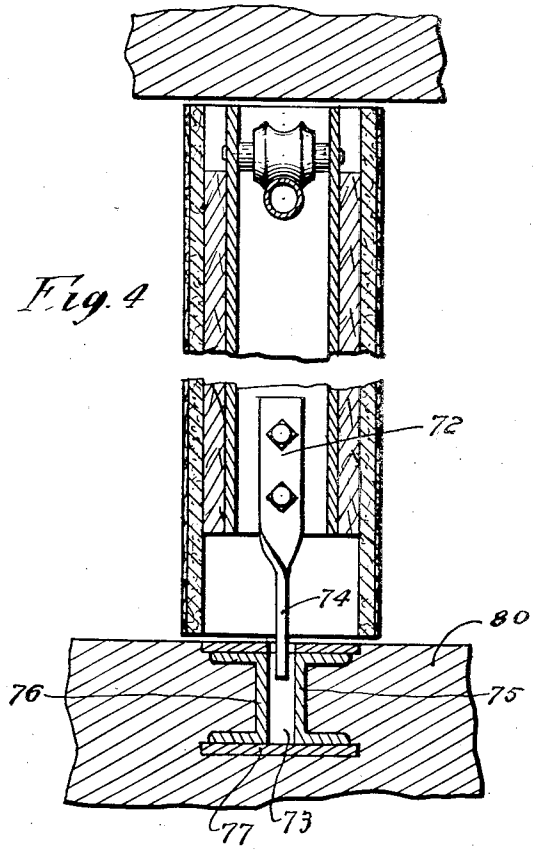


Fig. 4



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Patented Jan. 15, 1929. 1,698,996

UNITED STATES PATENT OFFICE.

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FOLDABLE CURTAIN.

Application filed June 17, 1927. Serial No. 199,427.

The present invention relates to foldable curtains, being more particularly concerned with the provision of foldable curtains which are adapted to be used for dividing large rooms into smaller units, as well as for closing openings in rooms of all kinds.

One of the objects of my invention is the provision of a foldable curtain comprising a uniformly extensible framework and an envelope of sound insulating and heat insulating material which is operatively connected to said framework to be extended to form a curtain or folded into a small space, and which is covered with an external layer of ornamental material to harmonize with surrounding decorations.

Another object of my invention is the provision of a foldable curtain of the class described in which a relatively stiff foldable envelope is supported on an extensible framework, which is in turn supported by said envelope and which is adapted to effect the uniform extension or folding of said envelope.

Another object of my invention is the provision of a novel foldable curtain of the class described, comprising a simplified assembly of links in which many of the parts used in such curtains have been eliminated by the use of extensible members directly supported by the curtain to insure its uniform extension.

Other objects and advantages of my invention will appear more fully from the following description and from the accompanying drawings in which similar characters of reference indicate similar parts throughout the several views.

Referring to the drawings:

Figure 1 is an elevational view with the cover partially removed to show the mechanism of my foldable curtain;

Figure 2 is an enlarged plan cross sectional view of the same on a line 2—2 of Figure 1;

Figure 3 is an enlarged detailed view of the extensible member;

Figure 4 is an elevational view of the guide mechanism taken on the direction of arrows 4—4 in Figure 1;

Figure 5 is an enlarged detailed cross sectional view of the upper guide and support; and

Figure 6 is an enlarged detailed cross sectional view of the means for securing the curtain to the extensible member.

Referring to Figure 1, 10 indicates in its entirety my foldable curtain, which in its most elementary form comprises a support 11 consisting of a wall or door frame of the building, a plurality of extensible members 12 and 13, a transverse frame member 14 and a foldable envelope 15 carried by said members.

The extensible members 12 and 13 may be formed of a plurality of metal links 16 and 17 pivoted to each other at their mid-points 18, each link 16 having its end pivotally secured to the end of another link 17. The links 16 and 17 thereby form a plurality of closed linkages having the shape of a parallelogram and forming an extensible member which is capable of rectilinear extension, either by causing the upper pivots 19 to approach the lower pivots 20 or by exerting force to separate the middle pivots 18. The extensible members 12 and 13 may be supported at one end by being pivotally connected as at 21 to a pair of right angle brackets 22 carried by a transverse frame member 23 which is affixed to the wall 11. As it is only necessary to affix one set of the links to the frame member 23, the lower end of the last links 17 may be eliminated and the link 17 may end at the mid-point 24 of the adjacent link 16.

In a similar manner the lower end of the forward link 16 may also be eliminated, the first link 16 terminating at the mid-point 25 of the first link 17 and the first link 17 may be pivotally secured to the transverse frame member 14 in a manner further to be described.

The transverse frame member 14 may consist of a pair of channeled metal members 26 and 27, having their channels outwardly turned and the channeled members 26 and 27 may be secured together in spaced relation by a plurality of wooden blocks 28 and 29, which may completely fill the space between said channeled members with the exception of the points 30 and 31, where the extensible members are pivotally attached and with the exception of the upper end through which the guide 32 passes.

It will thus be observed that the channeled members 26 and 27 may be secured together upon the blocks 28 and 29 by a plurality of bolts, rivets or other convenient fastening means, in such manner as to provide a transverse frame member which is light in weight but which is not subject to the defects of

warping, as would be the case with a wooden frame member.

The forward edge of the transverse frame member 14 may be rounded off by securing to the blocks 28 and 29 a molding strip 33 of substantially the same width as the distance between the outer edges of the channeled members 26 and 27. The space within the channels of the channeled members 26 and 27 may also be filled by a pair of wooden strips 35 and 36 adapted to fit closely in said channels, flush with the outer edges of the channeled members and completely filling said channels. The wooden strips 35 and 36 may be hollowed out at the points 30 and 31 to make room for the heads of the bolts 37, forming the pivotal connection with the extensible members 12 and 13.

Referring to Figure 2, I have here shown an enlarged detailed sectional view, of the extensible linkage, one on each side, in order to impart to the framework the desired degree of rigidity in a direction transverse to the curtain. The channeled members 26 and 27 may be provided with suitable apertures as at 30 and a bolt 37 may pass through the apertures in the channel 26, a washer 50^a, the end of the link 17, a tubular spacing member 39, the end of the other first link 17, a washer 40 and the other channeled member 27.

A pivotal connection is thereby provided for each end of the double sets of linkage which comprises one extensible member 13.

At the mid-points 18 of the links and at the points 25 which represent the end of the first link 16 and the mid-point of the first link 17, a similar form of pivotal connection may be provided with the exception that the bolt is not attached to any transverse frame member. For instance, the bolt 41 may pass through the end of link 16, a washer 42, through the mid-point of the link 17, through a tubular spacing member 43, the mid-point of another link 17, a washer 44, the end of another link 16, the whole being secured together by a nut 45. The connection of the links 16 and 17 at their mid-points through the extensible members 12 and 13 may be practically the same as that just described.

At certain of the pivotal connections for the links 16 and 17 I provide means for attaching the extensible members 12 and 13 to the foldable envelope 15. In the present instance I have supported the extensible members 12 and 13 at each end by one of the upper pivotal points and for this reason I prefer to form the upper pivotal points throughout the extensible members, in such manner that they may provide means for attaching an envelope.

I desire it to be understood, however, that any one of the pivotal points 18, 19 or 20 may be employed for this purpose, providing these pivotal points are likewise used for attaching to the support 11 and to the transverse frame member 14. In other words, the extensible members 12 and 13 might be pivotally attached to the support at the point 24 and to the transverse frame member at the point 25, in which case the central pivots 18 would be used for attaching the curtain to the extensible members.

The attaching pivots, which in the present instance comprise the pivots 19, may be formed as follows: I prefer to provide elongated bolts 46, preferably threaded at each end 47, 48, so that the curtain may be detached at either side. The bolts 46 pass through the upper ends of one link 16, through a washer 49, through the upper end of a link 17, through a tubular spacing member 50, through the upper end of another link 17, a washer 51 and through the upper end of another link 16. Upon each side of the exterior links 16 on the bolts 46 I provide tubular spacing members 52 of sufficient length to extend from the links 16 to a distance flush with the surfaces of the wooden strips 35 and 36, and the bolts 46 are of sufficient length to project beyond the spacing members 52 enough to pass through the envelope 15 and provide threads for the cap nuts 53. It will thus be observed that the bolt 46 with its spacing member is adapted to provide a pivotal connection for the upper ends of the links, as well as a means for connecting such point of pivot to the envelope 15.

Referring to Figure 6, I have here shown the detailed construction of the connection between the bolts 46 and the envelope 15. The envelope 15 may be provided with a plurality of apertures 54 suitably located as hereinafter described and the apertures 54 may be reinforced, preferably by grommets 55 of any standard construction. The grommets 55 may consist of tubular members with an outwardly extending annular flange 56 and when the tubular member 55 has been inserted in the aperture 54 a ring 57 of similar shape to the flange 56 may be placed upon the tubular member 55 and riveted thereon, compressing the envelope 15 about the aperture 54.

It will thus be observed that the flanges 56 and 57 of the grommet 55 are adapted to bear against the spacing members 52 and the cap nut 53 so as to protect the envelope from injury or wear by these members.

The supporting frame member 23 may, if desired, be made similar in form to the transverse frame member 14, consisting of a pair of channeled members 26 and 27, held in spaced relation upon blocks 28 and 29 without the molding strip 33. In such case the pivots 21 may be of similar form to the pivots 30 previously described and the right angle brackets 22 may be eliminated.

In order to assure the uniform extension of the extensible member 12 with the extensible member 13 and vice versa I provide a

plurality of connecting links 58 which consist of flat metal links pivotally connected between any of the similar pivots which are not used for attaching the curtain. For instance, in Figure 1 the link 58 is connected between one of the middle pivots 18 on the top extensible member 12 to the corresponding middle pivot 18 on the lower extensible member 13. It will be obvious that as the members 12 and 13 extend, the links 16 and 17 assume a position more nearly horizontal and as the upper pivot points 19 are supported in the envelope 15 the middle pivot points 18 and lower pivot points 20 rise during such extension.

The purpose of the link 58, therefore, is to assure that the middle points 18 of the lower extensible member 13 rise at the same rate as the pivot points 18 on the upper extensible member 12 and vice versa, thereby assuring that both of the extensible members will be extended at the same rate and the forward frame member 14 will be maintained substantially vertical. The connecting links 58 should preferably be employed at every fourth or fifth one of the links 16 and for this purpose the tubular spacing member 50 may be split in two parts 59 and 60 so that the bolt 41 may pass through the link 58 as well.

While I have illustrated a plurality of extensible members 12 and 13, I desire it to be understood that my invention may be employed with but a single extensible member 12 in which case the extensible member should preferably be so connected to the transverse frame member 14 so that it will maintain said frame member at right angles to the line of motion. For this purpose the first link 16 may be extended to meet the frame member 14, being attached thereto by a pivoted connection in a slot formed in the frame member 14.

The framework provided by the extensible members 12 and 13 and the frame member 14 may be covered with an envelope 15 comprising a relatively thick layer of felt, having an outer layer of ornamental material, such as silk, tapestry, artificial leather, leather, or other ornamental fabric. The envelope 15 may consist of a single length of such material, having one end affixed to the frame member 23 by nails or other convenient fastening means, the strip passing about one side of the extensible frame around the end frame member 14 and back upon the other side to be affixed to the other side of the frame member 23. The width of the strip comprising the envelope 15 is such that it will fit quite closely to the opening to be closed and the length should be such that when the frame is completely extended, as shown in Figure 2, the envelope bulges outward slightly at points intermediate its attachment to the frame as at 61. The purpose of this slight excess of material in the envelope is to assure the outward folding of the envelope when the extensible member is moved to folded position.

If desired the envelope 15 may be provided with vertical lines of stitching along the lines 61 midway between the bolts 46 but such lines of stitching are not necessarily required.

The apertures 54 and grommets 55 are previously formed and fastened in the envelope 15 so that the envelope may be attached to the pivot points of the framework by simply passing the bolts 46 through the grommets 55 and attaching the cap nuts 53. The envelope 15 may be attached to the end frame member 23 and to the transverse frame member 14 by means of tacks, screws, or other convenient fastening means, and such tacks should preferably be covered by a self-closing tacking strip 62. The tacking strip 62 comprises a strip of similar material to that used on the external layer of the envelope, said strip being folded back upon itself as at 63 and having a beaded edge 64. The strip is generally provided with a line of stitching near the beaded edge in such manner that the beaded edges 64 may be bent apart, a tack inserted and driven through the strip and envelope and the beaded edges 64 permitted to spring together to conceal the tack. It will be obvious that such strips may also be employed, where it is desired to form a joint in the envelope 15, if two pieces of material are employed instead of a single strip.

My foldable curtain is preferably provided with means for support of the transverse frame member 14 and means for guiding the curtain at its upper end or edges. In order to guide the curtain at its upper edge and to provide convenient means for the support of the same, I prefer to provide a curtain rod 32 which may consist of a tubular member of metal of sufficient length to extend from the support 11 to the opposite end 65 of the opening to be closed by the curtain. The curtain rod 32 may be supported at its ends by a tubular bracket 66, having an outwardly extending flange 67 to be affixed with screws or other fastening means to the supports 11 and 65. The tubular bracket 66 may be provided with set screws or other convenient fastening means for fixing the position of the curtain rod 32 and if desired the brackets may be located flush with the outer surface of the wall.

As has been previously described, the block 28 which forms a spacing member for the channeled members 26 and 27 does not extend to the upper end of the transverse frame member 14 but terminates below the pivot 31. The molding strip 33 may likewise be terminated a short distance below the upper end of the transverse frame member 14 sufficient to permit the curtain rod 32 to project through the frame member 14, or the molding strip 33

may be provided with a suitable aperture for the curtain rod 32.

Referring to Figure 5, I have here shown a fragment of the upper end of the frame member 14 and the channeled members 26 and 27 may be provided with an aperture to receive the bolt 68 which supports a pair of washers 69 and a grooved pulley 70. The curvature of the groove 71 in the roller 70 is preferably adapted to fit the curtain rod 32 and the roller is preferably located at such height as to support the frame member 14 and curtain just out of contact with the floor.

My curtain is also provided with guide means for the bottom of the curtain which may comprise a slider 72 conveniently affixed to the lower end of the block 29 and adapted to slide in guide 73. The slider 72 may consist of a strip of sheet metal having a pair of apertures for fastening the same by bolts or screws to the block 29 and having a twist at the end of said block so the opposite end 79 of said slider extends in a direction parallel to the line of motion.

The guide 73 may consist of a pair of channeled members 75 and 76 with their channels outwardly turned and secured in spaced relation upon a supporting plate 77 so as to form a central groove 73. The upper flanges of the channels 75 and 76 may be covered with sheet metal facing strips 78 and 79, spaced from each other a distance sufficient to receive the end 74 of the slider and adapted to form a smooth and finished surface against which said slider may slide.

The whole guide structure 73 may be disposed within the floor 80 in such manner that the facing strips 79 and 80 are flush with the surface of the floor and there are no projections formed upon the floor.

While I have found that it is sufficent to support the end of the curtain by means of the roller 71, where the curtain is of unusual length, it may be desirable to provide additional support at intermediate points and if desired this support may consist of a pair of links 81 pivotally secured to one of the upper pivot points 19 on each side and having an elongated slot to receive the bolt of the lower pivot point 20. The links 81 may be extended above the pivots 19 substantially to the top of the curtain where they may likewise be provided with a transverse bolt 68 having a similar roller 71 to support the curtain at intermediate points. The bolt 68 may be riveted at its ends as in Figure 5.

It will thus be observed that I have invented a foldable curtain which may be covered with an envelope of heat insulating and sound insulating material, having an exterior ornamental surface adapted to harmonize with the surroundings and that my extensible members are adapted to fold such an envelope into a space which is a very small fraction of the extended size of the curtain. It will also be observed that the curtain is supported directly upon the extensible members at a plurality of pivotal points and the provision of a double set of extensible links provides a curtain having high degree of rigidity in a direction transverse to the curtain. My extensible members are also adapted to extend uniformly at the same rate and maintain the forward edge of the curtain substantially vertical while the simple and convenient guides which are provided are relatively inconspicuous and capable of supporting the curtain in folded relation or guiding its motion during extension.

While I have illustrated and described a specific embodiment of my invention, many modifications may be made without departing from the spirit of the invention and I do not wish to be limited to the precise details of construction set forth but desire to avail myself of all changes within the scope of the appended claims.

Having thus described my invention, what I claim as new and desire to secure by Letters Patent of the United States, is as follows:

1. In a foldable curtain, the combination of a support, a plurality of uniformly extensible members carried by said support, a transverse frame member supporting said extensible members and a flexible envelope carried by said members and having a plurality of points of connection to said members to insure uniform extension of said envelope.

2. In a foldable curtain, the combination of a support, a plurality of uniformly extensible members carried by said support, a transverse frame member supporting said extensible members and a flexible envelope carried by said members and having a plurality of points of connection to said members to insure uniform extension of said envelope, said envelope comprising a layer of felt and an external layer of ornamental material.

3. In a foldable curtain, the combination of a support, a plurality of uniformly extensible members carried by said support, a transverse frame member supporting said extensible members and a flexible envelope carried by said members and having a plurality of points of connection to said members to insure uniform extension of said envelope, said extensible members having a plurality of transverse pins and said envelope having a plurality of apertures to receive said pins.

4. In a foldable curtain, the combination of a support, a plurality of uniformly extensible members carried by said support, a transverse frame member supporting said extensible members, a flexible envelope carried by said members and having a plurality of points of connection to said members to insure uniform extension of said envelope, a rod carried by a frame and a roller carried by said transverse frame member to support said curtain on said rod.

5. In a foldable curtain, the combination of a support, a plurality of uniformly extensible members carried by said support, a transverse frame member supporting said extensible members, a flexible envelope carried by said members and having a plurality of points of connection to said members to insure uniform extension of said envelope, a rod carried by a frame, a roller carried by said transverse frame member to support said curtain on said rod, and a guide member for the lower edge of said transverse frame member.

6. In a foldable curtain, the combination of a support, an extensible member having one end pivoted to said support, said member comprising two sets of links pivoted end to end, the corresponding links crossing each other and being pivoted at their mid-points, a transverse frame member carried by the end of said extensible member, and an envelope fixed to said support and transverse frame member and having a plurality of points of connection to said extensible member at pivots of said links.

7. In a foldable curtain, the combination of a support, a plurality of extensible members each having one end pivoted to said support, said members each comprising two sets of links pivoted end to end, the corresponding links crossing each other and being pivoted at their mid-points, a transverse frame member carried by the ends of said extensible members, and an envelope fixed to said support and transverse frame members and having a plurality of points of connection to said extensible member at pivots of said links.

8. In a foldable curtain, the combination of a support, a plurality of extensible members each having one end pivoted to said support, said members each comprising two sets of links pivoted end to end, the corresponding links crossing each other and being pivoted at their mid-points, a transverse frame member carried by the ends of said extensible members, an envelope fixed to said support and transverse frame member and having a plurality of points of connection to said extensible member at pivots of said links, and means for assuring the uniform extension of said extensible members.

9. In a foldable curtain, the combination of a support, a plurality of extensible members each having one end pivoted to said support, said members each comprising two sets of links pivoted end to end, the corresponding links crossing each other and being pivoted at their mid-points, a transverse frame member carried by the ends of said extensible members, and an envelope fixed to said support and transverse frame members and having a plurality of points of connection to said extensible member at pivots of said links, said curtain having a plurality of reinforced apertures and a plurality of said links being pivoted on members passing through said apertures.

10. In a foldable curtain, the combination of a support, a plurality of extensible members each having one end pivoted to said support, said members each comprising two sets of links pivoted end to end, the corresponding links crossing each other and being pivoted at their mid-points, a transverse frame member carried by the ends of said extensible members, an envelope fixed to said support and transverse frame members and having a plurality of points of connection to said extensible member at pivots of said links, means for assuring the uniform extension of said extensible members, and means for supporting said transverse frame member including upper and lower guides.

11. In a foldable curtain the combination of a support with a pair of extensible members, said members comprising a plurality of links each pivoted to another at its mid-point and at its ends, a plurality of rods for pivoting said links, and a foldable envelope having a plurality of apertures, said apertures receiving a plurality of said rods to connect said envelope to be extended with said extensible members.

In witness whereof, I hereunto subscribe my name this 14th day of June, 1927.

CARL H. NORDELL.