March 4, 1930. C. H. NORDELL 1,749,191

FOLDABLE CURTAIN

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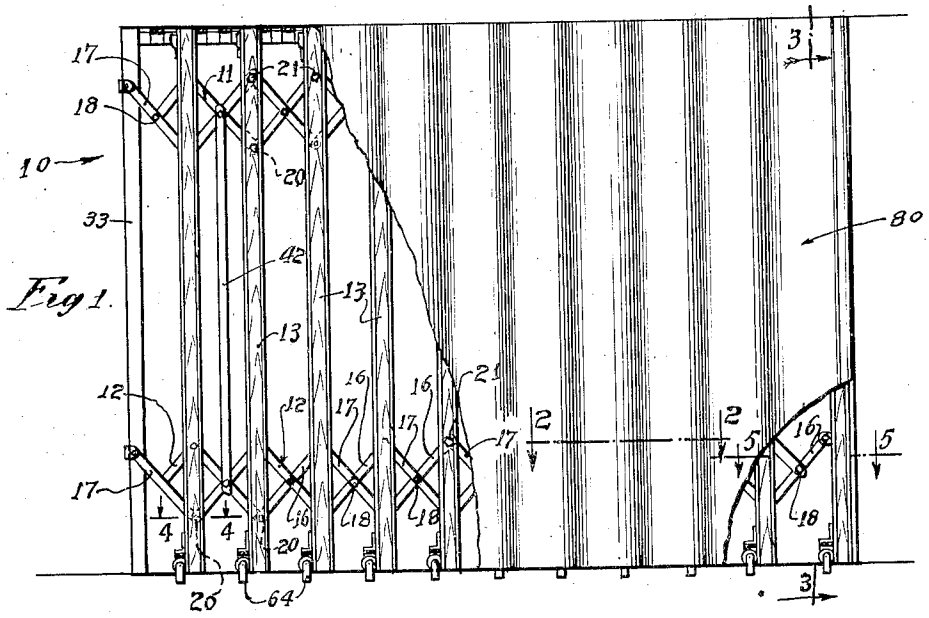


Fig 1.

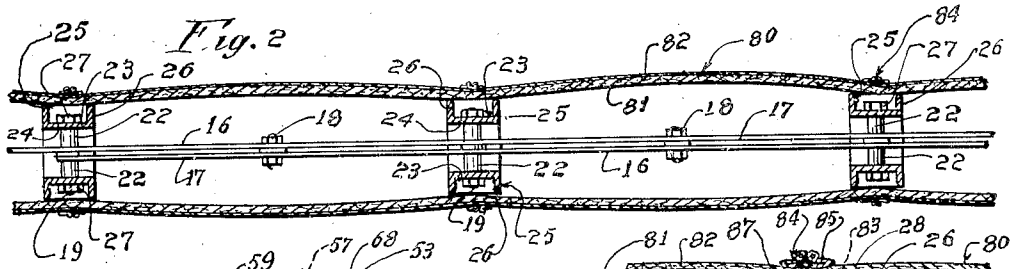


Fig. 2

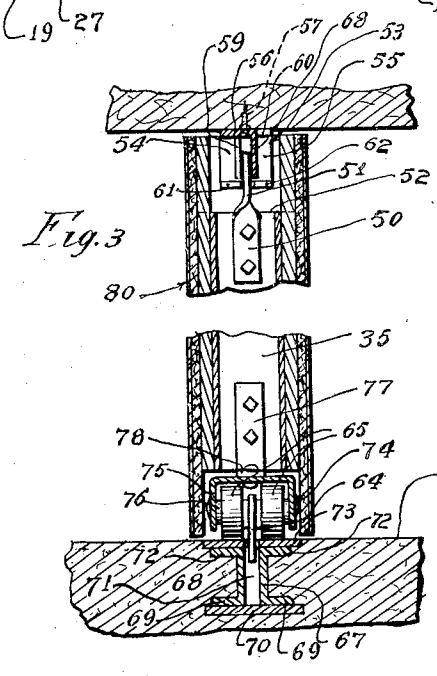


Fig. 3

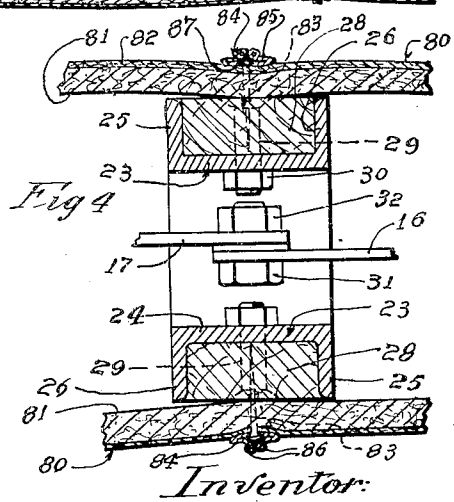


Fig 4

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Fig. 5

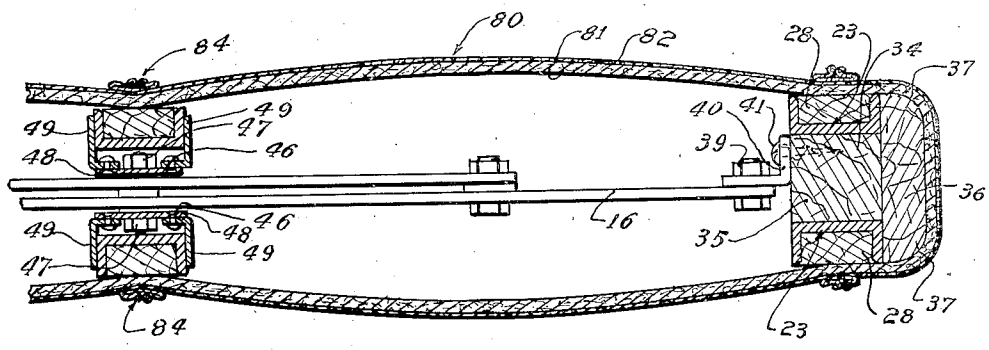
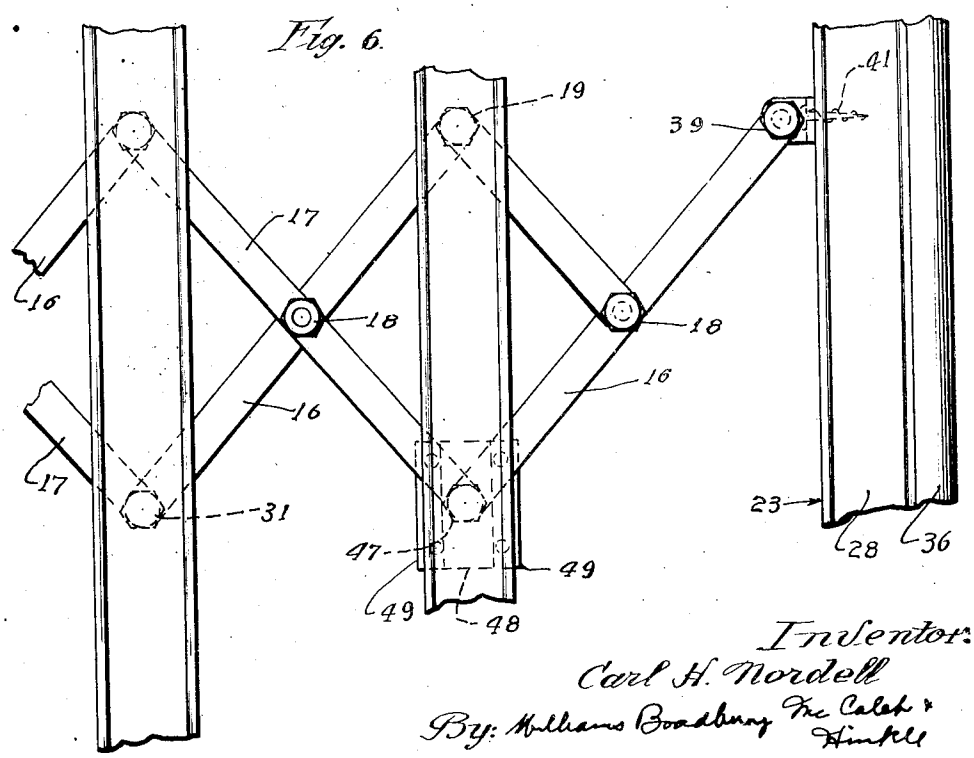


Fig. 6.



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UNITED STATES PATENT OFFICE

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FOLDABLE CURTAIN

Application filed May 28, 1927. Serial No. 195,021.

The present invention relates to foldable curtains being more particularly concerned with the provision of foldable curtains or partitions which are adapted to be used for closing off adjoining rooms or for dividing one room into smaller units. While I am aware that foldable curtains have been constructed which employ a plurality of wooden stiles in their framework, such foldable curtains have been very unsatisfactory due to the warping of the wooden stiles which inevitably distort the curtain, causing it to bulge at the warped stiles and causing the sliding members to bind in their respective guides.

One of the objects of my invention is the elimination of the foregoing difficulties by the provision of a foldable curtain comprising a plurality of channeled metal stiles having wooden inserts in their channels for the support of the curtain fabric by means of tacks or other convenient fastening means, thereby overcoming the defects in the structure above mentioned, but retaining the most economical method of securing the curtain fabric thereon.

Another object of my invention is the provision of a novel foldable curtain comprising a supporting frame which is uniformly extensible to unfold such curtain, sound insulating coverings for said frame including an exterior layer of decorative material and means for guiding the curtain during its extension and for supporting it in the extended relation.

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 curtain covering partially broken away to show the mechanism;

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

Figure 3 is an enlarged elevational cross sectional view on the line 3—3 of Figure 1;

Figure 4 is an enlarged cross sectional plan view on the line 4—4 of Figure 1;

Figure 5 is a similar view on the line 5—5 of Figure 1, and

Figure 6 is an enlarged elevational detail view of the mechanism shown in Figure 5.

Referring to Figure 1, 10 indicates in its entirety my foldable curtain, which comprises a plurality of extensible members 11 and 12 which are secured to a plurality of transversely disposed frame members 13 in such manner that the frame members are uniformly extended and spaced by said extensible members. The supporting structure for the foldable partition comprises the adjacent walls, floor and ceiling, or a door frame.

The extensible members 11 and 12 may consist of a plurality of flat metal links 16, each of which is pivotally connected to one or another series of metal links 17 at the ends of said links. The links 16 and 17 are also pivotally connected at their opposite ends as at 20 and at their mid points as at 18, forming an extensible member which may have its length changed by the pivotal movement of the links described, but which is uniformly extensible in substantially a straight line. In order to connect the extensible members 11 and 12 to the transverse frame members 13, all of the upper pivotal points 21 of the links 16 and 17 are pivotally connected to the transverse frame members 13.

Referring to Figure 2, it will be observed that the links 16 and 17 may be joined at their mid-points by a bolt 18 passing through both of said links and having nuts upon each end. The upper ends of the links 16 and 17 may likewise have a bolt 19 passing through apertures in said links, and the same bolt 19 may support tubular spacing members 22 on each side of said links for the purpose of spacing the links between the transverse frame members 13 further to be described.

The transverse frame members 13 may consist of channeled metal members 23, preferably of substantially U-shape having a central web 24 and a pair of outwardly

turned flanges 25 and 26. The web 24 may be provided with an aperture to receive the bolt 19 and each end of the bolt 19 may be secured in the web of a channeled member 23 by a nut 27. The channel between the flanges 25 and 26 may be filled by a wooden strip 28 of substantially rectangular cross section, the strip and web being provided with a plurality of aligned apertures to receive a plurality of countersunk bolts 29 having nuts 30 to secure the wooden strips 28 within said channels. The wooden strips may be provided with recesses to receive the head and nut of the bolt 19 and the strips 28 may thus be secured flush within the channels 25 and 26 providing a transverse frame member or stile which has a wooden section for the purpose of securing a covering but which cannot warp and which is greatly reinforced by the channeled metal members 23.

In order that the transverse frame members 13 may be uniformly extended and spaced by the extensible members 11 and 12, it will be obvious that the lower pivotal points of the links 16 and 17 as at 20 will not be connected to the frame members 13 but will be provided with a simple pivotal connection such as is shown in Figure 4. The link 16 is here joined by a bolt 31 passing through both links 16 and 17 and secured by a nut 32. In order to secure the frame structure to the wall of a building or the frame of a door, the end frame member 33 may be similar to the frame members 13 previously described, and this frame member may be fixedly mounted on the door frame or wall by a plurality of bolts, screws or other convenient fastening means. The upper ends of the last link 17 are, of course, pivotally connected to the frame member 33 in the usual manner, but the lower ends of the end links 16 beyond the central bolt 18 may be eliminated, as these ends cannot be connected and are not required.

At the opposite end of the curtain frame there may be provided a transverse frame member 34 of slightly different structure, which is adapted to form a rounded end for the curtains. The frame member 34 may consist of a pair of channeled members 23 having their channels filled with similar strips of wood 28 and the two channeled members 23 may be supported in spaced relation by a wooden strip 35 of substantially rectangular cross section and of such size as to space the channeled members 23 a distance equal to the space provided between them by the spacers 22 and links 16 and 17. The channeled members 23, the wooden strips 28, and the wooden strip 35 may all be secured together by a plurality of bolts passing through all of these members and having a head and nut countersunk within the strips 28. The rounded forward end of this frame member may be provided by a strip of wood 36 of a width equal to the full width of the frame member and having its forward corners 37 rounded to present a finished appearance for the corners of the curtain. The strip 36 may be secured to the wooden strip 35 by a plurality of bolts or screws or other convenient fastening means. In order to secure the frame member 34 to the links 16 there may be provided a pair of right angled brackets 40 secured to the wooden strip 35 by one or more screws 41, and the end links 16 may be connected to said bracket by a bolt 39.

It will thus be observed that the extensible members 11 and 12 may be extended by pulling upon any of the frame members or upon the extensible members so that the links 16 and 17 will cause the frame members 13 to separate from each other due to the pivotal connection of the frame members and the top pivots of the links 16 and 17. In order to provide for the uniform extension of both of the extensible members 11 and 12, a connecting link 42 may be provided at frequent intervals between every fourth or fifth pair of stiles, extending from the bolts 18 of the upper extensible member 11 to the bolts 18 of the lower extensible member 12. It will thus be observed that if the upper extensible member is extended by pulling on the front frame member 34, this will cause the links 16 and 17 of the extensible member 11 to assume a position more near to the horizontal, as the upper pivotal points of the links 16 and 17 are secured to the stiles and this will raise the bolts 18 at the intermediate pivot points, pulling upward on the connecting links 42 and causing the intermediate points of the links on the lower extensible member to move in a like direction.

In order to provide means which will assure the extension of the curtain with the transverse frame members parallel to each other, I prefer to provide sliding guides upon a plurality of the lower pivotal points 20 of the links 16 and 17 in the manner shown in Figure 5. The guides above mentioned may consist of flat plates 46 secured upon the bolts 20 which are employed to pivotally connect the lower ends of the links 16 and 17. The bolts 20 may pass through both of said links, and a pair of plates 48 on each side of said links, thereby securing the plates of the pivot. The plates 48 may support on each side a pair of elongated angle irons 49 by a plurality of rivets, the angle irons being so spaced as to permit them to slide up and down upon the channels 23. I prefer to provide these guides upon the lower pivotal points of the links at a plurality of points on the extensible member, generally at every fourth or fifth lower pivotal point.

The guides thus provided are adapted to slide up and down upon the channeled mem-

bers 23 and to maintain the frame members 13 at right angles to the direction of extension of the curtain. In order to secure the curtain at its top and to guide it during its extension, the end frame member 34, as well as a plurality of the other vertical frame members, may be provided with an upper guide plate 50 comprising a flat metal member which may be attached to the upper end of the wooden strip 35, the guide strip being twisted at right angles to provide a projecting portion 51 extending parallel to the motion of the curtain. In order to locate the guide strip 50 below the top of the curtain, the wooden strip 35 may be shorter than the channeled members 23, terminating at 52, and similar guide strips may be fixed to intermediate frame members by affixing blocks of wood supporting the guide strips between the channeled members 23 at their tops. The guide strips 50 are preferably located on every fourth or fifth frame member 13.

In order to provide a guide for the guide strips 50 there may be mounted upon the ceiling or the upper frame of the door a guide 53 which may consist of a pair of strips of molding 54 and 55, decorated to correspond with the surrounding woodwork and supported as shown in Figure 3 by a plurality of short angle irons 56. The angle irons 56 have one side attached to the ceiling or frame of the door by a plurality of screws 57, while the other side extends vertically downward as at 58 for the support of the wooden strip 55. As the angle irons 56 are relatively short, a plurality of them may be provided throughout the guide 53 and they may be alternately reversed in location to support the strips 54 and 55.

For instance, the angle iron 59 may support the strip 54 by screws or other convenient fastening means, its other flange 60 extending under the wooden strip 55 and being secured to the ceiling. The wooden strips 54 and 55 are thus supported in spaced relation along the line of direction of the extension of the curtain forming a slot which is adapted to receive the edge 51 of the guide strip. The lower edge of the wooden strips 54 and 55 may also be faced with strips of metal 61 and 62 secured thereto by a plurality of screws or other fastening means and spaced from each other a distance slightly less than the slot between the wooden strips.

The facing strips 61 and 62 thereby provide a finished appearance for the bottom of the guide and a metallic edge, against which the sides of the guide strip 51 may slide in the extension of the curtain. It will thus be observed that when the curtain is extended the guide strips 50 will slide along the guide 53 and maintain the top of the curtain along a straight line so as to make a flat partition or closure in the position desired.

The bottom of the curtain may likewise be provided with guide means and supporting means which may consist of a guide 63 adapted to receive a slider 64 and to support a pair of rollers 65. The guide 63 may be built in flush with the floor 66 and may consist of a pair of channeled members 67 and 68 of substantially U shape having their flanges outwardly turned. The lower flanges 69 of the channeled members 67 and 68 may be attached to a flat plate 70 by rivets or other convenient fastening means, thereby forming a central slot 71 to receive the slider 64. The upper flanges 72 of the channeled members 67 and 68 may be provided with metal facing strips 73 secured thereto by rivets or other convenient fastening means and providing a smooth and finished surface for the rollers 65.

The rollers 65 may be rotatably supported upon a shaft 74, having square shoulders at each end to be received in the U bracket 75 and a plurality of spacing washers 76 on each side of said rollers. The shaft 74 may also have a non-circular section at its middle between two washers 76 for the purpose of non-rotatably supporting the slider 64. The slider 64 consists of a flat strip of metal fixedly supported upon the shaft 74 and projecting downward beyond the rollers 65 to be received in the slot 71.

The U bracket 75 with its rollers and slider may be supported by means of an angle iron bracket 77 having its lower flange 78 riveted to said U bracket and its upper flange secured by bolts or screws to the back side of the wooden strip 35 of the front frame member. The rollers 65 should be supported on the frame member 35 in such position that they are adapted to support the frame member a slight distance above the floor and to permit the frame members to be extended with ease, rolling upon the rollers 65. The curtain is preferably provided with similar supporting rollers at every fourth or fifth frame member 13 and the brackets 77 may be secured upon blocks of wood bolted between the lower ends of the frame members 13 wherever the rollers are desired.

The framework, which has been constructed as described, may be covered with an envelope, preferably consisting of an unbroken sheet of material extending from one side of the curtain adjacent the frame member 33 about the end frame member 34 back to the other side of the curtain, but if desired joints may be provided at the frame members 13 where they may be concealed by a finishing strip. The envelope 80 may consist of an inside layer 81 of thick felt which is covered by an outside layer 82 of decorative material such as tapestry, silk or artificial leather.

The covering 80 may be secured to the frame members 13 when they are in extended relation by tacks 83 or other convenient

fastening means extending into the wooden strips 28. The tacks 83 are preferably driven through a finishing strip 84 having a pair of folds 85 bending back toward the middle and finished with a bead 86. The folds 85 are stitched to the bottom 87 of the finishing strip, but the beads 86 may be bent apart, a tack inserted driven through the finishing strip and the covering 80 and its head concealed by the beads 86 which tend to close together. If desired, additional tacks or fastening means may be provided underneath the finishing strip to secure the covering 80 and the ends of pieces of the covering may be concealed underneath the finishing strip.

The covering 80 is preferably fastened upon the frame members 13 when they are in extended position, and sufficient length of covering is preferably used so that the envelope will bend outward a slight amount between the frame members. The envelope is thus adapted to fold outward with ease when the frame members approach each other.

When the curtain is collapsed by pushing to the left upon the frame member 34, the links 16 and 17 will assume a position more nearly vertical, the frame members 13 will approach each other and the portion of the covering 80 between adjacent frame members will bulge outward forming a fold midway between the frame members. The curtain may thus be folded into a very small fraction of the space it occupies when extended. The connecting link 42 is adapted to assure the actuation of both extensible members at the same rate and to maintain the forward edge of the curtain as well as all of the frame members 13 in vertical position. If desired the connecting links may be made bifurcated at one end and connected between the pivots 20.

It will be evident that the decorative surface 82 may be made of any color or finish to correspond with the surrounding woodwork or the walls and that the curtain thus provided is adapted to separate a large room into a plurality of units or to be used as closures for ordinary rooms. The thick felt layer of the outer covering provides a heat insulating and sound insulating layer, together with the dead air space between both sides of the covering which effectively prevents the transmission of heat and the transmission of sound from one room to another.

It will thus be observed that I have invented a folding curtain which is adapted to be folded into a space which is a very small fraction of the extended length of the curtain and that my curtain is provided with frame members which are adapted to resist the warping action which might be present where ordinary wooden frame members are employed. My curtain is also adapted to be extended uniformly at the top and bottom and to be held in its extended position by guides which do not detract from the finished appearance of the room and which do not present obstructions upon the floor.

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 constructions 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 is new and desire to secure by Letters Patent of the United States is:

1. In a foldable partition, the combination of a supporting structure, with a plurality of stiles, said stiles comprising pairs of channelled metal members with outwardly turned channels, wooden fillers in said channels and spacers between said channelled members, a pair of extensible members located between said pairs of channelled members and comprising a plurality of links pivoted together, said links being pivotally mounted at similar points on said channelled members, guide means carried by said supporting structure above said partition, and slidably engaged by said stiles, between said channelled members, and a flexible covering of sound and heat insulating material carried by said stiles.

2. In a foldable partition, the combination of a supporting structure, with a plurality of stiles, said stiles comprising pairs of channelled metal members with outwardly turned channels, wooden fillers in said channels and spacers between said channelled members, a pair of extensible members located between said pairs of channelled members and comprising a plurality of links pivoted together, said links being pivotally mounted at similar points on said channelled members, guide means carried by said supporting structure above said partition, and slidaby engaged by said stiles, between said channelled members, a flexible covering of sound and heat insulating material carried by said stiles, a guide carried by said supporting structure below said partition, guide lugs carried by certain of said spacing members on said stiles, and rollers carried by said spacing members for supporting said stiles.

3. In a foldable partition, the combination of a supporting structure, having upper and lower guide members, with a purality of stiles, said stiles comprising pairs of channelled metal members with channels outwardly turned, spacing members between said channelled members, and securing means for said channelled members comprising pivotal members for an extensible linkage, wooden fillers for said channelled members, a flexible covering for said stiles comprising a fabric layer and a felted layer carried by said fabric layer, a pair of extensible

linkages having similar links pivotaly mounted on said pivotal members, and means for connecting other pivotal points of said linkages, to effect uniform extension of said stiles.

In witness whereof, I hereunto subscribe my name this 19th day of May, 1927.

CARL H. NORDELL.