March 25, 1930. H. C. FORD 1,751,807

FOLDABLE SCREEN

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Fig. 1.

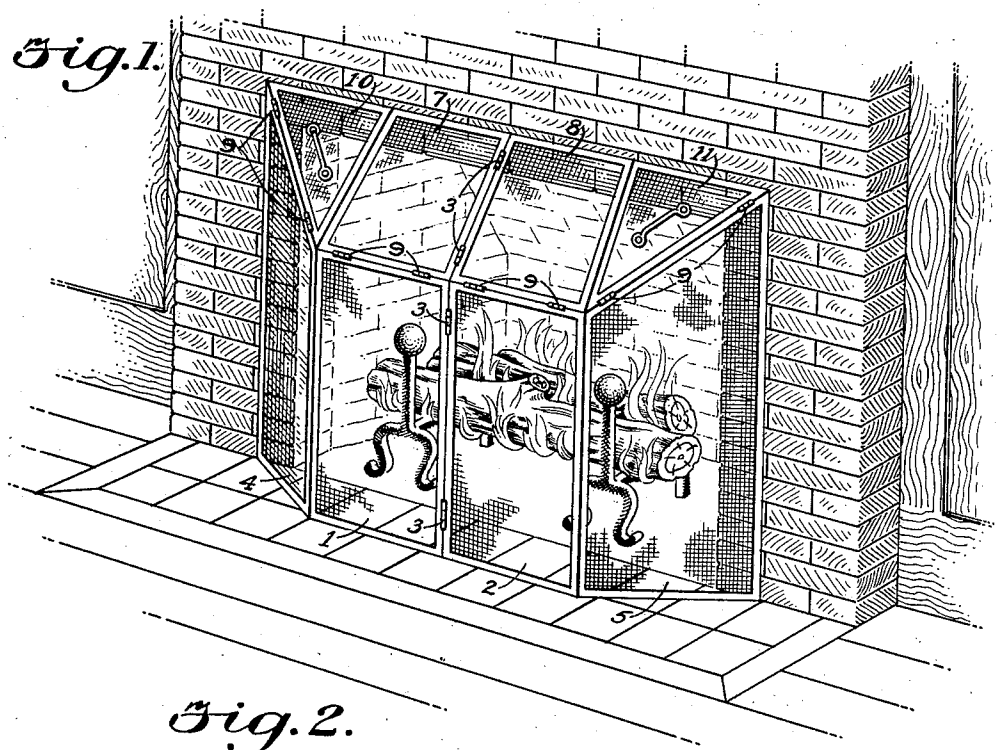


Fig. 2.

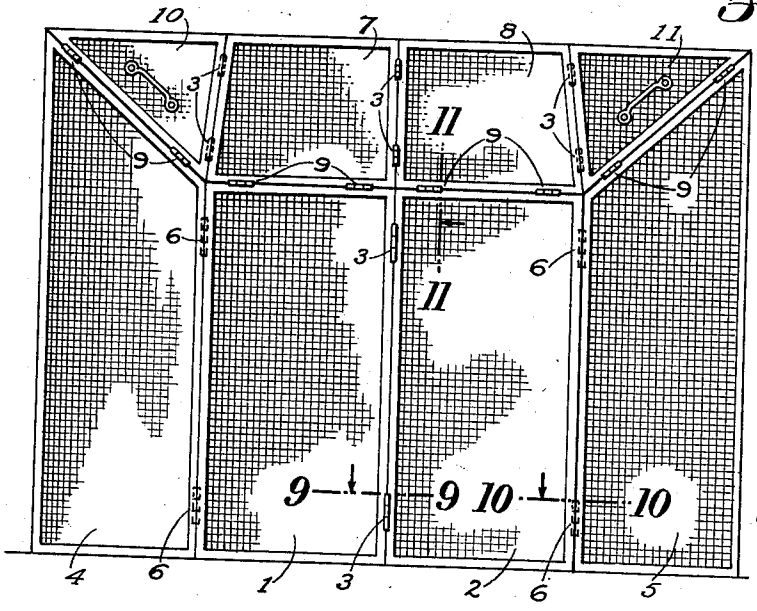
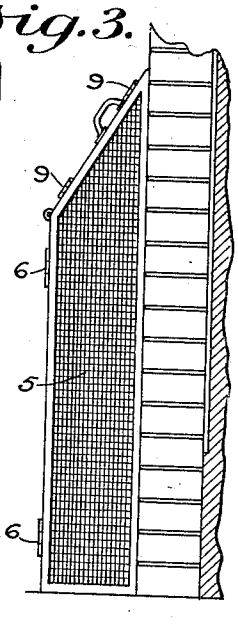


Fig. 3.



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Fig. 4.

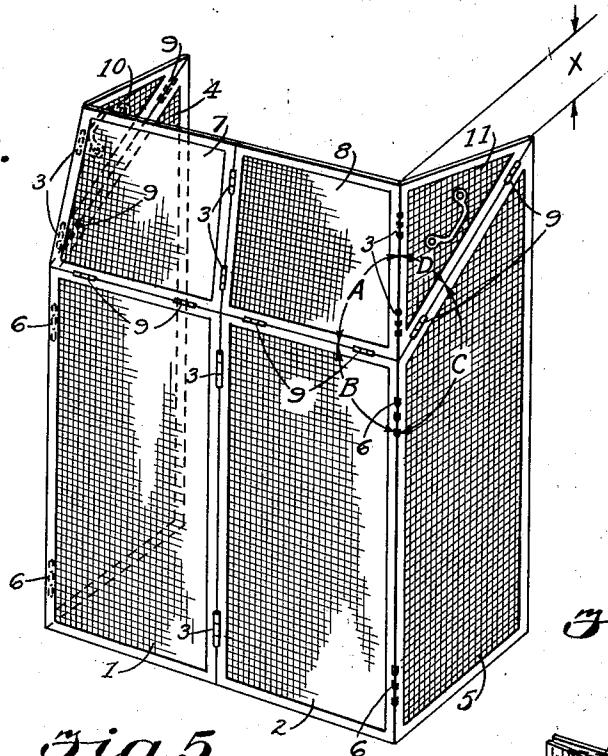


Fig. 6.

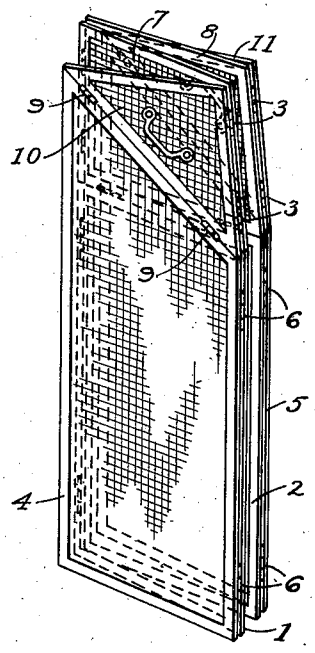
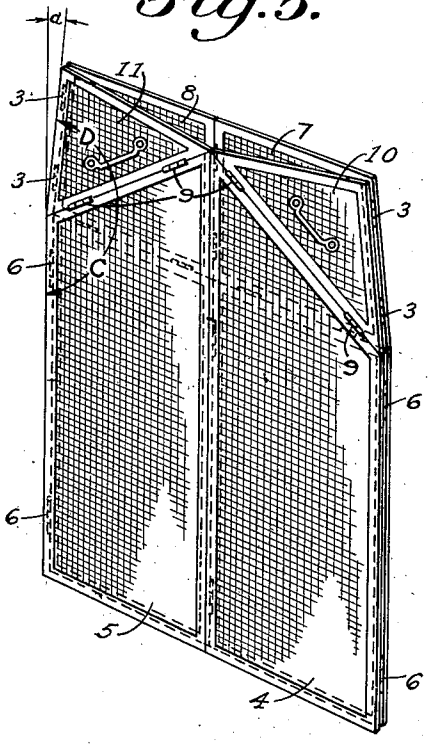


Fig. 5.



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Fig. 7.

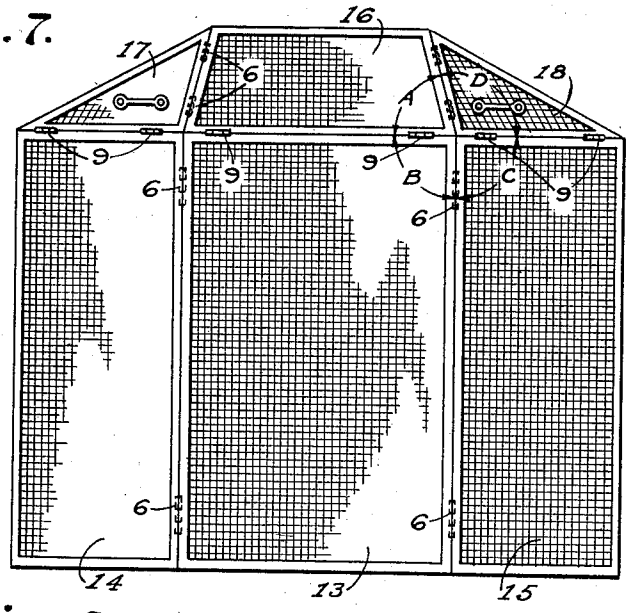


Fig. 8.

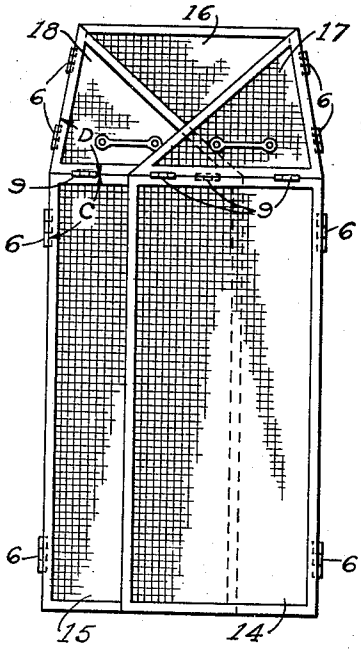


Fig. 9.

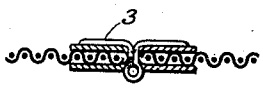


Fig. 10.



Fig. 11.

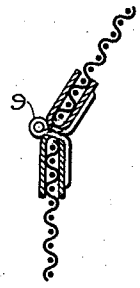
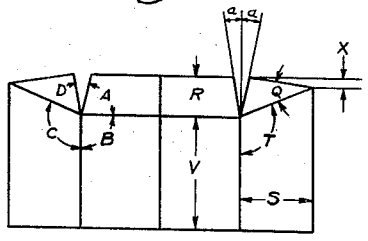


Fig. 12



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UNITED STATES PATENT OFFICE

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FOLDABLE SCREEN

Application filed January 24, 1929. Serial No. 334,669.

This invention relates to foldable screens and more particularly to screens adapted to be used for fireplaces as a protection against flying sparks.

It is an object of this invention to provide a foldable screen for this purpose which shall completely cover an opening, such as a fireplace, before which it may be placed with the free edges of its top and side members in contact with the wall surrounding the opening, and its front members suitably spaced from the plane of the wall to provide space for objects extending beyond this plane, such as andirons in a fireplace.

It is a further object to provide a foldable screen having its component members permanently connected to each other and so formed that the screen may be quickly and conveniently converted from its open unfolded condition to a flat folded one, or vice versa, by a simple operation not requiring the manipulation of any catches or other detachable fastening devices between any of the members.

These objects as well as others which will more clearly hereinafter appear are attained by providing a plurality of pairs of screen-sections permanently hinged together to form an extensible structure and each pair consisting of a top screen-section and a vertical screen-section. The top screen-sections of the two pairs constituting the side portions of the screen are triangular in form and each of them in hinged at one edge to the vertical screen-section of the same portion and at another edge to the top screen-section of an adjacent portion. These screen-sections are so proportioned that when the screen is in extended or open condition each top screen-section forms a dihedral angle with its corresponding vertical screen-section and when in folded condition lies in the same plane as the vertical screen-section. The arrangement is also such that the free edges of the top screen section and the adjacent free edges of the vertical screen-section of the side portions lie in the same plane so that the screen in open condition fits against the wall surrounding a fire place or other opening before which it may be placed.

The particular nature of the invention will appear most clearly from a description of certain preferred embodiments as shown in the accompanying drawings in which

Fig. 1 is a perspective view of the screen in place showing its general shape;

Fig. 2 is a front elevation as it would appear looking towards the fireplace;

Fig. 3 is a side view showing the slope of the top of the screen;

Fig. 4 shows the first stage in folding the screen;

Fig. 5 shows the screen from the opposite side from Fig. 4 wherein the wings of the screen are folded flat into the center;

Fig. 6 shows the last stage of folding wherein the screen as shown in Fig. 5 has been folded back at the center line;

Fig. 7 is an alternative form of the invention using one center pair of screen-sections instead of two, and which shows the adaptation of the screen to an arched fireplace.

Fig. 8 shows the alternative form in its flat folded position;

Figs. 9, 10, and 11 show the hinge connections at the indicated points in Fig. 2; and

Fig. 12 shows a layout pattern of the screen to indicate the angular relations.

Referring to Fig. 2, the forward vertical screen-sections 1 and 2 are rectangular in shape and are adapted to be positioned a suitable distance in front of the fireplace and are hinged together by the hinges 3. Each of these forward or center screen-sections 1 and 2 is provided with a quadrilateral side screen-section or wing 4 and 5 respectively, hinged by the hinges 6 to be obliquely disposed to both the center screen-sections and the wall surrounding the fireplace opening. At the top of each of the center screen-sections 1 and

2 is hinged a quadrilateral top screen-section 7 and 8 respectively, by the hinges 9, and these top screen-sections 7 and 8 are hinged together by the hinges 3, and are also both obliquely disposed to both the center screen-sections 1 and 2 and the wall surrounding the fireplace. The remaining two screen-sections 10 and 11 are triangular screen-sections connecting the sides of the top screen-sections 7 and 8 to the tops of the side screen-sections 4 and 5 respectively, as shown in the drawings. The arrangement of all these screen-sections is such that their adjoining edges are hinged or bound in a manner which permits the inner or free edges of the wings 4 and 5, the inner or free edges of the top screen-sections 7 and 8, and the inner or free edges of the triangular screen-sections 10 and 11 to all lie in the same vertical plane, which in practice will contain the outlining portion of the wall that surrounds the fireplace. It is, therefore, evident that the folding screen lies in contact against the vertical fireplace wall while the bottom edges of the screen sections of the forward and side wings rest on the hearth, whereby the fireplace is completely enclosed.

The hinges, or other suitable joint-forming means, are designed to support the screen in the desired position. The hinges 3 shown in Fig. 9 are placed on the proper sides of and join the screen-sections 10, 7, 8 and 11 to each other and also screen-sections 1 and 2. These two groups of screen-sections when in the open position form two flat extended surfaces, and the hinges prevent the folding of these surfaces, particularly 1 and 2, in the wrong direction, thus facilitating in folding the screen quickly. Hinges 6, connecting screen-sections 1 and 4, and 2 and 5, are designed to be at the limit of their opening when the side screen-sections are in their open position. The remaining hinges 9 connect the top screen-sections to their corresponding vertical screen-sections and are formed to hold the triangular screen-sections 10 and 11 in their correct position and to prevent any tendency of these screen-sections and the other top screen-sections to sag. In general, the hinges give the screen a certain rigidity when it is opened so that it is completely self-supporting. The weight of the top screen-sections assists in holding the screen open.

At such times as it is desired to remove the fire-place screen, it may be folded compactly as illustrated in Figs. 4, 5 and 6. Accordingly the screen may be either set up for use or taken down and folded for storage without any particular preparation and with the utmost ease. In order to fold the screen after drawing it away from the fireplace the first move may be as shown in Fig. 4. Here the side wings are in the process of being folded back. For convenience handles may be placed on the sides as shown, and in lifting these handles the weight of the top screen-sections is relieved which allows the sides to move back freely. The sides are moved on in to the center and at this point the whole screen becomes flat as shown in Fig. 5, which is a view from the opposite side of Fig. 4. Without turning it to the position shown in Fig. 5, which is used only for better illustration, the screen is next folded back on the center line. This is done merely to decrease the size of the folded screen, and is not essential to the flat folding of the screen as is apparent in Figs. 7 and 8 which show an alternative form whose screen-section 13 is not divided. The screen now folded (shown loosely folded in Fig. 6) is in a very suitable form for convenient storage or handling.

The alternative form chosen for Figs. 7 and 8 is particularly adapted for arched fireplaces, and may be somewhat smaller than the first form shown in the preceding figures. To the sides of the single center screen-section 13 are hinged narrower quadrilateral screen-sections 14 and 15 by the hinges 6. These screen-sections stand obliquely to the wall of the fireplace and the front screen-section 13. The quadrilateral top screen-section 16 is hinged by the hinges 9 to the top of the center screen-section 13, and is held obliquely to close the gap between the wall and the front screen-section 13. It is supported not only by the hinges 9, but also by the adjoining triangular screen-sections 17 and 18 as shown. The hinges 6 and 9 limit the downward motion of these top screen-sections and serve to hold the open screen in a rigid position. The inner or free edges all lie in a vertical plane so as to fit closely to the fireplace wall. In folding this screen it is sufficient merely to grasp the handles and turn the sides back, and the result is as shown in Fig. 8. It will be noted that in order for the screen to fold flat as in Fig. 8, the angles A and D must equal each other, or more generally that the sum of angles A and B must equal the sum of angles C and D.

In regard to the design of the screen-sections, the fundamental requirement in order to have them fold flat is that the sum of angles A and B equals the sum of angles D and C, shown in Figs. 12, 4 and 7. Fig. 12 shows a pattern of such a screen as it would look unfolded and flattened out. The above pairs of angles being equal, the angles a must be equal. In the embodiment shown in Figs. 1 to 6 the top edge of the screen forms a straight line against the wall of the fireplace. This particular construction requires that the pattern be cut somewhat as shown in Fig. 12. x represents the vertical distance which the top edge of the screen-sections 7 and 8 drops as they swing down to form the top of the screen in unfolding. In the form shown in Figs. 7 and 8 the angle T shown in Fig. 12 is made a right angle and the shape of the triangu-

lar screen-section 17 is varied accordingly. Also, the dimensions of the various screen-sections such as R, S, and V, may be made any desired value, and other numbers of screen-sections might be used as the necessity arises.

While the particular embodiment shown relates to fire screens it is not intended to limit the use of the invention to fire screens alone, and changes in detail may also be made without departing from the principles of the invention as defined by the appended claims.

I claim:

1. In a foldable screen, a series of vertically disposed screen-sections having parallel edges, a second series of screen-sections comprising triangular end screen-sections, the screen-sections of the latter series being flexibly connected to each other and to the screen-sections of the first series to form a top, means to limit the relative movement of the screen-sections to such an extent that the screen-sections of the second series have their free edges in the plane of the free side edges of the first series when the screen is in operative position.

2. A foldable screen having pairs of screen-sections, each pair comprising a vertical screen-section and a sloping top screen-section, connections between the screen-sections capable of yielding within predetermined limits, continuing edges of each pair forming an angle equal to a corresponding angle of an adjacent pair both when folded and extended, the elements forming a rigid structure when extended, and foldable into the area occupied by one pair of screen-sections.

3. A foldable screen comprising a plurality of connected vertical screen-sections, each of which has a sloping top screen-section joined thereto, the number of vertical screen-sections being equal to the number of top screen-sections, each vertical screen-section and its connected top screen-section comprising a pair, the continuing edges of which form an angle equal to the corresponding angle formed by the adjacent continuing edges of the adjoining pair.

4. A foldable screen having a vertical portion and an inclined portion each made up of an equal number of screen-sections with each screen-section of the inclined portion flexibly connected to a screen-section of the vertical portion with their respective meeting edges coterminous and with the screen-sections of each portion likewise flexibly connected to the adjacent screen-section or screen-sections of said portion.

5. In a foldable screen, a plurality of pairs of screen-sections hinged together to form an extensible structure, each pair consisting of a top screen-section and a vertical screen-section, two of the top screen-sections being triangular in form and each of them being hinged at one edge to a vertical screen-section and at another edge to an adjacent top screen-section.

6. In a foldable screen, a plurality of pairs of screen-sections hinged together to form an extensible structure, each pair consisting of a top screen-section and a vertical screen-section, two of the top screen-sections being triangular in form and each of them being hinged at one edge to the corresponding vertical screen-section and at another edge to an adjacent top screen-section, the screen-sections being so formed that when in extended position each top screen-section forms a dihedral angle with its corresponding vertical screen-section and when in folded position lies in the same plane therewith.

7. In a foldable screen, a plurality of pairs of screen-sections hinged together to form an extensible structure, each pair consisting of a top screen-section and a vertical screen-section, and each top screen-section being permanently hinged at one edge to a vertical screen-section and at another edge to an adjacent top screen-section.

8. In a foldable screen, a plurality of pairs of top and vertical screen-sections, each screen-section of each pair being permanently hinged at two edges to adjacent screen-sections, and means for limiting the relative movement of the screen-sections to a predetermined position wherein the free edges of the top screen-sections and the adjacent free edges of the side vertical screen-sections lie in the same plane when the screen is in operative position.

9. A foldable screen comprising two end portions each composed of a top screen-section of triangular form and a vertical screen-section of quadrilateral form, and one or more intermediate portions each composed of a top screen-section of quadrilateral form and a vertical screen-section of rectangular form and means for connecting all of the screen-sections together to form an extensible structure.

10. A foldable screen including two end portions each composed of a top screen-section of triangular form and a vertical screen-section of quadrilateral form, the meeting edges of the screen-sections being coterminous throughout.

11. A foldable screen made up of screen-sections and consisting of two groups composed of the same number of screen-sections, one of said groups being vertical and the other inclined when in operative position, means for flexibly holding each screen-section of the inclined group contiguous to a corresponding screen-section of the vertical group and the meeting edges of the screen-sections being coterminous throughout.

12. In a foldable screen, a series of screen-sections having parallel edges, a second series of screen-sections comprising end screen-sections of triangular shape and means perma-

nently connecting the screen-sections of each series to each other and to the screen-sections of the other series both when the screen is folded flat and when unfolded into a position in which the screen-sections of the first series are vertical and those of the second series are inclined with respect thereto, the meeting edges of the screen-sections being coterminous throughout.

In testimony whereof I affix my signature.

HANNIBAL C. FORD