Jan. 9, 1951 G. A. ZANDELIN ET AL 2,537,566

COLLAPSIBLE DOOR

Filed Nov. 29, 1946

FIG. 1.

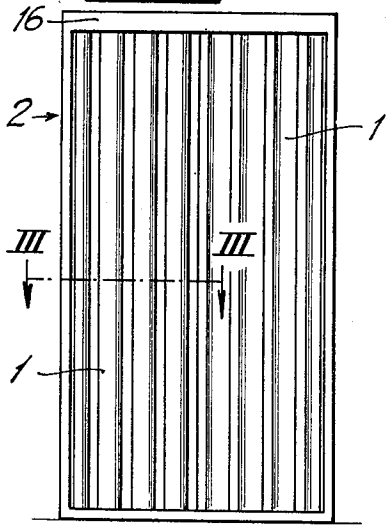
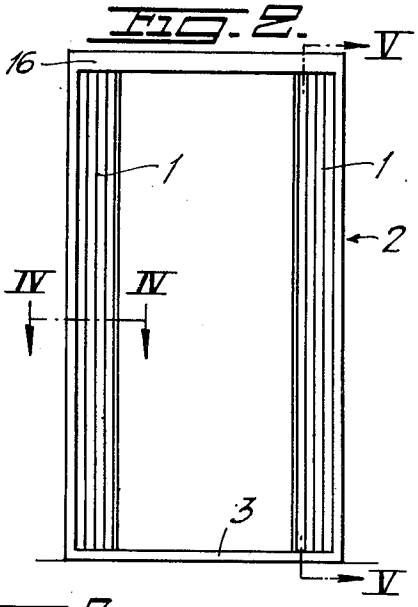


FIG. 2.



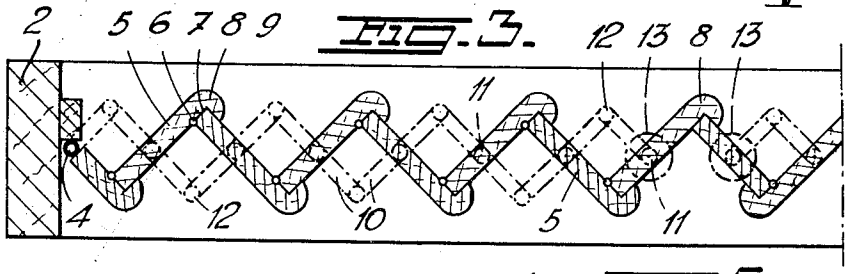


FIG. 3.

FIG. 4.

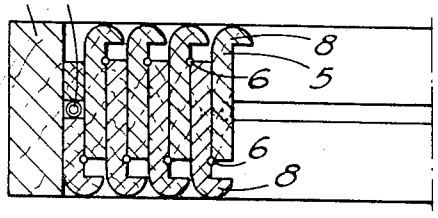


FIG. 5.

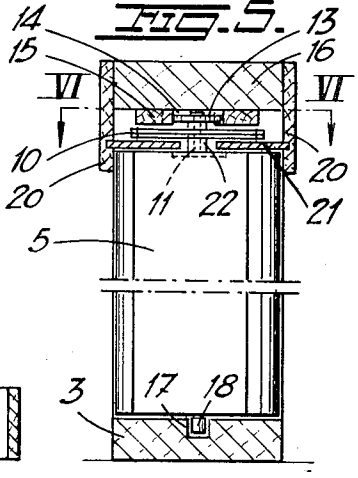
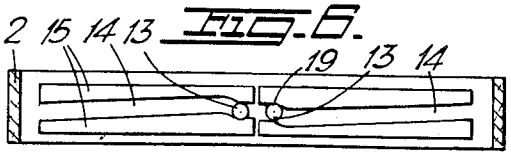


FIG. 6.



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COLLAPSIBLE DOOR

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5 Claims. (Cl. 160—118)

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This invention relates to collapsible doors comprising rectangular elements connected hingedly together about axes parallel to the longitudinal direction of said elements.

One object of the invention is to provide a door of this type which is of neat appearance and thus suitable for use indoors.

Another related object is to provide such a door substantially from nonmetallic material, preferably wood, forming a self-sustaining unit of light weight which is easy to assemble and mount in the doorway and facile to manipulate when mounted.

The invention consists in the construction and novel combination and arrangement of parts hereinafter fully described, illustrated on the accompanying drawing and pointed out in the claims hereunto appended.

On said drawing:

Fig. 1 is a front view of a dual door embodying our invention, in closed position.

Fig. 2 is a similar view illustrating the door in open position.

Fig. 3 is a horizontal sectional view, on an enlarged scale, along line III—III in Fig. 1 with parts of a lazy-tongs device at the top of the door and guiding rollers associated therewith indicated in dash-and-dot lines.

Fig. 4 is a horizontal sectional view, on an enlarged scale, along line IV—IV in Fig. 2.

Fig. 5 is a fragmentary vertical sectional view, on an enlarged scale, along line V—V in Fig. 2.

Fig. 6 is a fragmentary horizontal sectional view, on a reduced scale, substantially along line VI—VI in Fig. 5 illustrating in the guiding rollers seated at the ends of two guiding grooves in the closed position of the door.

As may be seen from the drawing the embodiment of our invention shown thereon consists of a double door the two sections or leaves of which are generally denoted by 1 in Figs. 1 and 2, each section being collapsible or foldable from the position illustrated in Fig. 1 to the position illustrated in Fig. 2 or any intermediate position. The special design of said collapsible door leaves 1 will be described in greater detail in the following but here it may be sufficient to mention that each leaf 1 forms a self-sustaining unit composed of a plurality of elements hinged together and supported in the doorway or doorcase 2 solely by pins providing pivots at the top and bottom of one vertical side of each section 1, one of said pivots being indicated at 4 in Figs. 3 and 4.

As may be seen particularly from said last

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mentioned figures each door leaf is made from a plurality of rectangular panels 5 preferably of wood or any other appropriate nonmetallic light weight material, such as synthetic resin, hingedly connected together as indicated at 6, about axes parallel to the vertical sides of panels 5. The hinges proper are not specifically shown to avoid unnecessary complication of the drawing but are preferably let into the faces of each pair of adjacent panels 5 abutting each other at 7 in Fig. 3 in the closed position of the door. Besides each panel 5 at one vertical side is formed with a moulding 8 which may be secured to the panel proper or made integrally therewith as shown on the drawing. The outer face of moulding 8 is rounded-off, preferably to substantially semicircular shape as shown and the inner face of moulding 8 is flat and bears tightly on the outer face of the adjacent panel 5 at the marginal face 9 thereof in the closed position of the door. By this means moulding 8 not only effects a sealing between adjacent panels 5 at 9 in addition to the sealing at 7 but also effectively conceals the joint at 7 as well as the slit formed thereat when the door is moved from its closed position through any partially open intermediate position to the fully open position shown in Fig. 4.

From the foregoing it may be seen that mouldings 8 extending transversely from one longitudinal edge of each panel 5 form simple and effective means for effecting a sealing between adjacent panels 5 and assist materially to the neat appearance of the door as may be seen from Figs. 1 and 2.

In the form of our invention illustrated the panels of each door-leaf are eight in number and in the closed position of the door adjacent panels 5 are at right angles to each other but it is to be understood that both the number of panels and the angle therebetween may vary to suit various requirements met in practice. If the panels meet at an obtuse angle then obviously a smaller number of panels may be used to span a doorway of predetermined width but on the other hand when the angle referred to is increased then it becomes more difficult to move the panels from their fully expanded position toward their contracted position. In building doors according to our invention we have found that angles substantially of 90° between adjacent panels in the closed position of the door as a rule are to be preferred in practice.

As shown in Fig. 4 the panels 5 when the door is fully opened are situated face to face and

occupy thus the smallest possible space in the doorway.

To secure that in the expansion of the series of hingedly interconnected rigid panels 5 the individual panels 5 are located each with its general plane inclined at substantially the same angle to the general plane of the expanded series we employ a single lazy tongs device at the top of each door-leaf 1. In the embodiment shown one-half of said lazy tongs device is formed by the interconnected panels 5 whereas the remainder of said device is formed by a series of links 10 pivotally connected intermediate their ends to panels 5 as indicated at 11 in Fig. 3 and likewise pivotally connected to one another at each end as indicated at 12 in Fig. 3.

As may be seen from Figs. 3 and 5 one of the pivot studs 11 for each door-leaf extends above the level of links 10 and carries at its upper end a roller 13 rotatively mounted thereon and received in a guiding groove 14 formed between rails 15 secured to the bottom face of top member 16 of door case 2. Preferably roller 13 is associated with the extreme panel 5 of each series of interconnected panels 5 as shown but it is within the scope of the invention to mount such roller or rollers on any desired panel or panels to secure the desired guiding of the series of interconnected panels in expanding and contracting each door leaf 1.

At its bottom each door leaf 1 is guided by one or more rollers 18 secured to one or more of panels 5 and running in a groove 17 in sill 3.

In the embodiment shown grooves 14 are inclined at a small angle with respect to the general plane of the door and form seats adjacent their juxtaposed inner ends, as indicated at 19, for the rollers 13 of each door leaf in the closed position of the door. The inclination of guiding grooves 14 has principally for its object to assist in moving moulding 8 associated with the extreme right-hand panel 5 of the left-hand door leaf 1 beyond the outer end of the extreme left-hand panel 5 of the right-hand door leaf in closing the door and when the free ends of the two panels just referred to thus have passed each other rollers 13 enter seats 19 whereby said two end panels 5 are caused to overlap each other as shown in Fig. 3 thereby simultaneously locking the two door leafs 1 to each other to prevent any unintentional opening of the door.

The above feature of the invention although specifically shown and described with reference to a double leaf door may of course also be applied to in a single leaf door of the present collapsible type in which the inclined guiding groove may be utilized to stabilize and lock the collapsible door leaf in its closed position.

To render the mechanism above the door leaves substantially non-visible from the outside horizontal panels 20 attached to the opposite sides of member 16 and depending therefrom extend beyond the upper margins of panels 5 as shown. Secured to the inner faces of panels 20 are horizontal panels 21 extending inwardly at right angles thereto and leaving an opening between their juxtaposed ends for pivot studs 11 and spacing members 22 surrounding said studs.

It is to be understood that the inveniton is not limited to the embodiment illustrated and specifically described in the foregoing as the details of construction may be modified in many respects without departing from the spirit of the invention.

What we claim is:

1. A collapsible door, comprising in combination a series of rigid panels interconnected by hinges at their longitudinal edges and forming a self-sustaining unit, the edges of said panels having recesses in which said hinges are seated, said unit being supported solely by pins providing pivots at the top and bottom of one vertical side of a doorway, said doorway having an inner horizontal face, a lazy-tongs device at the top of said unit, said panels being connected respectively with elements of said lazy-tongs device at least one roller rotatively mounted at the top of said unit and received in a guiding groove formed at the inner horizontal face of said doorway, and mouldings at the adjacent longitudinal edges of said panels to seal said panels in the expanded position of said unit and conceal slits formed therebetween in contracting said unit in moving the door from closed to open position.

2. A collapsible door, comprising in combination a series of rigid panels interconnected by hinges at their longitudinal edges and forming a self-sustaining unit, the edges of said panels having recesses in which said hinges are seated, said unit being supported solely by pins providing pivots at the top and bottom of one vertical side of a doorway, said doorway having an inner horizontal face, a lazy-tongs device at the top of said unit, said panels being connected respectively with elements of said lazy-tongs device one-half of said lazy-tongs device being formed by said panels, a series of interconnected links forming the remainder of said lazy-tongs device, at least one roller rotatively mounted at the top of said unit and received in a guiding groove formed at the inner horizontal face of said doorway, and mouldings at the adjacent longitudinal edges of said panels to seal said panels in expanded position of said unit and conceal the slits formed therebetween in contracting said unit in moving the door from closed to open position.

3. A collapsible door, comprising in combination a series of rigid panels interconnected by hinges at their longitudinal edges and forming a self-sustaining unit, the edges of said panels having recesses in which said hinges are seated, said unit being supported solely by pins providing pivots at the top and bottom of one vertical side of a doorway, said doorway having an inner horizontal face, a lazy-tongs device at the top of said unit, said panels being connected respectively with elements of said lazy-tongs device at least one roller rotatively mounted at the top of said unit and received in a guiding groove formed at the inner horizontal face of said doorway and inclined at a small angle with respect to the plane of said door, and mouldings at the adjacent longitudinal edges of said panels to seal said panels in the expanded position of said unit and conceal slits formed therebetween in contracting said unit in moving the door from closed to open position.

4. A collapsible door, comprising in combination a series of rigid panels interconnected by hinges at their longitudinal edges and forming a self-sustaining unit, the edges of said panels having recesses in which said hinges are seated, said unit being supported solely by pins providing pivots at the top and bottom of one vertical side of a doorway, said doorway having an inner horizontal face, a lazy-tongs device at the top of said unit, said panels being connected respectively with elements of said lazy-tongs device at

least one roller rotatively mounted at the top of said unit and received in a guiding groove formed at the inner horizontal face of said doorway and inclined at a small angle with respect to the plane of said door, a seat at one end of said inclined groove for receiving said roller in the expanded position of said unit, and mouldings at the adjacent longitudinal edges of said panels to seal said panels in the expanded position of said unit and conceal slits formed therebetween in contracting said unit in moving the door from closed to open position.

5. A double leaf collapsible door, comprising in combination two separate series of rigid panels each forming one door leaf, the panels of said series being interconnected by hinges at their longitudinal edges to form two separate self-sustaining units, the edges of said panels having recesses in which said hinges are seated, said units being supported solely by pins providing pivots at the top and bottom of the opposite vertical sides of a doorway, said doorway having an inner horizontal face, a lazy-tongs device at the top of each unit, said panels being connected respectively with elements of said lazy-tongs device at

least one roller rotatively mounted at the top of each unit, a guiding groove formed at the inner side of said doorway for receiving each roller, said grooves being inclined at a small angle with respect to the plane of said door, a seat at one end of each groove for receiving the respective rollers in the expanded position of said units, and mouldings at the adjacent longitudinal edges of said panels to seal said panels in the expanded position of said units and interlock said units in the closed position of the door.

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