

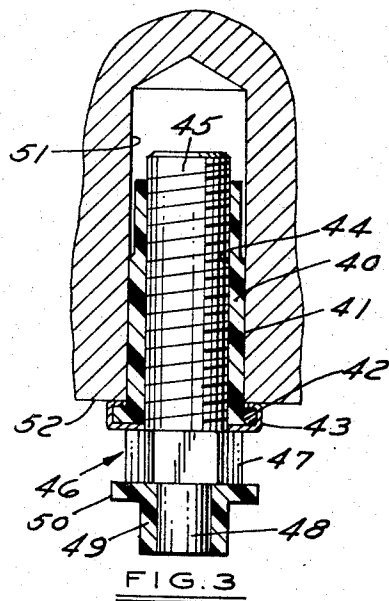
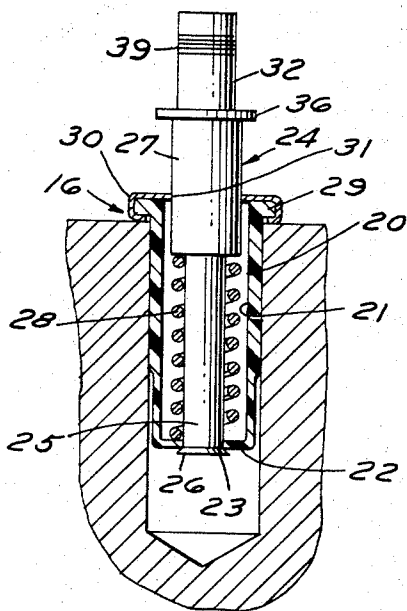
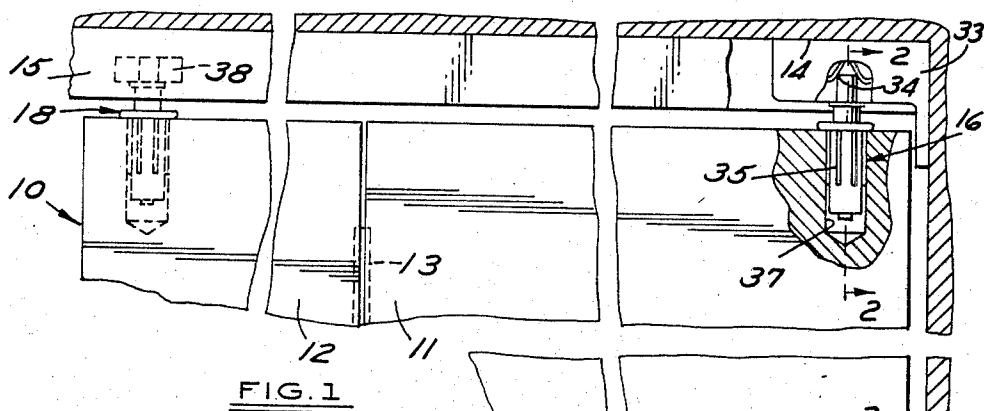
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FOLDING DOOR CONSTRUCTION

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FOLDING DOOR CONSTRUCTION

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ABSTRACT OF THE DISCLOSURE

The folding door construction disclosed herein comprises an upper pivot assembly and a lower pivot assembly for pivoting a panel to a door opening and a guide assembly which guides the panel along the track. Each of these assemblies includes a sleeve of organic plastic material and a metal cap over the flanged end of the sleeve. The upper pivot assembly and the guide assembly include a spring loaded pin while the lower pivot assembly includes a threaded pin.

This invention relates to folding doors.

Among the objects of the invention are to provide a folding door construction which utilizes novel pivot assemblies and guide assemblies that are easily insertable with a minimum use of tools and labor; which are not readily broken during insertion; which utilize similar parts.

Summary

The folding door construction embodying the invention comprises an upper pivot assembly and a lower pivot assembly for pivoting a panel to a door opening and a guide assembly which guides the panel along the track. Each of these assemblies includes a sleeve of organic plastic material and a metal cap over the flanged end of the sleeve. The upper pivot assembly and the guide assembly include a spring loaded pin while the lower pivot assembly includes a threaded pin.

In the drawings:

FIG. 1 is a fragmentary part sectional view of a door embodying the invention.

FIG. 2 is a sectional view taken along the line 2—2 in FIG. 1.

FIG. 3 is a sectional view taken along the line 3—3 in FIG. 1.

Referring to FIG. 1, the invention relates to a folding door 10 that comprises a plurality of panels 11, 12 that are hinged to another another as at 13 about vertical axes. The panel 11 is pivoted to the top and bottom sides of a door opening 14, while the panel 12 is guided in its folding and unfolding movement by a downwardly opening U-shaped track 15, as presently described.

In accordance with the invention, an upper pivot assembly 16 and a lower pivot assembly 17 pivot the panel 11 to the door opening while a guide assembly 18 guides the panel 12 along track 15 in the folding and unfolding movement.

The upper pivot assembly 16 and the guide assembly 18 utilize similar parts and a basic assembly as shown in FIG. 2. The assembly 16 comprises a sleeve 20 of organic plastic material such as nylon that has a cylindrical upwardly extending opening 21 and a lower wall 22 with an opening 23 therein. A pin 24 extends downwardly into the opening 21 and has a lower end 25 of reduced cross section substantially equal to the diameter of the opening 23 which extends through the opening 23 and is enlarged as at 26. The intermediate portion 27 of the pin 24 has a greater diameter than the lower end 25 and a compression spring 28 is interposed between the portion 27 and the wall 22 to yieldingly urge the pin 24 upwardly. Sleeve 20 is formed with an integral radially outwardly and horizontally extending flange 29 that has an outer diameter

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greater than the outer diameter of the central portion of the sleeve 20. A metal cap 30 is crimped over the flange 29 and has an opening 31 through which the portion 27 of the pin 24 extends. The opening 31 has a diameter substantially equal to the diameter of the portion 27 but less than the diameter of the opening 21 in the sleeve so that the cap 30 forms the upper guide for the pin 24.

The upper end 32 of the pin 24 is adapted to extend into a yieldable pivot fitment 33 (FIG. 1) that has a recess 34 for receiving the upper end of the pin 24.

The sleeve 20 includes vertically extending ribs 35 which extend downwardly from the area of the flange 29 to a point spaced from the lower end of the sleeve. The ribs 35 strengthen the sleeve 20 and at the same time form areas of high frictional contact so that the assembly will stay in position when inserted into an opening in the panel. Finally, the assembly includes a flange 36 between the intermediate portion 27 and the upper end 32 of the pin 24.

In use, the upper surface of door panel 11 is formed with vertical opening 37 which in the case of a wood panel can be drilled and the assembly 16 is inserted in the opening 37. Initially, the assembly can be placed in the opening by hand and thereafter a hammer can be used to strike the pin 32 causing the flange 36 to engage the cap 30 and, in turn, force the sleeve 20 into the opening. Variations in the size of the opening 37 as may occur with different materials including wood of different hardness and direction of grain are taken up by deflection of the sleeve 20. However, this does not affect in any way the movement of the pin 24 since the diameter of the opening 21 is substantially greater than the size of any portion of the pin 24 which extends into the sleeve. As the sleeve is driven inwardly the cap 30 engages the upper surface of the door panel. The cap protects the flange 29 from breakage due to further blows of the hammer.

Where the assembly shown in FIG. 2 is utilized on the door panel 12 to guide the panel, a roller 38 is forced on the upper end 32 of the pin 24 and frictionally held thereon by serrations 39. The roller 38 preferably comprises a low friction material such as nylon or similar plastic.

The lower pivot assembly 17 is similar in construction in that it utilizes an organic plastic sleeve 40 having ribs 41 on the outer surface thereof and a flange 42 over which a cap 43 is provided. However, the sleeve 40 has an internally threaded opening 44 into which the threaded portion 45 of the lower pivot pin 46 extends. The pivot pin 46 includes an integral hexagonal portion 47 whereby it can be engaged by a wrench, as presently described, and a lower free end 48 over which an organic plastic sleeve 49 with a flange 50 is press fitted. The assembly of the sleeve and pin with the portion 47 against the cap 43 is inserted in an opening 51 in the lower end of the door panel 11 by striking it with a hammer until the capped flange engages the horizontal surface 52 of the lower end of the door panel 11.

When the door is mounted in position in the door opening, the lower fitting 49 engages an opening 53 in a lower yieldable pivot fitment 54 to support the door. Alignment of the door vertically can be achieved by engaging a wrench with the portion 47 of pin 46 and thereby rotating the pin 46 relative to the sleeve 40 to elevate the door.

It can thus be seen that there has been provided a low cost, easily installed folding door arrangement which requires a minimum number of tools and labor and which cannot be readily broken during installation.

I claim:

1. In a folding door, the combination comprising a track adapted to be mounted horizontally in a door opening,

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a plurality of door panels hinged about substantially vertical axes to one another,
 an upper pivot comprising a sleeve of organic plastic material,
 one of said door panels having a vertical opening therein into which said sleeve extends,
 a pin,
 said sleeve having an upwardly facing opening therein into which said pin extends,
 the lower end of said sleeve having an opening therein of substantially the same diameter as the lower end of said pin,
 the lower end of said pin extending through said opening and having an enlarged end,
 spring means interposed in said sleeve between the lower end thereof and a portion of said pin yieldingly urging said pin upwardly,
 said sleeve having a flange extending horizontally and having an outer diameter greater than the diameter of said opening in said door panel,
 and a metal cap surrounding said flange and having an opening therein through which said pin extends, the diameter of the opening in said cap being substantially equal to the diameter of said pin in the portion thereof adjacent said cap and less than the inner diameter of said sleeve,
 and a lower pivot comprising a sleeve of organic plastic material,
 said one door panel having a vertical opening therein into which said sleeve frictionally extends,
 said sleeve having a flange extending radially and horizontally outwardly and having an outer diameter greater than the diameter of the opening in said door panel into which said sleeve extends,
 a metal cap over said flange,
 and a pivot pin threaded into said sleeve,
 said pivot pin having wrench engaging surfaces formed on the lower end thereof,
 and a pivot pin receiving fitment adapted to be mounted in said door opening for receiving the upper end of said pin,
 a lower pivot pin fitment adapted to be mounted in said door opening into which the lower end of said lower pivot pin extends,
 and a guide assembly comprising a sleeve of organic plastic material,
 another of said door panels having an upwardly opening vertical opening therein into which said sleeve extends and is frictionally engaged,
 said sleeve having a lower end with an opening therein of lesser diameter than substantially the diameter of the remainder of the sleeve,
 a pin in said sleeve,
 the lower end of said pin extending through said last mentioned opening and having a diameter substantially equal to the diameter of said last mentioned opening,
 said sleeve having an integral flange extending radially and horizontally outwardly and having an outer diameter greater than the outer diameter of the remainder of said sleeve,
 a metal cap on said flange,
 said metal cap having an opening therein through which the pin extends which has a diameter substantially equal to the diameter of the portion of the pin adjacent said metal cap and less than the diameter of the major portion of the opening of the sleeve,
 spring means interposed between the lower end of said sleeve and a portion of said pin yieldingly urging the pin upwardly,
 and a guide member on said pin engaging said track.

2. The combination set forth in claim 1 wherein said sleeve includes integral ribs along the outer surface thereof.

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3. The combination set forth in claim 2 wherein said ribs extend vertically of said sleeve.

4. In a folding door, the combination comprising a plurality of door panels hinged about substantially vertical axes to one another,
 an upper pivot comprising a sleeve of organic plastic material,
 one of said door panels having a vertical opening therein into which said sleeve extends,
 a pin,
 said sleeve having an upwardly facing opening therein into which said pin extends,
 the lower end of said sleeve having an opening therein of substantially the same diameter as said pin,
 the lower end of said pin extending through said opening and having an enlarged end,
 spring means interposed in said sleeve between the lower end thereof and a portion on said pin yieldingly urging said pin upwardly,
 said sleeve having a flange extending horizontally and having an outer diameter greater than the diameter of said opening in said floor panel,
 and a metal cap surrounding said flange and having an opening therein through which said pin extends, the diameter of the opening in said cap being substantially equal to the diameter of said pin in the portion thereof adjacent said cap and less than the inner diameter of the opening in said sleeve,
 and a lower pivot comprising a sleeve of organic plastic material,
 said one door panel having a vertical opening therein into which said sleeve frictionally extends,
 said sleeve having a flange extending radially and horizontally outwardly and having an outer diameter greater than the diameter of the opening in said door panel into which said sleeve extends,
 a metal cap over said flange,
 and a pivot pin threaded into said sleeve,
 said pivot pin having wrench engaging surfaces formed on the lower end thereof,
 and a pivot pin receiving fitment adapted to be mounted in said door opening for receiving the upper end of said pin,
 and a lower pivot pin fitment adapted to be mounted in said door opening into which the lower end of said lower pivot pin extends.

5. The combination set forth in claim 4 wherein said sleeve includes integral ribs along the outer surface thereof.

6. The combination set forth in claim 5 wherein said ribs extend vertically of said sleeve.

7. For use in a folding door comprising a track adapted to be mounted horizontally in a door opening, and a plurality of door panels hinged about substantially vertical axes to one another, the combination comprising an assembly comprising a sleeve of organic plastic material,
 a pin,
 said sleeve having an upwardly facing opening therein into which said pin extends,
 the lower end of said sleeve having an opening therein of substantially the same diameter as the lower end of said pin,
 said pin extending through said opening and having an enlarged end,
 spring means interposed in said sleeve between the lower end thereof and a portion on said pin yieldingly urging said pin upwardly,
 said sleeve having a flange extending horizontally and having an outer diameter greater than the diameter of said opening in said door panel,
 and a metal cap surrounding said flange and having an opening therein through which said pin extends, the diameter of the opening in said cap being substantially equal to the diameter of said pin in the portion

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thereof adjacent said cap and less than the inner diameter of the opening in said sleeve,
said assembly being adapted to be inserted into vertical openings in the tops of door panels with the upper end of said pin serving as a pivot pin or as a guide member for engaging a guide track in a door opening.
8. The combination set forth in claim 7 wherein said sleeve includes integral ribs along the outer surface thereof.
9. The combination set forth in claim 8 wherein said ribs extend vertically of said sleeve.
10. For use in a folding door comprising a track adapted to be mounted horizontally in a door opening, and a plurality of door panels hinged about substantially vertical axes to one another, the combination comprising a lower pivot pin comprising a sleeve of organic plastic material,
said one door panel having a vertical opening therein into which said sleeve frictionally extends,
said sleeve having a flange extending radially and horizontally outwardly and having an outer diameter greater than the diameter of the opening in said door panel into which said sleeve extends,
a metal cap over said flange,
and a pivot pin threaded into said sleeve,

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said pivot pin having wrench engaging surfaces formed on the lower end thereof,
said pivot pin being adapted to engage a lower pivot pin fitment mounted in said door opening.
11. The combination set forth in claim 10 wherein said sleeve includes integral ribs along the outer surface thereof.
12. The combination set forth in claim 11 wherein said ribs extend vertically of said sleeve.

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