Nov. 3, 1959 A. B. WILSON 2,911,037

METAL SLAT FOLDING DOOR

Filed Oct. 27, 1953 2 Sheets-Sheet 1

Fig. 1.

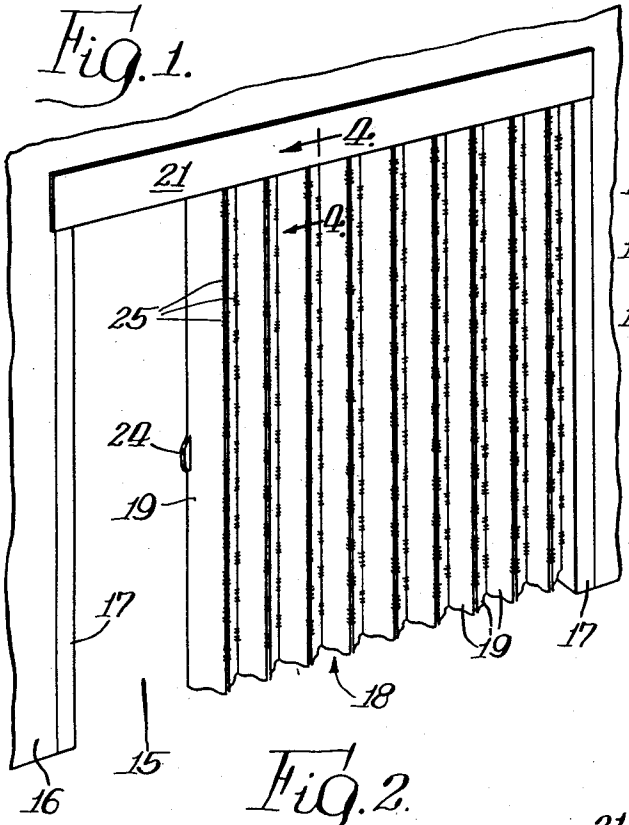


Fig. 3.

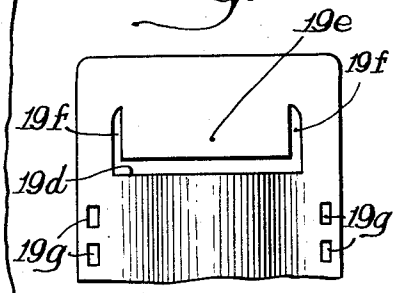


Fig. 4.

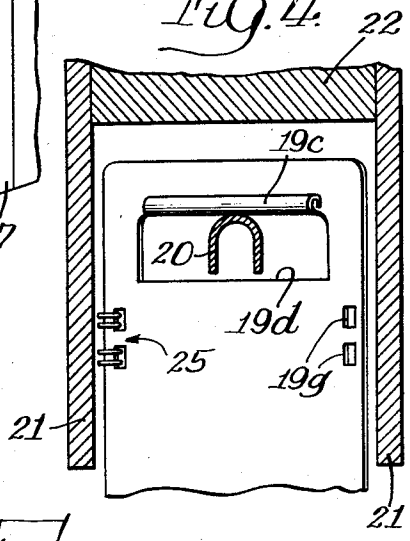


Fig. 2.

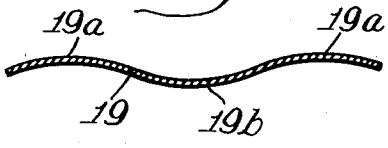
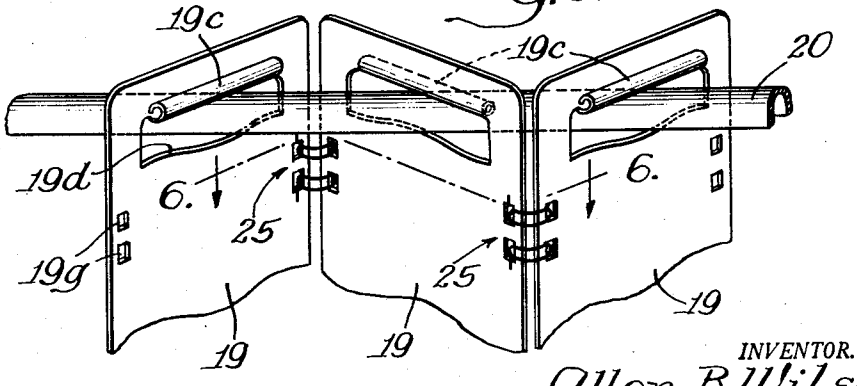


Fig. 5.



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Nov. 3, 1959 A. B. WILSON 2,911,037

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Filed Oct. 27, 1953 2 Sheets-Sheet 2

Fig. 6.

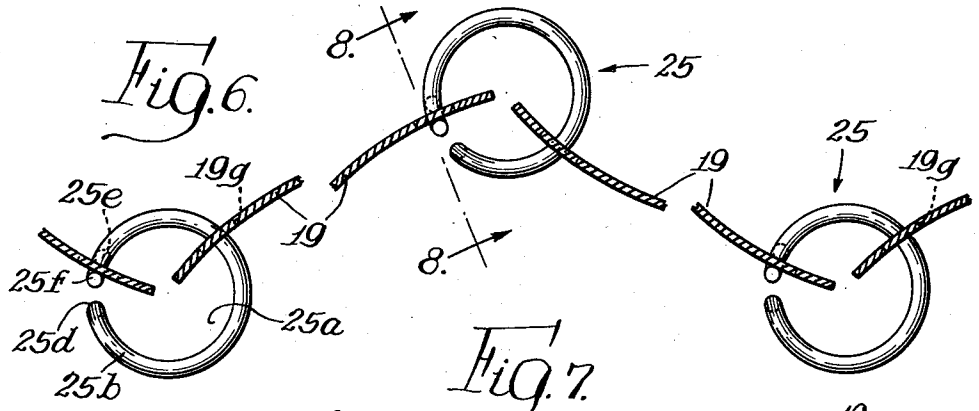


Fig. 7.

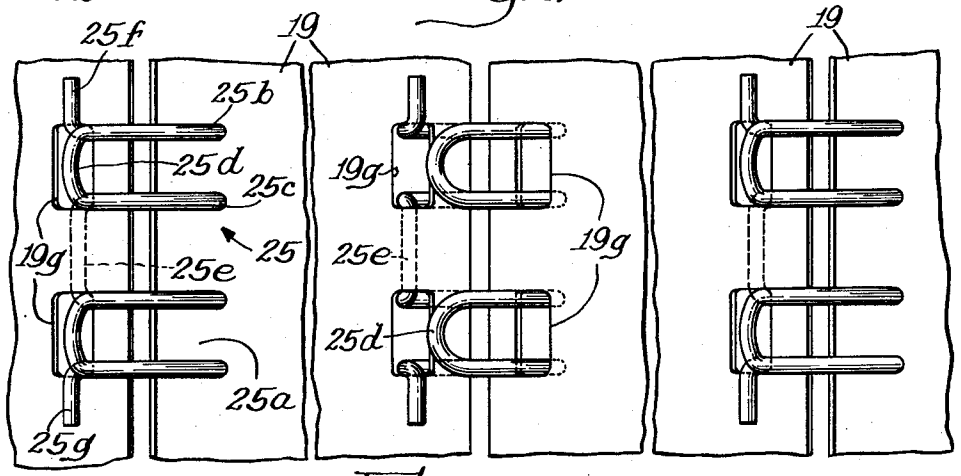


Fig. 8.

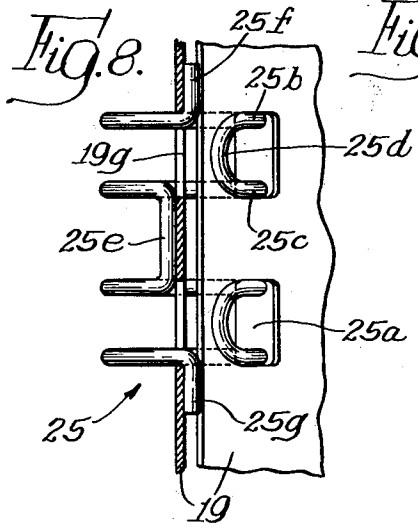


Fig. 9.

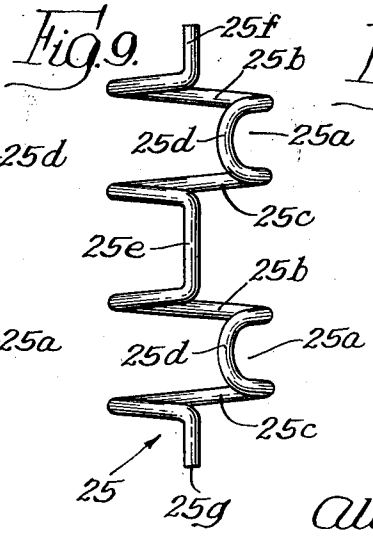
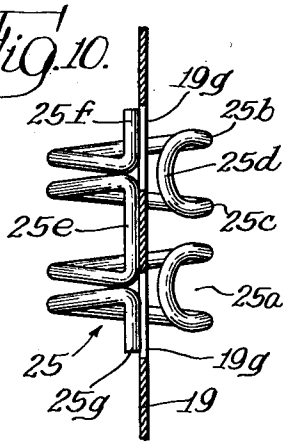


Fig. 10.



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METAL SLAT FOLDING DOOR

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2 Claims. (Cl. 160—199)

This invention relates to improvements in doors and its purpose is to provide a novel folding door made up of metal slats which are hinged together and suspended from an overhead track, so that the door may be readily expanded or collapsed and caused to close any desired part of a door opening.

The principal object of the invention is to provide an improved folding door comprising thin resilient metal slats which are transversely curved or otherwise formed to import longitudinal stiffness thereto and which are adapted to spring back to their normal shapes when bent therefrom. A further object is to provide improved means for supporting and guiding the slats of a folding door, whereby they may be readily constructed and may be operated quietly and conveniently. Another object of the invention is to provide a metal slat folding door comprising improved means for hinging adjacent slats together so that relative movement of the slats may be effected without rattles or other noise. Still another object of the invention is to provide an improved method of connecting the edges of adjacent slats in a metal slat folding door. Other objects relate to various features of construction and arrangement which will appear more fully hereinafter.

The nature of the invention will be understood from the following specification taken with the accompanying drawings in which one embodiment is illustrated. In the drawings,

Figure 1 shows a perspective view of a partially open door which has been constructed according to the present invention;

Fig. 2 shows an enlarged horizontal section through the preferred form of one of the slats embodied in the door construction illustrated in Fig. 1;

Fig. 3 shows an elevation of the upper end of a slat, illustrating the method of cutting away portions thereof in the process of forming the completed slat;

Fig. 4 shows an enlarged vertical section on the line 4—4 of Fig. 1, illustrating the method of suspending the slats from an overhead track member and the means for restraining the slats against transverse movement with respect to the track member;

Fig. 5 shows a perspective view of the upper end of a portion only of the slat construction illustrated in Fig. 1, showing the method of expanding the door by relative movement of the slats on the supporting track member;

Fig. 6 shows an enlarged vertical section taken on the line 6—6 of Fig. 5, illustrating the hinge construction by which the vertical edges of adjacent slats are pivotally connected, portions of the slats being broken away;

Fig. 7 shows a front elevation of the slat connections illustrated in Fig. 6;

Fig. 8 shows a vertical section taken on the line 8—8 of Fig. 6;

Fig. 9 shows a front elevation of one of the hinge members removed from the slats; and

Fig. 10 is a vertical section similar to that of Fig. 8 illustrating the method of compressing the hinge members axially in the process of moving them into interlocking engagement with the slats.

As illustrated in the drawings, the invention is illustrated in connection with a door opening **15** formed in a wall **16** and having its vertical edges bounded by the door posts **17**. The door opening **15** is adapted to be closed by a folding door **18** made up of a plurality of vertical slats **19** which are suspended from an overhead track **20** mounted horizontally at the top of the door opening behind the head boards **21** which extend downwardly from the head rail **22**.

The slats **19** are formed of thin resilient metal, such as strip steel, which is transversely curved or otherwise formed so that each slat has a non-planar cross section adapted to give it longitudinal stiffness. These slats may preferably be formed to have the cross sectional shape illustrated particularly in Fig. 2 where the slat **19** is illustrated as having a flattened M-shape comprising two curved portions **19*a*** which are convex in one direction and an intervening portion **19*b*** which is convex in the opposite direction. This formation is adapted to give the required stiffness to the slat while maintaining a minimum overall depth of the slat measured transversely to its width. These slats may preferably be formed of strip steel having a thickness of about .008" and they preferably have such resilience that they will return to their normal or original shapes when accidentally bent therefrom.

The track member **20** may preferably be formed from a bar of sheet metal which is bent into U-shape, as shown in Fig. 4, with the rounded surface of the bar presented upwardly to contact with tubular bearing members **19*c*** which are formed to extend horizontally along the upper edges of the slots **19*d*** which are formed in the upper portions of the slats. These rail engaging slots **19*d*** may preferably be formed by punching out a U-shaped portion of the metal adjacent one end of the slat to form a tongue **19*e*** which is bounded by the U-shaped opening **19*f***, as shown in Fig. 3. The tongue **19*e*** is then rolled to provide the tubular bead-like bearing member **19*c*** shown particularly in Figs. 4 and 5. With this arrangement, each slat is adequately supported upon the track member **20** with a minimum of contacting surface so that there is little frictional resistance to the movement of the slats longitudinally of the track member **20** in the process of opening or closing the door. The slots **19*d*** are of such length, measured transversely of the slats, that they permit the expansion and contraction of the door by collapsing or unfolding the slats in the manner illustrated in Figs. 1 and 5. The slat **19** which is at the free end of the door is preferably provided with a handle **24** by which the slats may be moved on the track member and the slat at the opposite end of the door may preferably be secured to the adjacent door post.

In order to permit the folding and unfolding of the slats while maintaining their assembled relationship in a unitary door structure, the slats are pivotally connected together along their vertical edges by means of hinges **25** which are preferably constructed in the manner which is illustrated particularly in Figs. 6 to 10, inclusive. These hinges engage rectangular marginal apertures **19*g*** which are formed in pairs along each vertical edge of each slat and the hinge members **25** are adapted to be moved into detachable interlocking engagement with two pairs of apertures **19*g*** which are located opposite to each other in the edges of adjacent slats. Each hinge **25** is formed of round resilient wire and comprises two circular loops **25*a*** which are adapted to engage registering apertures **19*g*** in the adjacent slats. Each loop **25*a*** comprises two arcuate arms **25*b*** and **25*c*** which are con-

nected by an intervening curved portion 25*d*. The lower arm 25*c* of the uper loop is connected to the upper arm 25*b* of the lower loop by an intervening straight portion 25*e*. The upper arm 25*b* of the upper loop terminates in an upwardly extending straight portion 25*f* which is in alignment with the part 25*e*. Similarly, the lower loop portion 25*a* terminates in a downwardly extending straight portion 25*g* which is also in alignment with the part 25*e*.

In assembling one of the hinges 25 with respect to the two adjacent slats 19, the hinge is compressed longitudinally, as shown in Fig. 10, until the end portions 25*f* and 25*g* register with two of the apertures 19*g*, whereupon these parts 25*f* and 25*g* are inserted through the apertures and the hinge is then allowed to expand longitudinally due to its own resilience so that the members 25*f* and 25*g* will then engage one surface of the slat 19 while the part 25*e* of that hinge member which connects the loops 25*a* will bear against the opposite face of the slat between the two apertures 19*g*. A torsional twist is thus imparted to the hinge so that it is maintained in close contact with that slat which is engaged by the parts 25*f* and 25*g*, whereby relative movement and rattling noises are prevented.

The assembly of a hinge with respect to two adjacent slats 19 also involves the insertion of the two loops 25*a* through the apertures 19*g* of the slat 19 which is adjacent to the slat having the interlocking connection with the hinge portions 25*e*, 25*f* and 25*g*. This is accomplished by inserting these loop portions through those slots in the manner shown in Fig. 8 with the hinge somewhat compressed axially so that when the assembly has been completed the hinge will expand vertically due to its own resilience and thereby cause the arms 25*b* and 25*c* of the upper and lower loops 25*a*, respectively, to bear vertically against the upper edge of the upper aperture 19*g* engaged thereby and against the lower edge of the lower aperture 19*g* engaged by the lower loop. A resilient pressure is thus exerted by the hinge in a vertical direction on both adjacent slats 19 while a resilient pressure also is exerted transversely to one slat by the parts 25*e*, 25*f* and 25*g*. A close frictional engagement is thus maintained between each hinge member and the connected parts of two adjacent slats so that relative movement of the slats may be effected conveniently and quietly. The process of assembly which has been described may, of course, be applied in the application of all of

the hinges 25 throughout the height of the door and any suitable number of hinges may be employed in connecting any two of the adjacent slats. The outermost slat 19 which carries the handle 24 has a free edge which is not provided with apertures 19*g*.

Although one form of the invention has been shown and described by way of illustration, together with one method of forming and assembling the hinge connections, it will be understood that the door construction and the method may be modified in various ways without departing from the scope of the appended claims.

I claim:

1. A folding closure for openings comprising, a plurality of thin metal slats suspended from their upper ends and proivded with marginal apertures in the body of the metal along their vertical edges, and hinge members engaging said apertures and having certain parts mounted to exert resilient pressure vertically on said slats at the edges of said apertures and having other parts arranged to exert resilient pressure on opposite faces of one of the slats engaged thereby.

2. A folding door comprising, a plurality of thin metal slats suspended from their upper ends and provided with marginal apertures along their vertical edges, and hinge members engaging and interconnecting adjacent edges of adjacent slats, each hinge member including first portions resiliently engaging opposite faces of one slat firmly to mount the hinge member thereon and including second portions resiliently and hingedly engaging the adjacent slat through the apertures therein, whereby to prevent rattling movement between said hinge members and said slats while permitting hinged movement of said adjacent slat with respect to said one slat and said hinge member.

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