

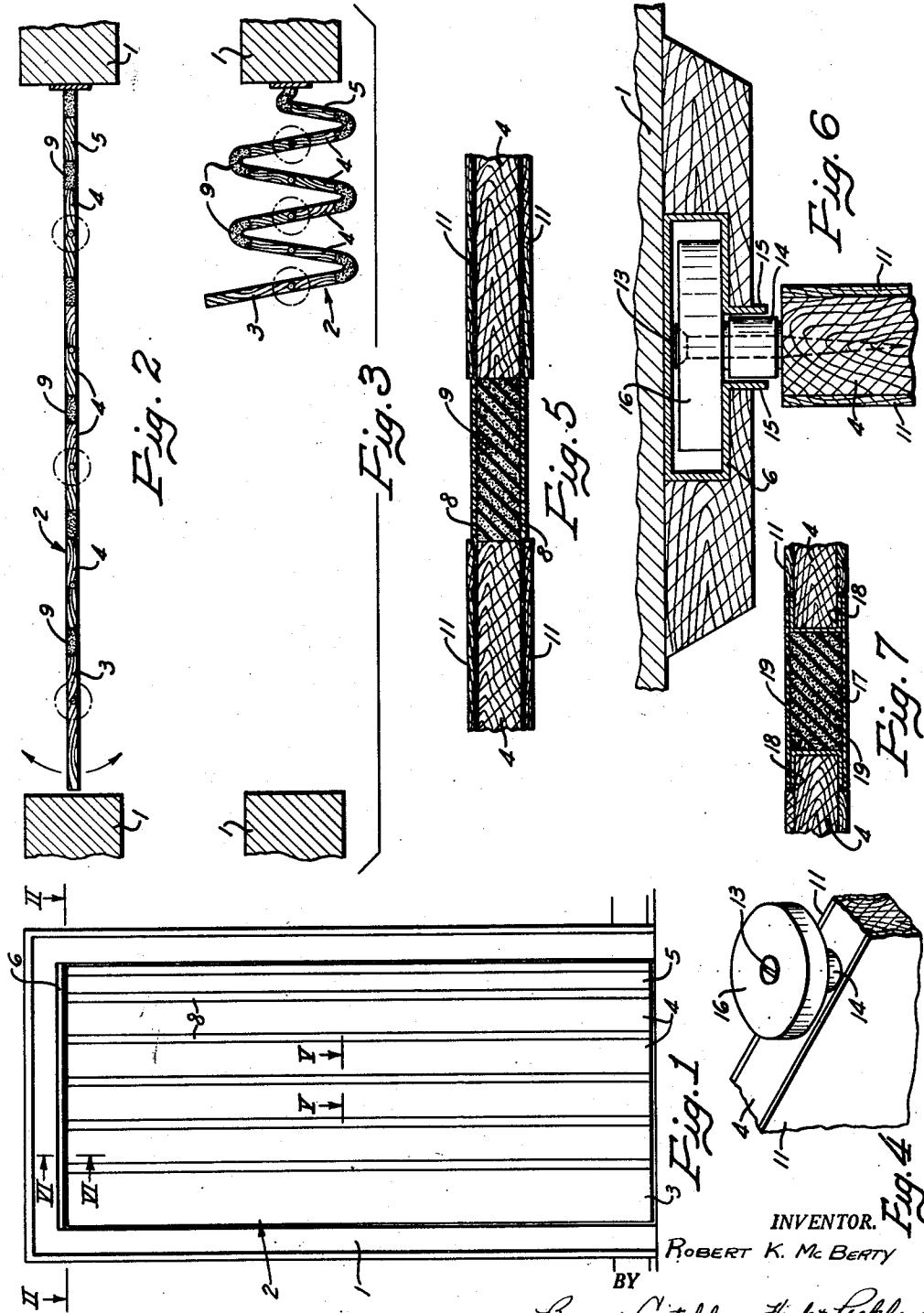
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FOLDING DOOR

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FOLDING DOOR

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This invention relates to folding doors, and more particularly to the type in which vertical slats are hinged together along their edges so that the door is accordion folded to open it.

In folding doors of this type with which I am acquainted, the doors are not flat, even when fully closed. This is due to the nature of the flexible connections between the edges of the slats. They either are biased laterally in one direction or the other from the beginning, or they soon acquire a set, which has the same effect. Two disadvantages result. One is that the door always has a wavy appearance instead of being flat when closed, and the other is that the leading slat of the door always has to be swung in the same direction in order to open the door, whereby the leading slat has to be pulled in some cases and pushed in others.

It is among the objects of this invention to provide a folding door, in which the slats and their connecting means all lie in a common vertical plane while the door is closed, and in which the leading slat can be pushed from either side of the door in order to open it. Other objects are to provide such a door, which is of simple construction, which is strong and durable, which is self-closing, and which has an attractive appearance.

In accordance with this invention, a row of vertical slats are suspended from an overhead track, along which they are slidable. Secured to the opposite sides of the slats are flexible means which connect them together edge to edge, but with spaces between the slats. In these spaces there are flexible resilient means which are compressed between the edges of the slats and normally stretch the flexible means taut so that the slats will hang in a common vertical plane. The flexible and resilient means are adapted to bend in either direction to permit the door to be accordion folded and simultaneously pushed to one end of the track in order to open the door. The flexible means that connect the slats preferably are sheets or tapes of fabric or similar sheet-like material, and the resilient means most suitably are made of sponge rubber, although springs or the like could be used. The leading slat may be wider than the others, in which case its free edge is located farther than its opposite edge from the axis of rotation of the slat, in order to facilitate swinging the slat to start the door to open.

The preferred embodiment of the invention is illustrated in the accompanying drawings, in which:

Fig. 1 is a side view of my door closed;

Fig. 2 is an enlarged view of the top of the closed door, taken on the line II—II of Fig. 1;

Fig. 3 is a view similar to Fig. 2, but showing the door folded and nearly fully open;

Fig. 4 is an enlarged fragmentary perspective view of the upper end of one of the slats and its hanger;

Fig. 5 is an enlarged fragmentary horizontal section taken on the line V—V of Fig. 1;

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Fig. 6 is an enlarged fragmentary vertical view taken on the line VI—VI of Fig. 1; and

Fig. 7 is a fragmentary horizontal section of a modification.

Referring to Fig. 1 of the drawings, a conventional door frame 1 forms a doorway which normally is closed by a folding door 2. The door is formed primarily from a row of horizontally spaced vertical slats 3, 4 and 5 hanging from a track 6 that extends along the door frame at the top of the doorway. The slats, either solid or hollow, may be formed of any suitable material, although wood generally is preferred. In such a case, it has been found that slats which are approximately 4½ inches wide and ¾ inch thick are satisfactory for most of the door, although the trailing slat 5 is narrower and the leading slat 3 may be wider as will be described presently. The slats are long enough to extend from approximately the track down to a short distance from the floor. The way in which the slats are suspended from the track will be described later.

When the door is closed, the slats hang in a straight line in a common vertical plane. They are connected together by flexible means secured to the opposite sides of the slats and bridging the spaces between them. The flexible means also connect the narrow trailing slat 5 to the side of the door or frame 1. The flexible means preferably are tapes of fabric 8 or the like, such as plactic, having the same length as the slats. Nylon fabric is especially suitable for this purpose. As shown in Fig. 5, the portions of the tapes overlapping the sides of the slats are cemented to them. Care is taken to have the flexible tapes that connect any given pair of slats the same width between the slats, so that when the two slats are pushed away from each other in a manner about to be described, the taut tapes between them will hold the slats in a straight line.

It is a feature of this invention that the slats are constantly urged away from one another while the door is closed, so that the door will be flat. Accordingly, the compressed resilient means are mounted in the covered spaces between the edges of the slats and constantly press against those edges. Although the resilient means may take various well-known forms, it is preferred to use rubber, especially foam or sponge rubber, natural or synthetic, which does not take a permanent set if deformed for a period of time. Thus, as shown in Fig. 5, strips of sponge rubber 9 having the same thickness and length as the slats are placed between the slats in the spaces between the flexible tapes. Each of these rubber strips originally is somewhat wider than the distance between the slats, whereby the rubber is compressed in a direction lengthwise of the door when the rubber is in place. The opposite edges of the rubber strips may be cemented to the slats. Since the rubber is under compression, it continually tries to push the adjoining slats away from each other and thereby holds the tapes taut. The result is that the slats are held in a common vertical plane and the door is flat while it is closed, as shown in Fig. 2. The flexible tapes not only hold the slats together, but they also confine and conceal and protect the rubber strips and cause them to bend more uniformly. If solid instead of sponge rubber were used, the strips might have to be so thin, in order to avoid undesirable stiffness, that they would not tend to hold the door straight.

If desired, thin strips of veneer 11 can be glued to the opposite sides of the slats to improve their appearance. The edges of these strips will overlie and hide the edges of the tapes 8 and thereby improve the connection between the tapes and the slats. This is

especially important in the case of nylon, which may not stick to the slats very well otherwise.

Projecting from the top of each of the slats, except the narrow trailing slat 5, is a pivot screw 13, as shown in Figs. 4 and 6. Rotatably mounted on each of these screws is a small roller 14 that extends between the parallel depending flanges 15 of the slotted tubular track 6. At least some of the screws extend above these rollers and have travelers mounted on their upper ends for suspending the door from the track. These travelers may take various forms of anti-friction devices, sliding discs 16 being shown in the drawings for the sake of simplicity. Each disc rests on the floor of the track at opposite sides of its slat. The leading slat 3 is supported by one of these travelers, as indicated by broken lines in Fig. 2, but generally alternate slats do not need to be supported because they will be carried by the slats at their opposite edges. With all of the slats except the leading one, the pivot screw at the top is midway between the opposite edges of the slat. The pivot screw in the top of the leading slat is the same distance from the inner edge of that slat as is the case with the other screws and slats. However, the leading slat preferably is wider than the others, so that its free edge will be a considerable distance farther than its inner edge from its supporting screw. This makes it easier to swing the leading slat, because there is more room between its leading edge and its axis of rotation for the hand to push against the slat.

While the door is closed, as shown in Fig. 2, it will be seen that it is perfectly straight and that there is nothing to prevent the leading slat 3 at the left-hand side of the door from being swung in either direction, as indicated by the arrows. Whenever someone wishes to pass through the doorway, all he has to do is to push against the outer portion of the leading slat and simultaneously push it toward the opposite side of the doorway. The motion of the arm is the same as used in passing through a curtained opening. This will cause the slats to rotate and slide along the track, whereby the door will fold like an accordion, as shown in Fig. 3. The flexible connections or hinges between the slats can fold in either direction, depending upon which way the door is approached by the person who opens it. When the door is released, the tendency of the rubber strips 9 to straighten out will cause the door to unfold and close again and to extend out straight and flat.

In the modification shown in Fig. 7, the slats 4 are connected by flexible units that can be quickly attached to or removed from the slats. Each unit includes a resilient strip 17 between a pair of vertical channels 18 facing in opposite directions. The resilient strip is held under compression by flexible tapes 19 at its opposite sides, the tapes being secured to the flanges of the channels. The channels preferably are made of spring metal or the like so that they will tightly grip the edges of the slats in the channels, so that the unit will fasten the slats together.

According to the provisions of the patent statutes, I have explained the principle of my invention and have illustrated and described what I now consider to represent its best embodiment. However, I desire to have it understood that, within the scope of the appended claims, the invention may be practiced otherwise than as specifically illustrated and described.

I claim:

1. The combination with an overhead track, of a folding door comprising a row of rotatable vertical slats suspended from the track and slidable along it, flexible means secured to the opposite sides of the slats and connecting the slats together edge to edge with spaces between them, and resilient means in said spaces compressed between the spaced edges of adjacent pairs of slats and normally stretching said flexible means taut so that the slats will be held in a common vertical plane, said flexible and resilient means being adapted to bend in either direction to permit the door to be accordion folded and simultaneously pushed toward one end of the track.

2. A folding door in accordance with claim 1, in which said flexible means connecting the slats are made of fabric-like material.

3. A folding door in accordance with claim 1, in which the areas of said flexible means overlying the slats are covered with veneer.

4. A folding door in accordance with claim 1, in which said resilient means are strips of sponge rubber.

5. A folding door in accordance with claim 1, in which said resilient means have substantially the same thickness as the adjoining slats.

6. A folding door in accordance with claim 1, in which the leading slat is wider than the other slats and is rotatably suspended from the track at a point closer to its inner edge than to its outer edge.

7. A folding door in accordance with claim 1, in which said flexible means and resilient means are secured to the slats by removable fastening members permanently connected to said means.

8. A folding door in accordance with claim 7, in which said fastening members are spring channels receiving the edges of the slats in gripping engagement therewith.

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