

Sept. 22, 1970

E. A. BENDER

3,529,651

HIP AND VALLEY PARTITION

Filed July 1, 1968

5 Sheets-Sheet 1

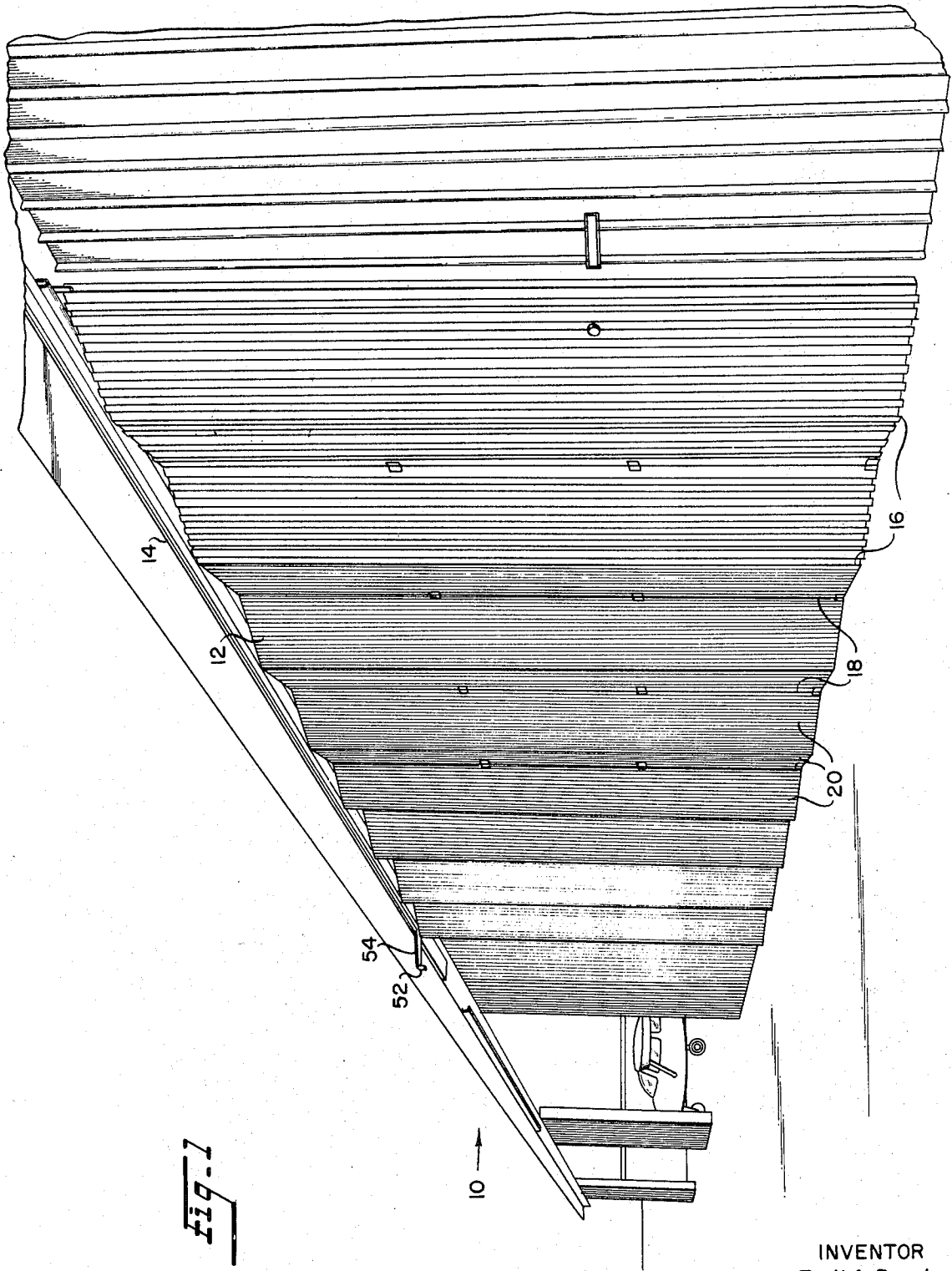


Fig-1

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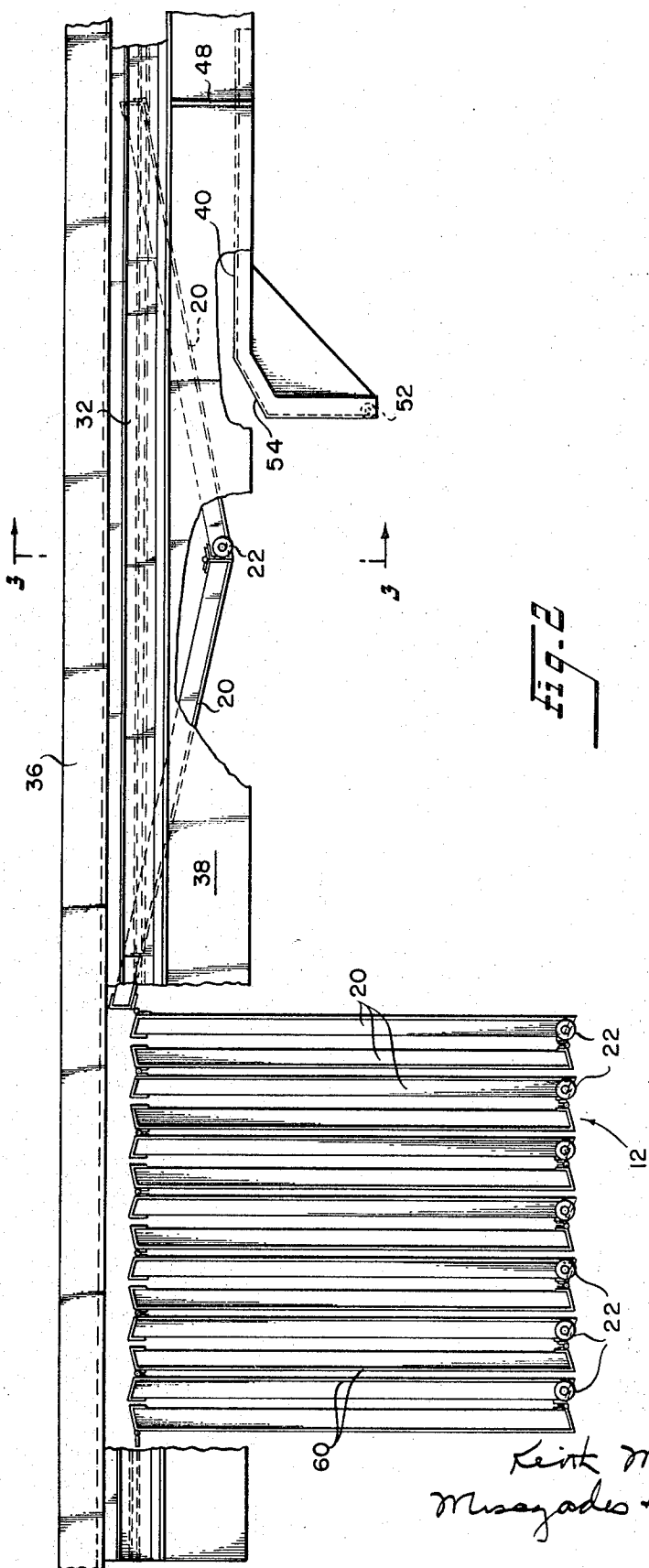


fig. 2



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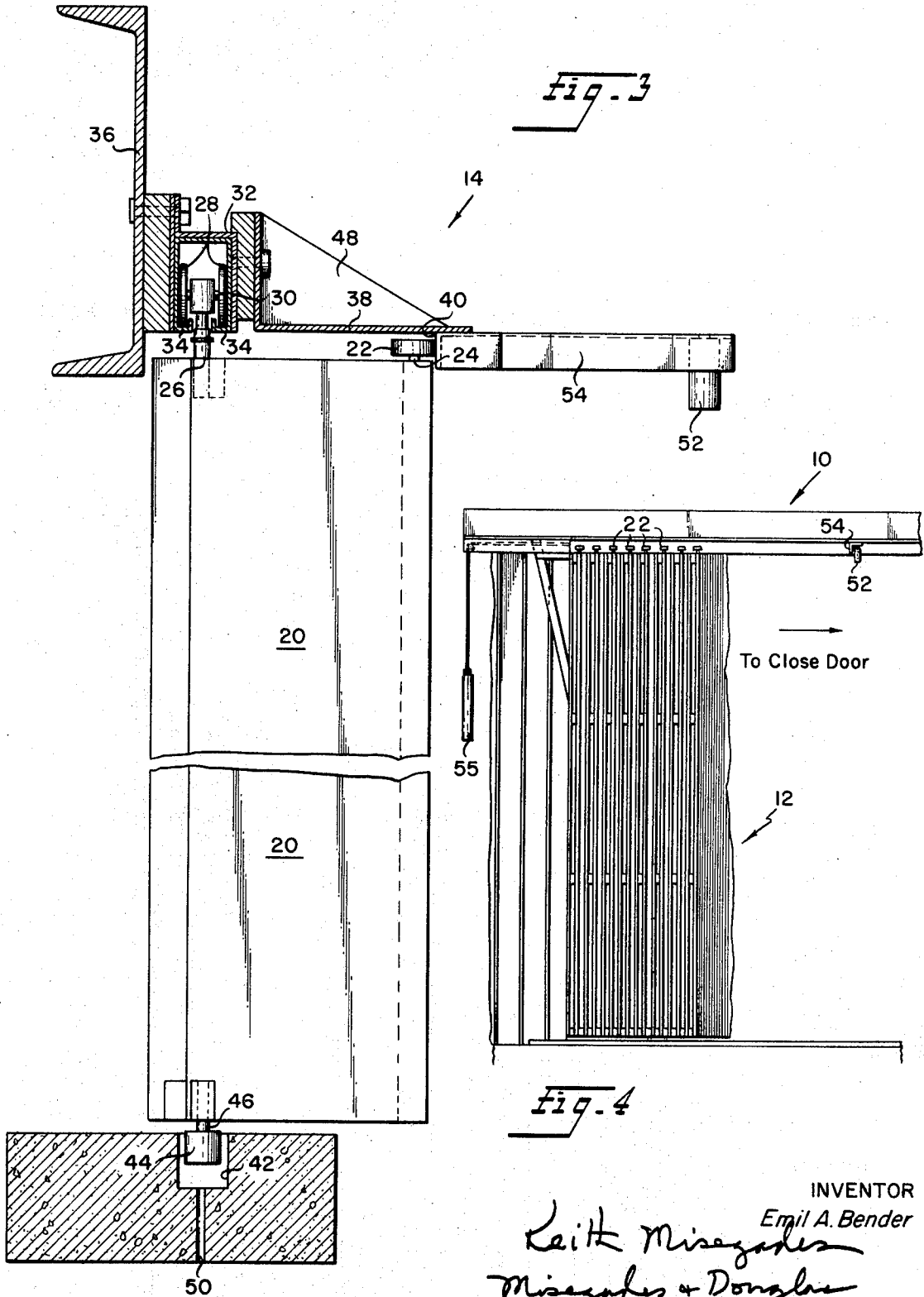


Fig. 3

Fig. 4

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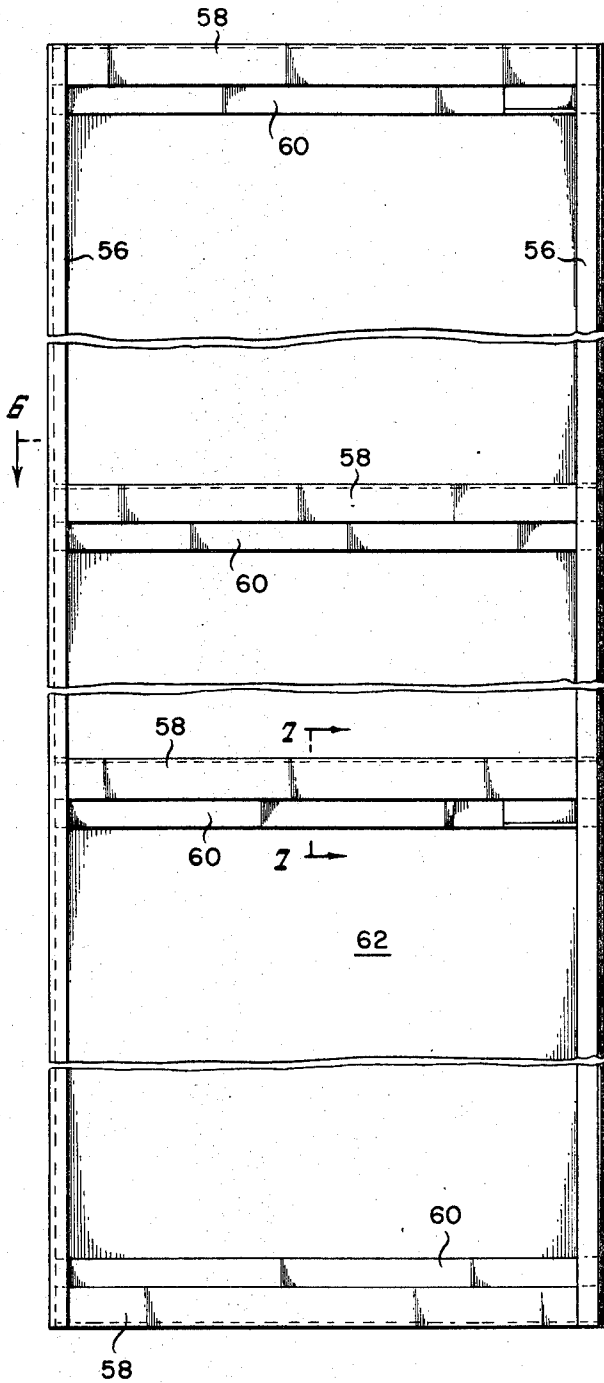
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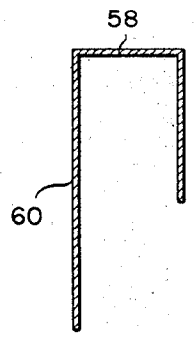
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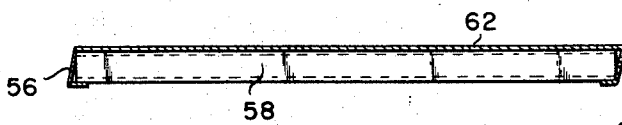
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*Fig. 5*



*Fig. 1*



*Fig. 6*

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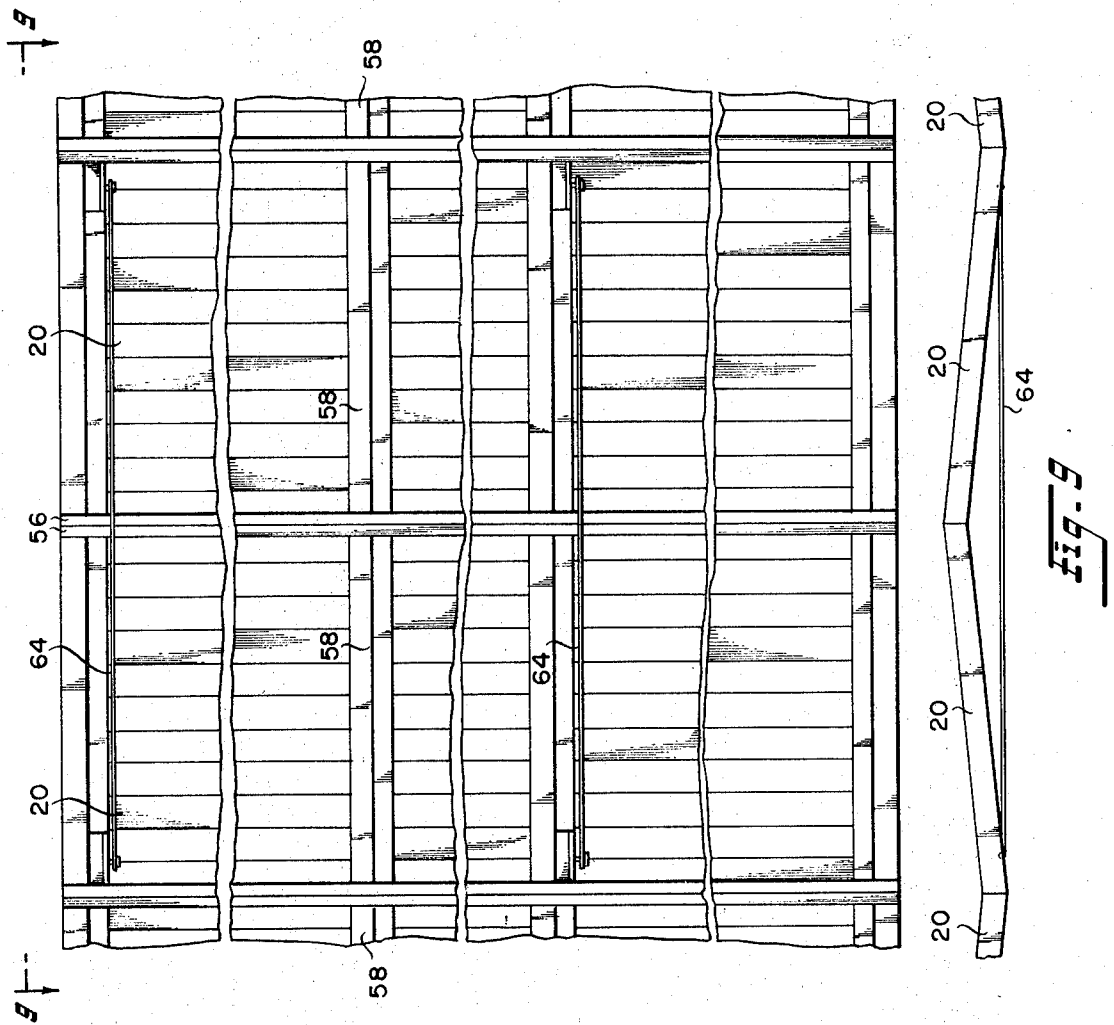


Fig. 8

Fig. 9

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3,529,651

**HIP AND VALLEY PARTITION**

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8 Claims

**ABSTRACT OF THE DISCLOSURE**

The invention comprises a multi-section hip and valley partition or door, the sections hingedly connected to each other in accordion-fold relationship and foldable into a face to face relationship when the door is open, an upper horizontal track for suspending the door, a ground track cooperating with the top track and door to assure integrity of the door when it is closed, and a deflecting roller depending from the upper track, outwardly thereof, arranged to sequentially strike each panel section as the door is unfolded.

**BACKGROUND OF THE INVENTION**

The invention relates generally to folding partitions and doors, but more particularly to a hip and valley type of folding door, such a construction allowing maximum door strength and minimum weight and cost of construction. It is most suitable in service for closing a very large entrance way, such as the entrance to an aircraft hangar, but is also obviously suitable for use in any location where it is necessary to cover a large doorway.

The major problems in such doorways are provision of a door that is strong enough to withstand high wind forces, foldable into a small compact unit to leave the doorway clear and of light weight so as not to require additional support structure in the building unit in which the door is used. The reason for compactness when folded is two-fold. First, most hangar doors in the art are of the sliding variety, to a position along a wall inwardly of the hangar when the door is opened, thus blocking an interior hangar wall and preventing use for suspending tools, etc. Second, a compact door may be more easily freighted from factory to installation point than a door that will not fold.

The prior art will be discussed chronologically. U.S. Pat. No. 781,665 issued to Charles F. Kusch illustrates a folding door including striker means to sequentially pivot each adjacent pair of door sections into a folded or unfolded position but each door panel is a solid panel, and the door when closed assumes a straight panel, rather than a hip and valley configuration. A similar folding door is disclosed in U.S. Pat. No. 1,246,314 issued to Norman A. Paliner, except that an upper, curved horizontal track is used to sequentially pivot door panel members into a closed or opened door position.

FIG. 33 of U.S. Pat. No. 2,151,033, issued to Malcolm L. Jones illustrates a pair of striker wheels 292 and 297 employed to swing door panels into a straight panel configuration, while U.S. Pat. No. 2,929,445 issued to Ernest R. Haws shows strikers 92 and 93 which serve the same purpose. Neither of these patents discloses a hip and valley type of door construction, nor the novel features of the instant invention disclosed and claimed below.

**SUMMARY OF THE INVENTION**

The invention is a light weight hip and valley partition or door composed of a plurality of pairs of door panels, an upper dual track assembly cooperating with each upper hip and valley of the partition and a lower track cooperating with each lower valley of the panel when the partition is closed, means for sequentially pivoting adjacent panels of the door into an unfolded attitude as the

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door is closed, and a rain cover over the upper dual track and door.

**BRIEF DESCRIPTION OF THE DRAWINGS**

5 Details of construction and operation according to a preferred embodiment of the invention will become readily apparent by reference to the following drawings, wherein:

FIG. 1 is a view in perspective of an airplane hangar equipped with the instant invention, the door being in an extended, closed position;

10 FIG. 2 is a top, plan view of the invention in a stored configuration, the lead pair of panels being unfolded, and with parts broken away to show interior detail;

15 FIG. 3 is a sectional view taken along lines 3—3 of FIG. 2;

FIG. 4 is a partial, front elevational view of the invention in a stored configuration, and drawn to a smaller scale;

20 FIG. 5 is a partial, rear plan view of one partition panel;

FIG. 6 is a sectional view taken along lines 6—6 of FIG. 5;

FIG. 7 is a sectional view taken along lines 7—7 of FIG. 5;

25 FIG. 8 is a rear elevational view of one pair of partition panels forming a single hip in the partition; and

FIG. 9 is a top view taken along lines 9—9 of FIG. 8.

**DESCRIPTION OF THE PREFERRED EMBODIMENT**

Referring now to the drawings wherein parts are indicated by reference character, there is shown in FIG. 1 an airplane hangar 10 with the partition 12 in extended position mounted across an opening thereof, suspended from its overhead dual track 14. In the extended position, the invention defines a plurality of hips 16 and valleys 18.

The suspension of panels 20 of the invention is best indicated by FIGS. 3 and 4. At the hip junction 16 of each adjacent pair of panels 20, 20, is mounted wheel 22, rotatable on a vertical axle 24, while at each valley junction 18, a trolley 26 is provided with a pair of flange wheels 28, 28, rotatable on horizontal trolley axle 30. Wheels 28, 28 ride in a generally inverted U-shaped support 32 having flanged tracks 34, 34 for receiving wheels 28, 28. Thus support for the partition is provided primarily by tracks 34, 34, wheels 28, 28 and trolleys 26. Of course, U-shaped support 32 may be mounted in any suitable manner on a channel door header 36 or other suitable fixture which is mounted above the open doorway of hangar 10.

Outwardly of tracks 34, 34 is a support 38 which includes along its outer edge a depending, vertical rail 40, extending along the length of the hangar doorway (FIG. 2), which cooperates with tracks 34, 34 to maintain partitions 12 in the hip and valley configuration.

At the base of partition 12 is another trackway or channel 42 which cooperates with a plurality of lower-guide wheels 44 which are each mounted on a vertical depending axle 46. Each axle 46 is mounted on a lower valley junction of adjacent panels 20. It is apparent that this construction provides three-way structural rigidity to partition 12 when it is in an extended position, in that the upper and lower valley junctions of adjacent panels are rigidly secured in tracks, and the upper end of each hip junction of adjacent panels is forced against rail 40.

If desired, a plurality of gussets 48 may be provided to lend strength to support 38 for rail 40, and a number of weepholes 50 may be formed beneath lower trackway 42. Support 38 is preferably of solid sheet material so as to serve additionally as a raincover for the open doorspace defined between valleys of partition 12.

FIGS. 2, 3 and 4 indicate the means for sequentially pivoting each pair of adjacent panels 20 into the extended position. As shown in FIGS. 2 and 4, the panels 20 may be stacked in a nested, face to face relationship when the partition is in a stored configuration. To close the door, the first panel is pulled away from the stack as indicated in FIG. 2. As it is pulled, the outer, hip end of the leading panel is guided by a depending striker roller 52, mounted on the end of a deflecting track segment 54, formed on the end of depending rail 40. As this occurs, hip wheel 22 will be directed to track segment 54, and subsequently onto rail 20. This procedure occurs as each pair of panels is moved to its extended position. When partition 12 is moved into a stored configuration, the reverse occurs, in that as each wheel 22 leaves rail 40, panels 20, 20 are forced into a nested relationship. For ease of opening and closing, a counterweight 55 may be provided (FIG. 4).

As shown by FIGS. 5 through 9, each panel 20 is constructed of a simple frame including two vertical members 56, 56 and a plurality of open cross channel beams 58. Each channel beam 58 may have an extended base flange 60 (FIG. 7) for further rigidity, which is spot welded or otherwise suitably attached to panel covering 62. Panel coverings 62 may be rib corrugated for further structural rigidity of each panel 20 (FIGS. 1 and 8). In the preferred embodiment of the invention, each panel covering is formed of a length of sheet metal, crimped inwardly over the outer edges of frame pieces 56, 58. As illustrated in FIG. 6, this crimping is angled so that the inner edges of adjacent panels will lie in face to face relationship when partition 12 is in the extended position (FIG. 2, right).

Each adjacent pair of panels 20, 20 includes a pair of truss cables 64, 64 which retain partition 12 in the desired hip and valley relationship when the partition is in the extended position, as depicted in FIGS. 8 and 9.

I claim:

1. A folding hip and valley partition comprising:

(a) a plurality of panels, hingedly connected to one another in accordion fold arrangement defining alternate hips and valleys when the partition is in the extended position, said panels foldable into a face to face relationship when the partition is in a stored configuration, each of said panels having vertical side edges parallel to each other and to a plane parallel to a surface not disposed 90° to a plane parallel to a surface of said each panel, thereby causing adjacent panel edges to abut so that the accordion fold arrangement is established;

(b) track means for suspending said panels comprising:

- (1) a first track above said panels;
- (2) a plurality of guide suspension means, mounted on the panels and slidable on the first track;
- (3) a second track adjacent the first track; and
- (4) a plurality of guide means, mounted on the panels and cooperating with said second track to maintain the partition in the extended position; and

(c) means for sequentially pivoting said panels from the stored configuration into the extended position comprising deflecting means mounted outwardly of the second track, adjacent the storage area of said partition, for striking a panel near its hip connection with an adjacent panel when said partition is unfolded, including:

(1) a track guide segment mounted adjacent said second track and disposed outwardly at an angle of approximately 30° with respect thereto for directing each panel guide means into contact with said second track as said partition is unfolded; and

(2) depending striking means mounted on the track guide segment for striking the upper lateral edge of an advancing panel.

2. The partition as recited in claim 1 wherein: said first track comprises a pair of flanges defining an open guideway therebetween; and each of said plurality of guide suspension means comprises:

- (a) a pair of rollers, having a horizontal axis of rotation, each roller on one of said pair of flanges;
- (b) an axle for said rollers; and
- (c) a support rod depending from said axle, through said guide-way, and secured to the upper end of a valley junction of said panels.

3. The partition as recited in claim 1 wherein said second track is mounted outwardly of the first track and comprises a single, depending rail, each of said plurality of guide means comprising:

- (a) a wheel rotatable about a vertical axis; and
- (b) an axle for said wheel, mounted on the upper end of a hip junction of said panels.

4. The partition as recited in claim 1 wherein said partition is further provided with lower track and guide means to maintain the integrity of said partition when in the extended position.

5. The partition as recited in claim 4 wherein said lower track and guide means comprise:

- (a) a trackway, parallel to said first track and located vertically therebeneath; and
- (b) a plurality of lower guide means, one secured to each lower end of a valley junction of said panels.

6. The partition as recited in claim 5 wherein each of said lower guides is a wheel mounted for rotation about a vertical axis.

7. The partition as recited in claim 1 wherein adjacent panels are further provided with a plurality of truss cables, mounted behind a hip connection, to retain said panels in a hip and valley configuration when said partition is in the extended position.

8. The partition as recited in claim 1 wherein a rain cover is mounted between said first and second tracks, above the position taken by said partition, when the partition is in the extended position.

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U.S. Cl. X.R.

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