

No. 697,689.

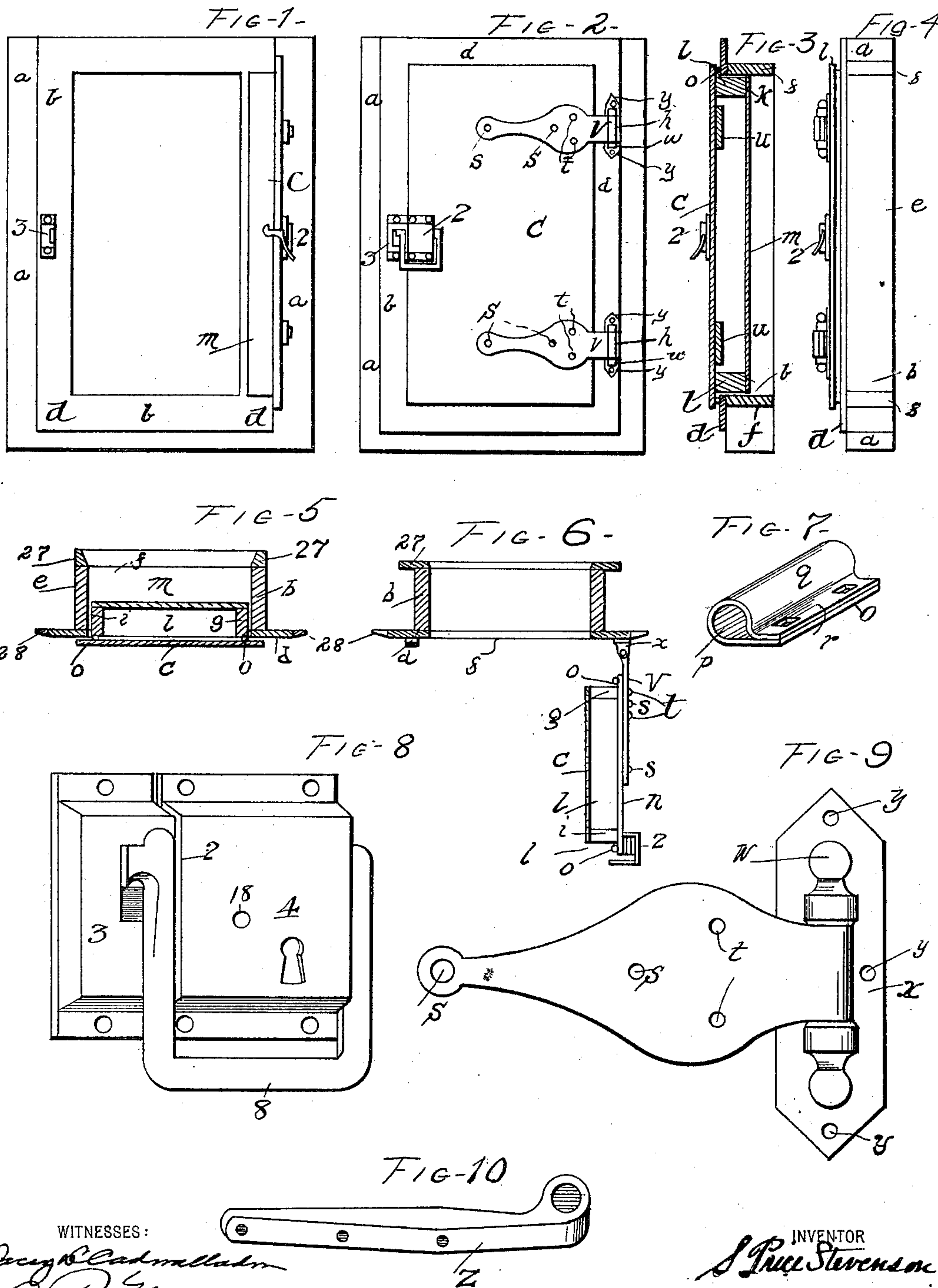
Patented Apr. 15, 1902.

S. P. STEVENSON.
DOOR AND FRAME FOR AIR TIGHT CHAMBERS.

(Application filed Sept. 16, 1899. Renewed July 18, 1901.)

(No Model.)

2 Sheets—Sheet I.



WITNESSES:

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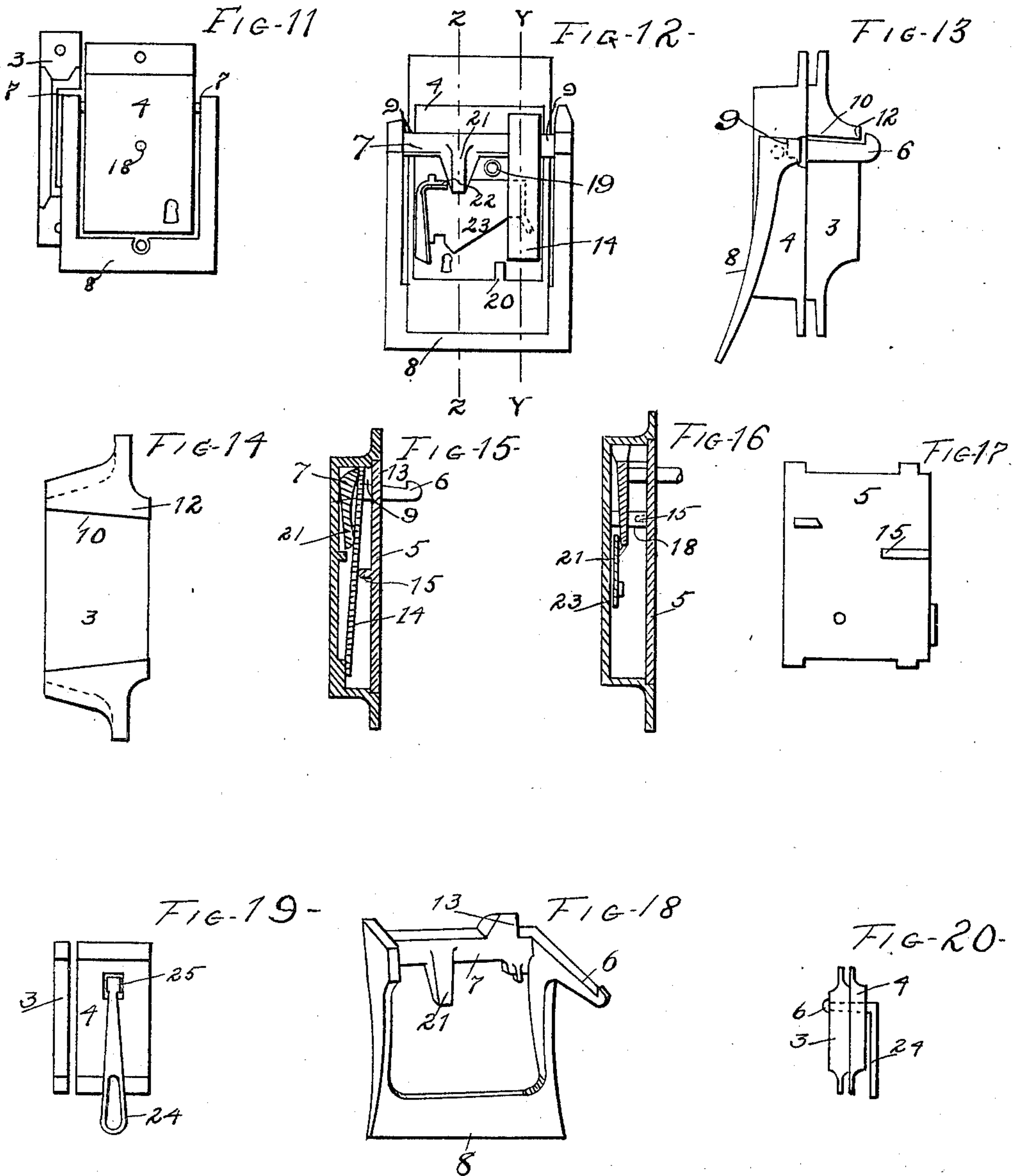
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(No Model.)

2 Sheets—Sheet 2.



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UNITED STATES PATENT OFFICE.

S. PRICE STEVENSON, OF CHESTER, PENNSYLVANIA.

DOOR AND FRAME FOR AIR-TIGHT CHAMBERS.

SPECIFICATION forming part of Letters Patent No. 697,689, dated April 15, 1902.

Application filed September 18, 1899. Renewed July 13, 1901. Serial No. 68,250. (No model.)

To all whom it may concern:

Be it known that I, S. PRICE STEVENSON, a citizen of the United States, residing at Chester, Delaware county, Pennsylvania, have invented a new and useful Improvement in Doors, Hinges, Locks, and Frames Therefor for Opening and Closing Air-Tight Chambers, of which the following is a specification.

This invention relates to doors and shutters for air-tight chambers, and especially to those required for refrigerators and cold-storage apartments, and embraces the doors and frames therefor and combined with the hinges and latches or locks for connecting and fastening the doors and frames, and has for its object the production of such frames and doors with the connecting parts as a commercially-merchantable article of trade of easy applicability to refrigerating and other chambers required to be air-tight and with a facility of adjustment to automatically compensate for any defects of form that may develop either in the door or in the wall of the chamber to which the door or frame is applied and facility of closing, latching, and opening that permits such functions with the least care and exertion of force.

The hinges and latches herein described as combined with the doors and frames are susceptible of other uses and form the subject of distinct applications for Letters Patent of the United States, numbered 686,989 and 569,394, respectively filed on the 27th day of July, 1898, and the 19th day of November, 1895.

To effect these several desiderata, this invention consists in a door having two rigid upright sides or edges united by flexible inside and outside sheathing and upper and lower rails and a frame and casing into which the door fits, said frame and casing being adjustably applicable to door-openings in walls, hinges of special construction elastically connecting the door with the frame, and a special construction of latch and lock by which the momentum of the closing motion of the door is utilized in clamping the door tightly in shut position, whereby the unlatching and opening of the door are greatly facilitated, the whole being arranged and constructed as hereinafter described, and shown in the accompanying drawings, in which—

Figure 1 is a front elevation of a door-frame with the door in open position embodying this invention. Fig. 2 is a front elevation thereof with the door closed. Fig. 3 is a vertical section. Fig. 4 is a side elevation. Fig. 5 is a horizontal section in closed position. Fig. 6 is a like section in open position. Fig. 7 is an enlarged perspective view of a portion of the gasket-packing. Fig. 8 is an enlarged perspective view of the latch and lock. Fig. 9 is an enlarged view of one of the hinges. Fig. 10 is an enlarged view of a modified form of hinge. Fig. 11 shows a front elevation of the lock and latch with the keeper therefor as applied to a door and door-jamb or stile embodying this invention. Fig. 12 is a rear elevation of the lock and latch with the back plate removed. Fig. 13 is a side elevation of the latch and keeper as viewed from the right side of Fig. 11. Fig. 14 is a detached side elevation of the keeper as viewed in the same direction as in Fig. 13. Fig. 15 is a vertical section in the plane indicated by the dotted line Y Y in Fig. 12. Fig. 16 is a vertical section in the plane indicated by the dotted line Z Z in Fig. 12. Fig. 17 shows the inner side of the back plate of the lock and latch case. Fig. 18 is a perspective view of the latching-lever and handle of the latch. Figs. 19 and 20 show modifications of the lever-handle and of the latch.

Referring to the drawings, *a* represents the wall of a refrigerating-chamber to which this invention is applied.

b is the frame, to which is fitted and hung the door *c*.

d is the front casing of the frame *b*, formed of thin boards and transversely flexible.

The frame *b* consists of stiles or jambs *e* and rails or strips forming a lintel *f'* and sill *f*, connecting them. These parts *e* and *f* are rigid edgewise and lengthwise, but susceptible of torsionally bending to an extent and for a purpose that will hereinafter appear.

c is the door, consisting of an upright *g*, to which the hinges *h* are attached by screws or rivets, and a rigid stile *i*, having the lock and latch *j*, attached in like manner. The stiles *g* and *i* are connected at the top and bottom by strips or rails *k* and *l*, as shown in Figs. 3, 5, and 6. The rails *k* and *l* are susceptible of slight torsional flexure. The inner face *m* of

the door is formed of sheathing grooved and tongued together so as to be air-tight, and while slightly flexible torsionally, as a plane, is stiff edgewise. The outer face *n* of the door *c* is made to project as a rim over the front casing *d*. It may be made of strips grooved and tongued like the inner face *m* or paneled, according to taste. It should be stiff edgewise and have some flexibility torsionally from a plane surface.

The frame of the door *c*, consisting of the stiles *g* and *i* and strips or rails *k* and *l*, fits easily within the frame *b* and casing *d*. The outer face *n* overlaps the casing *d*, forming a flange or rim 1, and has a gasket *o* attached thereto, which, contacting with the casing *d*, seals the joint air-tight. The gasket *o* (shown in Fig. 5) consists of a soft round core *p*, preferably of spun hemp, covered with a flexible fabric or cloth *q*. The edges of the cloth lap upon each other and form a flange *r*, by which it is tacked to the door, so that the elasticity of the core *p* is not obstructed by the tacks. The gasket *o* is compressed and slightly flattened and held clamped between the casing *d* and the rim 1 of the door *c* by the combined action of the hinges *h* and the latch 3, hereinafter described.

The hinges *h*, hereinafter described, are attached to the door *c* by screws *s* and *t*, as shown in Figs. 2, 3, 5, and 6. Horizontal strips *u* are placed in the door *c*, into which the screws *s* enter, and the screws *t* hold in the stile *g*. The extended portion (marked *v*) of the straps of the hinges *h* between the screws *t* and the pivots *w* is made elastically flexible horizontally, but is stiff vertically. The bearing *x* of the pivots *w* are fastened by screws *y* to the front casing *d*, as shown in Fig. 4. The elastic portions *v* of the hinges *h* are made tapering in width, as shown in Fig. 9, with the greater breadth at the place where they are attached to the stile *g* and front *n* of the door *c* by the screws *t*, and are of such proportions that the flexure of the plates is as nearly uniform as may be throughout these parts, the object of the tapering form being to distribute the flexure evenly in the plates and avoid permanent bending or set at any point, thereby impairing the elasticity of the hinge-plates. The same effect can be attained, but in a less satisfactory manner, in the form shown in Fig. 10, wherein the hinge-plate *z* is of equal breadth throughout, but tapered in thickness. The distance between the pivots *w* of the hinges *h* and the point of attachment to the door *c* is such as to provide ample elasticity to the hinges and at the same time operates to leave the doorway unobstructed by the thickness of the door *c* when opened at right angles to the frame *b*.

In applying the door and frame to a door-opening for use the frame is placed in the door-opening in the wall with the casing overlapping on the outer surface of the wall. The frame is then strained or twisted as may be required to contact the casing *d* of the frame

with the rim 1 on the door. Strips 27 are then applied closely to the inner edge of the frame and fastened to the wall in close contact therewith, and other strips 28 are fastened to the wall in close contact therewith and with the outer edges of the casing *d*.

The latch 2 is applied to the side of the door *c* opposite the hinges *h*, at or near the mid-length of the door, and engages a keeper 3, secured to the casing *d*. Both the latch 2 and keeper 3 are specially designed and adapted for use with such doors and are important elements in the efficient working of this invention. This is shown fully in all its details in Figs. 11 to 20 of the drawings and is constructed and operates as follows:

4 represents the case of the lock, (see Figs. 11 and 12;) 5, the back plate thereof; 6, the latching-hook, formed as a lever-arm integrally with the cross-bar or rock-shaft 7 and looped lever-handle 8. The rock-shaft 7 rests in notches 9 in the box 4 and is held therein by the back plate 5.

3 is the keeper in which the latch engages. This is secured to the casing *d* and has an inclined surface 10, upon which the latching-hook 6 slides until it reaches the angle 12, on which it hooks.

13 is a projection or short lever-arm on the rock-shaft 7, against which the upper end of the spring 14 presses, forcing the hook 6 upward and the looped lever-handle 8 toward the door. The spring 14 is forced into contact and is held in position with the arm 13 by a projection 15 on the inner side of the back plate 5. The back plate 5 is secured to the box by a screw 18 fitting in a boss 19, formed in the box 4. The spring 14 is a straight elastic plate and fits in the recess 20 in the box 4, so that it cannot be displaced. A lever-arm 21 is formed integrally with and projects downwardly from the rock-shaft 7 in such position as to clear a projection 22 on a bolt 23 when the latch is unfastened and when the bolt 23 is locked in the lever 21 rests on the projection 22 and prevents motion of the lever 21, rock-shaft 7, and handle 8 and the unlatching of the hook 6 from the angle of the keeper 3. The bolt 23 is operated by a key and may have tumblers or any of the usual attachments for obstructing unauthorized unfastening.

As shown in Figs. 17 and 18, a lever-handle 24, extending through an aperture 25 in the case 4, is substituted for the looped handle 8, which construction is found more convenient for large sizes.

Constructed as above described the momentum of the door in closing suffices to latch it, and the simple pulling of the lower end of the looped handle 8 serves to unlatch and open the door.

From the construction of the parts of the lock they are easy of production by casting and require little or no fitting to assemble them for use. The spring is of cheap production and easily renewed without any considerable degree of skill. The parts of the lock

and latch are held together when assembled by the screw 18, and when applied to a door for use the screws by which it is fastened to the door firmly hold the plate 5 in position by clamping it between the box 4 and the door c. As a consequence of the torsional flexible qualities of the door and frame and the means of continuously exerting elastic pressure at the hinges and the lock without any special attention such doors remain air-tight continuously with a minimum of strain and labor. The door in closing by its weight and motion acquires considerable momentum. This is greatest near the latch, and as it is arrested is expended first in latching and in compressing the gasket o and flexing the straps of the hinges h. Then the elastic reaction on the hinges makes a constant closing pressure on the gasket and permanently seals the closed door.

It is obvious that the frames and doors can be made as described and sold separately, as may also the hinges and latch, and afterward assembled and put to use. All of these parts are of novel and useful construction and adapted to cooperate with each other, but are separately salable, and therefore are made the subject of separate and distinct applications for Letters Patent.

Having described my invention and the operation thereof, what I claim is—

1. A door for air-tight compartments consisting of rigid stiles united by rails susceptible of torsion, a flexible inner sheathing; a flexible outer sheathing having a rim projecting beyond the stiles and rails, and a compressible gasket secured to said projecting rim, in combination with elastic hinges and a latch so proportioned as to exert equal pressure upon the gasket in all parts between the rim of the door and a casing surrounding the door-opening as set forth.

2. A combined frame and casing for the door-openings of refrigerating-chambers, consisting of stiles and rails rigid in the direction on their breadth and length, and susceptible of torsional flexure, in combination with a front casing secured thereto, adapted to contact with the gasket of the door opposed thereto, the whole arranged and adapted to be adjustably applied thereto, substantially as set forth.

3. In a door for air-tight compartments, rigid stiles united by rails susceptible of torsion, and a flexible inner sheathing attached to said frame, in combination with a flexible outer sheathing, also secured to said stiles and rails, and provided with a rim projecting beyond the stiles and rails, adapted to overlap and by flexure apply closely to the casing of the door-opening substantially as set forth.

4. In a frame for doors of air-tight compartments, stiles and a lintel and a sill rigid in lengthwise direction, and torsionally flexible, in combination with a torsionally-flexible casing attached to the front of said frame, and adapted to be adjusted by torsion to fit the

deviations from a flat plane of a door applied thereto, substantially as set forth.

5. In a combined air-tight door and frame for refrigerating and like chambers, a door having rigid stiles, rails connecting with said stiles, susceptible of torsional flexure, an inner sheathing susceptible of torsional flexure, an outer sheathing projecting beyond the stiles and rails, also torsionally flexible, and a frame having all parts rigid in the direction of their depth, a casing secured to said frame, a gasket applied to said outer sheathing to contact with said casing, in combination with elastic hinges and a latch, proportioned and arranged to press said door upon said gasket uniformly in all parts against said casing, with continuous pressure, as and for the purpose set forth.

6. Doors having rigid edges and torsionally-flexible faces in combination with elastic hinges and fastenings, arranged and adapted to apply the edges to contact with casings liable to variably deviate from flat planes, as and for the purpose set forth.

7. A door in combination with hinges, and fasteners, arranged to convert the momentum of the door in closing into a constant elastic force, to maintain pressure upon a gasket applied between the door and the margin of the door-opening as set forth.

8. In a door for air-tight inclosures, a doorway-frame, a flexible door fitted to overlap the front margin of said frame, elastic hinges applied to edge of said door, an automatic fastening, applied to the opposite edge of the door, and arranged to elastically enforce contact between the margin of the frame and the margin of the door, substantially as set forth.

9. In a door for air-tight apartments, a torsionally-flexible frame formed of rigid stiles and rails, an inner and outer torsionally-flexible sheathing secured thereto, said outer sheathing projecting as a rim beyond the frame and provided with a compressible gasket adapted to contact closely with the casing of a door-frame, substantially as set forth.

10. In a door and frame for air-tight apartments, a door frame and casing, having rigid edges and torsionally-flexible casing, in combination with a door having an edgewise-rigid frame and torsionally-flexible faces, one of which faces overlaps the face of the casing, and a gasket applied to said overlapping face, substantially as set forth.

11. A door having an edgewise-rigid frame and flexible faces, one of which faces projects beyond the frame, in combination with a gasket applied to said projecting face, and elastic hinges attached to said door, adapted to elastically connect the door with a door-frame, substantially as set forth.

12. A door having an edgewise-rigid frame and flexible faces, one of which faces projects beyond the frame, and a gasket applied to said projecting face, in combination with a

locking-latch adapted to automatically engage a keeper and hold the gasket under compression against a door-frame casing, substantially as set forth.

- 5 13. In a frame for doors of air-tight inclosures embracing torsionally-flexible jambs and a lintel rigid in lengthwise direction, adapted to be adjustably applied to an opening in a wall and a casing attached to the front
10 of said frame, adapted to support the bearings of extended hinges from said casing as shown and described.

14. In a frame for doors of air-tight apartments embracing a lintel a sill and torsionally-flexible jambs and a broad front casing 15 adapted to support extended hinges arranged to swing the door clear of the line of the doorway-opening when opened at right angles as set forth.

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Witnesses:

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