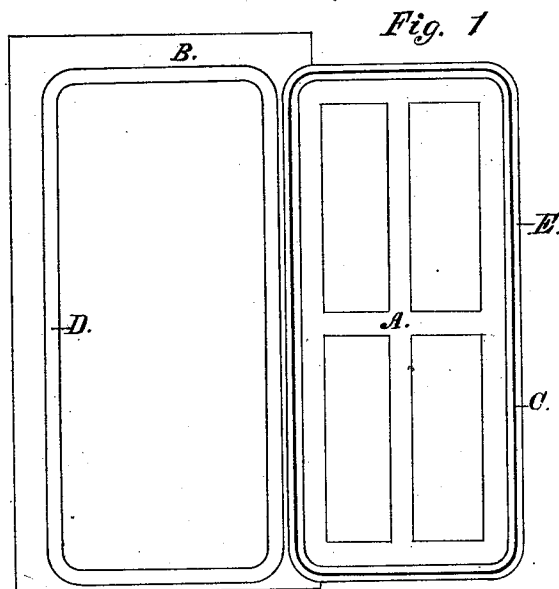
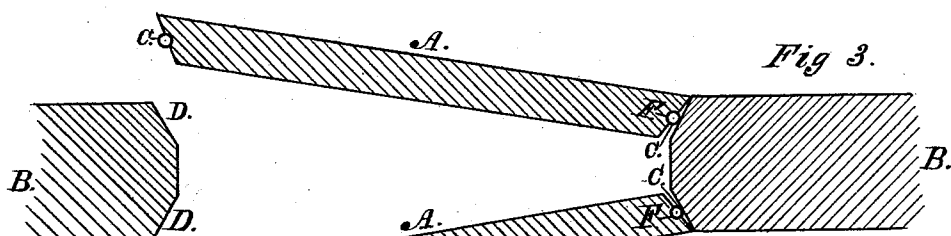
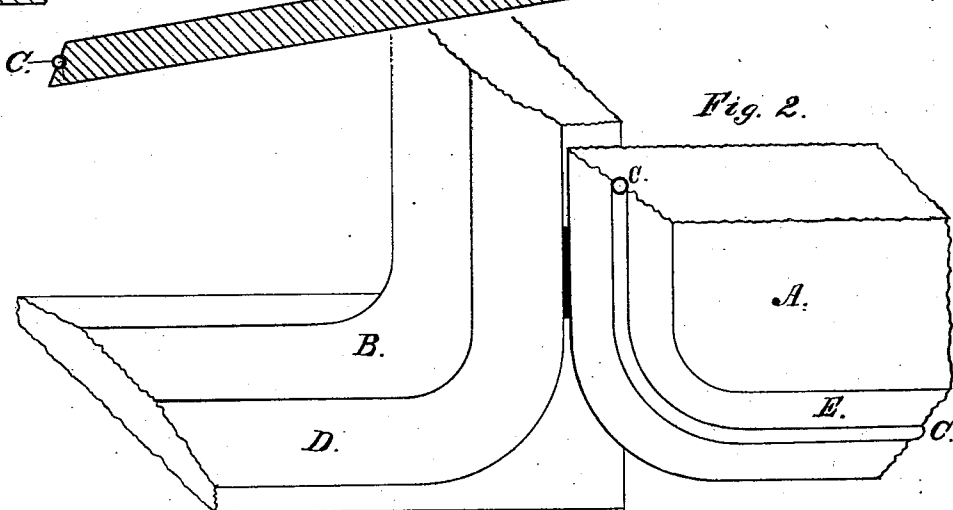


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Means for Tightly Closing Doorways, &c.

No. 234,895.

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MEANS FOR TIGHTLY CLOSING DOORWAYS, &c.

SPECIFICATION forming part of Letters Patent No. 234,895, dated November 30, 1880.

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To all whom it may concern:

Be it known that I, GEORGE B. THOMPSON, a citizen of the United States, residing at Pittsburgh, Pennsylvania, have invented a new and useful Improvement in Means for Preventing or Retarding the Sinking of Vessels, and for other purposes, of which the following is a specification.

My invention relates to means for tightly closing doorways and similar openings. Its primary application is to the doorways, window-openings, and hatchways of steamships and other large floating craft, to which I will refer by the term "vessels."

Heretofore it has been common to guard against the sinking of a vessel in case of collision or other accident causing a leak by providing it with bulk-heads, dividing its lower portion or all that part below the main passenger-deck into a series of water-tight compartments; but compartments above, and including the passenger-deck, are either wholly omitted, which is the rule, or are made too large to properly divide the risk. This limitation of the bulk-heads is owing to the difficulty that has been experienced in making the doors water-tight without preventing their ready operation; and for the same reason but few doorways are cut through the bulk-heads, while such doors as are provided are difficult to operate, and involve, without exception, high or obstructed sills. If sufficiently numerous doors are not provided, or if the doorways are at all obstructed when open, inconvenience more or less great is experienced in communicating between the compartments, and doors the opening and closing of which demands more than ordinary force or skill must obviously be very limited in number to render their operation at all certain, while ordinary swinging doors are liable to be kept open in cases of emergency by an opposing stream of inflowing water.

The doorways and other openings above named must be and are commonly of a general angular figure having one or more straight sides, in order to facilitate the passage of persons and things through them, to accommodate the hinges by which doors, transoms, hinged windows, and window-shutters are hung to economize space, to facilitate forming them and adjoining parts, and for other purposes,

and they must, furthermore, be adapted to be opened and closed by a swinging movement, and should be adapted to be opened and closed quickly without much effort, while this operation is liable to be materially affected by expansion or contraction, or by warping or sagging or settling in the coacting parts or in the general structure, and the corners incident to said straight sides are peculiarly difficult to pack or render tight.

My invention, without materially changing the general shape of the said openings or lessening their present advantages in any respects, and with adaptation to meet the said requirements and to overcome the said difficulties, consists, primarily, in a simple and inexpensive construction of hinged or swinging doors, transoms, windows, and window-shutters with their frames, and hatchways and hatches, whether the latter be hinged or not, and in the combination therewith of elastic packing in peculiar manner, as hereinafter set forth, which provides for tightly closing doorways and similar openings, so that they may be opened and closed as readily as if unpacked doors, etc., were used, and without interfering with their ordinary uses by obstruction or otherwise.

My invention consists, farther, in a peculiar combination of two doors with a double frame to insure closing the principal doorways in vessels and buildings, as hereinafter specified.

Applied to vessels, as aforesaid, my invention provides for tightly closing all the doorways and similar openings, or as many thereof as may be necessary to render the ordinary subdivisions water-tight compartments as well as the spaces between the bulk-heads, besides furnishing a still more effective means for closing the principal doorways.

As applied both to vessels and to buildings my peculiarly-packed doors, etc., provide an effective means for extinguishing fires by excluding oxygen, for preventing the spread of contagious or infectious diseases, and for confining noxious or unpleasant odors, and in mills or factories, for confining inflammable dust and gases to the places where they are generated.

The invention is also applicable, in part, to the doors of houses, passenger-cars, etc., to make them noiseless, and to keep out dust,

rain, and cold, and prevent drafts; to the doors of refrigerator-cars, refrigerators, provision-safes, powder and dynamite cars, and magazines to make them air-tight; to the doors, etc., of show-cases and show-windows to prevent injury to the contents by water, moisture, dust, or coal-gases; to the doors of book-cases, wardrobes, etc., for excluding dust; and generally wherever it is desirable to tightly close a doorway or similar opening of a general angular figure, or having one or more straight sides, for any useful purpose.

In the accompanying drawings, which form a part of this specification, Figure 1 may represent an elevation of an open door, transom, window, or window-shutter and its frame, (the sheet being held on edge to make it a view of a transom,) or it may represent a plan view of a hatchway and hatch constructed and packed according to this invention. Fig. 2 represents a perspective sectional view of one corner of the same, on a larger scale; and Fig. 3 represents a horizontal section of two partly-closed doors and their double frame, illustrating the said combination.

For brevity, the principal parts, as shown in the drawings, will be mentioned in the following description simply as doors and their frames.

A A in the several figures represent doors, B B their frames, and C C elastic packings. I preferably make a packing, C, especially for this use, of round-rubber tubing, by cutting from unvulcanized tubing a piece shorter than the perimeter of the door for which it is intended, causing it to contain more or less air or other elastic fluid, then hermetically sealing its ends together, and finally vulcanizing it. It may be made to contain sufficient air by simply preserving the shape of the tube and avoiding the expulsion of air therefrom preliminary to sealing its ends. Similar packing may be made from other materials or from vulcanized rubber tubing; but it is best to first form and then vulcanize it. However made, it should have such materials in its composition as to make it wear well and cause it to resist the action of the elements to which it may be exposed. It may be re-enforced by placing therein a cord of rubber or other suitable material of less diameter in its cross-section than the internal diameter of the tubing; but the same purpose may be accomplished in a better way by making the tubing of heavy or light sheet rubber, so that it will be more or less rigid, according to the pressure it is to bear.

A door-frame, B, is constructed with all its corners round, and without the usual rabbet or stop, having instead a smooth beveled seat, D, extending across the sill, as well as along the lintel and side posts within the frame; and a round-cornered door, A, is made with a continuous beveled edge, E, matching the seat D, and grooved, as shown at F, to receive a packing-ring, C. The latter, being stretched and

sprung into place, is retained by its own elasticity, while it projects from its groove sufficiently to pack effectually against the beveled seat D.

Two or more packings may be held in parallel grooves in the same edge, if desired.

By making the door and the frame with beveled edges and a beveled seat without rabbet or stop, I avoid having any part of the door bear against any part of the frame, concentrating the pressure upon the packing, and adapting the door to move to a greater or less depth in its seat with increasing compression of the packing, while the door, however tightly it may be wedged shut, is adapted to open readily, and any injury to the packing by sharp edges is precluded.

The round corners of the door and frame render the latter less liable to change its shape in settling, and, in connection with the beveled edge and seat, adapt the parts to accommodate themselves to each other when distorted. They also facilitate packing the corners and relieve the latter from cutting-edges. The round corners also prevent collapsing the tubular packing, while the air or other elastic fluid contained in the latter equalizes the pressure at all points, the door operating automatically to force the said elastic fluid from a given side or point where the space is least to those sides or points where it is greater, thus aiding in the accomplishment of my purpose.

Apart from the features above specified the door and its frame may be of any of the ordinary forms, and of any approved construction and materials.

To hang the door I use, preferably, rim-locks and spring-hinges, that may be attached to the flat faces of the door and frame so as not to interfere with the parts upon which the packing bears. The lock or spring-latch, or both, should be so constructed that the bolts will stand off farther from the flat face of the door than is usual, and the catches into which the bolts slide should have a series of sub-catches, so that the door will be caught and held tightly in its seat at the depth to which it is forced; or, what is still better for this purpose, a spring-catch may be used which operates as an eccentric. Several spring-catches, operating upon either principle, may be attached to the door and connected together, so that they may be operated simultaneously by hand and additional pressure exerted.

My invention is easily applied to an old door, as the space occupied by the packing and the filling of the rabbet to form the beveled seat in the frame and to round its corners fully compensates for all the material of the door that it is necessary to remove from its corners and edge.

In lieu of the tubular packing an endless cord or band of rubber or other suitable elastic material may be used upon the beveled edge of the door, and a band of rubber may be secured upon the seat in the frame to coact with

that upon the door edge; or the main packing of either form may be glued, cemented, or otherwise attached to the said seat or within grooves that may be made therein. I prefer, however, to carry the packing upon the door edge alone, as I am thereby enabled to make it bear upon a sill of ordinary form and height without having the packing in the way of injury, and I prefer to use the tubular packing, as it is more elastic and accommodates itself better to the varying space between the door and the frame, as above set forth.

The tubular packing may be glued or cemented within its groove in the door edge or to plugs of rubber or other suitable material set therein, or it may be secured in other known ways; and it will be best in some cases to so attach it at points near each side of each corner, to relieve it of any tendency to flatten on the corners, and also at one or more places on each of the longer sides if the door be large.

Independently of the packing new and useful results are effected by constructing the door and its frame as herein specified, as it causes the former to enter the latter on the principle of the wedge without being stopped or prevented from making a close joint by the corners of the door, or by any rabbet or door-stop, thus allowing it to move to a greater or less depth in its seat to compensate for expansion, contraction, or settling of the parts; and, further, by the application of this principle, not found heretofore in doors or door-like structures, a tighter joint is made with a given amount of pressure against the door than is accomplished by any construction heretofore known. It also renders the door, if packed, more effective for the purposes described, in case the packing should get displaced or be out of order, than is the case with any other packed door. To this end the bearing parts should be so proportioned and beveled that the door will not pass through the opening of the frame if the packing is displaced. If packing is wholly omitted in any case the door should be made enough larger to make up for the space ordinarily occupied by the packing.

Each of the two doors A shown in Fig. 3, with its seat in their frame B, and its packing C, is of the construction and operation first above specified. The invention shown in this figure is of great importance, especially upon vessels, the same consisting in hanging within one doorway a pair of doors each of which is capable of completely closing the same to render it water-tight and air-tight, one opening inwardly and the other outwardly from opposite faces of the same frames, each operating independently of the other and both arranged to close automatically, when released, so that in case of a leak or fire occurring upon either side of said doorway the flow, current, pressure, or draft of the water or fire is made to assist in closing and securing one or the other of said doors.

In applying my invention to an ocean-steamship double doors, as shown in Fig. 3, should be used in the bulk-heads where the compartments communicate, and each compartment on the upper or passenger decks should be subdivided and double doors be used between the principal subdivisions. The doorways of state-rooms and other subdivisions may have single doors, as shown in Fig. 1. Transoms constructed and packed on the same principle as the doors should take the place of the usual openings at the tops of state-rooms and similar divisions of the vessel, and window-openings and hatchways may be closed in like manner, the former either with hinged windows or shutters, and the latter by either hinged or loose hatches having edges, seats, and packings, as above described.

In ferry-boats, river-steamers, barges, and such craft as are usually without water-tight compartments double doors should be used at all principal doorways, and either double or single doors at minor points, each ordinary subdivision being thereby made a water-tight compartment. It would also be well in constructing vessels to arrange and subdivide passenger-decks and other parts with a view to this object.

The invention is applied to a building, so as to provide for extinguishing or retarding fires in a similar manner, the double doors being applied to principal openings, and the single doors between minor subdivisions with transoms, hinged windows, window-shutters, and hatches of the same style, and all preferably packed.

The said doors, etc., belonging to either a vessel or a building may be controlled by a person or persons at one or more suitable points by devices similar to those used to close deck-windows in cars or buildings; or, if arranged to be held open, an electrical connection may be made to them, by which they may be released and allowed to close automatically by the force of the spring-hinges, door-springs, weights, or other suitable devices that may be used, together with the assisting flow, current, pressure, or draft of the water or fire. The former should close the doors, etc., to at least the extent indicated in Fig. 3.

The invention will generally be used for other purposes in the form of single doors or door-like windows or shutters, as illustrated by Figs. 1 and 2, and as thus applied does not demand spring-hinges and special closing and fastening provisions as a rule, ordinary hinges and fastenings being generally sufficient.

I am aware that a round port-hole has been closed by a tapering stopper ground into a corresponding seat and provided with packing. Said port-hole stopper is not adapted to be operated in the same manner nor to perform the same functions as an ordinary swinging door or the like, and has not a like general angular figure or one or more straight

sides. It does not, therefore, operate on the same principle as my doors, etc., nor meet the difficulties overcome in my invention.

I am also aware that doorways and similar openings of a general angular figure have heretofore been provided with elastic packing in various ways other than between a continuous beveled edge, and a matching seat constructed with round corners and without rabbet or stop, as herein specified, and that such packing has in some cases been carried by the door or shutter, and that tubular elastic packing is not broadly new.

I am also aware that a fire-proof safe has been provided with a door of a general angular figure, having all its corners rounded and its edges, in part, corrugated to form a retreating series of continuous rounded steps or shoulders, the door-frame being constructed with a matching seat to insure a close-fitting joint; but said steps operate as stops and do not permit the door to move to a greater or less depth in the seat, so as to accomplish the aforesaid wedge-like action of a round-cornered door constructed with beveled edges and fitted to a corresponding seat without any stop, according to my invention. Moreover, the perimeter of said safe-door fits within a deep rabbet, forming sharp edges, which would preclude or obstruct closing the door in the event of warping or sagging, and thus render it unsuitable for the uses for which my doors, etc., are intended.

I also disclaim as old the broad idea of hinging two doors to opposite faces of a single frame, but know of no anticipation of such doors constructed and operated as herein specified, so as to close a doorway water-tight or air-tight, and arranged so that one of them will be acted upon by a favorable current or pressure of water or air, so as to insure so closing the doorway, for the purposes herein set forth.

I claim as new and of my own invention—
1. As means for tightly closing a doorway or similar opening having one or more straight sides, a swinging door or the like and its frame constructed without rabbet or stop, and with all their corners rounded, and constructed, respectively, with a continuous beveled edge and an internal beveled seat, substantially as herein described.

2. As means for tightly closing a doorway

or similar opening having one or more straight sides, a swinging door or the like and its frame constructed without rabbet or stop, and with all their corners rounded, and constructed, respectively, with a continuous beveled edge and an internal beveled seat, in combination with an elastic packing, substantially as herein described, for the purpose set forth.

3. As means for tightly closing a doorway or similar opening having one or more straight sides, a swinging door or the like and its frame constructed with round corners and without rabbet or stop, and constructed, respectively, with a continuous beveled and grooved edge and an internal beveled seat, in combination with one or more rings of elastic tubular packing sprung into the groove or grooves of said edge, and having more or less air or other elastic fluid hermetically sealed therein, substantially as herein specified, for the purpose set forth.

4. The combination, substantially as herein described, of two independent doors, of a general angular figure, having all their corners rounded and all their edges beveled, and a frame constructed with internal beveled seats of corresponding form, without rabbet or stop, said doors being provided with suitable spring-hinges or their equivalent and suitable fastenings, and adapted to close into said seats in opposite directions, and each of them to close the doorway water-tight or air-tight independently of the other, so as to insure so closing the same by one of them aided by a favorable current or pressure of water or air, in the manner specified.

5. A vessel or building provided, substantially as herein described, with swinging doors and transoms, hinged windows and window-shutters, and hatches of a general angular figure having all their corners rounded and all their edges beveled, and frames therefor constructed with internal beveled seats of corresponding form, without rabbet or stop, said doors, etc., being adapted to close into said seats, and provided with elastic packing for tightly closing the doorways, etc., in the manner specified, for the purposes set forth.

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