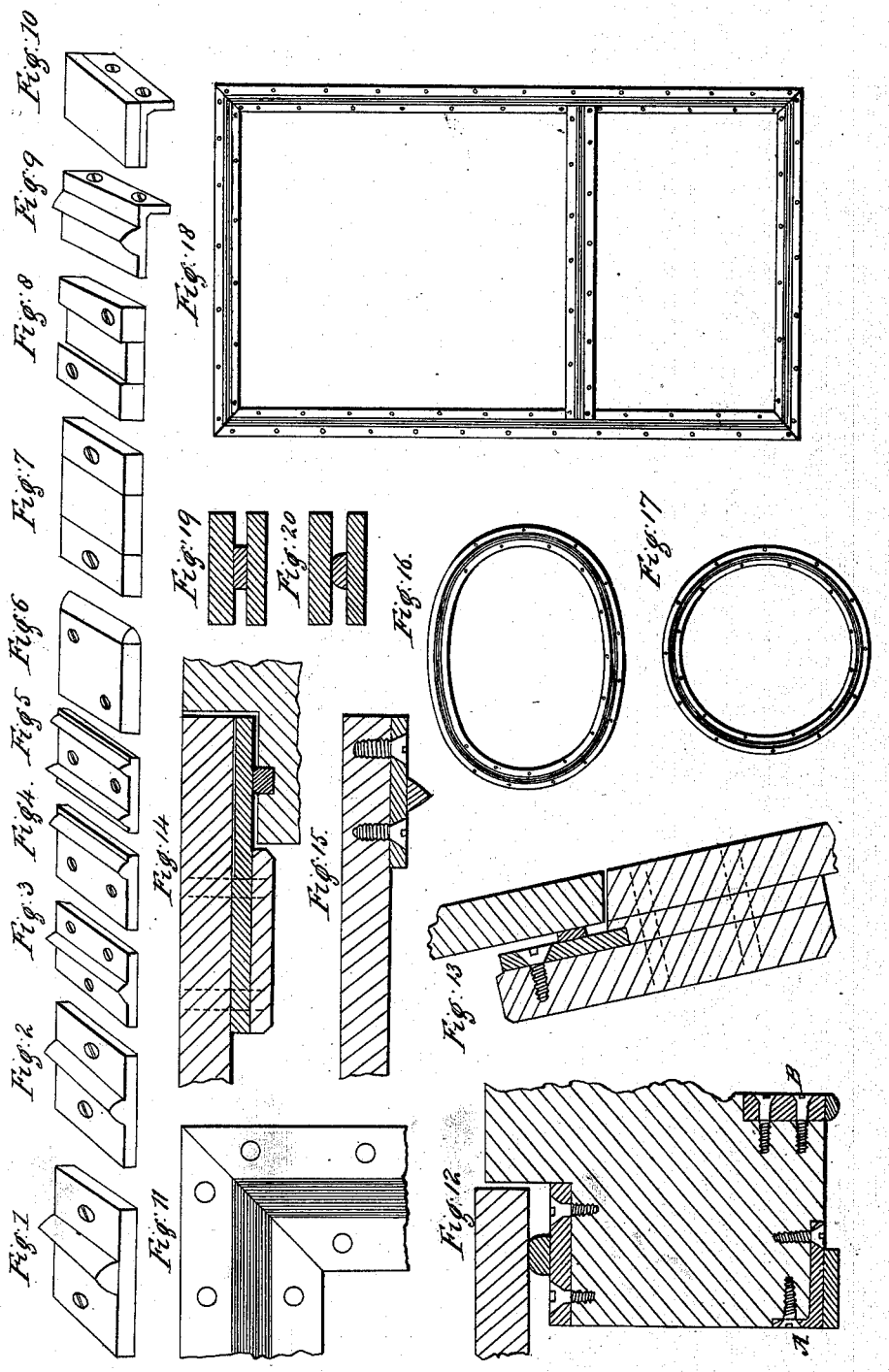
W. C. FULLER.

Rubber-Weather Strip.

No. 47,368 Patented Apr. 18, 1865.



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IMPROVED METHOD OF RENDERING DOORS AND WINDOWS WATER-TIGHT.

Specification forming part of Letters Patent No. **47,368**, dated April 18, 1865.

To all whom it may concern:

Be it known that I, WILLIAM COLES FULLER, of No. 1 Ironmonger Lane, Cheapside, London, in the United Kingdom of Great Britain and Ireland, have invented certain Improvements in the Method of Rendering Doors and Windows Water-Tight, especially applicable to the port-holes and other openings on board ships and vessels; and I do hereby declare that the following is a full and true description thereof.

The special features of novelty and utility in the present invention consist in the adaptation of vulcanized india-rubber in new forms and combinations for the purpose of rendering doors and windows and other openings more perfectly water-tight, and the invention is especially applicable to the port-holes, deck-lights, bulk-head doors, man-holes, &c., on board iron-clad or other vessels.

The improvements consist in the use of india-rubber beading made of two distinct kinds of that material chemically united in molds in the process of vulcanizing, so as to form one solid homogeneous substance.

The flat surface for fixing is of hard rubber, commonly known as "vulcanite," which may be planed, mitered, drilled, or countersunk with ordinary joiners' tools, and the projecting rib or bead is of the usual elastic material, of the very best quality. In most cases I prefer to use for the elastic part the red rubber compounded with golden sulphate of antimony, because it resists oil better than the ordinary gray rubber, and at the same time combines perfectly with the harder material; but either kind will do. This well-known substance (vulcanized india-rubber) is at present largely employed as the best, if not the only, material to effect the object—viz., of excluding sea-water from port-holes, &c.—and its use is, to a certain extent, efficient; but the difficulty of obtaining a secure fixing for so elastic a material to the surfaces of port-lids, iron doors, &c., is admitted by all practical engineers.

The use of cement and riveted plates as a means of fixing is not satisfactory, and scarcely less so is the practice of using a flat surface of india-rubber with a sharp metal V-piece opposite, which, by indentation, secures the parts in contact from leakage, the almost invariable result of this arrangement being that by unequal or violent pressure upon the hard opposing surface the material is cut and damaged.

The present invention is designed to obviate both these disadvantages, first, by securing a firm mechanical fixing, and next by substituting for the cutting-edge of metal a rib or head of india-rubber expanding on a flat surface, by which means all danger or possibility of cutting is prevented.

From a long acquaintance with the various mechanical applications of caoutchouc, I may here state what is well known to those practically acquainted with this material—that so long as it is free to expand upon a flat surface it will bear an incalculable amount of pressure, however sudden or violent, without injury. For example, a cubic inch of good vulcanized india-rubber placed under a steam-hammer will sustain a blow of at least five tons, and recover its form perfectly. By this extreme pressure it will for the moment be reduced to a thickness of one-eighth of an inch, expanding at the same time to an area of eight square inches, whereas a blow of one-tenth the force exerted by a sharp angular edge upon a surface of sheet-rubber will penetrate and damage the material. It is on the same principle—viz., the expansion on a flat surface—that the projecting rib possesses a decided advantage, and is not liable to be cut or damaged.

There are two methods in which my improved beading may be applied to port-holes. One is to fix it round the edges of the port-lid, as shown in Figure 15, in which case it expands on the flat surface of the recess, and by comparing Figs. 14 and 15 it will be seen how much incumbrance and expensive labor is saved by dispensing with the riveted plates and brass V-piece. The other method, which on most accounts I consider preferable, is to fix the beading in the recess, as shown at Fig. 12, and in this position, by keeping the recess a trifle deeper, it will be sufficiently protected. This arrangement also allows of the port-lid being quite plain and free from projections, and in either case the brass V-piece and riveted plates are rendered unnecessary.

I prefer in most cases to fix the beading with brass countersunk screws, on account of the facility with which, in the event of damage by accident or otherwise, a defective piece can

be cut out and replaced. The screws may be about two or three inches apart on alternate sides of the rib, and each length should be bedded with thin white or red lead. It should be observed that the flat surface, though sufficiently "hard" to obtain a firm and effectual fixing, is by no means brittle, but when drawn tight by the screws will give to any slight curvatures, if required by the conformation of the vessel. Some of the smaller sizes of the beading will be found useful for the sky-lights of buildings on land, especially of iron-roofed buildings, also for the doors and windows of light-houses or other erections exposed to tempestuous weather. The molds suitable for this purpose may be made of cast or wrought iron of any convenient lengths, from two feet to four feet six inches, and of sufficient strength, as is well known to all india rubber manufacturers.

The detailed description of the accompanying sheet of drawings will furnish such further explanations as are necessary.

In the drawings, Fig. 1 represents a full-size section of my improved molded beading. The flat surface for fixing is about two inches by one-fourth, and the projecting rib or bead about one-half by three-eighths. This width and thickness I prefer where the recess has yet to be made; but a narrower width of one and three-fourths inch, or even one and one half inch, would suffice where necessary. Throughout the drawings the elastic part of the material is colored red, and the hard or vulcanite brown. Figs. 2 to 10 represent full-size sections of various patterns of beading adapted to different purposes. Figs 3 and 4 are one inch wide, and are suitable for the dead-lights of ocean-going steamers; or they may be used with advantage for the sky-lights of cabins, or the side windows of saloons, or wherever the water is liable to penetrate. Fig. 5 is a variation in shape—viz., a double rib with the screws for fixing between. Fig. 6 is another variation, intended to fix sidewise by recessing the corner of an iron plate or door, as shown at B, Fig. 12. Figs. 7 and 8 are made with a flat elastic center and two hard sides for fixing, which will be found useful for doors and other covers which are formed with a projecting rim round their edges. Fig. 7 will also be found especially useful for repairs of the port-holes of vessels already constructed on the present plan. (See Fig. 14.) In the event of any portion of the material being cut or damaged by the brass V-piece or otherwise, instead of having to remove the port-lid or the riveted plates, all that is necessary would be to cut away the defective part and replacing it with beading, Fig. 7, fixed by screws. Figs. 9 and 10 represent two kinds of surfaces vulcanized onto brass—one a projecting rib and the other a flat surface. The mode of fixing is shown at A, Fig. 12. I would here observe that it is well known to manufacturers that india-rubber in the process of curing in molds adapted for the purpose will chemically adhere to brass; and I therefore in certain cases employ sheet-brass or cast-brass as a fixing-surface, where the nature of the case may require it. Fig. 11 represents a mitered corner-piece of the large-size beading for port-holes. Fig. 12 is a sectional plan view of the beading fixed in the recess of the armor-plate; Fig. 13, a side view, in section, of the upper and lower port lid, showing the position of the beading on the cross piece. Fig. 14 is a section of the port-lid as at present fitted with the strip of sheet-rubber cemented and riveted on with iron plates and the brass V piece let into the recess opposite. Fig. 15 shows the position of the improved beading when fixed to the port-lid. Figs. 16 and 17 represent (on reduced scale of about two inches to the foot) an oval and a round man-hole molded in one piece with the projecting bead. Fig. 18 represents (on two-inch scale) the front view of a port-hole, with the position of the beading either in the recess or on the port-lid. Figs. 19 and 20 show the expansion of the beading under more or less pressure.

Having described the nature of my invention and the means of carrying it out, I would observe that Figs. 1 to 10 indicate the principal forms of beading which I consider most likely to be useful; but I do not confine myself to these forms, but vary the shape and configuration both of the hard and elastic part to suit the different surfaces and situations required; and I further remark that under the general description of "india-rubber" I include any other analogous gums having the same or similar properties, and that I do not claim as new the union of the hard and soft material, that being already practiced and well understood by manufacturers; but

What I claim as new, and desire to secure by the present patent, is—

The employment of a rib, strip, or bead of elastic india-rubber chemically united to a harder surface, whether of vulcanite or brass, as herein set forth and described.

In witness whereof I, the said WILLIAM COLES FULLER, have hereunto set my hand and seal this 26th day of August, in the year our Lord 1864.

W. C. FULLER.

In presence of—
ROBERT ROLFE,
FREDERICK GARDINER.