E. N. Horsford,

Fire-Proof Safe.

No. 39,919. Patented Sep. 15, 1863.

Fig. 1

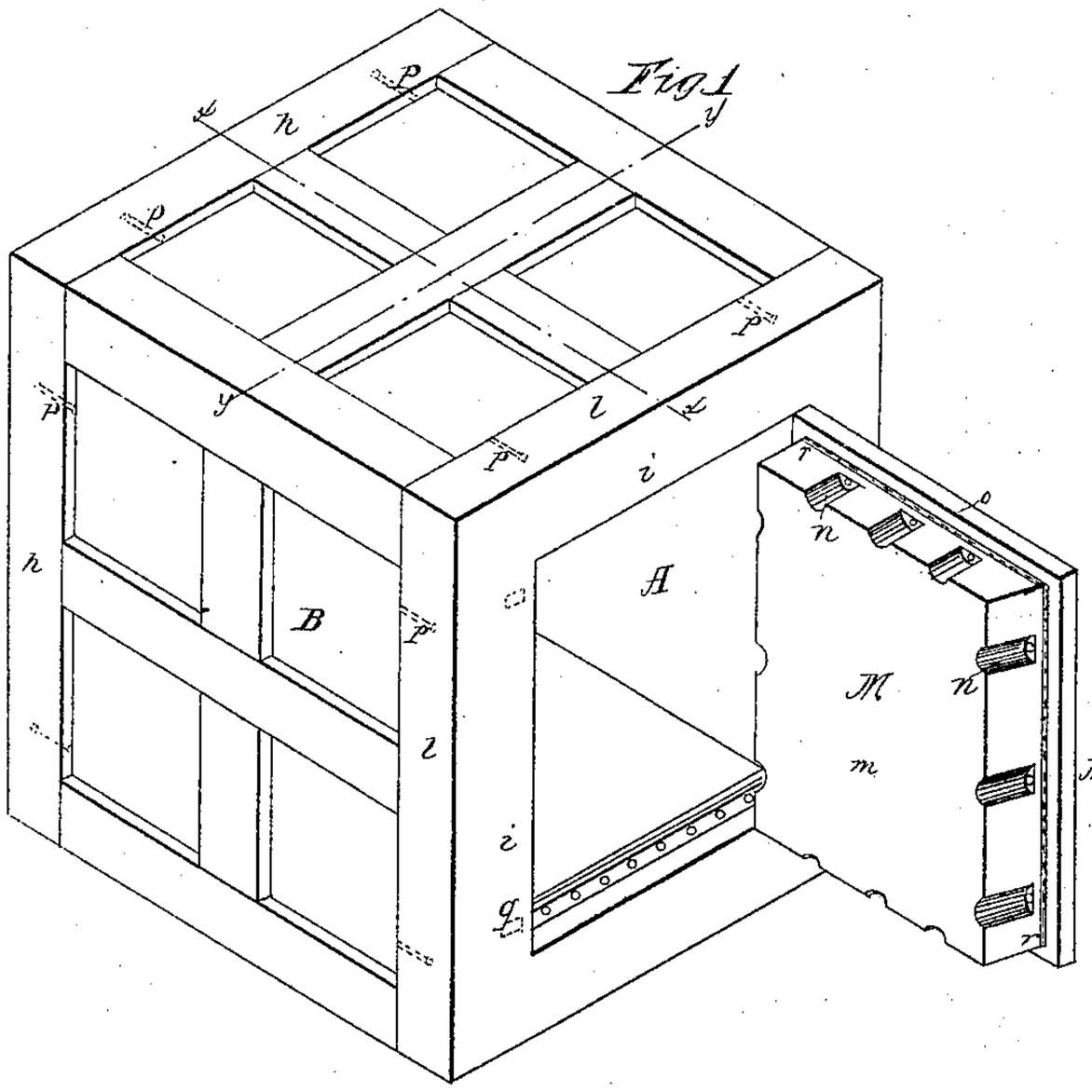


Fig. 2.

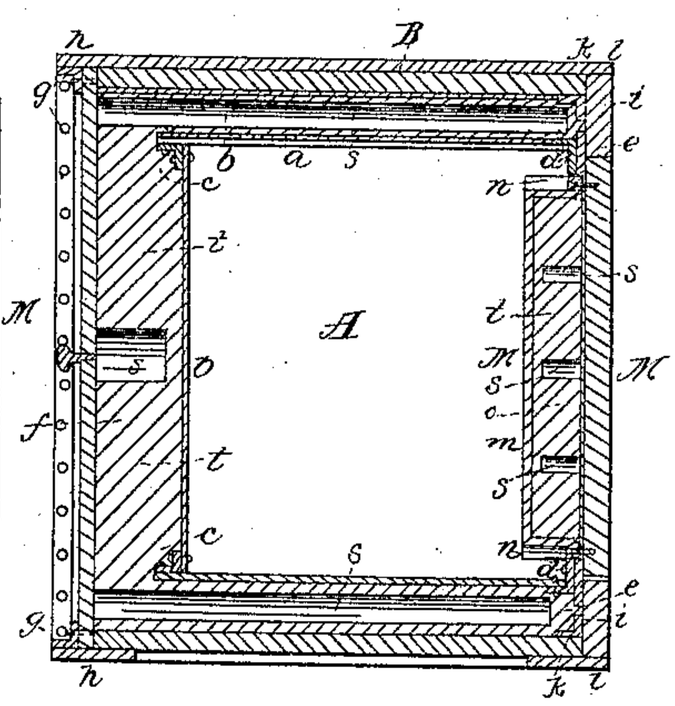


Fig. 4

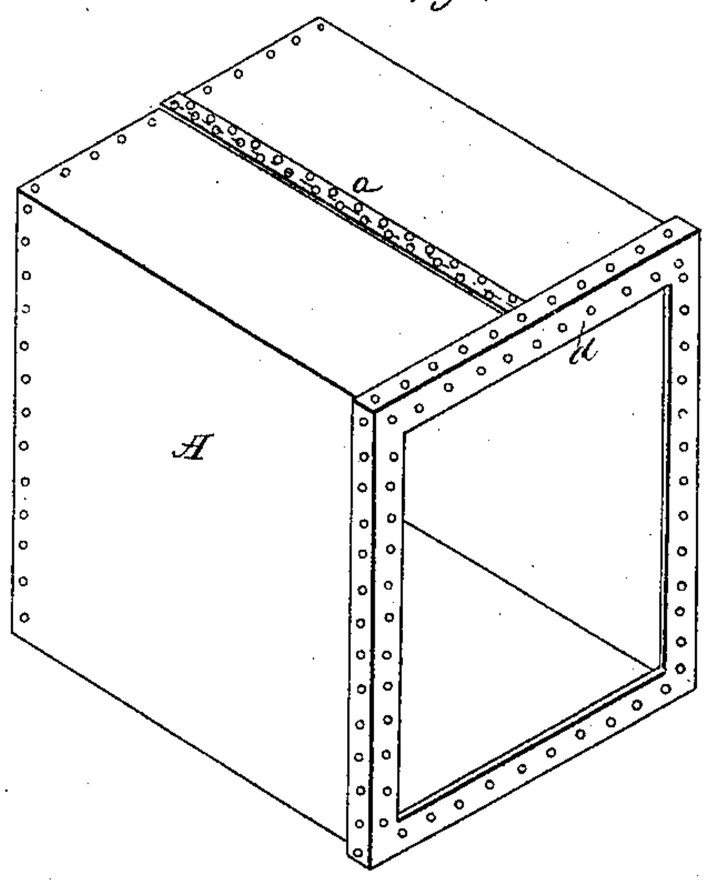
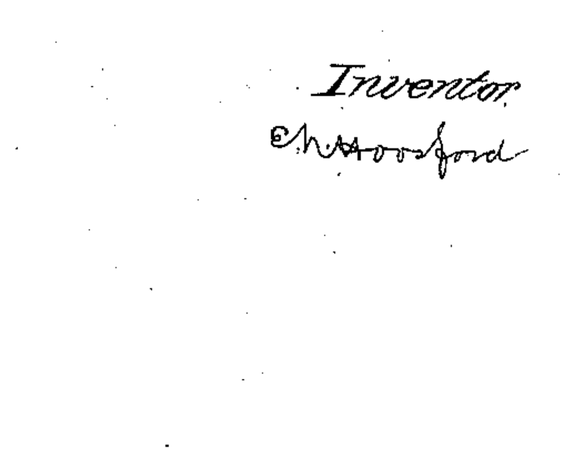


Fig. 3.



Witnesses.

J. Lundon Hill

Wm. D. Baldwin

Inventor

E. N. Horsford

UNITED STATES PATENT OFFICE.

EBEN NORTON HORSFORD, OF CAMBRIDGE, MASSACHUSETTS.

IMPROVED FIRE-PROOF SAFE.

Specification forming part of Letters Patent No. **39,919,** dated September 15, 1863.

To all whom it may concern:

Be it known that I, EBEN NORTON HORSFORD, of Cambridge, in the county of Middlesex and State of Massachusetts, have invented certain new and useful Improvements in Fire-Proof Safes or Chests, of which the following is a full, clear, and exact description, reference being had to the accompanying drawings, which make part of this specification, and in which—

Figure 1 represents a view, in perspective, of a fire-proof safe embracing my improvements, the door being shown as open in order to illustrate the details of its construction; Fig. 2, a vertical section through the same at the line *x x* of Fig. 1; Fig. 3, a similar section at the line *y y* of Fig. 1; and Fig 4, a view, in perspective, of the inner shell or casing of the safe detached, showing more especially the manner in which the shells are constructed.

Fire-proof safes, as heretofore constructed, have been found by experience to be defective in many respects. They usually have been filled with some material which is a bad conductor of heat, which is put in in a wet state. The safe is consequently liable to be burst from the freezing of the water. The moisture, moreover, exhales through the joints of the safe and injures its contents, besides depriving it of its fire-resisting qualities and corroding the casing. Furthermore, when exposed to a high temperature, the steam or vapor expelled from the filling forces its way into the papers or other valuables in the safe and injures them.

It is one of the objects of my invention to obviate the disadvantages incident to safes of this class, and to provide a safe which shall preserve its contents under any ordinary circumstances; and to these ends my improvements consist, first, in constructing a fire-proof safe of two air and water tight metallic casings or shells (one within the other) so arranged that the space between them shall constitute the compartment or chamber to contain the "filling," the construction of the casings being such as effectually to prevent the escape of any moisture or vapor from the filling-chamber at any temperature to which the safe ordinarily may be exposed, as hereinafter shown; secondly, in providing the outer shell or casing of a fire-proof safe with apertures closed with fusible alloy or other equivalent material, which will fuse at a temperature of about 212° Fahrenheit, in order to permit the steam or vapor generated by the heat to escape, and thus carry the heat from the safe when exposed to a high temperature.

In the accompanying drawings, which exemplify one mode of carrying out the objects of my invention, the safe is shown as consisting, mainly, of two shells or casings, A B. In order to render these casings perfectly air or water tight, I take a sheet of metal and bend it into the form of a rectangular tube or box, open at both ends, and with its edges abutting against each other, as shown in Fig. 4, which represents the inner shell, A. The seam thus formed is covered with an overlapping plate or bar, *a*, and fastened with a double row of rivets, like a steam-boiler. A sheet, *b*, of metal is cut accurately to fit one end of this tube or casing A, and strips *c* of angle-iron are then riveted around its outer edge. (See Fig. 2.) The plate is then slipped within the end of the casing and securely fastened by rivets passing through the angle-iron and the edges of the casing, as shown in Figs. 2 and 4. The other end of the tube or box, at which the door is situated, is likewise encompassed by angle-irons *d*, which are riveted to its outer side in such manner that their edges project within the casing and form a flange, to which the batting-bar *e* of the door may be attached, as shown in Fig. 2.

The outer casing, B, is constructed in a manner similar to the inner one. In this instance, however, the back plate, *f*, instead of fitting inside the outer casing, abuts against it, and has its angle-irons *g* riveted to a band or hoop, *h*, which encompasses the back end of the safe, and the bar *b'*, which overlaps the joint, is riveted on the inner side of the shell.

The safe is to be strengthened externally by bands or straps in the most approved manner. The joints and seams in every instance are to be made air and water tight, and securely fastened in any suitable and well-known way. The front hoop, *i*, is attached to the outer shell by means of angle-irons *k*, (instead of the knees usually employed for that purpose,) firmly riveted to both hoop and shell. The batting-bar *e* is, in like manner, firmly riveted to this hoop near its inner edge, and, as the flange *d* of the inner casing, A, is likewise riveted to this batting-bar, the two shells are

securely united. A hoop, *l*, similar to the back hoop, *h*, encompasses the front end of the safe and protects the joint between the casing B and the hoop *i*. The door M is made of a plate of metal suitably strengthened by hoops and bars in the usual manner. The back plate, *m*, of the door is cast in one piece, with slots or grooves *n* in its edges for the insertion of screws by which to secure it to the plate M. A strip, *o*, of vulcanized-rubber packing, is interposed between the two plates in order to form a tight joint. The door may be hung in any approved way, and an internal door may be provided, if deemed necessary. At any convenient stage of the process of manufacture apertures are made in the outer casing, communicating with the filling-chamber or air-tight compartment. In Fig. 1 of the drawings these apertures are shown by dotted lines in the form of grooves or channels *p*, cut in the under side of the hoops *h i* and communicating with the filling or air-tight compartment through holes in the bent corners of the angle-irons. These apertures are closed with a fusible alloy or cement that will fuse at a temperature of 212° Fahrenheit, or thereabout. I also make similar apertures, *q r*, near each corner of the batting-bar *e* and of the door-casting *m*.

Besides riveting the joints and seams of my safe I propose sometimes, as an additional precaution, to solder them with a solder which will melt or fuse at a temperature of about 250° Fahrenheit, but I have discovered a cement which answers all the purposes of solder, is easier to apply, and which I prefer to use. This cement is made as follows: I take equal parts, by weight, of gutta-percha and the common paraffine-varnish of commerce. I heat the varnish in a suitable vessel, and while heated introduce, little by little, small pieces of the gutta-percha, until the whole quantity is dissolved and thoroughly incorporated with the varnish, stirring the mixture all the time. All the joints and seams of the safe are to be liberally coated with this cement while hot, and the apertures *p* are to be closed with it, the cement being poured in on the fusible alloy which closes the apertures.

In order to prevent corrosion or the escape of moisture, I coat thoroughly all the internal portion of the filling-compartments with a varnish composed of one part, by weight, of gutta-percha and three parts of paraffine-varnish, prepared in the same way as the cement above described. This varnish is to be applied while hot with a brush or swab several hours before the filling is put in.

The filling I employ is made in the following manner: To every seventy pounds of water I add two pounds of starch and incorporate the two thoroughly by boiling. To this solution, when cold, I add fifty pounds of plaster-of-paris by gradually sifting it in and constantly stirring the mixture. The above-mentioned proportions are the best, so far as I have been enabled to judge by experiment, but they may be varied somewhat without materially affecting the result.

There are many chemical equivalents both for the starch and plaster well known to chemists, which might be substituted for them, but I prefer the ingredients named. The starch renders the solution viscid, increases the capillary power of the set plaster to retain water and the non-conducting property of the plaster after the moisture is expelled.

Before filling the safe, I turn it face or door downward, and insert into the compartments to be occupied by the filling rods or bars of wood or metal. These rods are made slightly tapering, and may be wrapped with paper in order to facilitate their removal after the filling *t* is poured in. I prefer to arrange these rods parallel to the sides of the safe and equidistant from each other. This, however, is not a matter of essential importance. The rods should be long enough to reach from the front to the back of the safe, and it is best to have not less than eight of them, and arranged as shown in the drawings. They should likewise be of such dimensions that when withdrawn from the filling the aggregate capacity or area of the cavities *s*, formed by them, will not be less than one-twelfth of the entire space embraced in the compartments occupied by the filling. The filling is poured into its compartments in a plastic or fluid state, and when it has "set" sufficiently the rods are withdrawn, leaving cavities *s* in the compartments. The office of these cavities is to prevent injury to the safe from exposure to low temperatures, for if the water contained in the safe should freeze, the freezing would naturally commence on the outer sides, and the expansion thus caused would force a portion of the water into the cavities, and thus afford room for the necessary expansion and thus prevent the bursting of the safe or the opening of its joints, either internally or externally. After the plaster has set, the outer back plate, *f*, is put on and securely riveted, as hereinbefore described. The cavity of the door M is filled in a manner similar to the other compartment before its plates are screwed together, and a strip, *o*, of vulcanized rubber, is interposed between them to make a tight joint.

The advantages of my improved safe are such that it is equally well adapted to resist great extremes of either heat or cold. When exposed to cold sufficient to freeze the filling, the bursting of the safe is prevented by the water being driven into the cavities, as above described. When subjected to a temperature above 212° Fahrenheit, the fusible alloy or cement which seals the apertures in the casing will melt and permit the escape of steam, and by reference to Fig. 1 of the drawings it will be seen that these apertures are so arranged as to direct the jets of steam upon the sides of the safe, thus absorbing and carrying off the heat. The apertures of the door-space are so arranged that the steam which escapes through them must pass through the chinks of

the door, and thus cool that portion of the safe. Even when all the moisture has been driven from the filling there still remains a wall of plaster and starch around the safe of great heat-resisting power. The addition of the starch gives the filling an increased capacity for retaining moisture, and by making the joints absolutely tight any exhalation or evaporation whatever is prevented.

All or nearly all of the safes with the construction of which I am familiar use wood for the inner casing, which is easily rotted or permeated by moisture, and even where iron casings are used the joints are so imperfect as to permit the loss of the greater portion of the moisture by exhalation or evaporation, so that in process of time the safe becomes almost valueless as a safeguard against fire.

What I claim as my invention, and desire to secure by Letters Patent, is—

1. A fire-proof safe consisting of two air and water tight metallic casings or shells, A B, arranged one within the other, when constructed and combined substantially in the manner described, for the purposes set forth.

2. A fire-proof safe having apertures in its outer shell or casing for the escape of steam, when said apertures are closed with fusible alloy or cement, which melts at a temperature of 212° Fahrenheit or thereabout, substantially in the manner and for the purposes specified.

In testimony whereof I have hereunto subscribed my name.

E. N. HORSFORD.

Witnesses:
J. SNOWDEN BELL,
WM. D. BALDWIN.