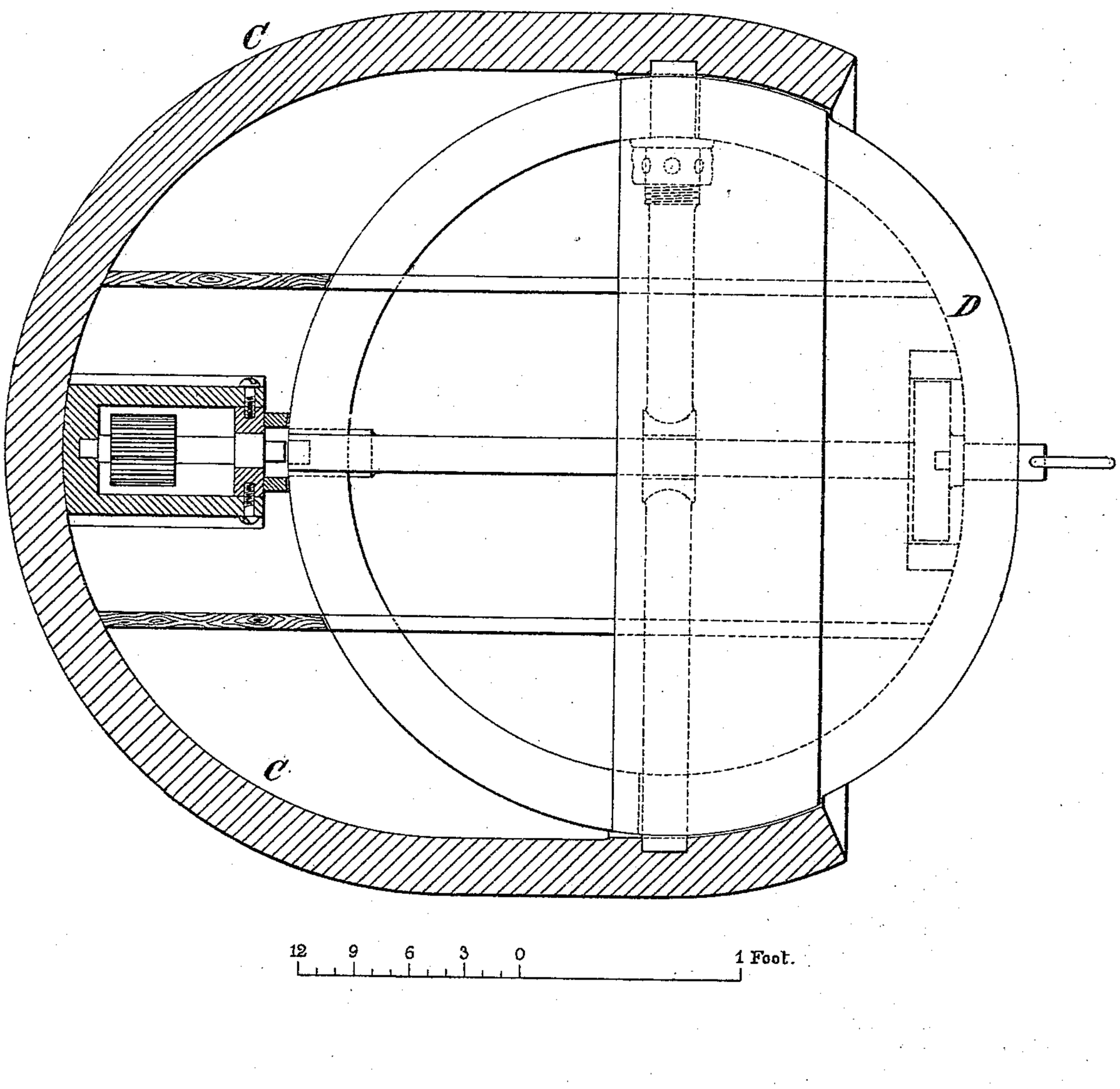
2 Sheets--Sheet 1.

WILLIAM CORLISS.

Improvement in Safes.

No. 126,134. Patented April 30, 1872.

Fig. 1.



Witnesses,

Arnold Hoeniman.

Campbell C. Livings

Inventor,

William Corliss

by his attorney

J. L. Stetson

2 Sheets--Sheet 2.

WILLIAM CORLISS.

Improvement in Safes.

No. 126,134. Patented April 30, 1872.

Fig. 2,

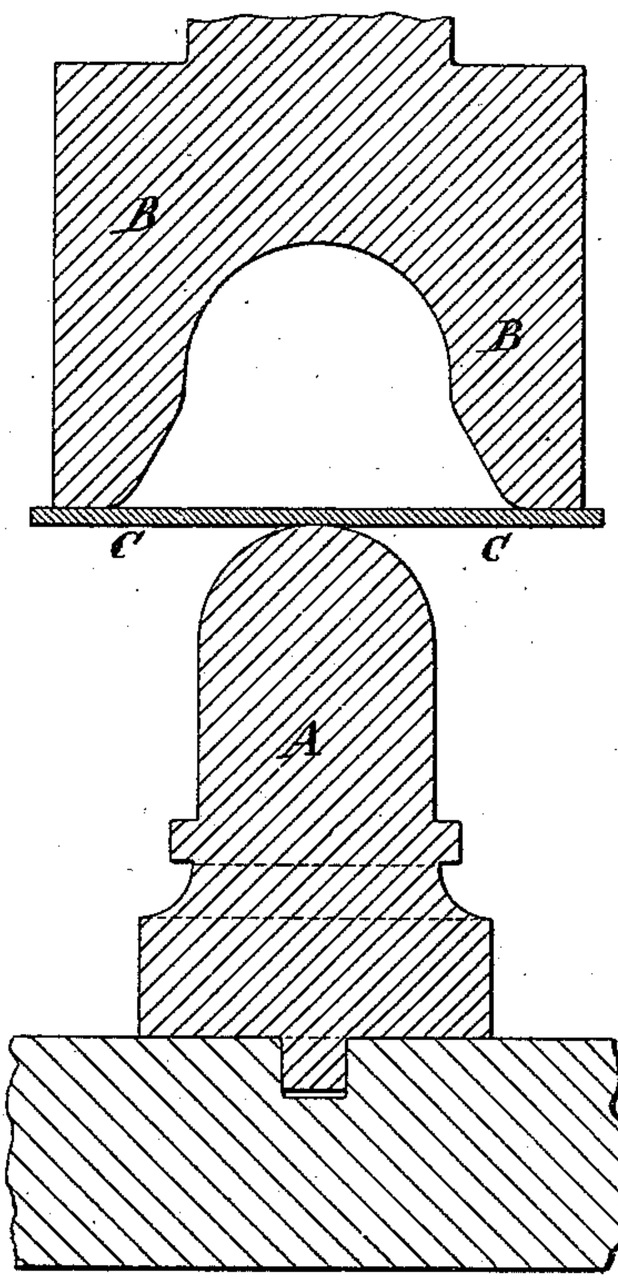


Fig. 3,

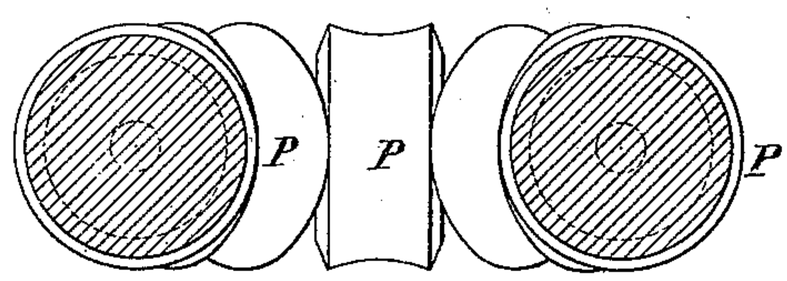
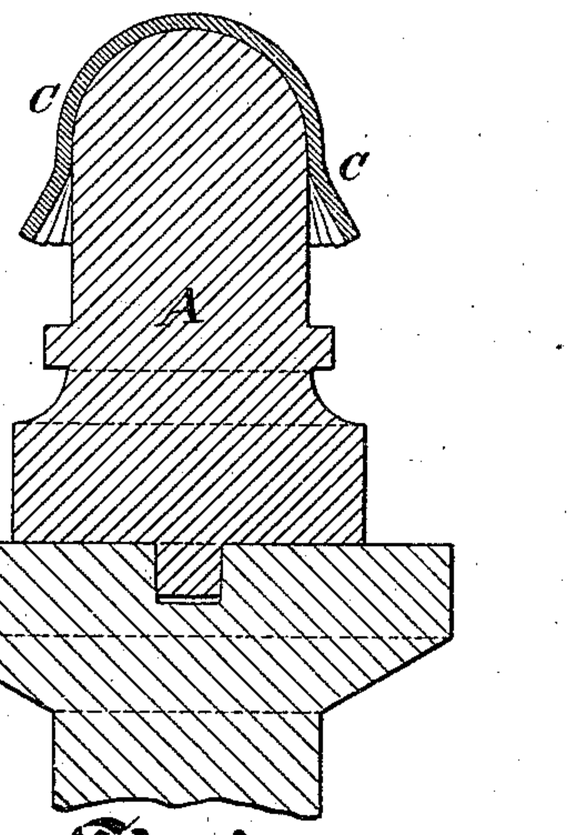
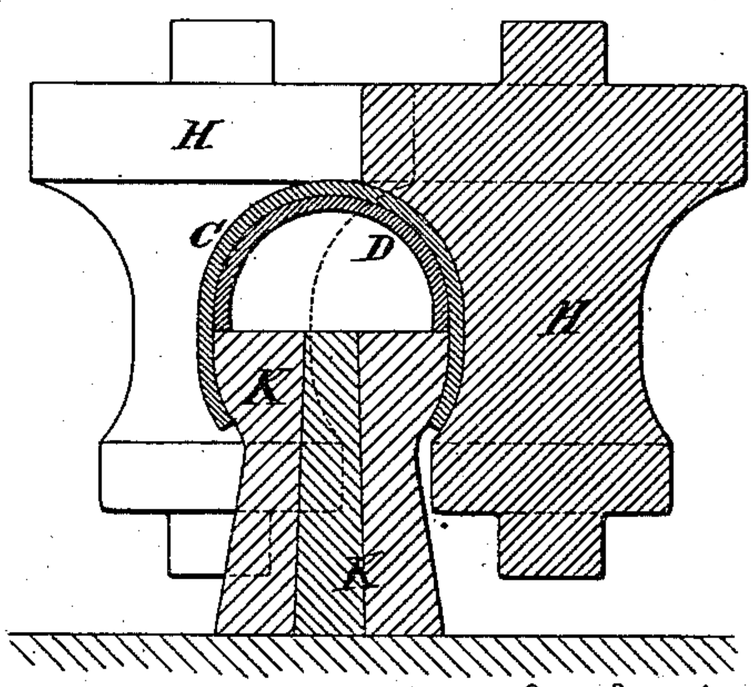
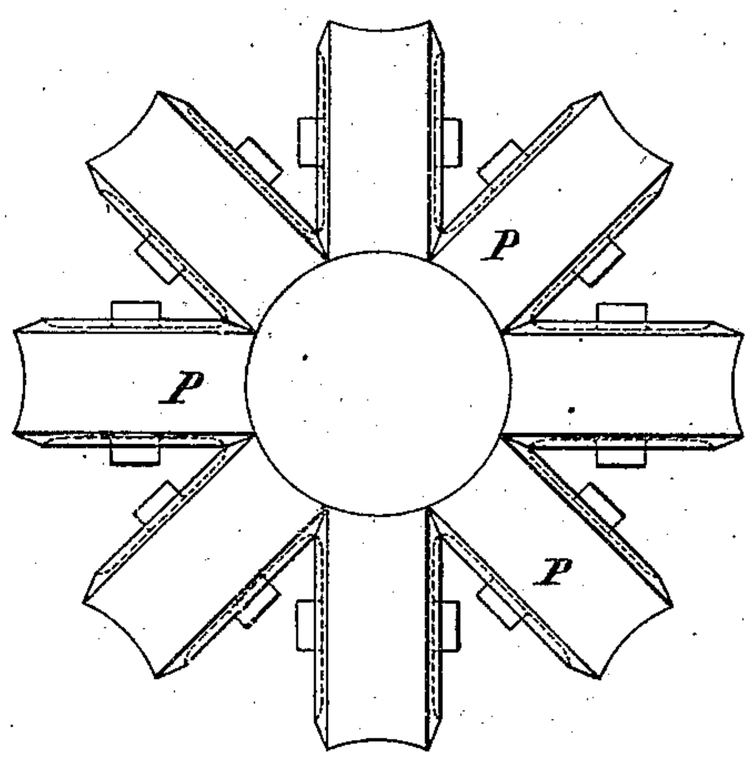


Fig. 5,

Fig. 4,







0 2 4 6 8 10 12 Feet.

Witnesses,

Arnold Herrmann.

Campbell C. Livings

Inventor,

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by his attorney C. C. Stetson.

126,134

UNITED STATES PATENT OFFICE.

WILLIAM CORLISS, OF PROVIDENCE, RHODE ISLAND.

IMPROVEMENT IN SAFES.

Specification forming part of Letters Patent No. 126,134, dated April 30, 1872.

Specification describing an Improved Manufacture of Burglar-Proof Safes, invented by WILLIAM CORLISS, of Providence, in the State of Rhode Island.

I make a safe having a main shell or body which is spherical in form and open on one side, so that the shell shall be considerably more than half of a spheroid, and I close the open side with a hemispherical door, which is inclosed within the main shell in the process of manufacture. The main shell is preferably in the form of a prolate or elongated spheroid. Both parts are made of wrought-iron or steel, or analogous workable material—preferably steel or other very hard material, laminated, interwoven, or otherwise streaked, spotted, and mixed with iron.

The peculiar difficulty involved in the manufacture relates to the inclosing of the door within a shell formed in one piece, having an aperture or mouth narrower than the door. My invention provides for successfully overcoming all the difficulties.

I will proceed to describe what I consider the best means of carrying out the invention.

The accompanying drawing forms a part of this specification.

Figure 1 is a partial vertical section of the completed safe. It shows the door in elevation. The remaining figures indicate the several stages of its manufacture with outlines of the machinery employed. Fig. 2 is a hammer and anvil, the material lying between, as a thick flat plate. Fig. 3 shows the same anvil used as a former, to hold partially manufactured shell thereon in the form of a cap and carry it up thereon between a circular series of rollers forming a circular die. Fig. 4 is a plain view of this peculiar circular die; and Fig. 5 shows the shell completely formed, except the finishing. It is mounted on another former having the door in place thereon, so as to hold it in the back of the shell. This figure also shows two of a series of peculiar rolls which act on the blank to contract it around the mouth.

It will be understood that in the completed safe the door turns around on the upright shaft shown in dotted lines, and which is made in two parts to allow its introduction.

Similar letters of reference indicate corresponding parts in all the figures.

C is the main shell, or the material therefor. It is, in Fig. 2, shown in edge view in the form of a flat plate. In Fig. 3 the same is shown partly struck into shape, and in Fig. 5 it is shown completely formed, with the exception of trimming and finishing, which may be done by lathes and analogous tools which I have not deemed it necessary to refer to. D is the hemispherical door, which may be formed of the same material as the shell, or different, at will. It may be formed by the same means as I have devised for the manufacture of the main shell, but its construction will offer less difficulty, and need not be particularly described. I will assume that the door has been already previously manufactured and nicely turned and finished. It is difficult to perform any elaborate work on it after its inclosure in the main shell. I provide, by the means employed in producing armor-plating for ships or otherwise, a sufficiently large mass of proper forgeable material to form the outer shell and to allow of some waste to be trimmed off ultimately around the edge of the hole or open side. This is heated thoroughly in a proper furnace, and is laid on a peculiar former, A, having a rounded top and nearly cylindrical body. It is adapted below to be supported firmly in the hammer-bed, and also to be changed conveniently by the aid of a crane or analogous device, not represented, so as to be transferred to other pieces of powerful mechanism, as will appear further on. A massive hammer, B, having a nearly corresponding concavity on its face, is operated above by the direct action of steam, or otherwise, and is accurately guided so as to strike truly and centrally in the line of the former A. This hammer is brought down upon the plate by a succession of blows increasing in force; and the material C is thereby partially shaped, as indicated in Fig. 3. At this stage the hammer is raised, and the former A, with the partially-formed blank C thereon, is lifted and transferred to the movable head of a press which is adapted to be raised strongly and with considerable rapidity by the action of water or by the direct action of steam on a large piston working in a cylinder below. So soon as the former A with its load is transferred to this press it is raised and caused to pass between a series of rollers, P, mounted above. These

rollers are ranged in a circle with hollowed peripheries, as represented, so that their joint effect on the blank is to form it down nicely to a nearly perfect cylinder. There is mechanism, not represented, for drawing these rollers P together and moving them apart within considerable limits. I propose to raise and lower the former A and its partially-formed blank several times, partially turning it at each operation and drawing the rollers P together a little each time. The result is a nicely-formed cylindrical exterior on the blank C, without any considerable ridges. Now the hot blank is lifted off from its closely-fitting former A, which operation may be effected by bringing up a strong ring loosely surrounding the latter, and which has before laid idle, or by other convenient means, and the hot blank is thrust down upon a different former, K, which is made in sections adapted to be afterward taken apart and collapsed in the manner analogous to the well-known hatter's block. This stands ready prepared, with the parts firmly applied together and with the previously-formed door D laid on its upper surface. All these parts are cold. Immediately on the reception of the hot blank thereon it is rotated slowly and subjected to the action of three strong rolls, H H H, which are gradually brought together and are of such form as to draw the lower edge of the blank gradually and smoothly together. This operation may be continued, turning the blanks slowly around between the rolls H, with a gradually-increasing pressure, so as to leave the surface very truly and smoothly finished. Now, before the hot blank C has materially contracted by cooling, the rolls H are separated, and so much of the former K is removed as will allow it to contract. After the mass has thoroughly cooled in this condition the several remaining sections of the former K may be removed.

If preferred in any case, a portion of the superfluous material around the mouth may be removed by cutting, by machinery or otherwise, while the blank is hot. In either event a subsequent finishing may be done by lathe-work after the whole is cooled and before it is hardened.

All the drilling, truing, &c., required for the finished safe is now to be performed at this stage as far as possible. It will usually happen that in the hardening process the work warps sufficiently to throw the previous finishing a little out of true, and in such case the work must be afterward finished with grinding mechanism adapted to treat hard and obdurate materials.

My means of forming acts so uniformly on the material and leaves the form so true that there is little liability to distortion in hardening.

The hardening of the whole, in case steel is employed, is a matter requiring some skill. I provide a framing which holds the door D up in a position as widely separated as possible from the inner surface of the shell C, and in this position heat the whole of the shell C and the door D uniformly to the proper temperature and immerse it in a tank, providing means for circulating the water as actively as possible through the interior as well as on the exterior of the shell C.

Instead of commencing with a flat plate, I can commence with the material in the form of bars at a welding heat, and in such case provide two or more sets of such bars of the same or of different sizes—as, for example, one set of the softest Pennsylvania iron and another set of the hardest tempering steel. There may be other bars containing continuous or intermittent lengths of Franklinite iron or other undrillable or practically very difficult material to drill or cut, applying the bars from the several sets in succession and welding them by pressure-rolls or by successive blows over a former. The former may be the same here marked A, and the bars may be of any convenient length, wound around, beginning at the bottom of the exposed part of the former and gradually building up, so as to be a minute or more, if necessary, in applying and welding together all the bars around the former. At the close the heat remaining will be sufficient, probably, to allow of the shaping smoothly with the finishing-rolls H H H. Or, if the operation is conducted more slowly, so as to be many minutes in completing the formation of the shell, taking care to retain the heat in the last ones applied long enough to cause the last course to weld thoroughly to the next, the work may still be successful. A blow-pipe, with oxygen and hydrogen gases, may be used as an auxiliary to maintain a high temperature at the welding point or line. I can use a movable series of such pipes to keep the entire upper edge of the partly-formed work hot, raising the series of blow-pipes as the work proceeds. Instead of using the former A in such cases, and being put to the necessity of reheating and contracting the mouth, I think it practicable to effect the welding operation, with proper precautions, directly around the door. In such a procedure I would, for example, mount the door with its hollow face downward upon the former K, and cover it with a series—say three or more thicknesses—of thin iron, previously formed into thin hemispherical shapes. These protect the door from the heat of the welding bars and the hot metal outside from the cooling influence of the thick door. The door thus serves efficiently as a part of the former.

I claim—

As a new article of manufacture, a safe of forged material, in a spherical form, formed with the door inclosed, all substantially in the manner herein set forth.

WILLIAM CORLISS.

Witnesses:

THOMAS D. STETSON,

CAMPBELL C. LIVINGS.