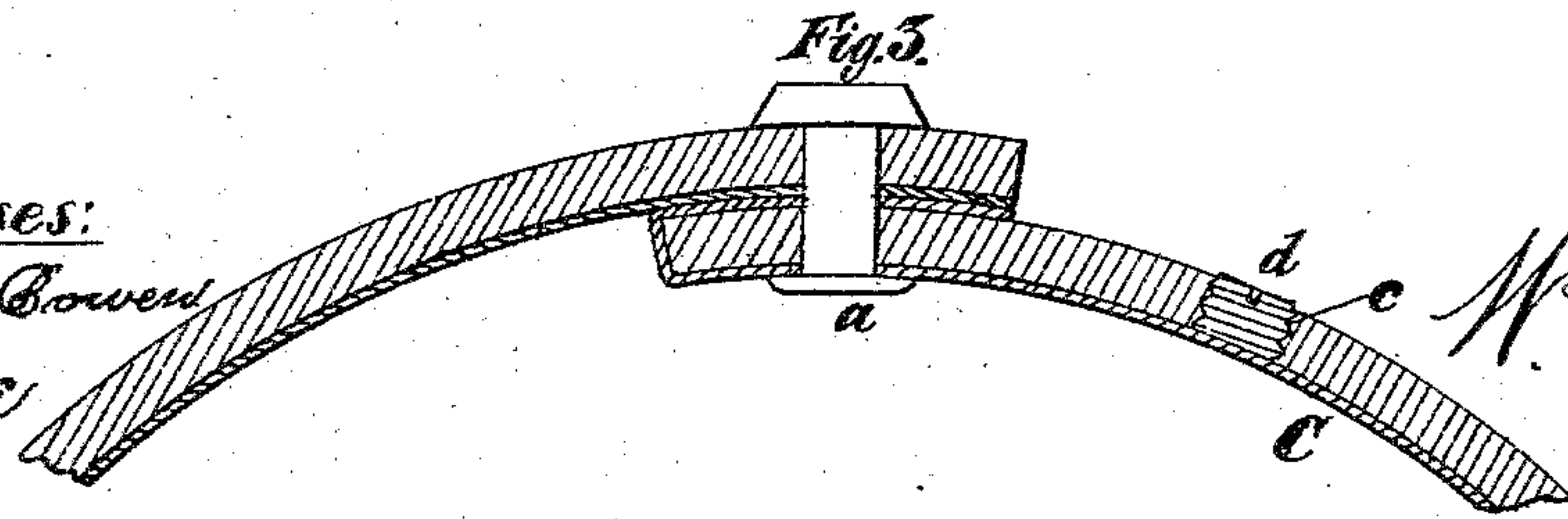
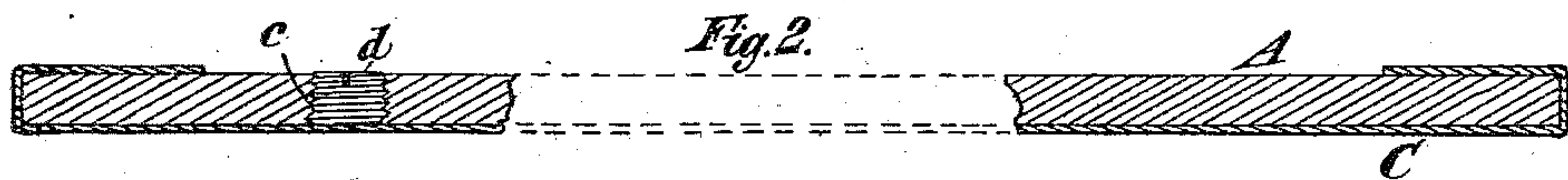
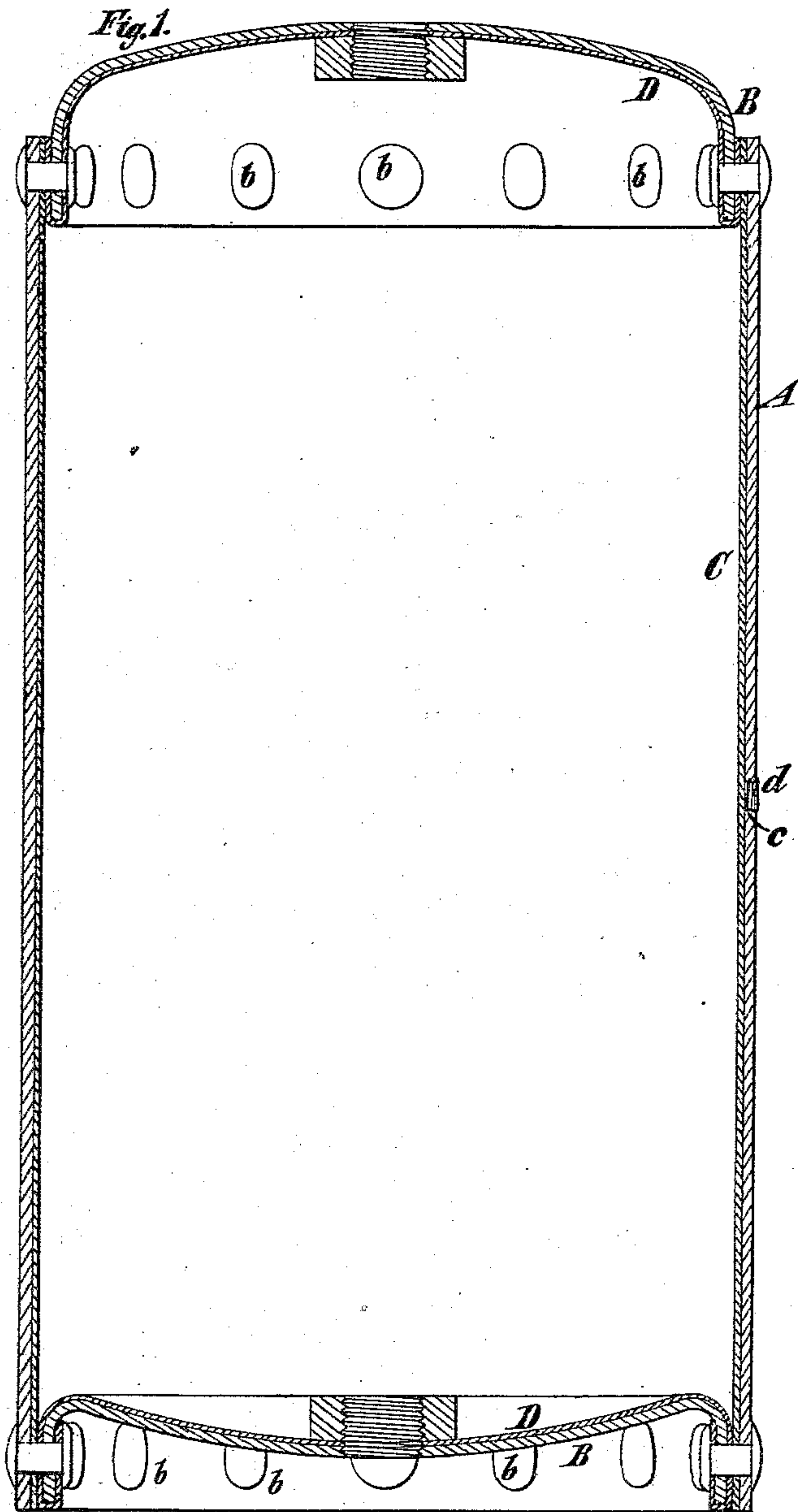


(No Model.)

W. L. BROWNELL.
PROCESS OF MAKING BOILERS.

No. 280,905.

Patented July 10, 1883.



Witnesses:
James R. Bowen
W. H. Kane

Inventor:
W. L. Brownell
By his atty
Edwin H. Brown.

UNITED STATES PATENT OFFICE.

WILLIS L. BROWNELL, OF BROOKLYN, NEW YORK, ASSIGNOR, BY DIRECT
AND MESNE ASSIGNMENTS, TO APOLLOS SMITH AND ANNA J. BROWNELL,
BOTH OF SAME PLACE.

PROCESS OF MAKING BOILERS.

SPECIFICATION forming part of Letters Patent No. 280,905, dated July 10, 1883.

Application filed April 8, 1882. (No model.)

To all whom it may concern:

Be it known that I, WILLIS L. BROWNELL, of Brooklyn, in the county of Kings and State of New York, have invented a new and Improved Process of Manufacturing Boilers and Analogous Articles, of which the following is a specification.

My invention relates to boilers or analogous articles which are composed of shells of iron or steel and linings of copper or brass applied separately to the body portion of the shell and to the heads of the shell.

The invention consists in a novel process of manufacturing a boiler or other analogous article, said process consisting in forming the heads and providing them separately with linings; in taking a sheet of metal suitable for the body and forming a hole therein; in applying a lining to said sheet and rolling or bending them together into a body of cylindric form; in riveting the longitudinal seam of the body and riveting the heads to the body; in soldering the longitudinal seam of the body and the seams which connect the body with the heads while the hole in the body is still open, so that any air remaining between the lining and the body, and which would be expanded by the heat produced in soldering, may escape; in subjecting the article to hydraulic or pneumatic pressure on the inside, and in finally closing the hole in the body. As the hole in the body is open when the boiler or other article is subjected to internal pressure, any leak in the lining would be detected by water or air escaping from said hole.

In the accompanying drawings, Figure 1 is a central vertical section of a boiler made by my improved process. Fig. 2 is a section of a sheet of iron or steel having applied to it a sheathing of copper, and suitable for use in the manufacture of the body of the boiler; and Fig. 3 is a similar section of the end portions of the same bent into shape to form the body of the boiler.

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

A designates a sheet of iron or steel forming the body of the shell of the boiler.

B designates the heads of the boiler, which are made of the same material.

C designates a lining of copper applied to the interior of the body A of the boiler-shell.

D designates linings of copper applied separately to the heads, and extending around their edges and over the adjacent portion of their exterior.

I apply the copper C to the sheet A, as shown particularly in Fig. 2, and I preferably lap the ends of the copper around the ends of said sheet. The sheet and the copper lining will then be bent or rolled together into a cylindric shape at one operation. The end of the sheet which is inside the boiler is then also covered by the copper, and the ends of the copper are brought together, so as to form a good joint. I do not desire, however, to confine myself to this method of construction, as the copper need not be lapped around the ends of said sheet, but could terminate at the ends of the sheet, and be united by the same rivets, *a*, which unite the ends of the sheet.

The linings D may be applied to the heads B in any suitable manner; but I prefer to spin them directly into the heads. In thus applying them the air is effectually expelled from between them and the heads, and as their edges overlap the edges of the heads there is no danger of leakage through them to the heads.

In the sheet A is a hole, *c*, which is formed before the lining C is applied to said sheet, and which is here represented as screw-threaded, so that a plug, *d*, may be secured therein. This plug is, however, not inserted until the boiler is otherwise complete. After the sheet A and its lining C have been bent or rolled into shape to form the body, they are secured by rivets *a* to form the longitudinal seam, and the body is secured to the heads B by rivets *b*. It will be observed that the lining of the heads fits against the lining of the body. After the parts are put together as above described, I solder the longitudinal seam of the body and the seams which connect the body and heads. This is done while the hole *c* is open, and consequently any air remaining between the lining of the body and the body, and which would be expanded by the heat produced in soldering, can escape freely through said hole. After the soldering is finished, I subject the boiler to hydraulic or pneumatic pressure on the inside

by means of any suitable apparatus. This forces the copper lining tightly against the body A, and thereby drives out any air which may have been between the lining and body.
5 If there is any leakage in the lining, water or air will subsequently escape from the hole *c*; hence if none escapes, it will be evident that no leak exists in the lining. After this test, the plug *d* is screwed into or otherwise secured
10 in the hole *c*, white lead or red lead being employed to make a tight joint, and the boiler is then complete. Of course any number of the holes *c* may be employed, and the heads, if desirable, may be provided with similar holes for
15 the same purpose.

The improvement is applicable to steam as well as water boilers and to other analogous articles.

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

The process of manufacturing a boiler or other analogous article, consisting in forming

the heads and providing them separately with linings; in taking a sheet of metal suitable for the body and forming a hole therein; in apply- 25 ing a lining to said sheet and rolling or bending them together into a body of cylindric form; in riveting the longitudinal seam of the body and riveting the heads to the body; in soldering the longitudinal seam of the body 30 and the seams which connect the body with the heads while the hole in the body is still open, so that air remaining between the lining and the body, and which would be expanded by the heat produced in soldering, may escape; 35 in subjecting the article to hydraulic or pneumatic pressure on the inside, and in finally closing the hole in the body, all substantially as and for the purpose herein described.

WILLIS L. BROWNELL.

Witnesses:

FREDK. HAYNES,
T. J. KEANE.