(No Model.)

G. R. NOBLE.

METHOD OF MAKING LEAD LINED BOILERS.

No. 345,168. Patented July 6, 1886.

FIG. 1.

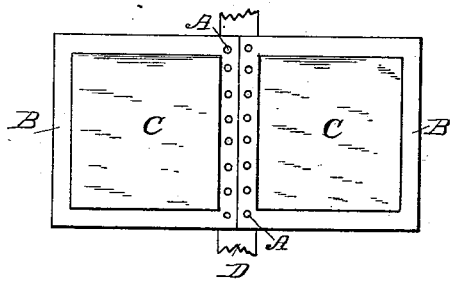


FIG. 2.

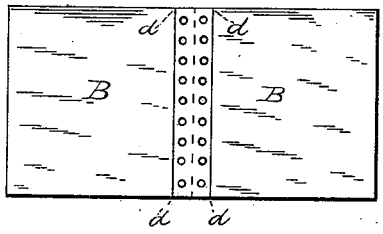
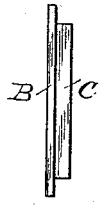


FIG. 3.



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GEORGE RICHARD NOBLE, OF BUCKHURST HILL, COUNTY OF ESSEX, ENGLAND.

METHOD OF MAKING LEAD-LINED BOILERS.

SPECIFICATION forming part of Letters Patent No. 345,168, dated July 6, 1886.

Application filed April 23, 1886. Serial No. 199,975. (No model.)

To all whom it may concern:

Be it known that I, GEORGE RICHARD NOBLE, a citizen of England, residing at Buckhurst Hill, county of Essex, in the Kingdom of England, have invented certain new and useful Improvements in Methods of Making Lead-Lined Boilers; and I do declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same.

My invention has for its object an improvement for the method of manufacturing iron or steel boilers with a lining of lead or other non-corrosive metals capable of resisting the action of acids employed in the manufacture of certain articles, and also of resisting a high atmospheric pressure and a high degree of heat. These boilers are principally used as digesters or rotaries for the manufacture of wood-pulp, and also for various other manufactures in which acids are used which attack iron or steel.

My invention consists, first, in taking separate plates of iron which have received a thick coating of lead, leaving, however, an edge all around the plates which is to remain unlined, for the purpose hereinafter described; second, rolling these plates lined with lead into the proper shape, so that they will form sections of a boiler or other vessel; third, riveting the plates thus prepared together, the rivet-head having been, if desired, first countersunk in the iron plates to render them flush with the inner surface thereof; fourth, covering the riveted spaces with lead; fifth, applying heat to the outside of the boiler for the purpose of melting the lead applied to the inner surface, and also of melting the flux employed for this purpose, whereby by these several processes the inner side of the boiler is given a substantially homogeneous coating of lead.

My invention is illustrated in the accompanying drawings, in which Figure 1 represents two iron plates, B B, with lead lining C, having an edge all around which is unlined. An iron band, D, is placed on the reverse side, and the two plates B B are riveted to the iron band D.

A A show the rivets, which are countersunk so as to be flush with the inner surface of the iron plate B.

Fig. 2 shows the reverse side with the iron bands extended form the four points, marked *d*, the dotted line in the center representing the junction of the two lead-lined plates, which are butted together, and A represents the rivets, which may be secured with nuts or in any other manner.

Fig. 3 is a side view of the plate B, representing the iron plate, and C the lead lining, and shows that the lead lining does not extend to the edge of the iron plate.

The preliminary lining of the plates with lead may be made by any well-known process whereby a thick, solid, and substantial lining is produced. The method I prefer for giving to the plates this thick preliminary lining is that of Graham's, as set forth in his Patent No. 280,466, July 3, 1885, in which chloride of zinc is the uniting agent, and the lead is applied to any suitable thickness on a surface heated above the melting-point of lead.

To produce the unlined edge upon the plate, I first pass an asbestus rope around the edge of the plate, so that the lead may extend no farther than the rope and leave a space for the rivets. This is secured in its place by iron frame bolted to plate by nuts and bolts or clamps, and when the melted lead is poured onto the iron plate it can extend no farther than to the rope, thus leaving the edge entirely free from lead. I do not, however, confine myself to this device, but the lead may cover the entire plate and afterward be removed for the purpose of leaving the edge free.

The various iron plates are all made of a proper size, so that they will fit exactly, when lined, the different parts of the boiler for which they are intended.

After the plates are all prepared by lining and rolling into proper shape they are all riveted together, as shown in the drawings, and then the spaces between the lead lining have to be filled up with lead. This is done by preparing the iron in these spaces, which may have become oxidized or soiled, in the usual manner, and the rivet-heads also have to be prepared in the same manner, and when the

rivets have been countersunk into the iron plate, so as to make them flush with the iron plate, it presents an even surface to be coated with lead. These spaces having been prepared, heat is applied to the outside of the boiler, necessarily underneath the boiler, and a suitable flux having been applied, melted lead is poured in, and the fresh lead thus applied is melted by a blow-pipe or otherwise fused into the body of lead already on the plates, so as to form a substantially homogeneous coating upon the interior of the boiler.

Having thus described my invention, I claim—

The method of preparing lead-lined boilers, digesters, or other vessels and utensils, of any required shape, consisting of the following steps: first, lining separate plates of iron with lead, leaving an unlined edge, or removing the lead around the edge of the plate after it has been applied; second, rolling or pressing the plates so lined into proper shape; third, riveting the iron plates together at their unlined edges; fourth, covering the riveted space with lead, and, fifth, fusing the said lead-covering and the adjacent edges of the plate-lining, whereby a substantially homogeneous coating of lead is given to the inner surface of the vessel.

In testimony whereof I affix my signature in presence of two witnesses.

GEORGE RICHARD NOBLE.

Witnesses:
C. A. WHEDON,
A. S. BOYNTON.