

(No Model.)

G. W. RUSSELL.

PULP DIGESTER FOR PAPER MAKING.

No. 341,434.

Patented May 4, 1886.

*Fig. 1.*

*Fig. 4.*

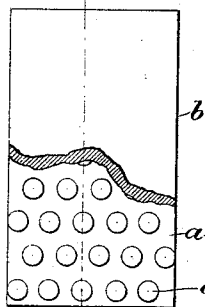


*Fig. 5.*

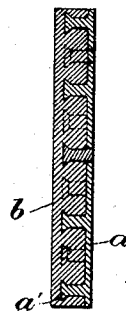


*Fig. 2.*

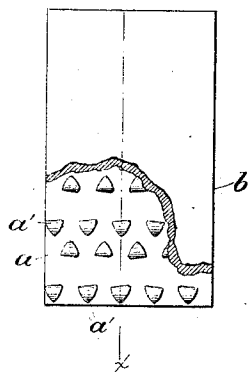
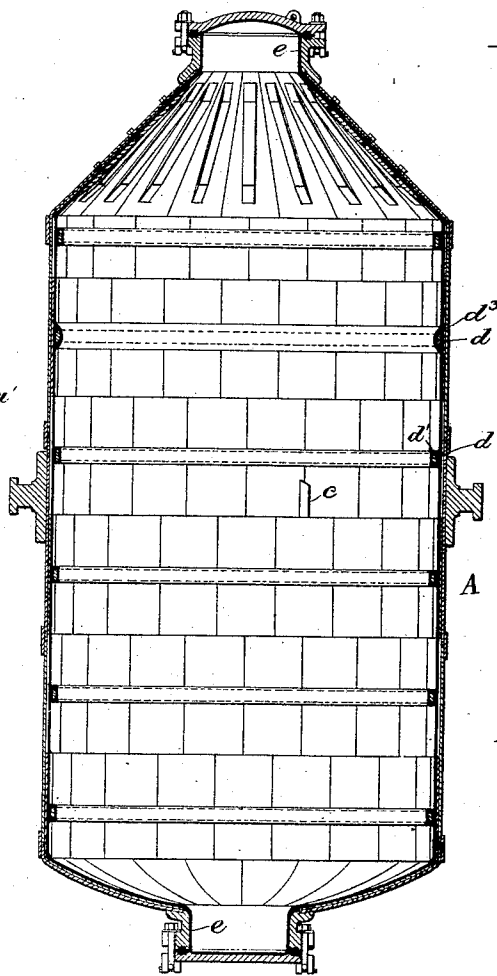
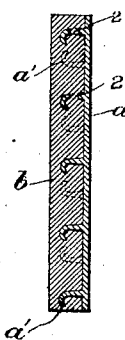


*Fig. 3.*



Witnesses.  
John F. Nelson.  
John F. C. Printlock

Inventor.  
George W. Russell  
by Crosby & Gregory attys.

# UNITED STATES PATENT OFFICE.

GEORGE W. RUSSELL, OF LAWRENCE, MASSACHUSETTS, ASSIGNOR TO THE  
AMERICAN SULPHITE PULP COMPANY, OF PORTLAND, MAINE.

## PULP-DIGESTER FOR PAPER-MAKING.

SPECIFICATION forming part of Letters Patent No. 341,434, dated May 4, 1886.

Application filed April 1, 1885. Serial No. 160,860. (No model.)

### *To all whom it may concern:*

Be it known that I, GEORGE W. RUSSELL, of Lawrence, county of Essex, and State of Massachusetts, have invented an Improvement in Pulp-Digesters for Paper-Making, of which the following description, in connection with the accompanying drawings, is a specification, like letters on the drawings representing like parts.

In the treatment of comminuted wood, esparto, grass, and other material containing a fiber suitable for the manufacture of pulp for paper, the production of white pulp can be greatly hastened and cheapened by the use of acid sulphates or sulphates of alkalies or alkaline earths; but such disintegrating and bleaching agents cannot be used in iron vessels, for the acids eat the iron and blacken the pulp. To obviate this injurious action on the iron boiler of the acid salt used, the said boilers have been lined with lead in various ways, as by causing the ends of the lead lining to be held between flanged parts of the boiler united by bolts or rivets; and so, also, the boiler has had the lead lining attached to it by lead-covered bolts extended through the lining and through the boiler; but this last named plan weakens the boiler; and so, also, a boiler has been provided with a compound lining composed, essentially, of perforated sheet metal—such as iron—covered with lead at both sides, the said lead passing through the holes in the said sheet metal.

When lead is fitted to the interior of an iron boiler, the heating of the contents of the boiler causes the lead to expand, and at the same time the boiler expands, and after the material is discharged from the boiler the latter contracts, but the lead lining fails to resume its original position, and thus the lead lining becomes detached or bulged out or “creeps,” as it is called, in the boiler. Riveting the lead lining to the boiler at frequent intervals effects the distribution of the bulging action of the same equally throughout the entire interior of the boiler, and so prevents and in a great measure counteracts the “crawling” or “creeping” action of the lead, as it is called, or retains it better in position.

To provide a lining which will not creep or crawl to an injurious extent, I have provided the metallic boiler with a lining composed of a series of iron or steel plates having each a series of holding prongs or projections, upon and covering which and the iron plate itself on one or both sides is cast a plate of lead or a mixture of lead with zinc or other metal or alloy which will resist the destructive action of the acid salt being used, the said lining being placed in the iron boiler in sections, with its lead-covered edges abutting, after which the said abutting edges are soldered or fused together, making a liquid-tight lining. The said compound lining of lead and iron may be held pressed against the inner wall of the metallic boiler by means of a strong metallic ring covered with lead.

My invention consists, essentially, in the combination, with a metallic boiler-shell, of a compound lining composed of a metal plate having prongs or projections upon which the lead part of the compound lining is caused to adhere by casting in a mold or otherwise.

Figure 1, in vertical section, represents one usual form of boiler employed in pulping apparatus; Fig. 2, an enlarged detail showing the specific construction of one of the lining-sections, some of the lead being omitted; Fig. 3, a section of Fig. 2 in the dotted line *xx*; and Figs. 4 and 5 modifications of the lining, where in the lead-holding prongs or projections are of different shape.

The boiler A, composed preferably of boiler-iron bolted together in usual manner, is and may be of ordinary shape common in pulping apparatus for wood and other fiber-producing materials. The lining to be used is composed of plates *a* of cast or wrought metal, having at one but it may be at both sides prongs or projections *a'*, either integral therewith or separate therefrom, and screwed or forced into the said cast or wrought iron plate, both sides of the plate having prongs or projections when it is desired to cover both sides of the said metal plate with lead.

The prongs or projections *a'* (shown in Figs. 2 and 3) are integral with the plate itself, and the plate and prongs are annealed or malleable

to thus enable the prongs or projections to be bent and act as hooks, as in Fig. 3, by which to better and more effectually retain the lead part *b* of the lining in place on the iron or steel plate as the lead cools after being cast or poured upon the metal in a mold as usually practiced when casting one metal upon another, and to aid in making the lead adhere more closely to the iron or steel plate, the surface of the latter and the prongs or projections may be prepared with a flux or alloy commonly used for such purposes—as, for instance, chloride of zinc.

In Figs. 4 and 5 the projections *a'* are shown as enlarged at their outer ends. If desired, the prongs or projections may be provided with transverse holes 2, as shown in Fig. 3, into which the lead or other equivalent metal used for the exposed face *b* of the lining may enter to aid in holding the lead in place.

In Fig. 5 two of the projections *a'* are shown as screwed into one metal plate, *a*.

The lining is cast in sections to fit the interior of the boiler, and the said sections are arranged in the said boiler side by side with the lead-covered edges of the lining plates in contact, after which the said edges are subjected to heat by a blow-pipe and fused together liquid-tight; but, if desired, the said abutting and soldered edges may be covered by means of a strip or ribbon, *c*, of lead laid thereon, as shown in Fig. 1, the said strip being herein shown as applied to but a very short part of the junction of two plates, the strip being merely long enough to illustrate how the junction of the sections may be protected. The edges of the said strip or ribbon are soldered to the lead face of the lining sections.

The compound segmental lining plates will in practice remain in place by reason of their shape as do fire-bricks; but may be further held in place by means of an iron or brass hoop or ring, *d*, covered with lead or equivalent acid-resisting metal or material, as at *d'*. The lead *d'* may entirely surround the hoop or ring, as shown in Fig. 1; or the lead in the form of a strip or ribbon may be laid over the

said ring and be soldered to the lead face of the compound lining at each side of the hoop, as shown at *d'*; or at the upper ring of Fig. 1.

The sections of the compound lining fitting the concaved interior of the heads of the boilers will be made wedge-shaped, and the smaller ends of the said wedge-shaped sections appearing at the openings in the central parts of the said heads will have soldered to them the inner end of a piece of lead, *e*, preferably in the shape of a tube, one end of which is flanged outwardly to cover or lap over the ends of the compound sectional plates.

The compound lead and iron or steel lining once secured in place in the boiler will remain there for a very long time.

I do not broadly claim an iron or metal plate with lead cast upon it; nor do I claim anything claimed in United States Patent No. 335,943.

I claim—

1. In a pulp-making apparatus, a boiler provided with a compound lining composed of sections of cast or wrought metal plate, provided with projections or prongs and having a cast-metal face held in place by the said prongs, the said sections being placed in the metal boiler and having their lead-coated edges soldered or fused together, substantially as described.

2. In a pulp-making apparatus, a boiler provided with a compound lining composed of sections of cast or wrought metal plate, provided with projections or prongs and having a cast-metal face held in place by the said prongs, the said sections being placed in the metal boiler and having their lead-coated edges soldered or fused together, combined with lead-covered section-holding rings, substantially as described.

In testimony whereof I have signed my name to this specification in the presence of two subscribing witnesses.

GEORGE W. RUSSELL.

Witnesses:

G. W. GREGORY,  
F. CUTTER.