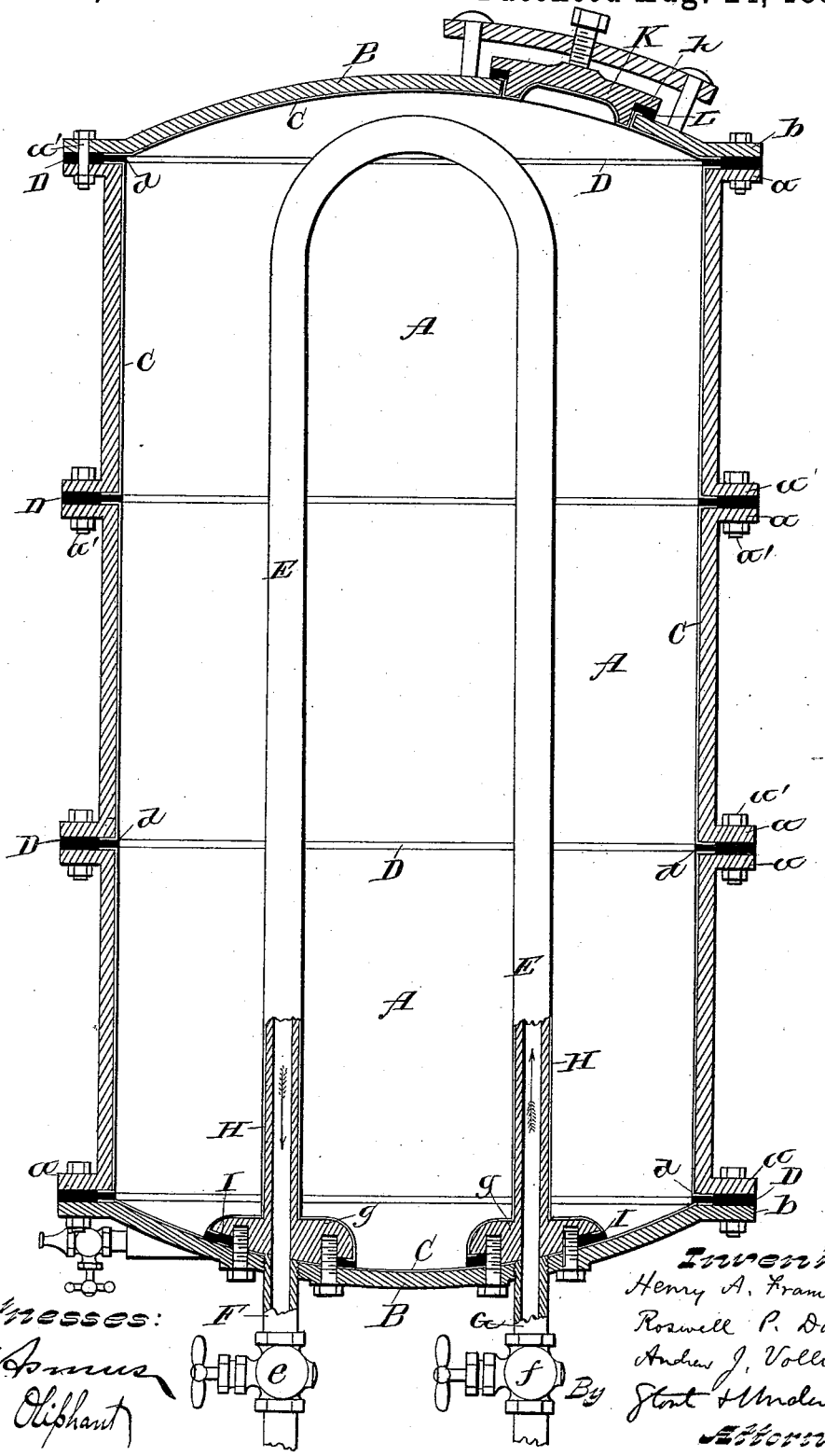
(No Model.)

H. A. FRAMBACH, R. P. DART & A. J. VOLLRATH.

BOILER OR DIGESTER FOR REDUCING WOOD AND OTHER PAPER STOCK.

No. 348,159. Patented Aug. 24, 1886.



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UNITED STATES PATENT OFFICE.

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BOILER OR DIGESTER FOR REDUCING WOOD AND OTHER PAPER-STOCK.

SPECIFICATION forming part of Letters Patent No. 348,159, dated August 24, 1886.

Application filed December 21, 1885. Serial No. 186,300. (No model.)

To all whom it may concern:

Be it known that we, HENRY A. FRAMBACH and ROSWELL P. DART, both of Kaukauna, in the county of Outagamie, and in the State of Wisconsin, and ANDREW J. VOLLRATH, of Sheboygan, in the county of Sheboygan, in said State, have invented certain new and useful Improvements in Boilers or Digesters for Reducing Wood and other Paper-Stock; and we do hereby declare that the following is a full, clear, and exact description thereof.

Our invention relates to apparatus for treating wood and other stock capable of being reduced to paper-pulp by the various acid or acid-sulphite processes, and will be fully set forth hereinafter.

Previous to our invention it has been usual to line the boilers or digesters for cooking the material in the process of reduction with sheet-lead; but this lead lining has proved insufficient for the purpose, owing to the fact that it will not expand and contract equally with the vessel, thereby becoming puckered and liable to crack, and thus permitting the acid to come in contact with the iron or steel composing said vessel, thus acting disastrously on the latter, and also, by the chemical result of such contact, seriously impairing or absolutely ruining the stock contained therein. A lining of glazed bricks has also been used in connection with the lead lining, but the same objections are pertinent to such lining as apply to those composed entirely of lead.

Our invention, therefore, has for its objects to overcome the difficulties heretofore experienced; and it consists in lining or covering the various vessels, &c., used in the acid or acid-sulphite processes for reducing wood and other stock to paper-pulp, with an elastic and acid resistant enamel, as will be hereinafter described with reference to the accompanying drawing, in which is represented a sectional view of a boiler or digester and the heating-pipes constructed in accordance with our invention.

The boiler is composed of a series of united sections, A, and head-plates B, said parts being of any suitable dimensions, and consisting of iron, steel, or other suitable metal, as may be preferred, said sections and the head-plates being respectively provided with flanges *a b* and interiorly coated with enamel C. This enamel is for the purpose of insulating the metal composing the boiler from the acids employed or generated in the process of reducing stock to paper-pulp, otherwise these acids would corrode and destroy said boiler, and at the same time the resultant chemical action would stain and ruin the stock. The enamel is applied to the sections A and head-plates B in a liquid state, and these parts when dried are placed in a muffle and heated to a degree sufficient to fuse said enamel but not to melt the metal of which said parts are composed. The sections A and head-plates B of the boiler, having been enameled as above described, are united by suitable bolts, *a'*, passed through their flanged portions *a b*, lead gaskets D being introduced between the opposing flanges in order to form a tight and acid-resisting joint. The enamel, when properly prepared, has the same quality of resisting the action of acid as is possessed by fine glass, and will expand and contract with the metal composing the boiler as heat is applied without cracking or puckering. Not only are the interior surfaces of the boiler-sections and head-plates coated with the enamel, but this coating is extended so far around on the flanges of the respective parts as to permit the lead gaskets to be placed between the enameled surfaces, as shown at *d*.

Heat may be applied to the boiler in various ways; but in the present instance we have shown a continuous bent pipe, E, located in said boiler and suitably connected to exterior feed and exhaust pipes, F G, the latter having stop-cocks *e f*. In this construction the pipe E is provided at its terminations with extensions or feet *g* and is exteriorly coated with enamel H after the manner above described. The central portions of the pipe extensions or feet *g* rest upon the coated surface of the lower head-plate, and the outer portions of said extensions or feet are in the form of a flange, and between these and the head-plate a lead gasket, I, is inserted to make a tight and acid-proof joint. That portion of the cover K that fits the man-hole in the upper head-plate has its interior surface coated with enamel, and between the flange *h* of said cover and head-plate is interposed a lead gasket, L,

this coating and gasket being for the purpose above described. Not only is this coating or lining of acid-resisting enamel applicable to the boiler or digester apparatus for reducing paper-stock, but it is equally applicable to the tank and connections thereof for holding and storing the acids used in such operation.

Although we have shown the heating-pipe E as being made in a single piece bent at the top, it will be understood that in certain cases we propose to make the pipe in sections with flanges united similarly to the boiler-flanges, with interposed lead gaskets, it being necessary of course to use non-corrodible bolts or to have their projecting surfaces enameled.

When more convenient, the digester may be provided with an exterior heating-jacket in lieu of (or in addition to) the inner heating-pipes, E.

In the process of applying the enamel to the metallic parts to be coated therewith the latter are first subjected to an acid bath to remove rust, scale, &c., and then the said parts are scoured with sand and then rinsed off, and next put into a bath of hot lime water, and then taken out and dried. The parts are then sponged off and the first coating of the enamel applied. The parts are then dried on top of a large range made therefor, so as to prevent oxidation, after which the parts are placed in a hot muffle and the first coating of enamel fused. After this fusion takes place the parts are removed from the muffle and allowed to cool, after which the second coating of enamel is applied, the parts again dried on the range, and then again put into the muffle, and the said second coating of enamel is similarly fused.

We do not confine ourselves to any especial enamel, but may use any vitreous enamel possessing the qualities of elasticity and resistance to acid.

A suitable composition for the above-named first coating consists of, say, five parts of lime, ten parts of fluor-spar, five parts of sal-soda, fifty parts of white sand or flint, fifty parts of litharge, and twenty parts of boracic acid, all mixed and fused together, after which it is ground and mixed with water into a consistency like very thin paint. For the second coating the ingredients above described may be used, with the addition of ten parts of bone-ash, five parts of talc, and four parts of kryolite, similarly mixed together and melted into a liquid glass by strong heat, run into water, and then taken out and ground very fine, and then mixed with water and applied as before.

In this present case we do not claim either the process or compositions above described, but reserve them as the subject-matter of future applications for Letters Patent.

We are aware that casks have been lined with porcelain and that it is not new, broadly, to enamel parts of iron vessels, and such we do not claim; but,

Having thus fully described our invention, what we claim as new, and desire to secure by Letters Patent, is—

1. In the manufacture of paper from wood or other stock by an acid or acid-sulphite process, a boiler or digester composed of enamel-lined sections suitably united to form tight joints impervious to acids, substantially as and for the purpose set forth.

2. In the manufacture of paper from wood or other stock by an acid or acid-sulphite process, a sectional boiler or digester having its metallic portions insulated by a coating of elastic and acid-resistant enamel, and its joints rendered acid-proof by the interposition of lead gaskets, substantially as and for the purpose specified.

3. In the manufacture of paper from wood or other stock by an acid or acid-sulphite process, a boiler composed of suitable metallic sections and head-plates provided with flanges and internally lined with an acid-proof enamel, in combination with lead gaskets designed to be interposed between the opposing flanges of the respective parts, substantially as and for the purpose set forth.

4. In the manufacture of paper from wood or other stock by an acid or acid-sulphite process, a boiler composed of suitable metallic sections and head-plates provided with flanges and internally lined with a coating of acid-proof enamel, in combination with lead gaskets interposed between the opposing flanges of the respective parts, and an internal heating-pipe having an exterior coating of enamel and acid-proof connections with said boiler, substantially as and for the purpose set forth.

In testimony that we claim the foregoing we have hereunto set our hands, at Kaukauna, in the county of Outagamie and State of Wisconsin, in the presence of two witnesses.

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