

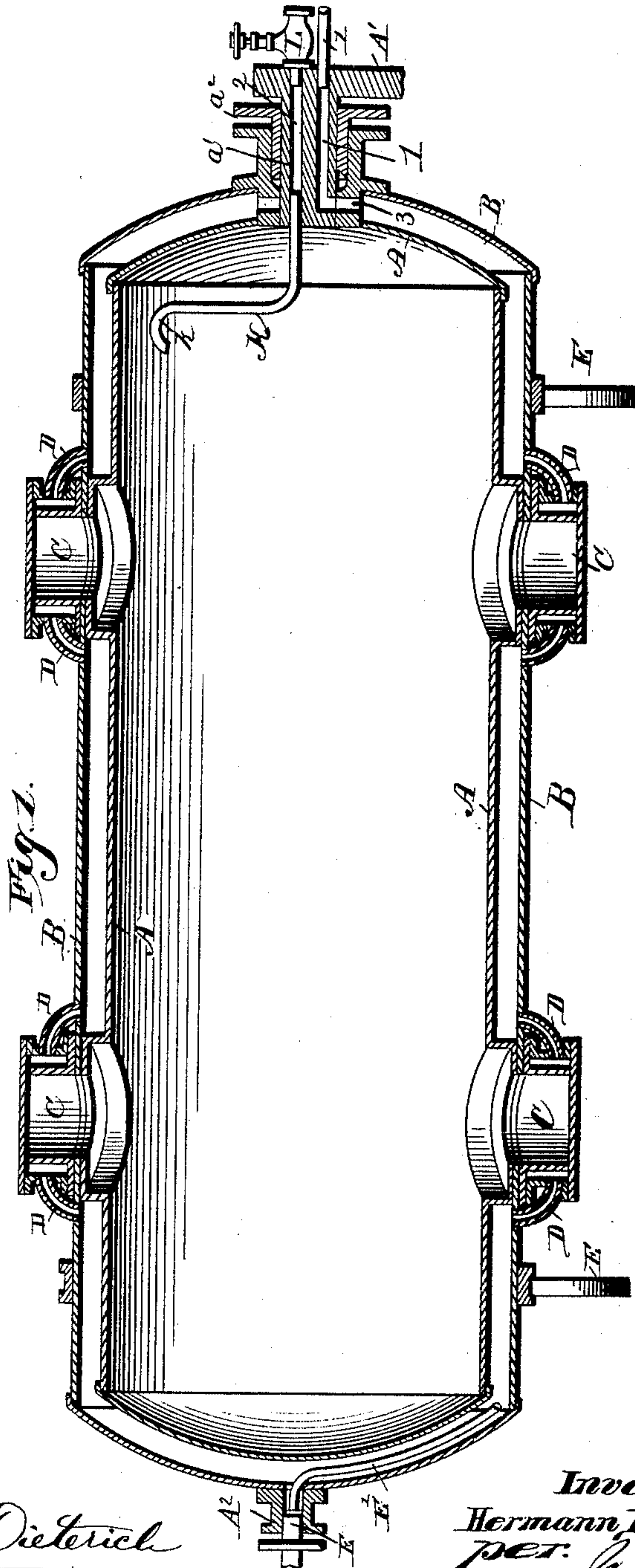
(No Model.)

2 Sheets—Sheet 1.

H. BRÜNGGER.
DIGESTER.

No. 483,828.

Patented Oct. 4, 1892.



Witnesses:

Henry G. Dieterich
Thomson Cross

Inventor.

Hermann Brünger,
per. *[Signature]*
Attorney.

(No Model.)

2 Sheets—Sheet 2.

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Fig. 2.

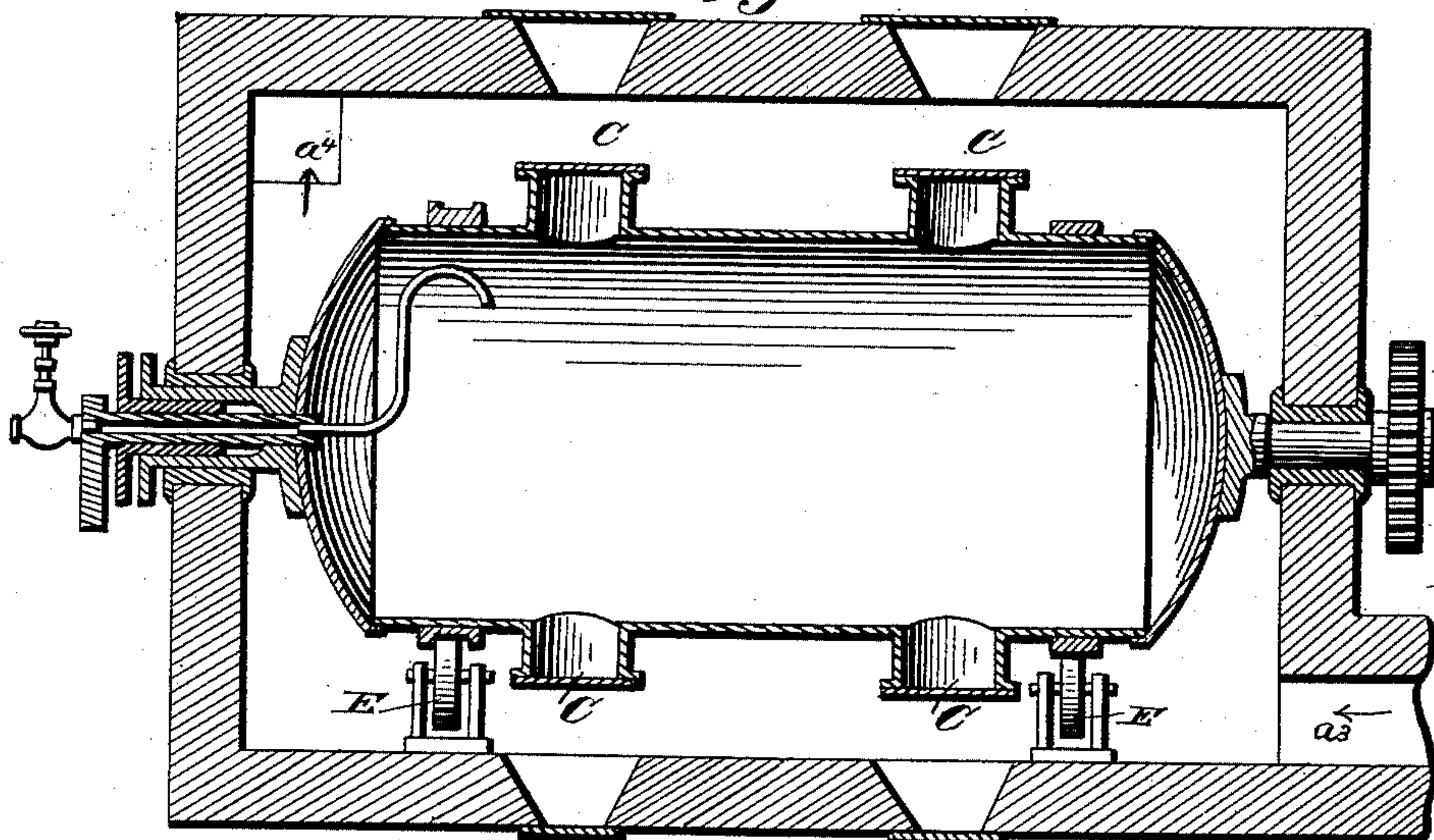
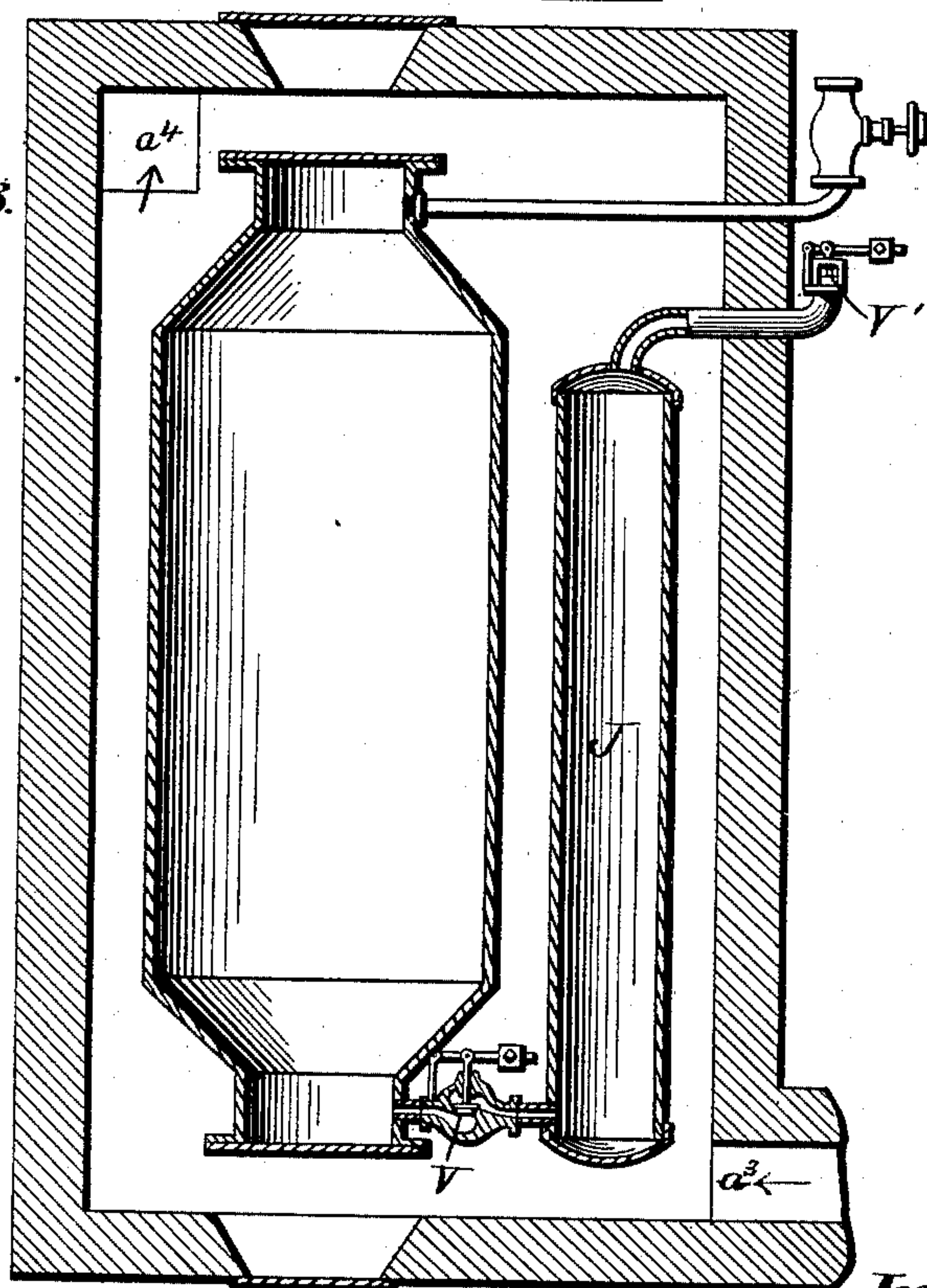


Fig. 3.



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UNITED STATES PATENT OFFICE.

HERMANN BRÜNGGER, OF CUNNERSDORF, ASSIGNOR TO FERDINAND SALOMON, OF BERLIN, GERMANY.

DIGESTER.

SPECIFICATION forming part of Letters Patent No. 488,828, dated October 4, 1892.

Application filed April 26, 1890. Serial No. 349,623. (No model.) Patented in England September 17, 1888, No. 13,396, and December 10, 1888, No. 18,003; in Norway September 17, 1888, No. 1,087; in France October 19, 1888, No. 193,637; in Belgium November 5, 1888, No. 83,841, and December 1, 1888, No. 84,140; in Germany November 7, 1888, No. 50,789, and in Switzerland February 5, 1889, No. 398.

To all whom it may concern:

Be it known that I, HERMANN BRÜNGGER, a citizen of Switzerland, residing at Cunnnersdorf, in the district of Liegnitz, German Empire, have invented a certain new and useful Improvement in Digesters, (for which I have obtained a patent in Switzerland, dated February 5, 1889, No. 398, and for which I have obtained patents in conjunction with Ferdinand Salomon, LL. D. and manufacturer, a subject of the King of Prussia, residing at 59 Mohrenstrasse, Berlin, who is interested in said invention with me, in the following countries, to wit: Great Britain, September 17, 1888, No. 13,396, and December 10, 1888, No. 18,003; Norway, September 17, 1888, No. 1,087; France, October 19, 1888, No. 193,637; Germany, November 7, 1888, No. 50,789, and in Belgium, November 5, 1888, No. 83,841, and December 1, 1888, No. 84,140;) and I do hereby declare that the following is 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, reference being had to the accompanying drawings, and to letters or figures of reference marked thereon, which form a part of this specification.

Figure 1 is a longitudinal axial section of a revoluble jacketed boiler. Fig. 2 is a like view of a boiler inclosed within a heating-chamber, and Fig. 3 is a vertical axial section of a stationary boiler inclosed within a heating-chamber.

The invention has for its object to provide digesters or boilers with a lining that is insoluble in the fluid with which such digesters or boilers are or may be charged—as, for instance, in that class of digesters or boilers employed in the disintegration of fibrous materials by the sulphite process or other processes in which solutions are employed that have a deleterious or corrosive effect upon the metallic surfaces of the digester or boiler brought in contact therewith.

In my application for Letters Patent of the United States of even date with this, Serial

No. 349,622, I have described a process or method of providing a lining insoluble in sulphite solutions by means of the solution itself; but such lining may be formed in boilers or digesters used in conjunction with other fluids or solutions which may have a deleterious action upon the metallic surfaces thereof, such linings being likewise formed by means of a solution of a salt or salts that when precipitated or separated from their solution will be insoluble in the fluid or solution used in the boiler, and thereby protect such boiler against the corrosive action of such fluid or solution, as described in another application of even date with this, Serial No. 349,621.

To these ends the invention consists in boilers or digesters provided with a lining, substantially as hereinafter fully described, and as set forth in the claims.

In carrying out my invention various salts or combinations of salts may be employed, from the solution of which the boiler-lining may be produced by a decomposition or partial decomposition of the solution or by separation, in conjunction with heat, to form a hard incrustation. Thus, for instance, linings of a more or less strong nature may be produced from solutions of sulphate of calcium, barium sulphite, or sulphite of strontium, and similarly of other salts soluble in water that will separate or precipitate from their solutions by decomposition or partial decomposition of the latter or simply by separation, so that boilers or digesters may be provided with a lining that may be insoluble in the solution of the salt from which such lining has been derived, or insoluble in some other fluid or chemical solution that would act corrosively upon bare boiler-walls.

I am not able at the present time to positively determine the reactions that take place or may take place under the influence of heat upon any particular salt or combination of salts; but from experiments made with some of the salts of the alkaline earths I may state that in the case of a bisulphite,

as of a bisulphite of calcium, the salt is converted into a monosulphite, which by the further action of the heat is decomposed into calcic sulphate and sulphide with evolution of water, sulphurous oxide, and sulphur, which calcic sulphate and sulphide, with some of the monosulphite that remains, are insoluble in the bisulphite solution. Such linings may also be produced from a barium or strontium sulphite; in fact, from any salt or salts that are more or less soluble in water and which can be separated therefrom by the agency of heat to form a lining to protect the boiler or digester provided there- with against the deleterious action of a fluid. Such linings may also be obtained from a calcium-sulphate solution, such sulphate being sufficiently soluble in water, especially when obtained by neutralizing a weak solution of sulphuric acid with carbonate of lime.

In the use of a calcium sulphite or bisulphite or of a barium or strontium bisulphite or of calcium sulphate the lining obtained is enamel-like, hard, compact, and adheres to the boiler-walls with exceeding tenacity, and should such lining crack or fissure from any cause it can be readily repaired by deposition from a solution of a salt or salts from which such lining has originally been produced.

The degree of saturation of the solution is, so far as I have been able to determine, immaterial, as the separation of the salt from its solution will take place under the influence of heat whether the solution is introduced into a preheated boiler or digester or whether the walls of the latter in contact with the solution are heated after the introduction of the solution.

In Figure 1 have shown a convenient means for heating the solution in the digester or boiler with a view to its decomposition or partial decomposition to separate the salt therefrom and produce or form a crust or lining within the boiler. In this construction the boiler A is provided with an inclosing jacket B, such boiler being revoluble on journals or trunnions A' A^2 , respectively, said boiler revolving on rolling bearings E. As shown, the journal or trunnion A' has an axial stem a' , so constructed as to leave an annular space around it for a stuffing-box gland a^2 , said axial stem having two passages 1 and 2. The passage 1 is connected with a suitable steam-generator or superheater or steam-reservoir and communicates at its inner end with an annular passage 3, that opens into the boiler-jacket B. To the outer end of the passage 2 is connected a valve L and to the inner end of such passage a pipe K, that extends into proximity to the inner wall of the boiler and terminates in a bent portion k . This pipe and the valved passage perform the function of a valved vent whereby the vapors or gases accumulating within the boiler during the process of

decomposition of the solution may be allowed to escape into the atmosphere.

D D indicate tubular connections that connect the jacket of the boiler with the jacket of the manholes C, and E' is a pipe that is connected with a pipe E, secured in the bore of the tubular journal A^2 , through which the steam admitted to the jacket B is allowed to escape.

Instead of providing the boiler with a heating-jacket such boiler may be contained in a heating-chamber constructed of masonry, as shown in Figs. 2 and 3, and, if desired, a reservoir J for the salt solution may be arranged within the heating-chamber and connected with the boiler, a suitable check-valve V being interposed in such connection, and a pressure-regulating valve V' may be interposed in the supply-pipe of the reservoir J, as shown in Fig. 3, for obvious purposes.

In either of the described arrangements or construction of boiler the jacket or heating-chamber serves, also, to heat the fluid in the boiler for whatever purpose such fluid may be used—as, for instance, the sulphite solution in the process of disintegrating fibrous materials—and in the arrangement shown in Fig. 3 either the solution of the salts for forming the incrustated lining in the boiler or the fluid or solution subsequently used in the boiler can be kept at a proper temperature, so that a saving of fuel is effected.

In Figs. 2 and 3 the arrows a^3 and a^4 indicate, respectively, the admission and escape of the heating medium, such as heated air or air and other gases.

When the boiler is revoluble, as shown in Figs. 1 and 2, it is not necessary to completely fill it with the solution of a salt in order to form a protective lining for such boiler by the decomposition or partial decomposition of the solution, since the entire interior surface of the boiler will come in contact with the solution during the rotation of such boiler. When, however, the boiler is a stationary one, whether horizontal or vertical, then it becomes necessary to completely fill such boiler with the salt solution, as will be readily understood.

The degree to which the boiler-walls in contact with the solution are heated will vary according to the nature of the solution. In the case of a solution of a salt of the alkaline earths the temperature may range from 100° centigrade upward.

It is obvious that by means of the described process the usual expensive linings for the digesters or boilers may be entirely or partially dispensed with, which has heretofore not been the case.

The advantages of boilers or digesters lined as described over the usual lining of such boilers with lead or other material will be readily understood.

Having described my invention, what I claim, and desire to secure by Letters Patent, is—

1. A digester or boiler having its interior surface provided with a protective coating or lining of a salt or salts precipitated upon said surface and insoluble in the solution used in the boiler, as set forth.

2. As an improvement in apparatus for manufacturing cellulose by the sulphite process, a boiler or digester having its interior surface provided with a protective coating or lining of a salt or salts precipitated upon said surface and insoluble in sulphite solutions, as set forth.

3. As an improvement in apparatus for manufacturing cellulose by the sulphite process, a boiler or digester having its interior surface provided with a protective coating or lining of a salt or salts of the alkaline earths precipitated upon said surface and insoluble in sulphite solutions, as set forth.

4. As an improvement in apparatus for manufacturing cellulose by the sulphite process, a boiler or digester having its interior

surface provided with a protective coating or lining of a sulphur salt or sulphur salts of the alkaline earths precipitated upon said surface and insoluble in sulphite solutions, as set forth.

5. As an improvement in apparatus for manufacturing cellulose by the sulphite process, a boiler or digester having its interior surface provided with a protective coating or lining of a sulphur salt or sulphur salts of calcium precipitated upon said surface and insoluble in sulphite solutions, as set forth.

6. A digester or boiler having its interior surface provided with a protective coating or lining consisting in part of a sulphite and insoluble in sulphite solutions, as set forth.

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

HERMANN BRÜNGGER.

Witnesses:

J. J. KENNEDY,
THOS. H. SAVERY.