

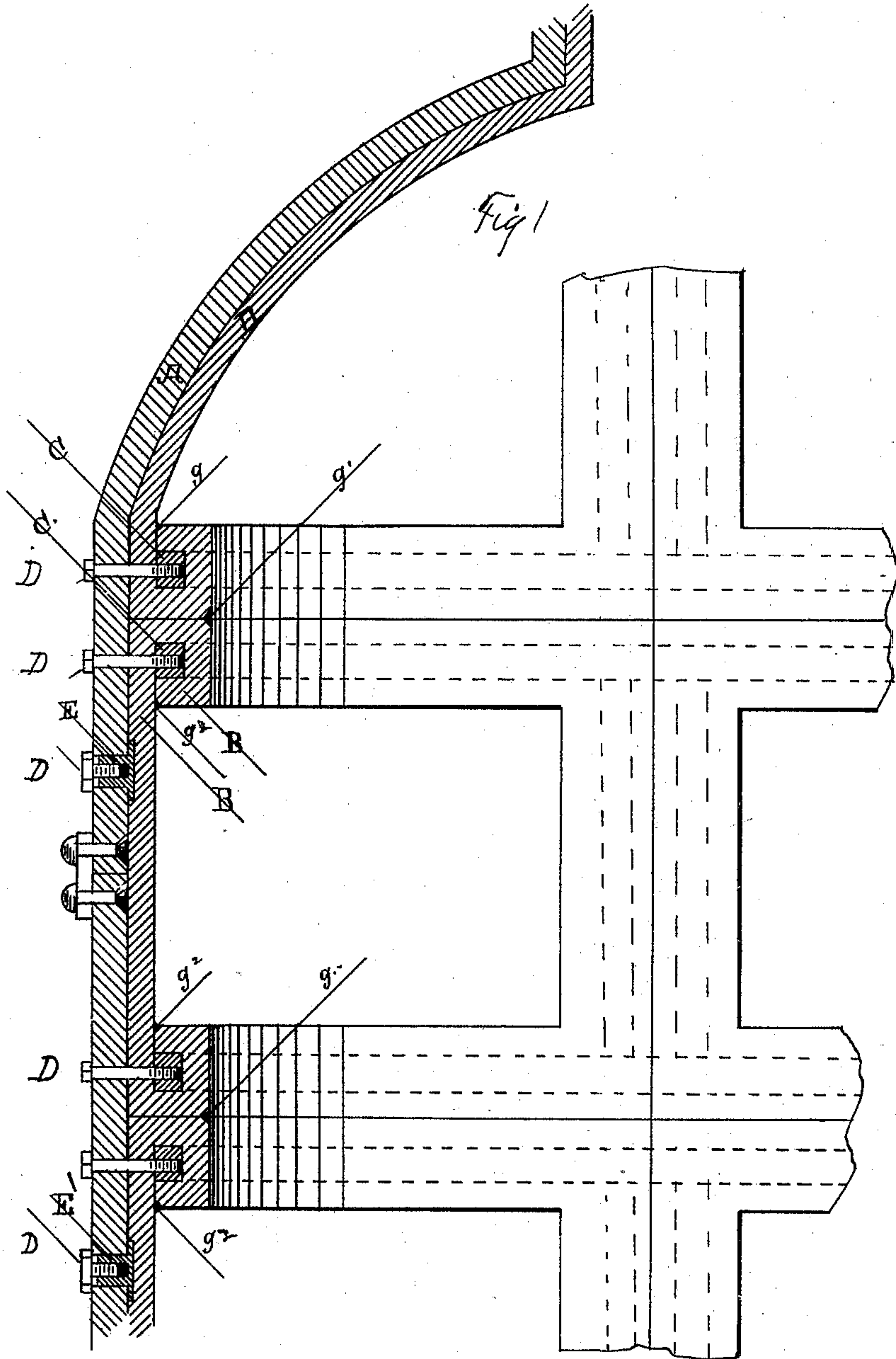
(No Model.)

3 Sheets—Sheet 1.

S. R. WAGG.
PAPER PULP BOILER.

No. 446,041.

Patented Feb. 10, 1891.



Witnesses.

H. G. Freeman.

Geo. H. Peerenboom.

Inventor
Solomon R. Wagg.

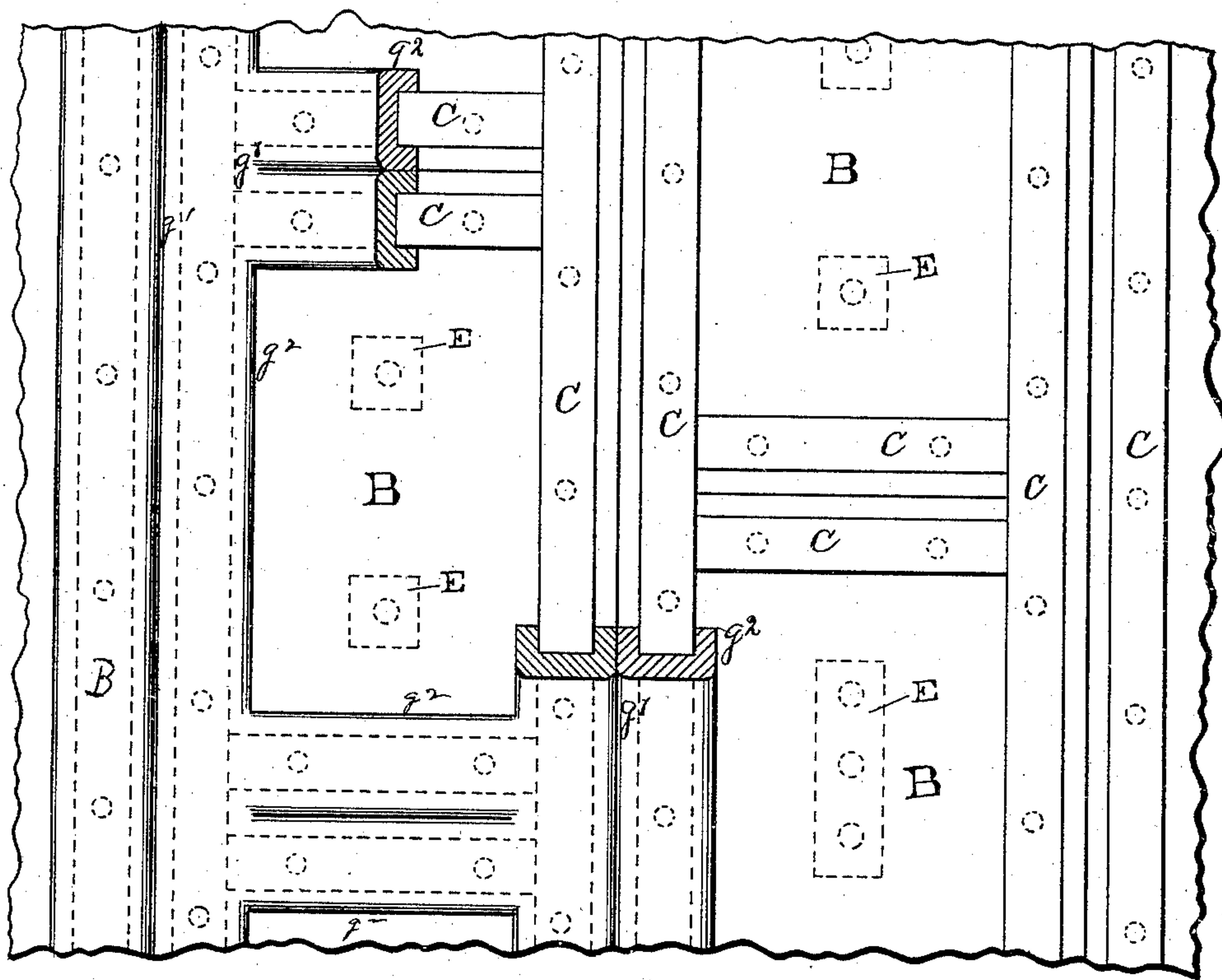
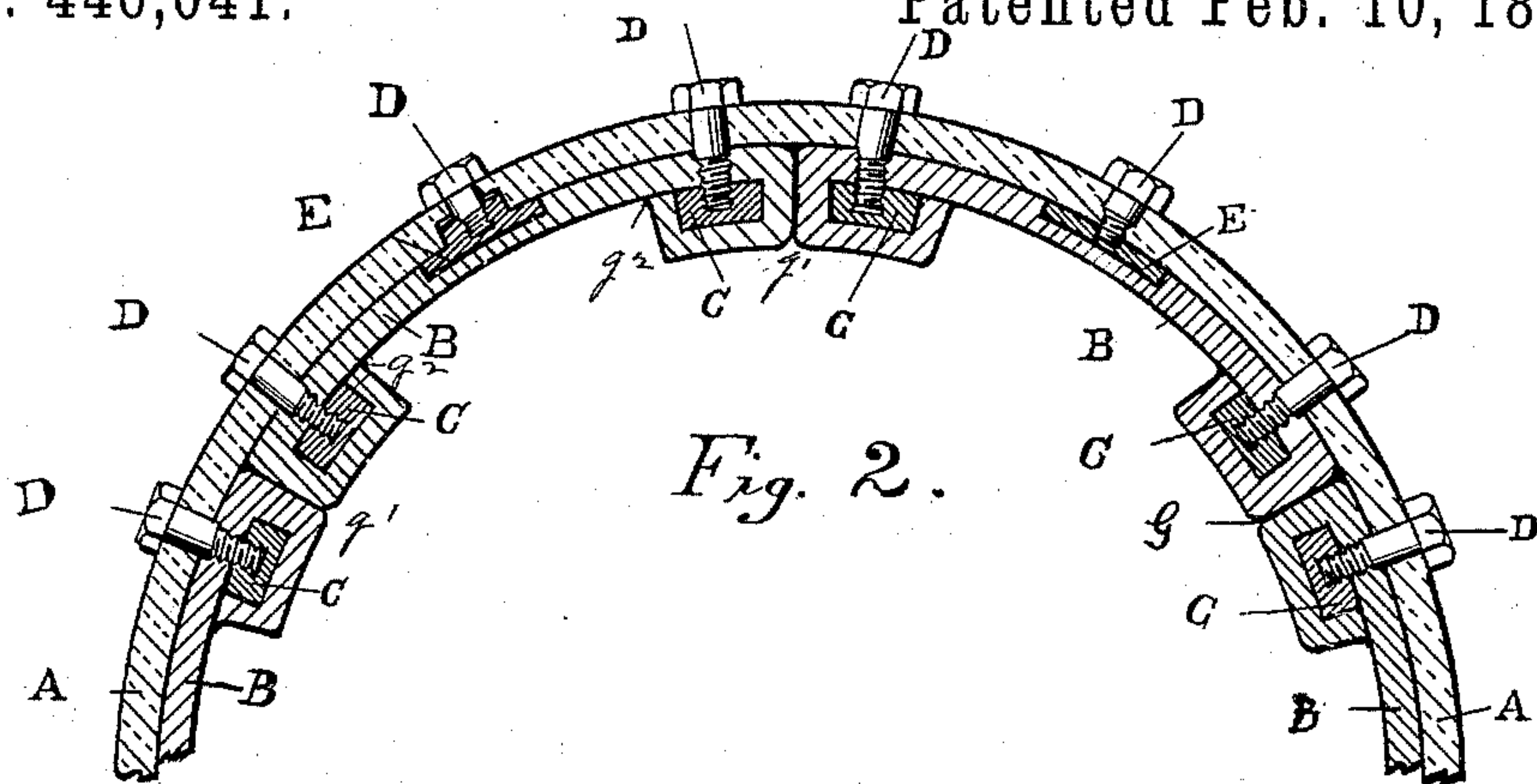
(No Model.)

3 Sheets—Sheet 2.

S. R. WAGG.
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Witnesses.
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Fig. 3.

Inventor.

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(No Model.)

3 Sheets—Sheet 3.

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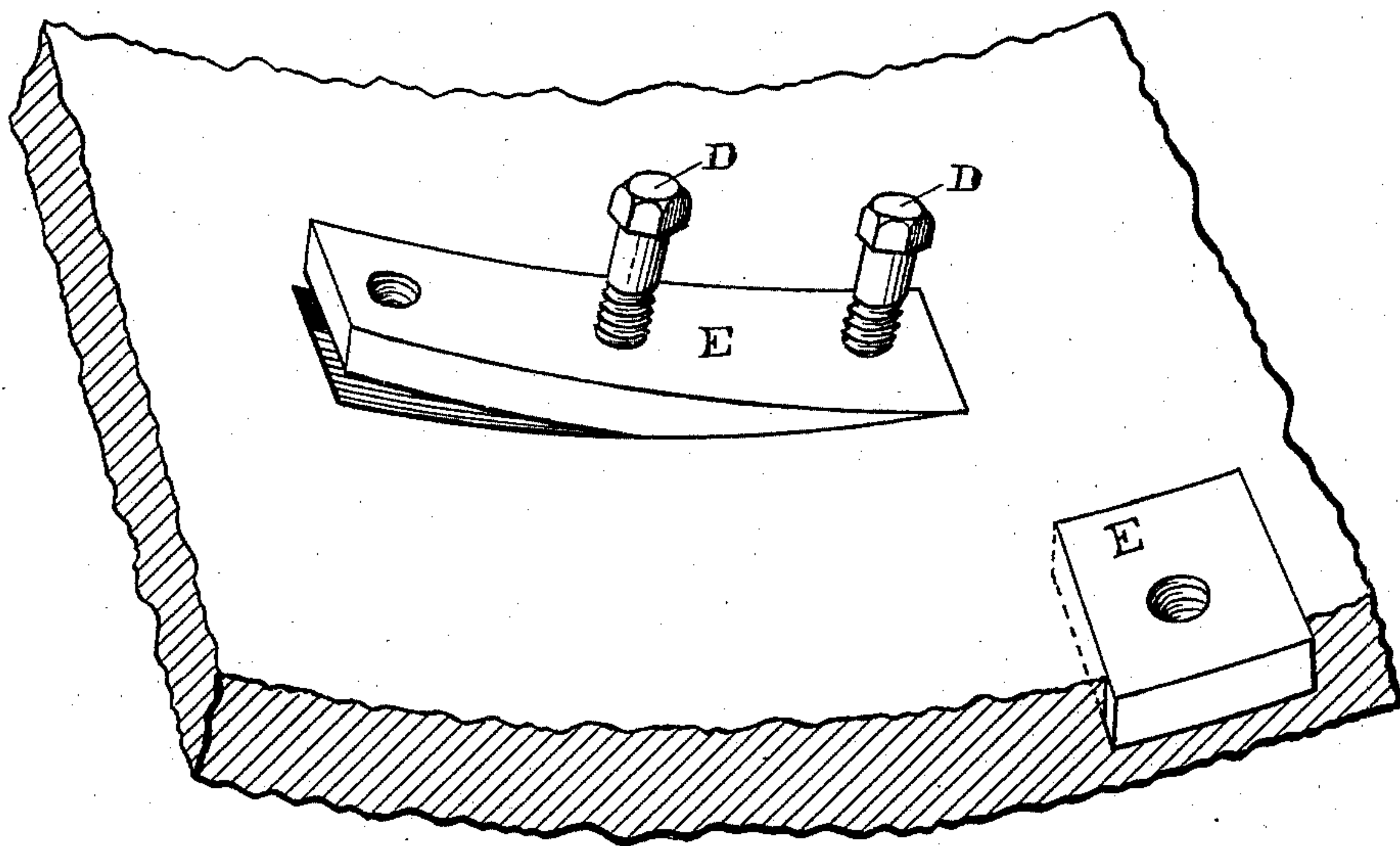


Fig. 4.

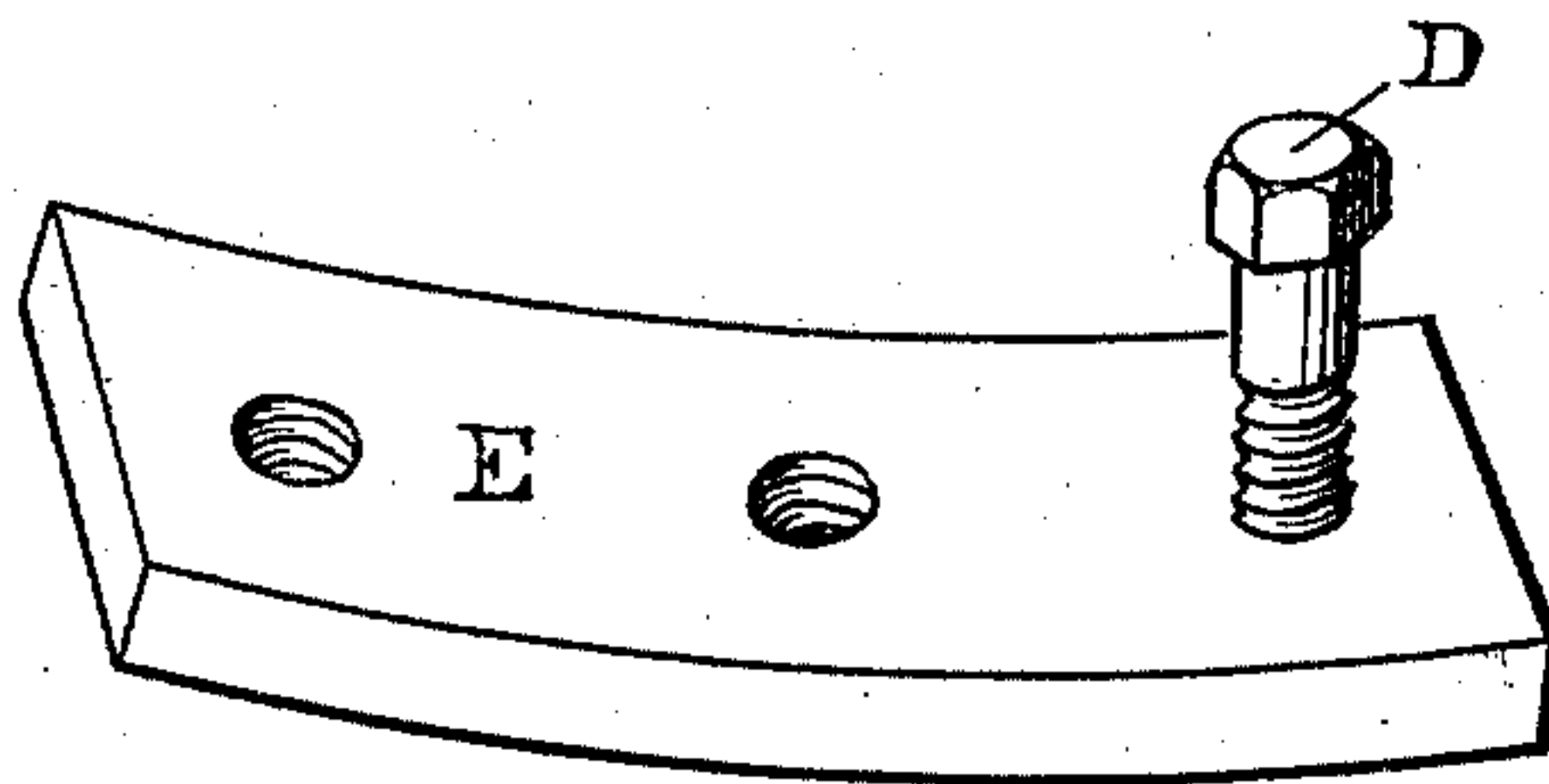


Fig. 5.

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A. H. H. H. H.
N. J. Ross.

Inventor.
Solomon R. Wagg

UNITED STATES PATENT OFFICE.

SOLOMON R. WAGG, OF APPLETON, WISCONSIN.

PAPER-PULP BOILER.

SPECIFICATION forming part of Letters Patent No. 446,041, dated February 10, 1891.

Application filed July 18, 1889. Serial No. 317,940. (No model.)

To all whom it may concern:

Be it known that I, SOLOMON R. WAGG, of Appleton, county of Outagamie, State of Wisconsin, have invented certain new and useful
5 Improvements in Paper-Pulp Boilers, of which the following is a specification.

The object of the invention is to provide a lead or equivalent lining for metallic boilers which will not be distorted by expansion and
10 contraction to such an extent as to permit the acid or alkaline contents of the boiler to come in contact with the metallic plates of the shell.

In the drawings, Figure 1 is a vertical section of one side of a boiler-shell in common
15 use, showing the means for fastening the lining to the boiler-shell. Fig. 2 is a horizontal section of a similar construction. Fig. 3 is a face view or elevation of part of the inside of the boiler or digester, parts being broken
20 away. Fig. 4 is a perspective view of a portion of the lead lining-sheet, the side next the boiler-shell being shown, and the hard-metal retaining-plate shown partly detached. Fig.
25 5 is a perspective view of a hard-metal retaining-plate and bolt.

It is well known that lead and iron have an unequal degree of expansion when heated, the lead expanding in much greater degree. To
30 avoid the evil effects of this unequal expansion, well known in the paper-maker's art, I divide the lead lining into sections, which sections are secured to the shell in such manner that the expansion is localized, and while certain portions may spring away from the shell the
35 fastening devices shall always retain the lining in its unbroken relation to the shell.

A indicates the shell of the boiler or digester, the same being of iron or other hard metal usual in this art.

40 B denotes one of the lead lining-plates. The plates B are usually rectangular; but this is not essential, and the form depends on the shape of the digester to be lined. One face of the plate B rests against the inner surface
45 of the shell of the boiler. The edges of the plate B are turned inward and over a hard-metal rod or bar C, as in Figs. 1 and 2.

Assuming the plates B to be rectangular, as shown in Figs. 1 and 3, these plates will be
50 placed side by side with their turned-over edges abutting, as at g' , and the whole interior surface of the boiler will be covered with

such plates. The joints g' may then be closed by solder or melting or burning. The joints
55 g^2 on the lines where the turned-over edges of the lead plates rest against the body of the lining-plates may also be closed by solder.

The holding bars or strips C are held in place by bolts D, &c., entering the shell from the outside, passing through the lining, and
60 having screw engagement with the retaining bands or strips C.

The strips C may be continuous, extending entirely around the boiler, or they may be of
65 such length as to extend along the edge of one or more lining-sections.

The lead lining-plates B are further secured to the boiler-plates by preference by inserted hard-metal strips or re-enforce pieces E' , which
70 pieces are let into that face of the lining-sheets which comes next the boiler-shell or are soldered thereto. Bolts D, passing through the outer shell of the boiler, enter these plates and serve to secure the same and the lead-
75 lining-plates to the boiler-shell.

The hard-metal re-enforce pieces E may have projecting bosses which pass nearly or quite through holes in the boiler-shell, as in
80 Fig. 1, said bosses forming screw-threaded sockets to receive the screw-bolts f , which extend in from outside the boiler-shells.

The re-enforce pieces E hold the lining-plates locally to the shell, and the strips C hold the edges of the plates. The elasticity
85 of the lining will permit such inward bulging of the plates between the fastenings as is caused by the different ratios of expansion; but when the joints are properly closed (by soldering or burning) such joints will not be
90 opened by such expansion, and the interior of the shell will be durably covered by the soft-metal lining.

The plates E may be of such size and shape as is necessary to give sufficient support to the
95 soft-metal lining. If secured near the edges of the plates B, these plates will form a good means of securing the lining to the shell. This strip E can be advantageously used in various places in the boiler.

What I claim is—

1. In combination with the hard-metal shell of a boiler, a series of soft-metal lining-plates and hard-metal bars inside the lining-plates
100 parallel with the edges thereof, said bars be-

ing covered by the inturned edges of the lining-plates, as described, and securing-bolts passing through the shell into said bars, substantially as described.

5 2. The combination, with a hard-metal boiler-shell, of a series of soft-metal lining-plates inside said shell, the edges of said plates being turned over and soldered, as described, sustaining-bars inside the soft-metal
10 linings, but covered by the inturned edges of the plates thereof, and securing-bolts entering these bars from outside the shell.

3. The combination, with the hard-metal shell of a boiler, of a soft-metal lining-plate,
15 a hard-metal re-enforce sunk into the lining-plate flush with the lining at the margin, but having a projecting boss in the direction of

the shell, and a fastening-bolt passing through the shell and engaging a screw-thread in said boss, substantially as described. 20

4. In combination with the shell of a boiler, a soft-metal lining-sheet held at the edges by hard-metal strips covered by the inturned edges of the sheets, as described, hard-metal re-enforce plates sunk into the soft-metal
25 sheets, as described, and fastening-bolts entering the hard-metal strips and re-enforce plates from outside the shell of the boiler, substantially as described.

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Witnesses:

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GEO. H. PEERENBOOM.