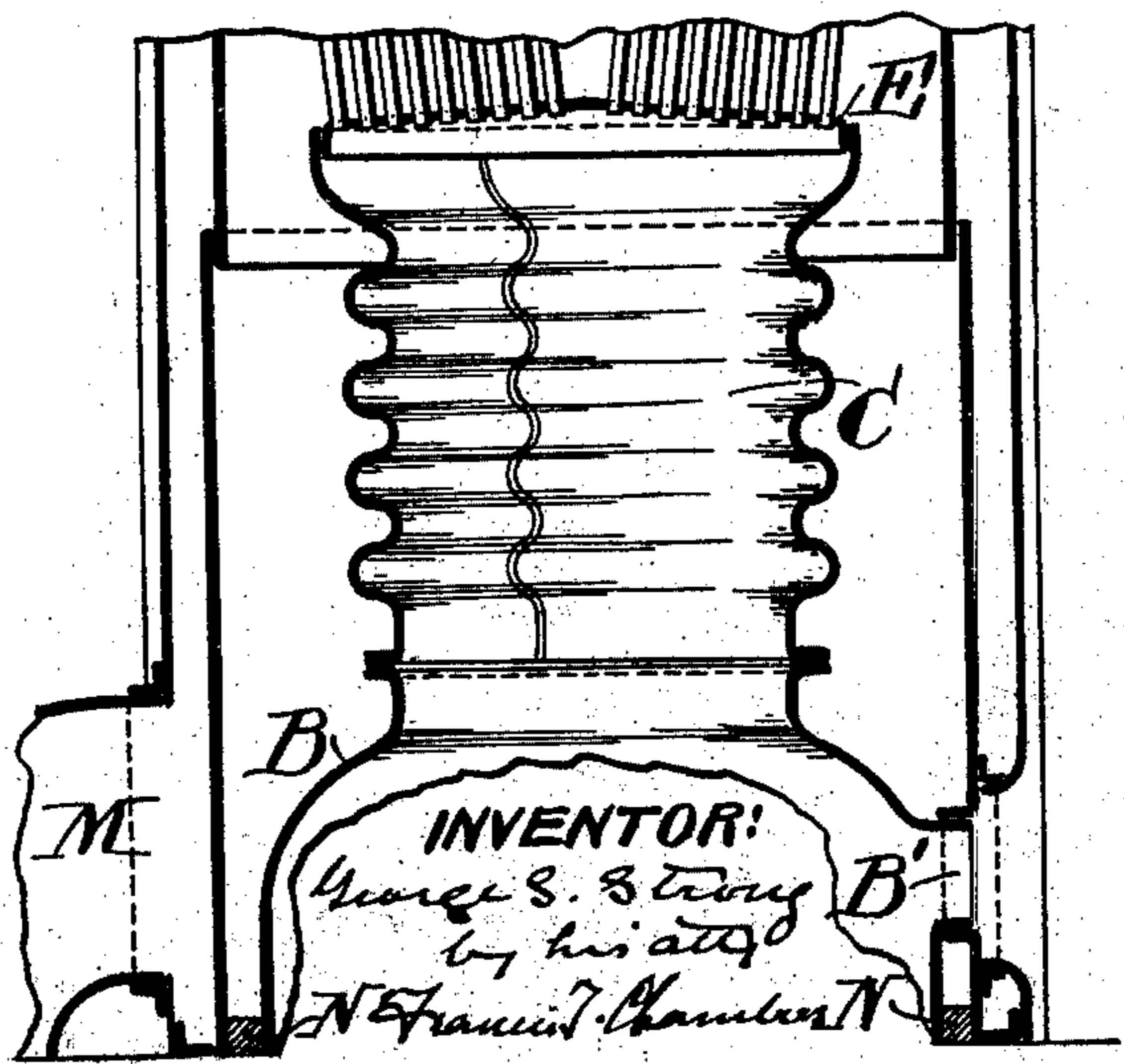
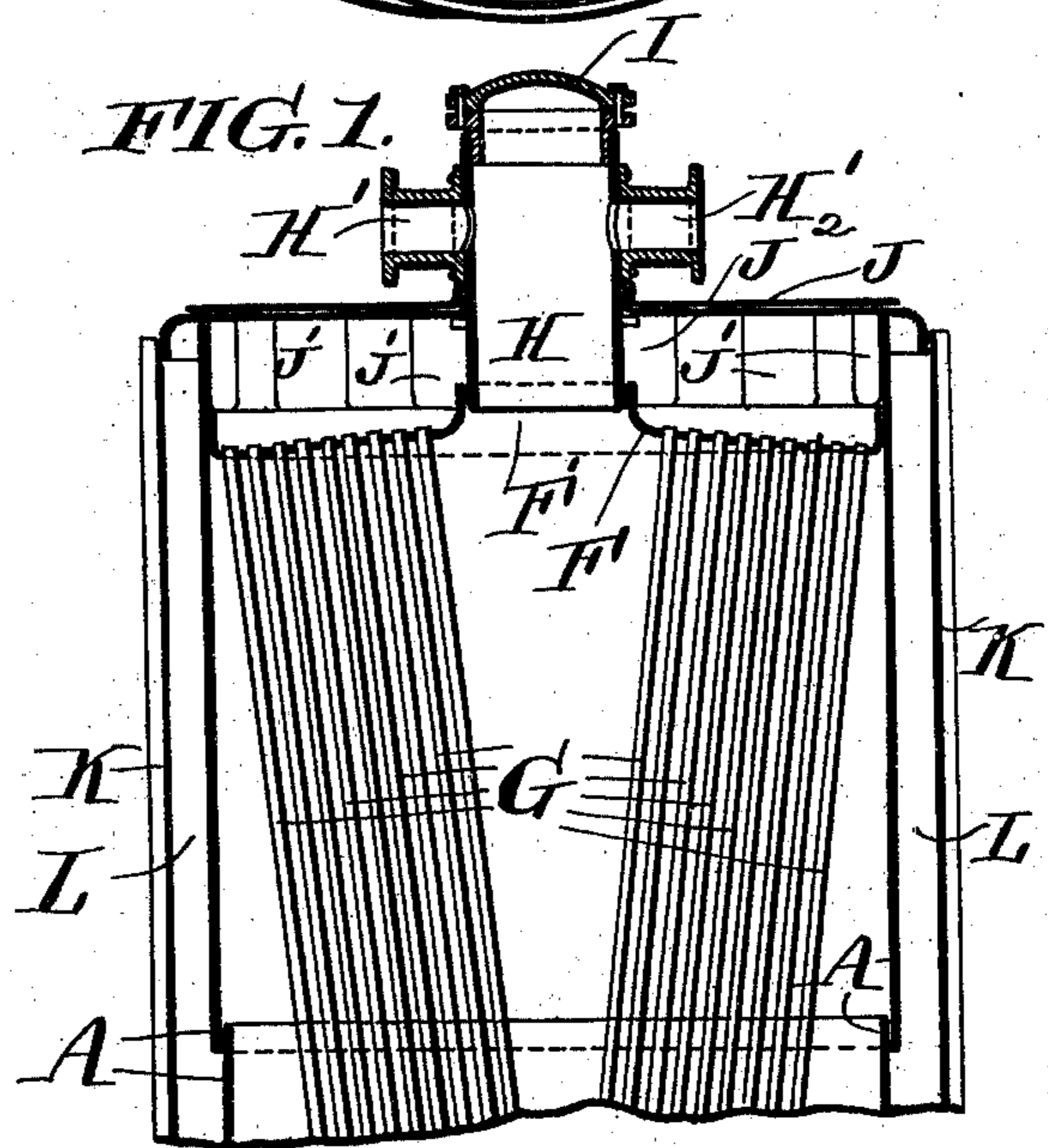
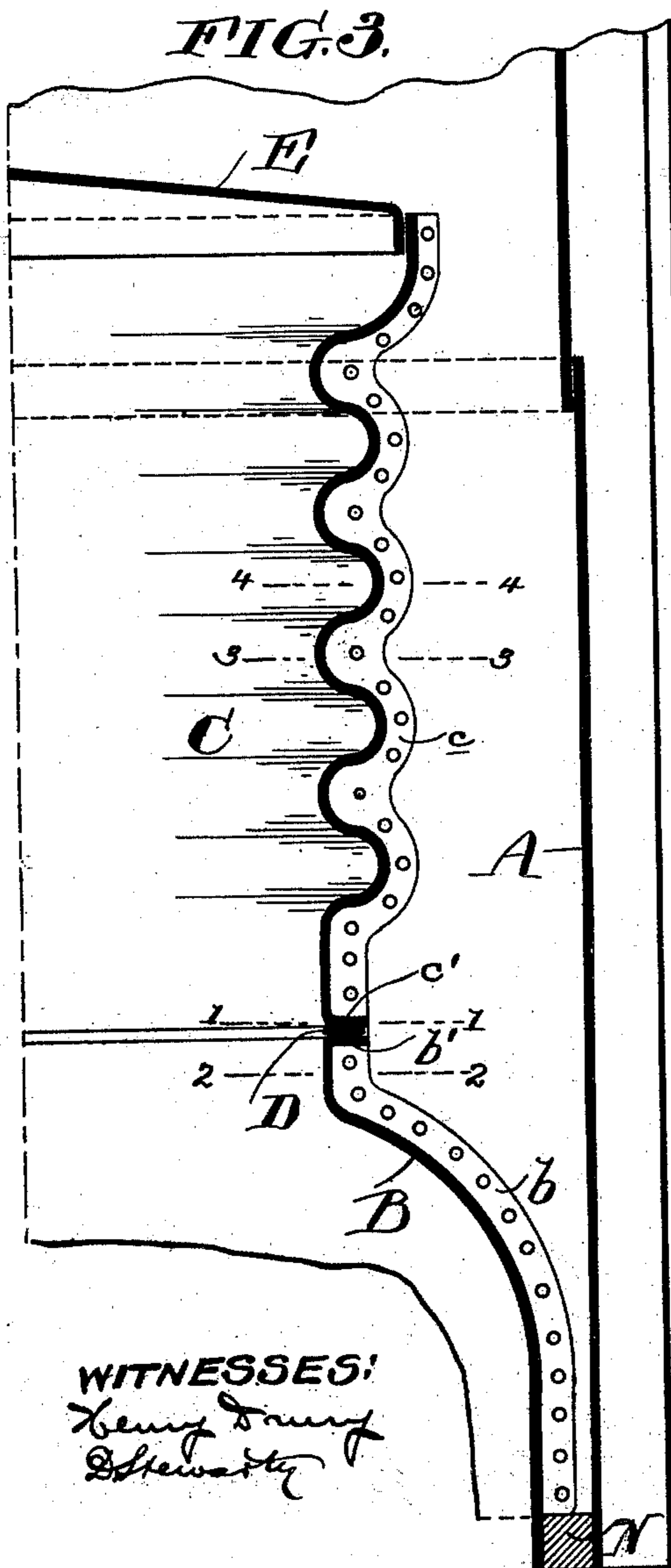
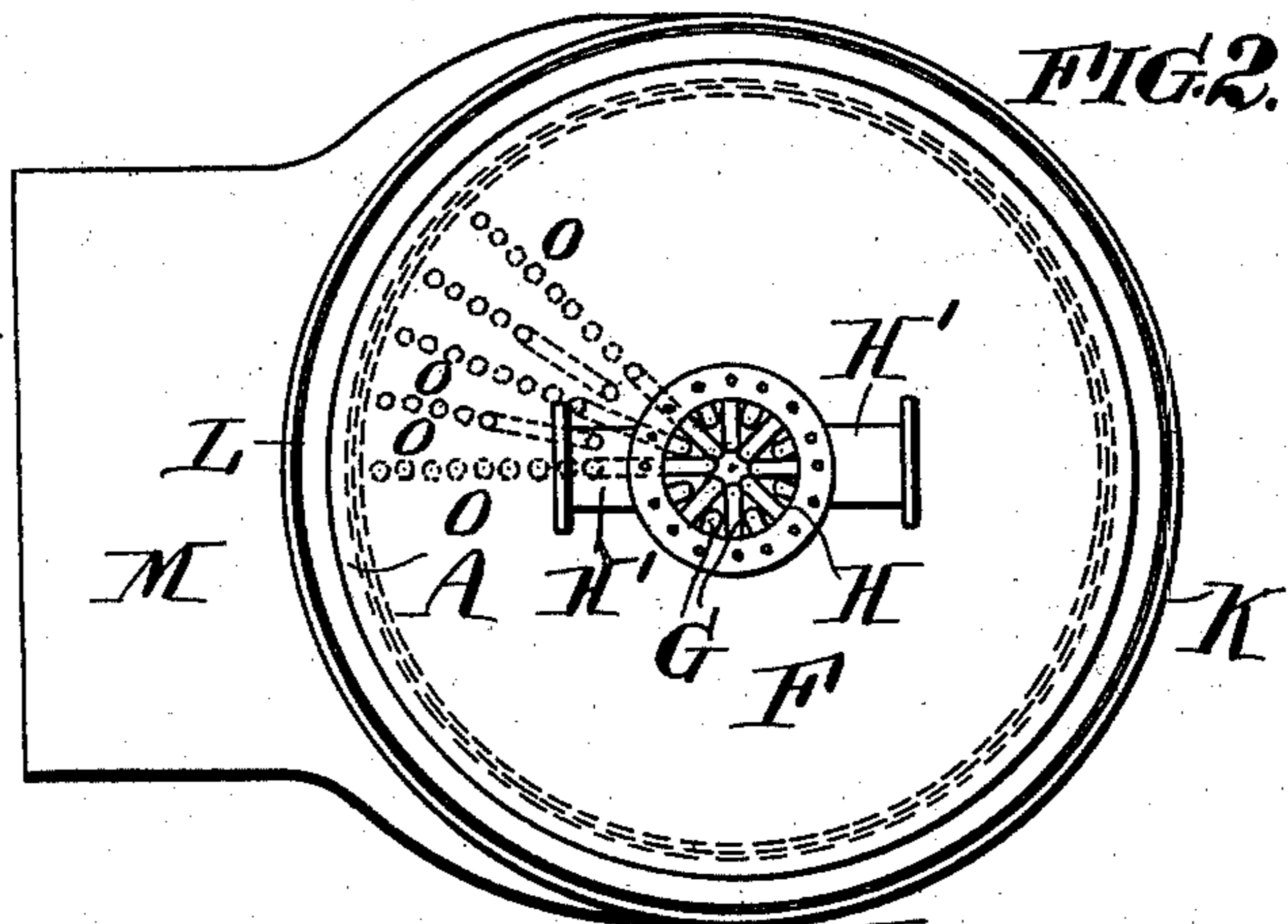
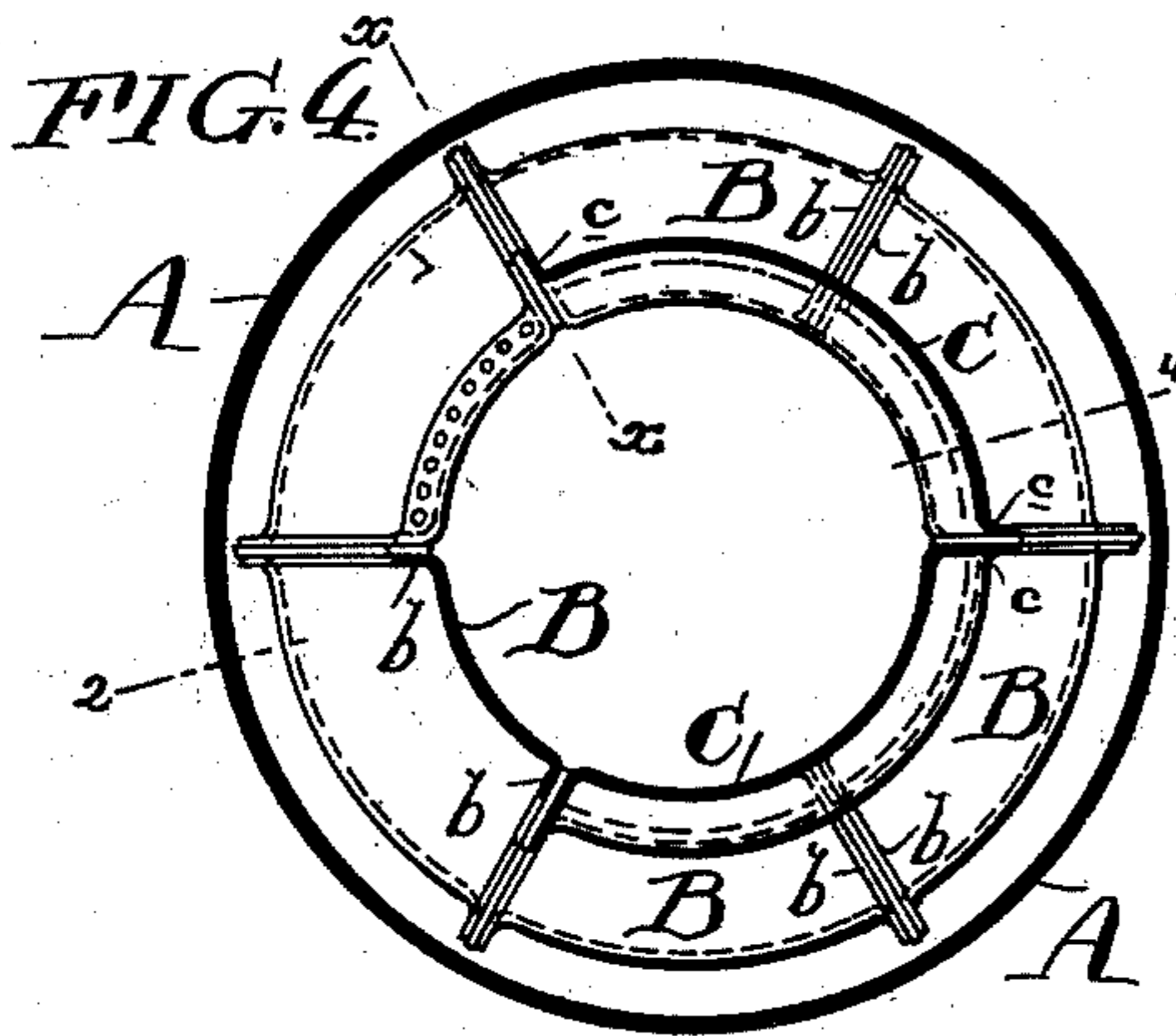


(No Model.)

G. S. STRONG.  
BOILER.

No. 505,542.

Patented Sept. 26, 1893.



WITNESSES:  
Henry Denny  
Stewart

INVENTOR:

George S. Strong

by his atty

N. Francis Hamilton

# UNITED STATES PATENT OFFICE.

GEORGE S. STRONG, OF NEW YORK, N. Y., ASSIGNOR TO JAMES N. GAMBLE,  
OF DAYTONA, FLORIDA.

## BOILER.

SPECIFICATION forming part of Letters Patent No. 505,542, dated September 26, 1893.

Application filed September 19, 1892. Serial No. 446,329. (No model.)

*To all whom it may concern:*

Be it known that I, GEORGE S. STRONG, of the city, county, and State of New York, have invented a certain new and useful Boiler, of which the following is a true and exact description, reference being had to the accompanying drawings, which form a part of this specification.

My invention relates to the construction of vertical boilers and has for its object to provide improved means for cleaning the same, my invention consisting in the construction and combination of the tube sheets and tubes, and their accessories which I will describe in connection with the drawings in which they are illustrated, and in which—

Figure 1 is a central vertical section through my improved boiler; Fig. 2 a plan view of the boiler with the cover I and top plate J removed. Fig. 3 is a section on an enlarged scale on the line  $x-x$  of Fig. 1, and Fig. 4 is a cross-section taken from 1 to 2 on line 1-1 of Fig. 3; from 2 to 3 on line 2-2; from 3 to 4 on line 3-3, and from 4 to 1 on line 4-4.

A is the shell of the boiler; B a dome-shaped fire-box, and C a corrugated combustion chamber, the fire-box and combustion chamber being made up of plates of iron or steel forged to shape and united together by Adamson's seams as indicated at  $b, c$  and  $b' c'$  D, their parts being substantially as described and claimed in my former application for a patent filed March 4, 1892, Serial No. 423,707.

At the top of the combustion chamber I secure a tube-sheet preferably of convex or conical form, that is: having its center higher than its body which slopes away on all sides. Near the top of the boiler I secure the upper tube-sheet F which is larger than the tube-sheet E and is made with a central opening F' through which the steam escapes into the steam dome or conduit H which in turn is provided with lateral passages H' for the escape of the steam and is covered at top by a removable cap or cover I. The tube sheet F I also prefer to make of conical form as shown.

G indicates the tubes which are arranged in radial lines and set at a diverging angle so that they extend upward and outward as they pass from sheet E to sheet F.

J<sup>2</sup> is the smoke box formed between the tube

sheet F and the top plate J of the boiler; this box or chamber communicating through openings J' in an extension of the boiler wall A with a smoke chamber L formed between the sheet A and an outer wall K and communicating through a passage M with a stack (not shown).

B' indicates the fire door.

By forming the tube sheet F with a central passage F' and arranging the tubes G so that they extend obliquely upward it is obvious that I can get at them with a hose or scraper very easily; in the construction shown it is only necessary to remove the cap I to give free access to the tubes and the top of sheet E. The ease of access is increased by arranging the tubes in radial lines as shown in Fig. 2, and this construction has another advantage in that the outwardly widening spaces O (see Fig. 2) between the rows insure that scale or dirt once dislodged will not be caught on the face of the tube sheet E. The conical shape given to sheet E also assists in shedding scale or dirt, and by making both sheets E and F of conical form the tubes can pass through them at right angles and thus form a better joint than if they were at an oblique angle to the sheets.

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

1. In a vertical boiler the combination of a tube sheet above the fire-box with a tube sheet at the top of the boiler having a central opening F<sup>2</sup> and a series of tubes extending obliquely upward from the lower tube sheet to the upper tube sheet, said series of tubes being arranged radially from the center of the tube sheets substantially as specified, so that a proper tool can be inserted through the opening F<sup>2</sup> to clean the tubes.

2. In a vertical boiler the combination with a tube sheet above the fire-box, of a tube sheet at the top of the boiler having a central opening F', a series of tubes extending obliquely upward in radial lines from the lower tube sheet, a smoke chamber J<sup>2</sup> into which the tubes discharge and a jacket L opening from the chamber J<sup>2</sup> and surrounding the boiler substantially as described.

3. In a vertical boiler the combination with

a tube sheet above the fire-box of a tube sheet  
at the top of the boiler having a central open-  
ing, a series of tubes extending obliquely up-  
ward from the lower tube sheet to the upper  
5 tube sheet a smoke chamber J<sup>2</sup> into which the  
tubes discharge and a jacket surrounding the  
boiler and connecting with the smoke cham-

ber J<sup>2</sup> and serving as a conduit for the escap-  
ing smoke and gases.

GEO. S. STRONG.

Witnesses:

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FRANCIS T. CHAMBERS.