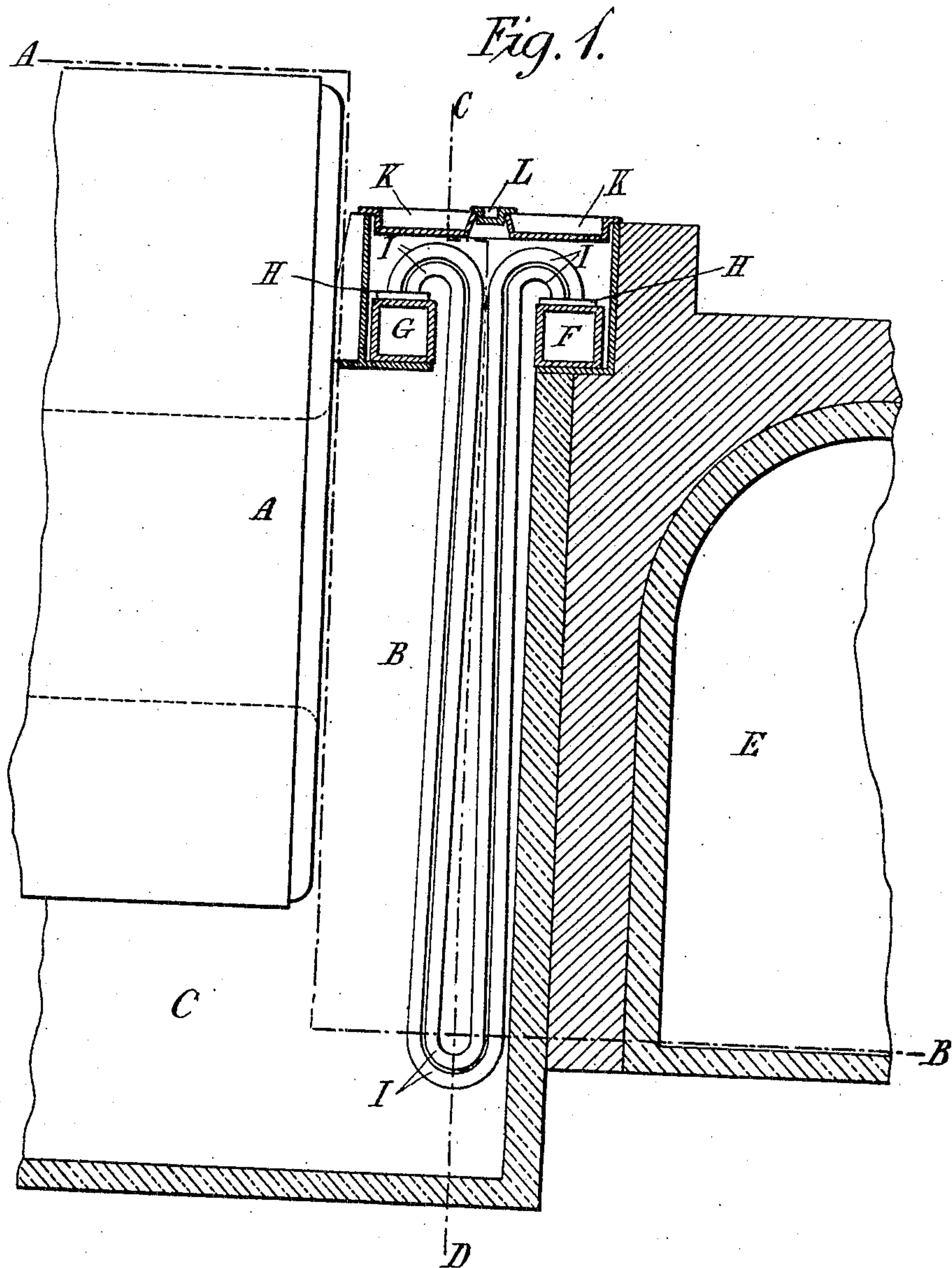


No. 849,468.

PATENTED APR. 9, 1907.

C. M. FERGUSON.
STEAM SUPERHEATER.
APPLICATION FILED NOV. 19, 1908.

3 SHEETS-SHEET 1.



Witnesses.
C. B. Franconi
M. Silian Adams.

Inventor.
Charles M. Ferguson
By his Attorneys
Baldwin Wright

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3 SHEETS—SHEET 2.

Fig. 3.

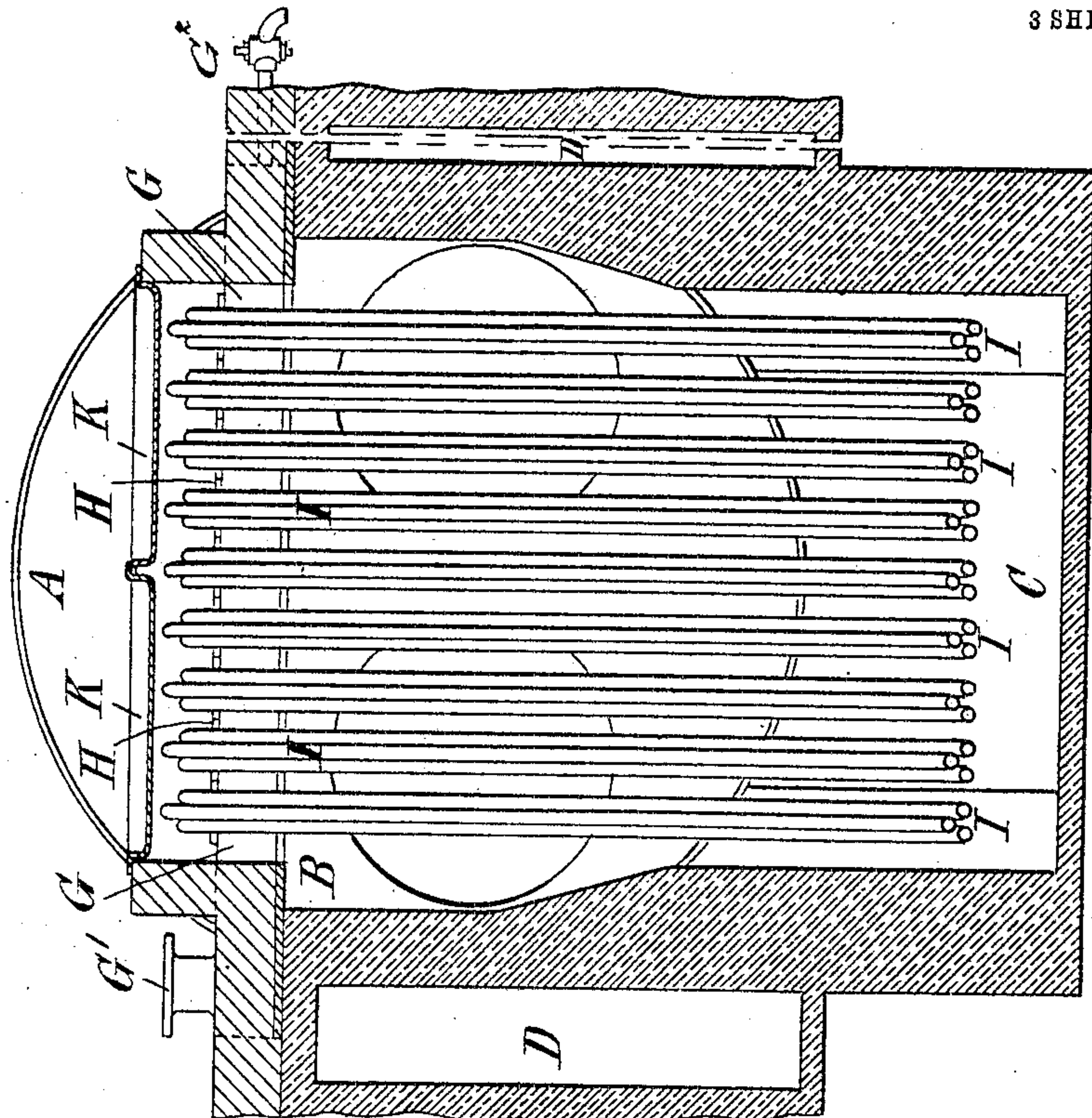
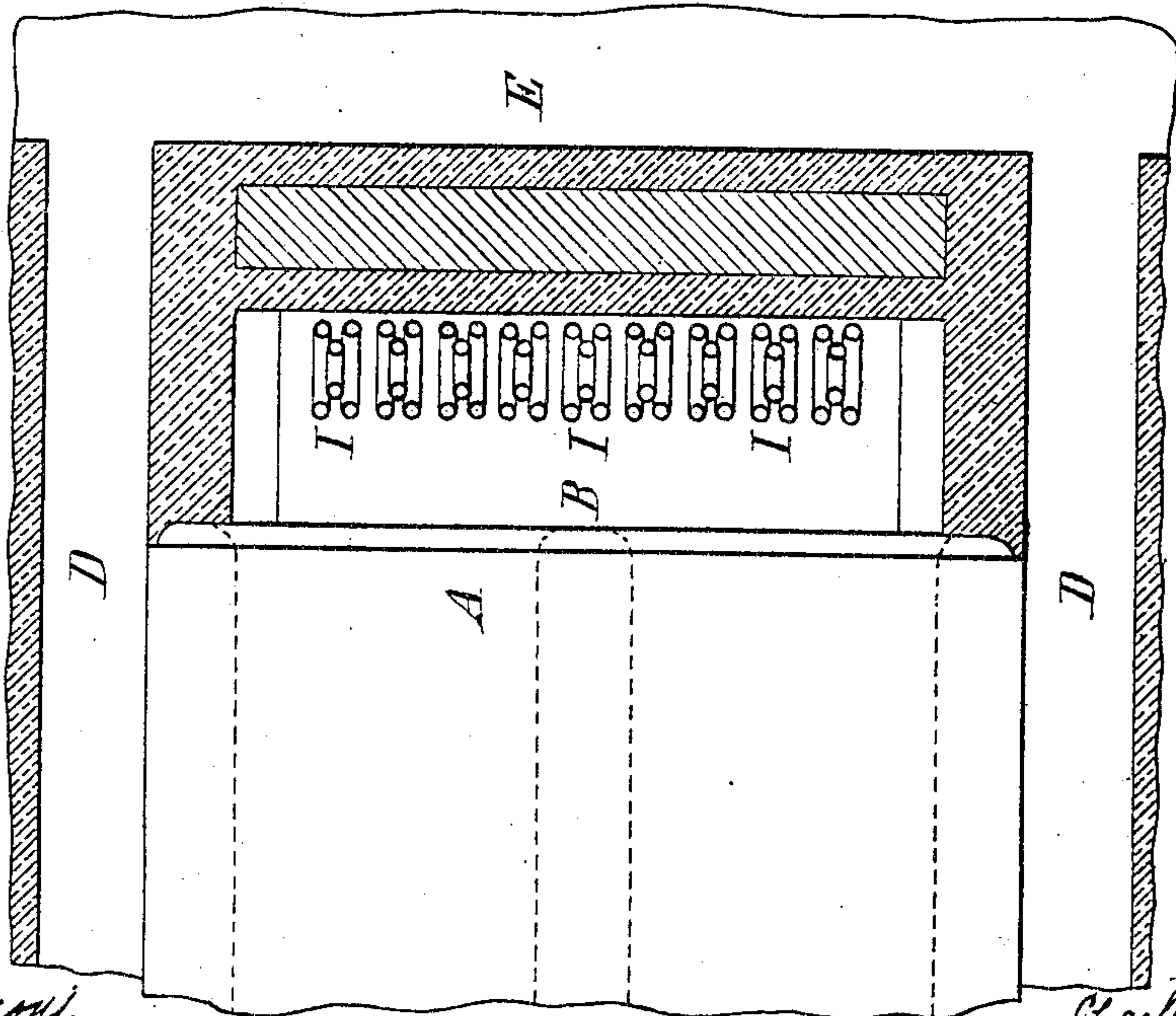


Fig. 2.



Witnesses
E. B. Thompson
Mr. Silvan Adams.

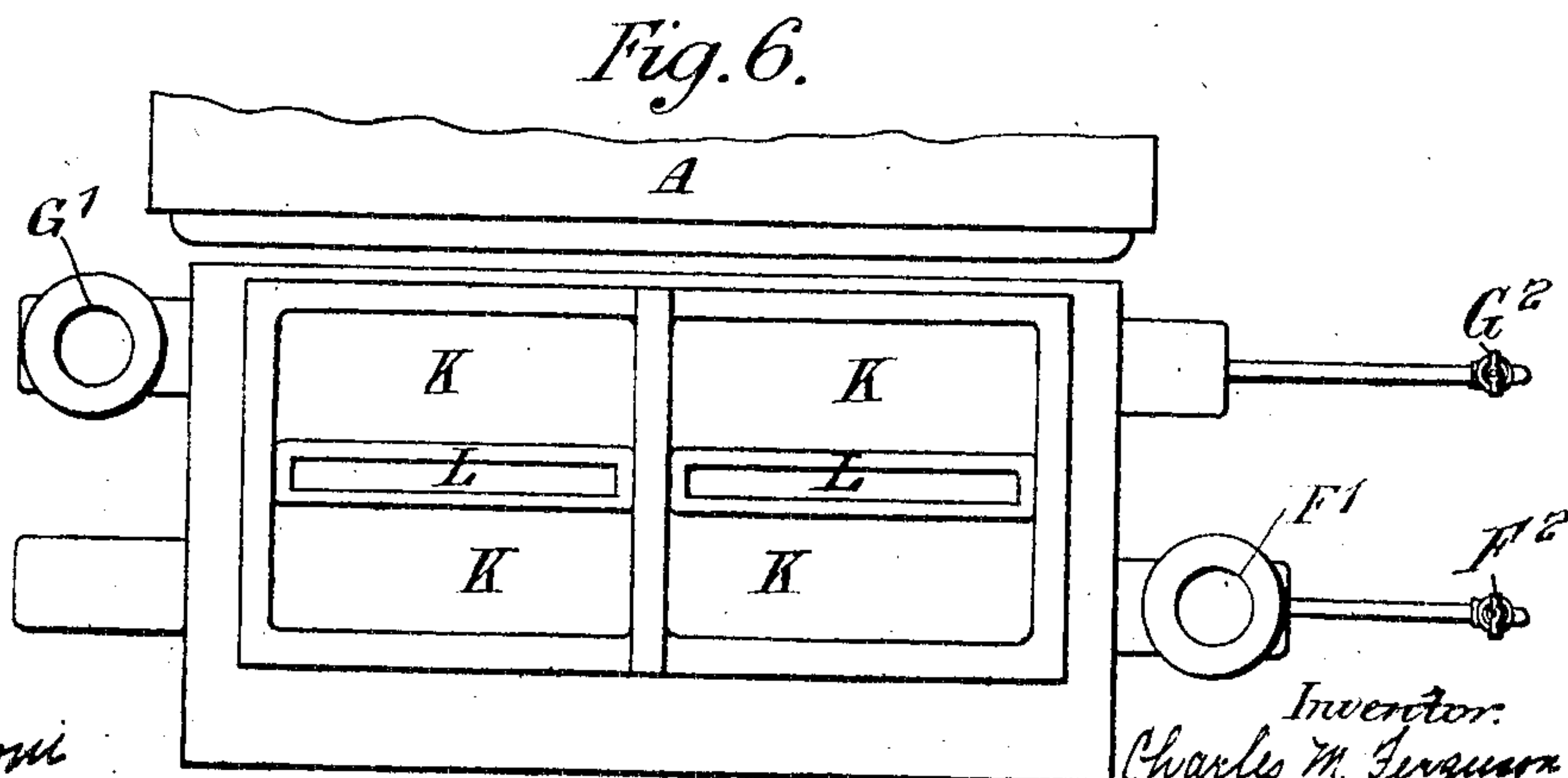
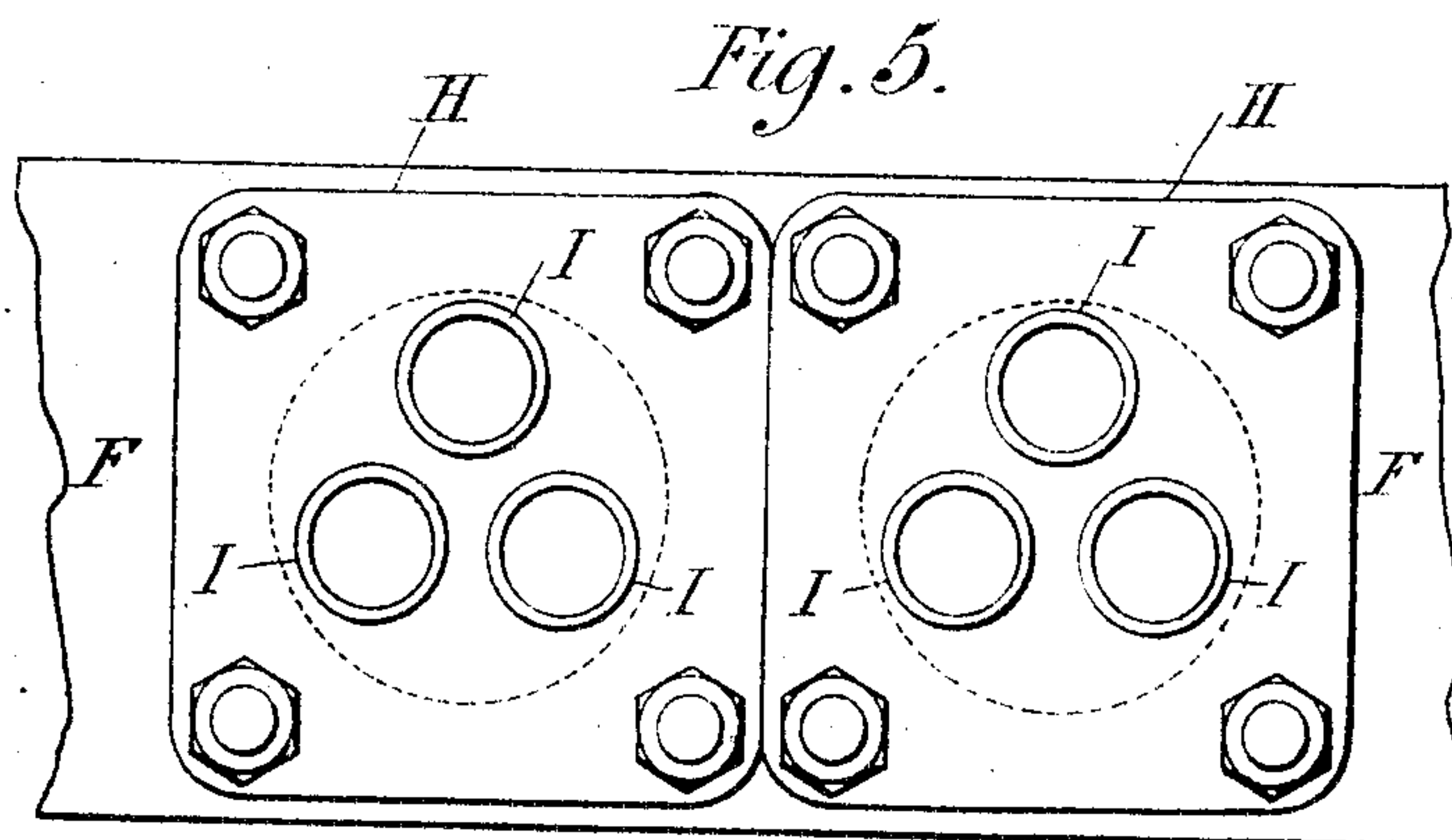
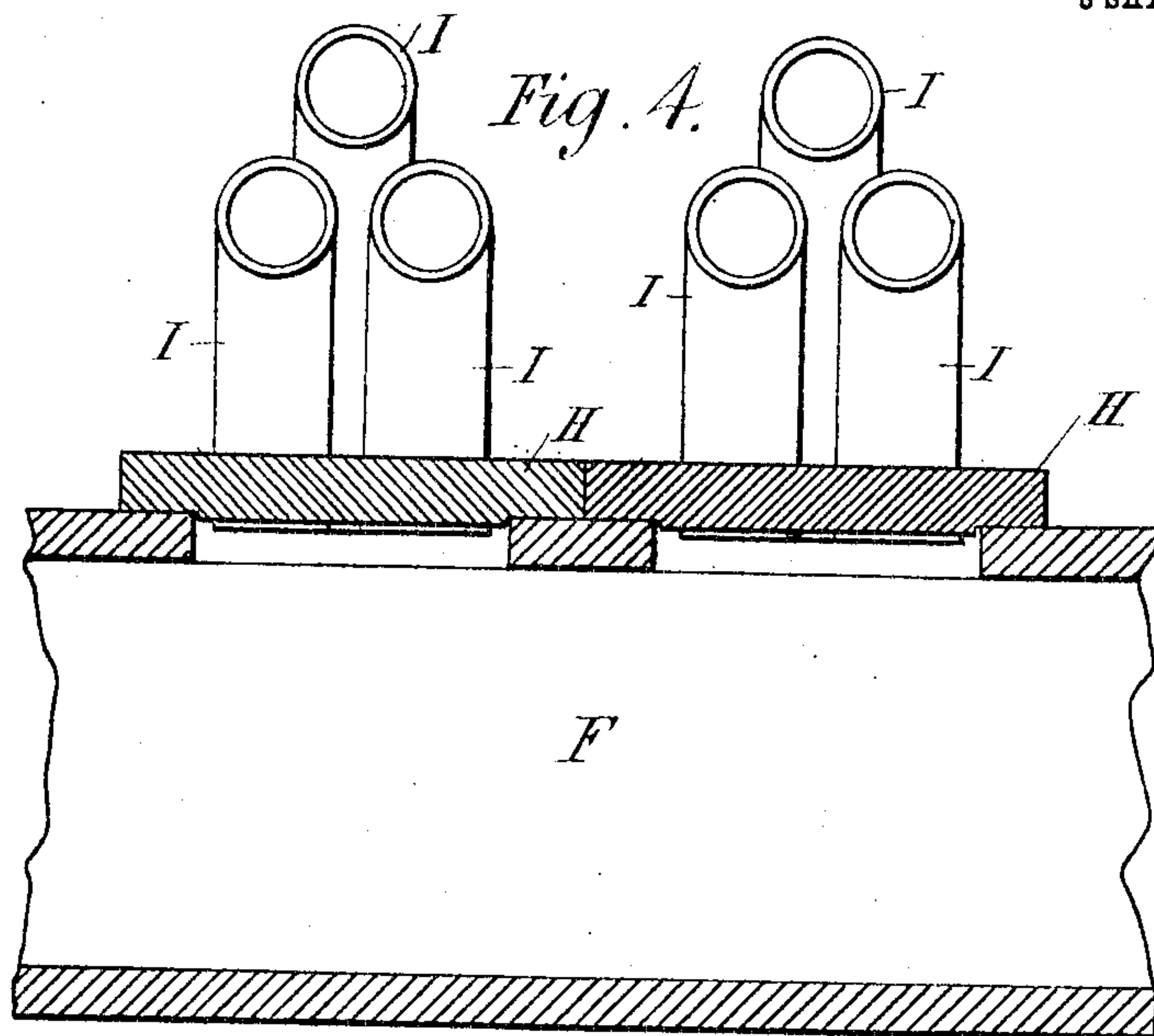
Inventor
Charles M. Ferguson
By his Attorneys Baldwin Wright

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3 SHEETS—SHEET 3.



Witnesses.

C. B. Traxler
M. Silas Adams.

Inventor.

Charles M. Ferguson
By his Attorney
Rudolph W. H. H.

UNITED STATES PATENT OFFICE.

CHARLES MELVILLE FERGUSON, OF LAVENDER HILL, ENGLAND, ASSIGNOR
TO ARTHUR HORACE SPEARING, OF LONDON, ENGLAND.

STEAM-SUPERHEATER.

No. 849,468.

Specification of Letters Patent.

Patented April 9, 1907.

Application filed November 19, 1906. Serial No. 344,108.

To all whom it may concern:

Be it known that I, CHARLES MELVILLE FERGUSON, mechanical engineer, a subject of the King of Great Britain, residing at 29 Beauchamp road, Lavender Hill, in the county of Surrey, England, have invented new and useful Improvements in Connection with Steam-Superheaters, of which the following is a specification.

10 This invention relates to improvements in connection with superheaters for use upon or in connection with steam-boilers of any type, the object being to provide a form of superheater that can be readily attached to any
15 type of boiler or steam-generator or employed independently, and that can be constructed so that its joints can be examined during the working of the boilers and that the parts can be readily repaired or removed
20 without having to disturb or disconnect the entire superheater or casing, and for securing other advantages such as will result from having a superheater constructed with its tubes arranged in a series of independent
25 sections of moderate weight and convenient of form for handling instead of being all attached to large members or to one continuous header or casing in the manner now commonly adopted with the usual type of super-
30 heater at present in use.

In carrying my invention into effect when applying my superheater to a horizontal cylindrical form of boiler having a back or end flue I provide a header or steam-supply chamber with a branch or branches for enabling
35 the steam from the boiler to be delivered thereto, preferably in a position above the flues of the boiler, and I connect to this header a series of tubes which I carry from
40 the upper surface of the header and then bend downward and cause them to pass through the flue-space or chamber where the gases or flames may impinge thereon, the other ends of the bent tubes being connected
45 by flanges or the like to the upper surface of the superheated-steam chamber, which superheated-steam chamber I provide with an outlet or supply branch or branches arranged in any convenient position thereon. I make
50 the superheater-tubes which are thus connected at their ends to the upper surfaces of the wet-steam-collecting chamber and the superheated or dry steam-chamber in the form of independent sections—that is, I make
55 my tubes to be secured by ferrules or other

ordinary attachments to flanges which are bolted on or otherwise attached to suitable openings in the upper surface of the chambers. I arrange the tubes as a series of sections, providing two, three, or more tubes, as may be
60 found convenient, upon each section or flange, so that when it is desired to remove a section for repair or cleaning the removal of the attaching-bolts will enable the flanges to be drawn away upward from the two steam-
65 chambers and the tubes readily removed without having to disturb any of the other sections or tubes mounted upon the chambers or steam-main connections. I provide blank flanges upon the openings to which the
70 tubes are attached when the tubes are withdrawn, so that the superheater as a whole may continue working, while any of its sections may be withdrawn for cleaning or for other purposes. I dispose the independent
75 tubes upon the sectional flanges in such a manner that they nest one around or about the other conveniently to make the flanges as small as possible and to bring the greatest
80 amount of tube-heating surface in contact with the flames or gases that are to be employed to give the superheat. I carry drain-pipes with suitable cocks thereon from the lower portions of the steam-collecting box or
85 chambers for taking off whatever water of condensation may collect there during the working or standing of the boiler. When building up my superheaters by this arrangement of sectionally-disposed tubes, I can by
90 proportioning the number of independent sections to suit the extent of superheat that is required readily decrease or increase the amount of superheat that is to be given to the steam by varying the number of sections
95 that are to be used or the course which the steam shall take through such sections. I sometimes provide baffles or division-plates within the headers, so as to cause the steam to pass first through one series of tubes and then another before emerging from the super-
100 heated or dry steam-supply main, and I sometimes construct the whole of the header or manifold in the form of a series of sectional lengths of casing, so as to enable me to add to or decrease the size of superheater to suit
105 the boiler or conditions under which the apparatus is to be employed. I mount my headers within a chamber and provide a cover or covers thereto which upon removal enables me to have complete access to the
110

joints of the tubes and the flanges, seeing that these are disposed upon the upper surface of the steam-collecting headers, and I make the covers of such casing to be of size
5 and form suitable for enabling access to be obtained to the whole or any portion of the tubes as and when required without having to disturb or interfere with the steam-mains arranged thereon.

10 In the drawings annexed I have shown a superheater constructed according to my invention used in conjunction with a two-flued Lancashire boiler.

Figure 1 is a longitudinal section of the
15 rear end of the boiler and the superheater placed at this end. Fig. 2 is a horizontal section on the line A B, Fig. 1. Fig. 3 is a vertical section on the line C D. Fig. 4 is a longitudinal section, on a larger scale, of one
20 of the steam chambers or headers. Fig. 5 is a plan view of the same, and Fig. 6 a plan view of the parts of the superheater and of the rear end of the boiler.

In these figures, A is the rear end of the
25 boiler.

B is the back or end flue, and C the return flue, which passes back below the boiler, and D the side flues, which, as usual, lead the gases from the return-flue to the main flue E,
30 from which they pass to the chimney.

F G are two steam chambers or headers mounted at the top of the back flue B. One end of each is prolonged and has a flanged branch F' or G' extending upward from it.
35 Steam from the boiler is supplied to the branch F', while the steam after being superheated is led off from the branch G'.

In the upper side of each header are a series of openings, a corresponding number in
40 each header, and each closed by a separate cover-plate H, secured to the header, as shown, or it might be in other suitable ways. Each cover-plate H closing one opening in the top of the header F, has rising from it a
45 suitable number of tubes I. It is shown to have three tubes rising from it. The tubes after rising from the plate H are bent downward and after being made to extend downward nearly to the bottom of the flue B are
50 again bent upward and then at the top of the flue again bent downward and passed through and secured to the plate H, which closes the corresponding opening in the header G. Each set of three or other number of superheating-tubes I can thus readily
55 be disconnected from the headers F and G and replaced by another set, or the openings in the headers may for a time be covered over with blank plates which carry no superheating-tubes.
60

By making the superheating-tubes I to rise upward from the top of the steam-headers any water of condensation collecting in the headers will not pass from them into the
65 superheating-tubes. Any water of conden-

sation so collecting in the headers during the working or standing of the boiler can, as previously stated, be drawn off from them through drain-pipes extending from them at the bottom and fitted with suitable draw-off
70 cocks F² G².

K K are two cover-plates closing over the top of the back flue B. Each has a central opening formed through it covered over with a smaller readily-removable cover L. When
75 the covers K are removed any section of pipes can readily be detached and taken away. The smaller covers L allow of dust, &c., being at any time readily removed from the pipes.
80

As previously stated, the steam in place of being superheated by being caused to pass once only through superheating-tubes I might be made to pass through two or more sets of such tubes in succession. For ex-
85 ample, a division might be placed across the center of the header F and the steam after being admitted to one half or division of the header be made to pass through superheating-tubes I into the header G and from there
90 through other superheating-tubes back again into the other half of the header F before being led away. As above stated also, each header in place of being formed in one length
95 might be built up of a number of short lengths bolted together, so that headers of any desired length may be built up by bolting together a greater or lesser number of such short lengths.

What I claim is—

1. In a steam-superheater for steam-boilers the combination of a steam-boiler, a vertical flue-space at the back of the boiler, a readily-removable cover closing over the top of this space, an inlet and an outlet steam
105 chamber or header mounted side by side in the upper part of the flue-space, openings in the upper sides of these headers, removable cover-plates closing over these openings and tubes secured at one end to a cover-plate closing an opening in the upper side of one header and then bent and passed downward through the vertical flue-space and then again upward and secured to a cover-plate closing an opening in the other header and means for
110 conveying steam from the steam-boiler to one of the headers and for leading it away in a superheated state from the other header.
115

2. The combination of an inlet and an outlet steam chamber or header, tubes led for a
120 distance downward from the upper surface of one header and then upward to the upper surface of the other header and drain-pipes fitted with draw-off cocks extending from the bottom of the header.

CHARLES MELVILLE FERGUSON.

Witnesses:

R. B. RANSFORD,
ARTHUR CARPENAEL, JUNR.