

No. 849,875.

PATENTED APR. 9, 1907.

H. V. WILLE.
SUPERHEATER FOR LOCOMOTIVES.

APPLICATION FILED NOV. 20, 1905.

4 SHEETS—SHEET 1.

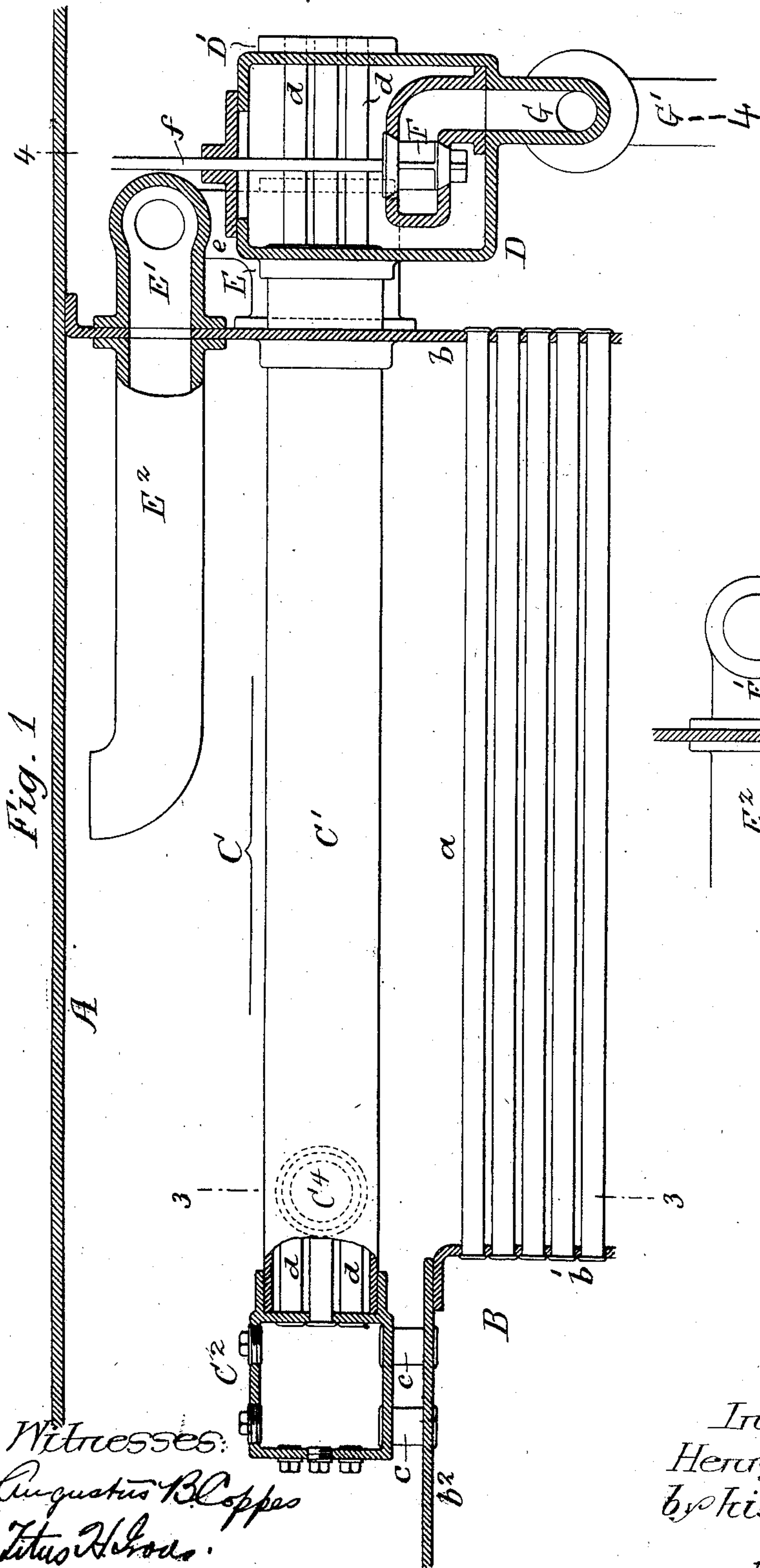


Fig. 1

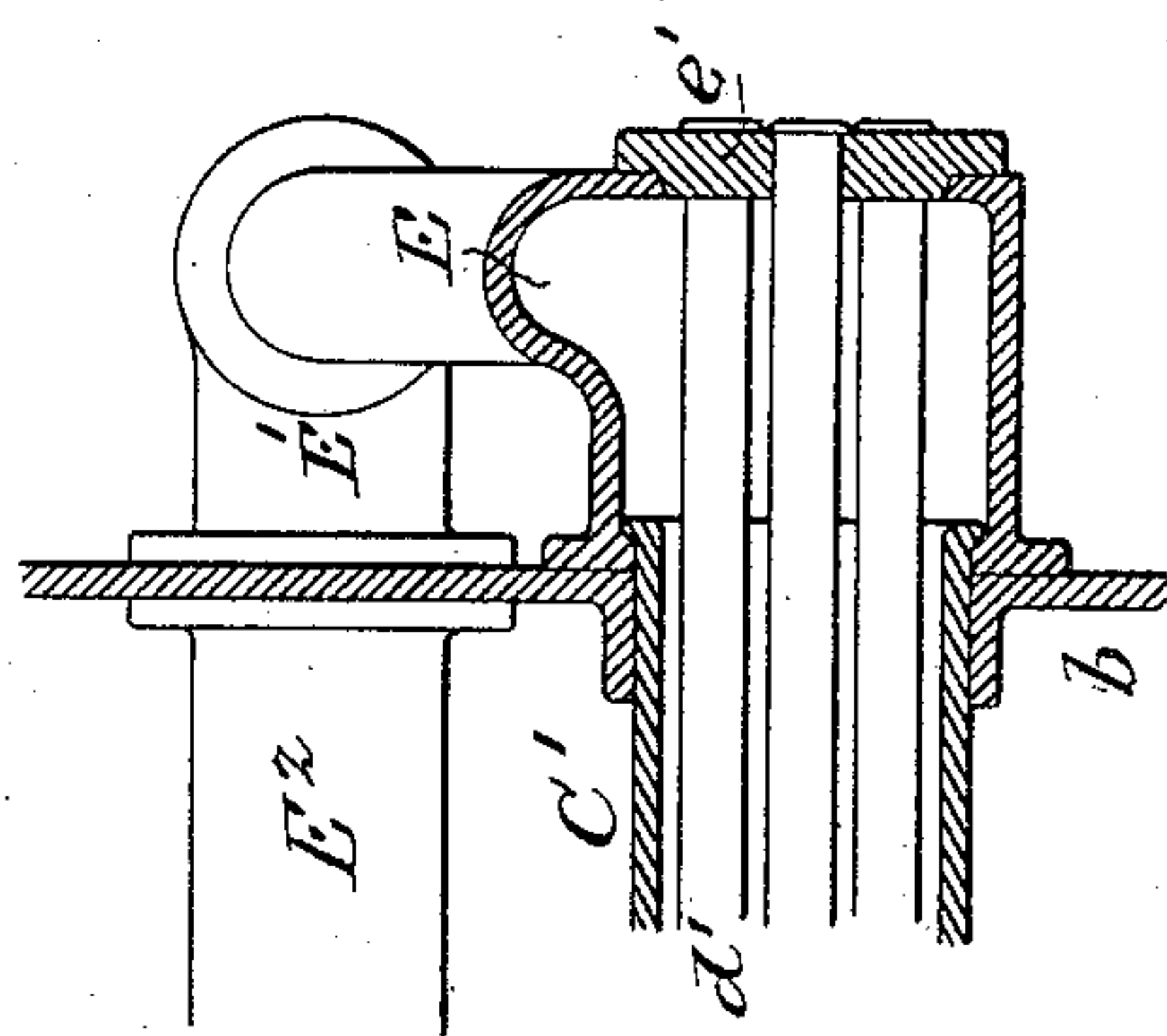


Fig. 5

Witnesses:
Augustus B. Coppes
John H. Crook.

Inventor:
Henry V. Wille.
by his Attorneys,
Hornum & Hornum

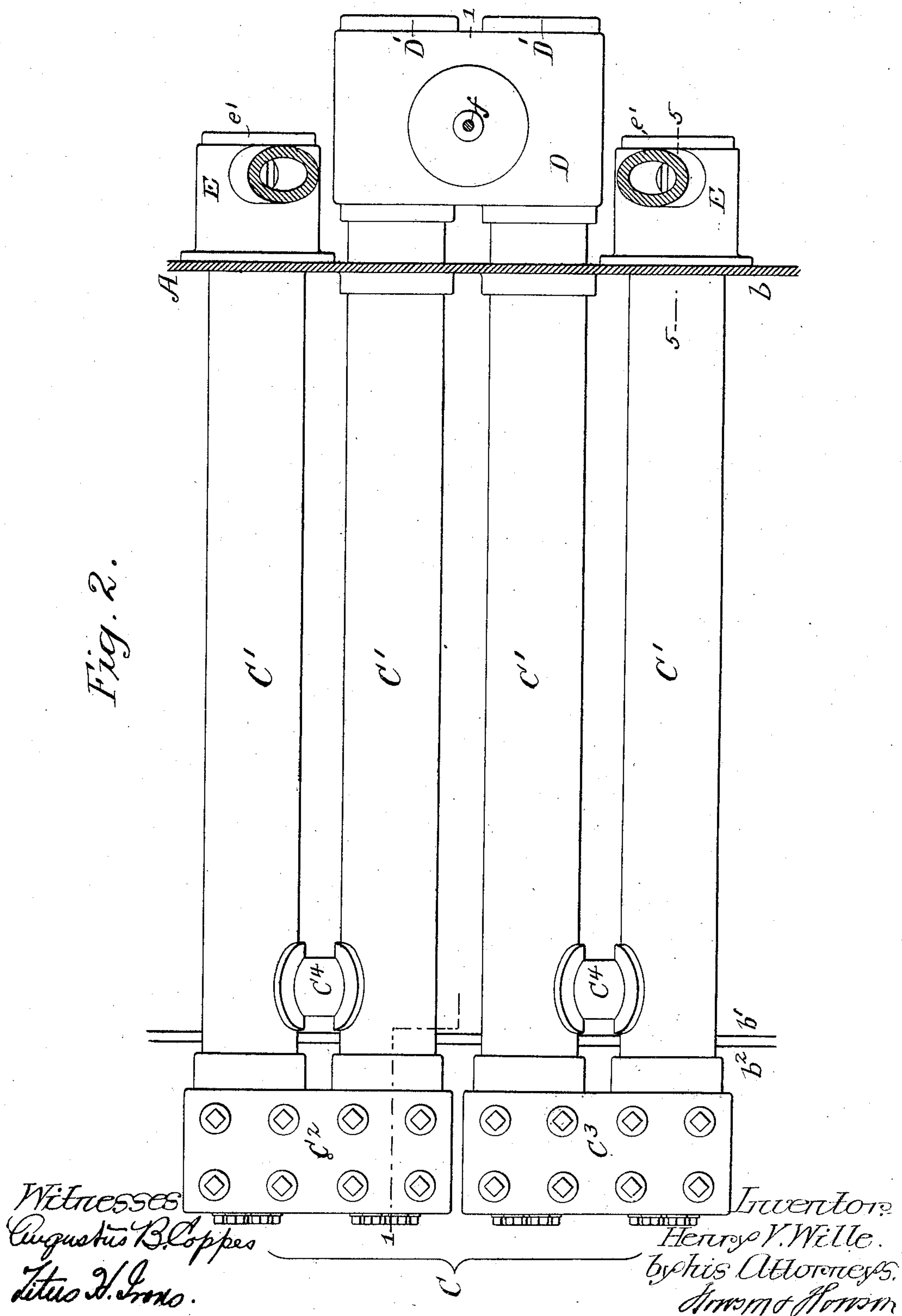
No. 849,875

PATENTED APR. 9, 1907.

H. V. WILLE.
SUPERHEATER FOR LOCOMOTIVES.

APPLICATION FILED NOV. 20, 1905.

4 SHEETS—SHEET 2.



No. 849,875.

PATENTED APR. 9, 1907.

H. V. WILLE,
SUPERHEATER FOR LOCOMOTIVES.

APPLICATION FILED NOV. 20, 1905.

4 SHEETS—SHEET 3.

Fig. 3.

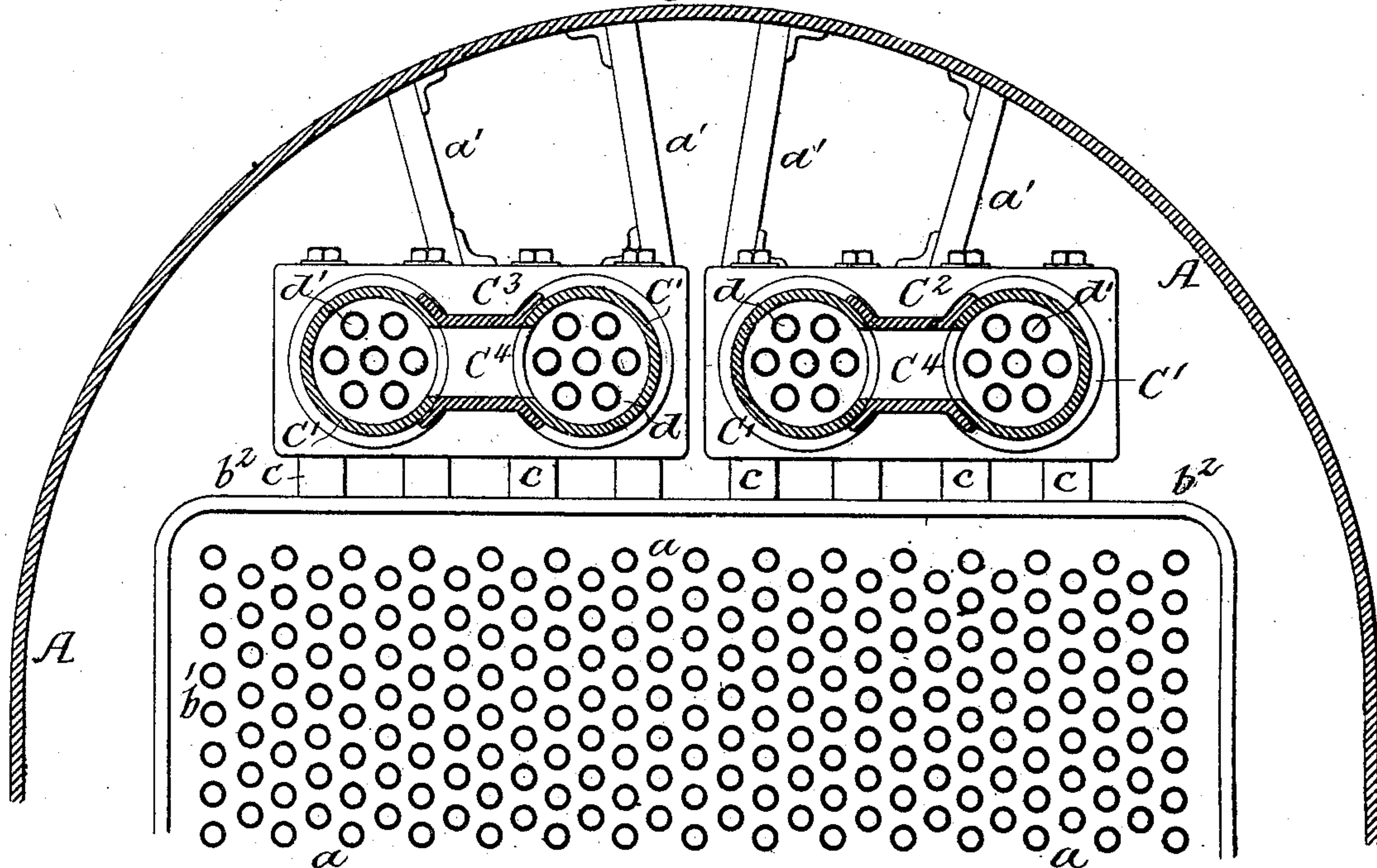
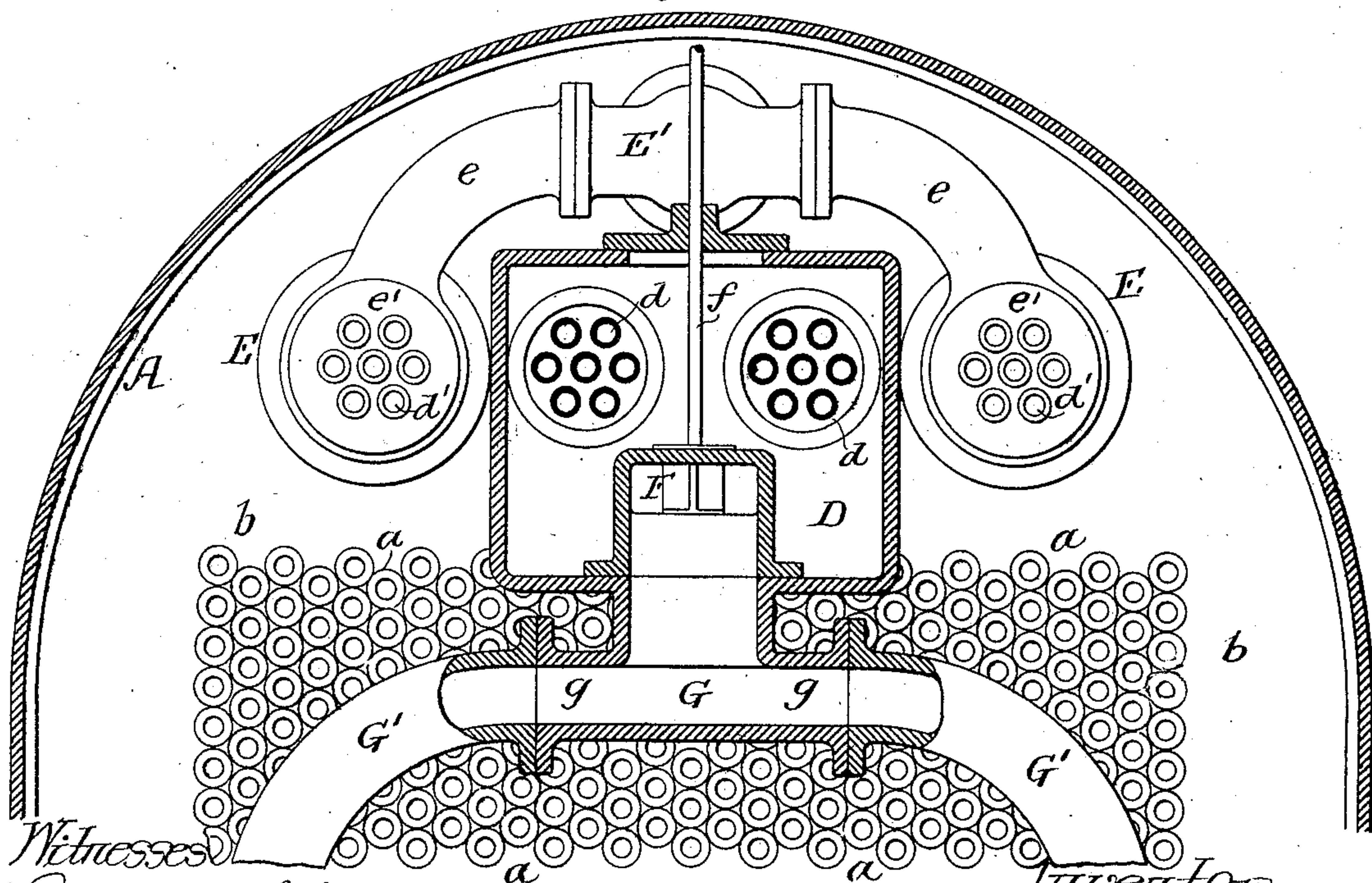




Fig. 4.



Witnesses  
Augustus K. Oppes
Titus H. Frou.

Inventor.
Henry V. Wille.
by his Attorneys.
Hornum & Hornum

No. 849,875.

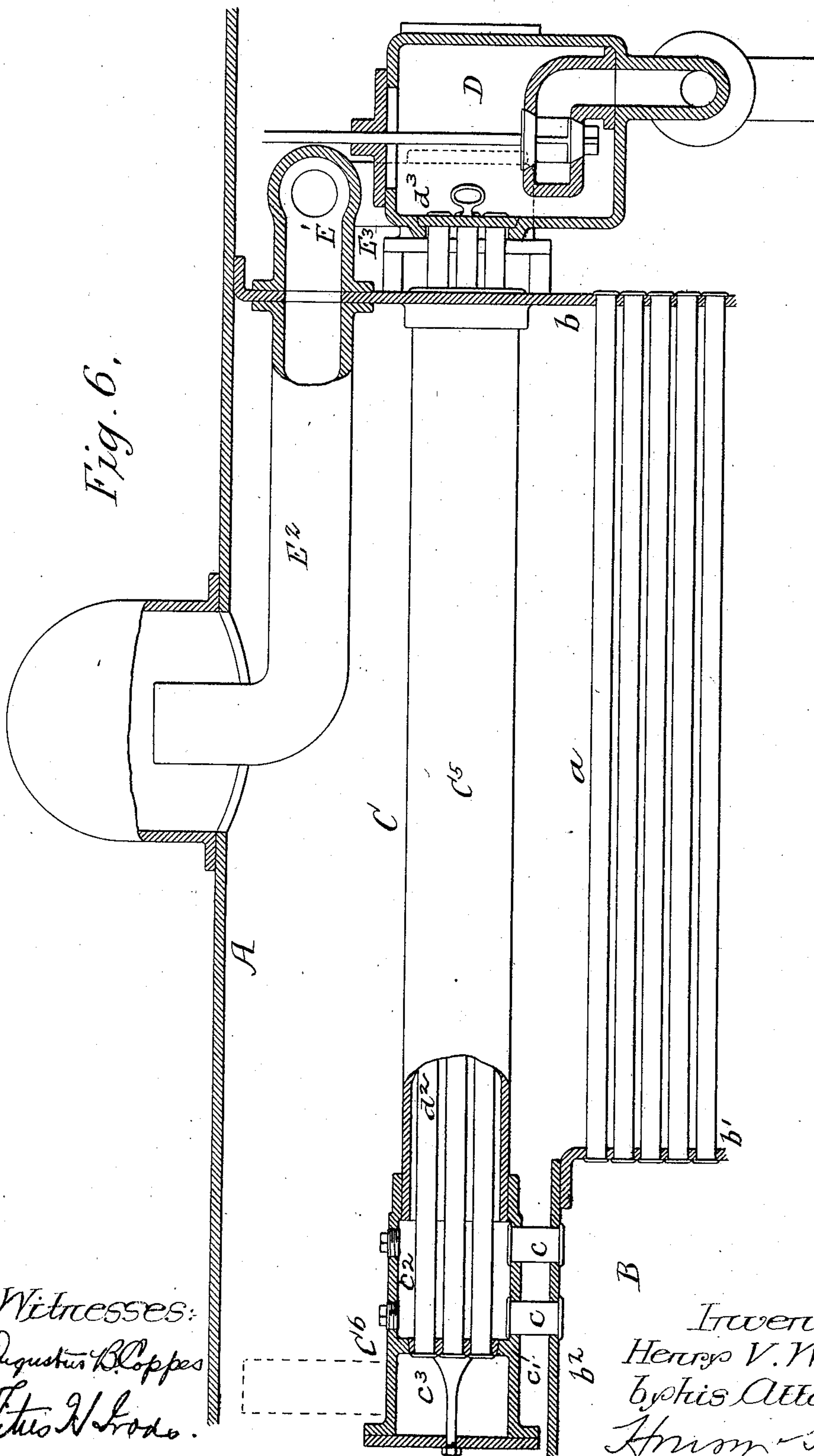
PATENTED APR. 9, 1907.

H. V. WILLE.
SUPERHEATER FOR LOCOMOTIVES.

APPLICATION FILED NOV. 20, 1905.

4 SHEETS—SHEET 4.

Fig. 6.



Witnesses:
Augustus B. Coppes
Lester H. Looze.

Inventor:
Henry V. Wille.
by his Attorneys:
Hiram Hiram

UNITED STATES PATENT OFFICE.

HENRY V. WILLE, OF PHILADELPHIA, PENNSYLVANIA, ASSIGNOR TO BURNHAM, WILLIAMS & COMPANY, OF PHILADELPHIA, PENNSYLVANIA, A FIRM.

SUPERHEATER FOR LOCOMOTIVES.

No. 849,875.

Specification of Letters Patent.

Patented April 9, 1907.

Application filed November 20, 1905. Serial No. 288,188.

To all whom it may concern:

Be it known that I, HENRY V. WILLE, a citizen of the United States, residing in Philadelphia, Pennsylvania, have invented certain
5 Improvements in Superheaters for Locomotives, of which the following is a specification.

The object of my invention is to combine a
10 superheater with a locomotive-boiler so that the main portion of the superheater will be mounted within the locomotive-boiler, one end being supported by the front tube-sheet of the boiler and the other end supported on the crown-sheet of the fire-box.

15 In the accompanying drawings, Figure 1 is a longitudinal sectional view of a locomotive-boiler, showing my improvement, being on the line 1 1, Fig. 2. Fig. 2 is a plan view of my improved superheater, the boiler and
20 supply-pipes being in section. Fig. 3 is a transverse section on the line 3 3, Fig. 1. Fig. 4 is a transverse section on the line 4 4, Fig. 1. Fig. 5 is a section on the line 5 5, Fig. 2, and Fig. 6 is a view illustrating a modification of my invention.

A is the shell of the boiler.

B is the fire-box; *b* the front tube-sheet, *b'* the rear tube-sheet, and *b*² the crown-sheet, of the fire-box.

30 *a a* are the tubes of the boiler extending from the rear tube-sheet to the front tube-sheet. These tubes are of the ordinary construction and are not interfered with in applying my improved superheater to the loco-
35 motive-boiler.

C is the superheater, in the present instance consisting of four cylindrical casings *C'*, arranged in pairs, one pair being connected to a header *C*² and the other pair
40 connected to a header *C*³ at the rear end. These two headers are supported on the crown-sheet *b*² of the fire-box, as clearly shown in Figs. 1 and 3. The tubes *c* form a communication between the body of the furnace B and the interior of the headers *C*² *C*³. The casings *C'* extend through the front tube-sheet *b*, and a suitable packing is provided, so as to make a tight joint between the parts. In the present instance the two central cas-
50 ings *C'* are connected to a valve-casing D in the smoke-box of the locomotive, while the two end casings *C'* are each connected to a head E. These heads E E have necks *e*, which communicate with a T-pipe *E'*, which

in turn communicates with the dry pipe *E*² 55 within the boiler. This dry pipe communicates with the steam-space of the boiler, and in some instances, as shown in Fig. 1, a steam-dome may not be necessary for the reception of the end of this pipe, but a steam-
60 dome may be used, as clearly shown in Fig. 6. It will be understood that the throttle-valve in this instance is mounted in the casing D within the smoke-box of the locomotive.

Within each casing *C'* is a series of tubes *d*. 65 The tubes *d* of the two central casings extend from the headers *C*² *C*³ through the valve-casing D and are secured to caps *D'*, attached to the valve-casing D, while the tubes *d'* of the end casings *C'* extend from the
70 headers *C*² *C*³ through the casings and through the heads E and are secured to plates *e'*, attached to the heads E E.

The headers are provided with openings in line with the several tubes *d*, *d'*, and *c*, and
75 screw-plugs are screwed into these openings, so that on the removal of the plugs access may be had to the tubes. Thus it will be seen that the products of combustion from the fire-box pass through the tubes *c* in the
80 headers *C*², through the tubes *d* *d'*, and into the smoke-box of the locomotive, while the steam from the boiler passes from the dry pipe *E*² into the T-pipe *E'* to the heads E, through the outer casings *C'*, in contact with
85 the tubes *d'*. The steam then passes through pipes *C*⁴, which connect each outer casing with a central casing, as indicated in Figs. 2 and 3, and returns through the central cas-
90 ings *C'*, in contact with the tube *d*, to the valve-casing D. In this casing is a throttle-valve F of any suitable construction, having a stem *f*, which can be connected with mechanism extending to the cab of the loco-
95 motive. The valve in the present instance is double-seated and is of the balance type.

The steam passes from the valve-casing through a T-pipe G, having branches *g g*, at-
100 tached to pipes *G'*, leading to the cylinders of the locomotive. Suitable stay-rods *a'* connect the headers *C*² *C*³ with the body of the boiler, so that the superheater is properly braced.

In the modification shown in Fig. 6 the products of combustion pass through the cas-
105 ing and the steam passes through the tubes. The tube-sections *C*⁵ are coupled to a header *C*⁶, which is supported on the crown-sheet of

the fire-box, similar to the construction shown in Fig. 1; but the header in this instance is divided by a partition c' into two compartments—one, c^2 , for the products of combustion and the other, c^3 , for the steam. The head in the partition is held in place by a suitable bolt. The tubes are attached to the head, and the head is of such a size that it can be withdrawn through the casing C^5 when it is desired to detach the tubes. The outer ends of the tubes d^2 are attached to a plate d^3 , detachably secured to the valve-casing D. There is a sufficient space between the valve-casing and the front tube-sheet of the boiler to allow for the escape of the products of combustion from the casing C^5 .

When a single-tube superheater is used, then the space c^3 in the header C^6 is connected by a pipe (shown by dotted lines in Fig. 6) to the steam-space of the boiler, so that the steam will flow from the rear of the superheater to the valve-chest in the smoke-box; but if a superheater is used of the series type, as shown in Fig. 2, then two sets of tubes are connected to a head E^3 and the two heads are connected by the pipe E' to the dry pipe E^2 within the boiler. There is sufficient space between the heads E^3 and the front tube-sheet of the boiler to allow for the escape of the products of combustion from the tubes. The header C^6 in this instance is of such length that the tubes of the different series will communicate with the space c^3 and a division may be made in the center of the header, so as to divide the steam, as in the construction shown in Fig. 2. Thus it will be seen that the steam can either pass through the casing and the products of combustion pass through the tubes or the steam can pass through the tubes and the products of combustion pass through the casing, and the throttle-valve can be either in the connection between the superheater and the cylinders or between the superheater and the boiler, and it will be understood that while I have shown in Fig. 2 a superheater composed of four cylindrical casings with two tubes therein in some instances the superheater may be composed of one tubular casing or more than one, as desired, depending upon the size and design of the boiler.

While in Fig. 2 I have shown two independent rear headers, a single header may be used, to which all four cylinders are attached, as described in connection with Fig. 6 of the drawings.

I claim—

1. The combination of a boiler having a front tube-sheet, a fire-box, a rear tube-sheet separating the fire-box from the body of the boiler, a crown for the fire-box, tubes extending from the rear tube-sheet to the front tube-sheet, a superheater mounted within the upper portion of the boiler and extending through the front tube-sheet, the rear end of

the superheater resting upon and supported solely by the crown of the fire-box and connected to the fire-box; a steam-supply pipe extending from the upper portion of the boiler and communicating with the superheater, and pipes in the smoke-box leading to the cylinders and also communicating with the superheater, substantially as described.

2. The combination of a locomotive-boiler having a fire-box at one end, a smoke-box at the opposite end, longitudinal tubes extending from the fire-box to the smoke-box, a superheater mounted in that portion of the boiler above the tubes and extending through the front tube-sheet and resting upon the crown of the fire-box, the flue-space of the superheater being connected to the fire-box, a pipe extending from the steam-space of the boiler through the front tube-sheet and connected to the superheater within the smoke-box, and a valve-box in the smoke-box connected to the superheater and to the cylinders of the locomotive, substantially as described.

3. The combination of a locomotive-boiler having a fire-box, a rear tube-sheet and a crown separating the fire-box from the boiler, a front tube-sheet, tubes extending from the front tube-sheet to the rear tube-sheet, a superheater mounted within the upper portion of the boiler above the tubes and extending through the front header, the rear end of the superheater stopping short of the rear end of the boiler and resting upon the crown of the fire-box, the front of the superheater being connected with steam-pipes, one leading from the upper portion of the boiler and the other leading to the cylinders, both connections being within the fire-box of the locomotive, substantially as described.

4. The combination in a locomotive-boiler, of a fire-box, front and rear tube-sheets, longitudinal tubes extending from one sheet to the other, a series of cylindrical casings and rear headers forming a superheater, said superheater mounted within the boiler above the tubes, the rear headers being supported by the crown of the fire-box and connected thereto, a dry pipe leading from the steam-space in the boiler and communicating with two of a series of casings forming the superheater, a valve-box with which the other two of the series communicate, said valve-box communicating with the cylinders of the locomotive so that the steam will pass rearward through two of the casings and forward through the other two, substantially as described.

5. The combination of a locomotive-boiler having a fire-box at one end, a rear tube-sheet and crown separating the fire-box from the boiler, a front tube-sheet, tubes extending from one sheet to the other, a superheater mounted in the upper portion of the

boiler above the said tubes; said superheater extending through the front tube-sheet and having a front header within the smoke-box of the boiler, the superheater having a rear header resting upon the crown of the fire-box, short tubes connecting the rear header with the crown-sheet and through which the products of combustion pass from the fire-box to the superheater, with two pipes communicating with the forward header of the superheater within the smoke-box of the boiler, one pipe leading from the boiler and the other pipe leading to the cylinders, substantially as described.

6. The combination of a locomotive-boiler having a fire-box at one end, a smoke-box at the opposite end, a rear tube-sheet and a crown-sheet separating the boiler from the fire-box, a front tube-sheet separating the boiler from the smoke-box, tubes extending from one tube-sheet to the other, a superheater mounted within the upper portion of the boiler and consisting of a cylindrical casing connected to headers at each end, a series of tubes within the casing also connected to the headers, the rear header of the superheater resting upon the crown-sheet of the boiler, tubes attaching said rear header to the crown-sheet and through which the products of combustion pass to the superheater, the said tubular casing extending through the front tube-sheet, and steam-pipes communicating with the front header of the superheater within the smoke-box, substantially as described.

7. The combination of a steam-boiler having a fire-box and a smoke-box, front and rear headers, a superheater mounted upon the fire-box and passing through the front header, said superheater consisting of four tubular casings, rear headers to which the tubes are attached, said headers communicating with the fire-box of the locomotive, connections between the casings at the rear end thereof, heads attached to the end casings and communicating with the steam-space of the boiler, a chest connecting with the two central casings, the tubes within the casings communicating with the smoke-box of the locomotive, the chest communicating with the cylinders, substantially as described.

8. The combination of a locomotive-boiler having a fire-box and a smoke-box, longitudinal tubes connecting the fire-box with the smoke-box, a superheater mounted in the upper portion of the boiler above the tubes and extending through the front tube-sheet, said superheater including a series of casings and rear headers resting on the fire-box and connected thereto, with a valve-box and steam connections therefor within the smoke-box, substantially as described.

In testimony whereof I have signed my name to this specification in the presence of two subscribing witnesses.

HENRY V. WILLE.

Witnesses:

WILL. A. BARR,
JOS. H. KLEIN.