

(No Model.)

2 Sheets—Sheet 1.

P. HANREZ.  
STEAM BOILER.

No. 411,191.

Patented Sept. 17, 1889.

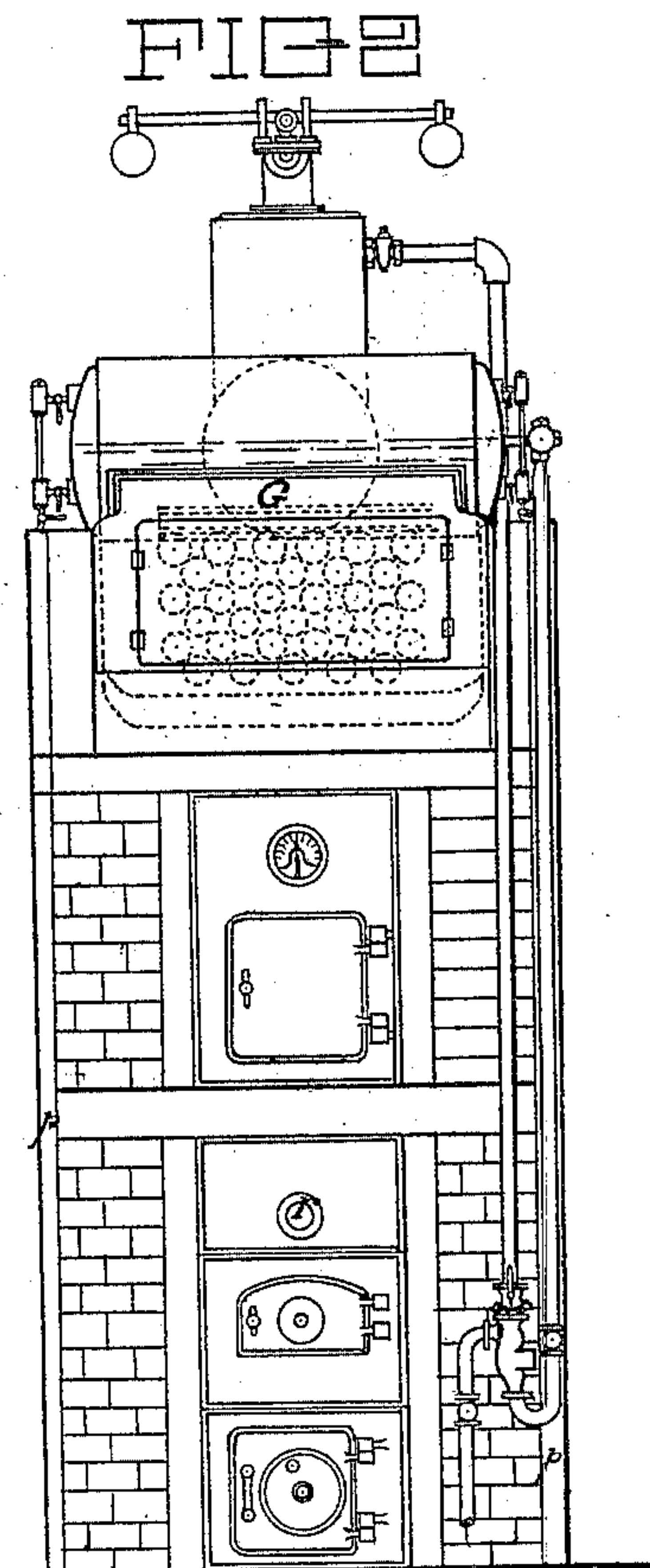
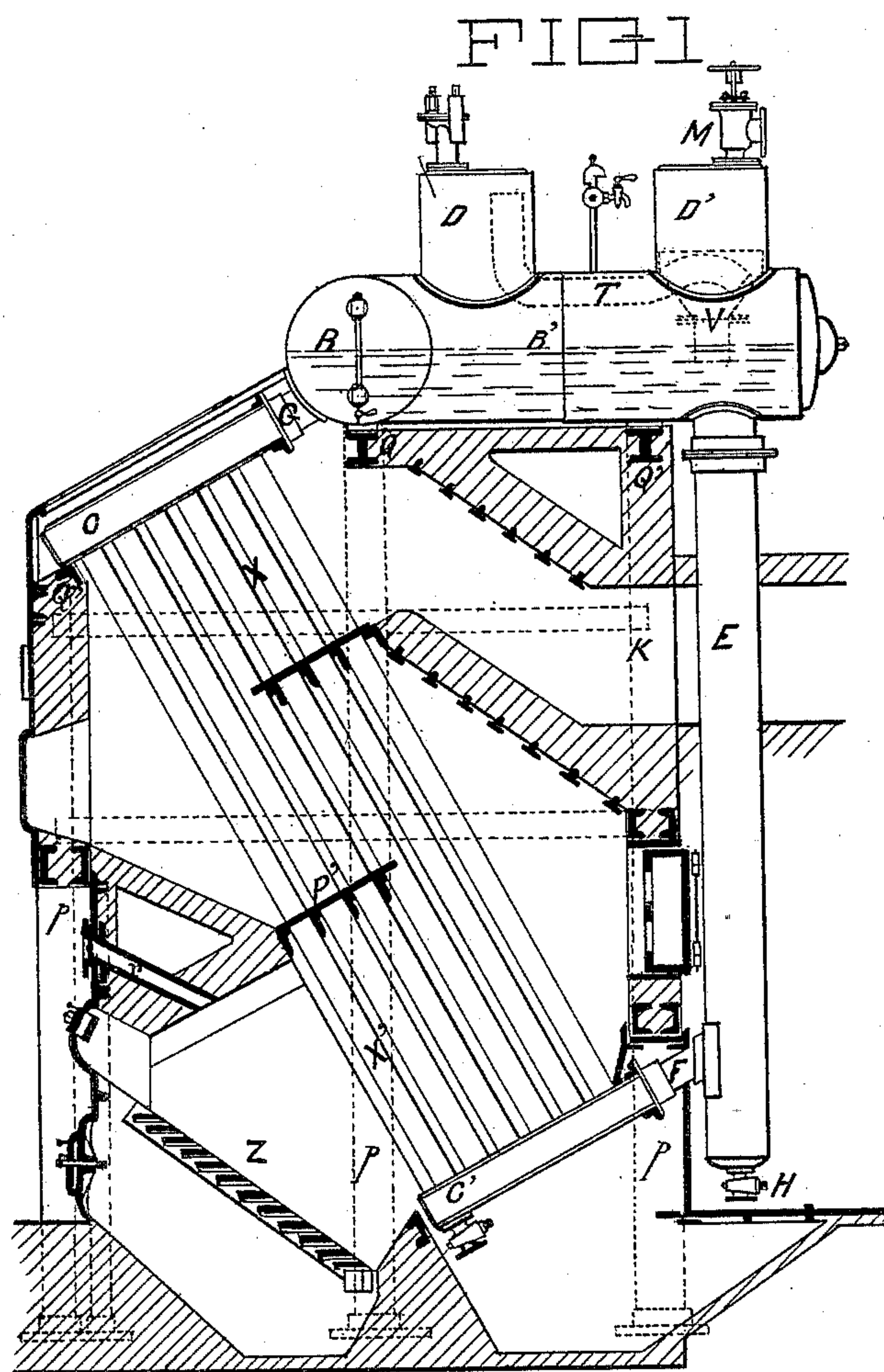
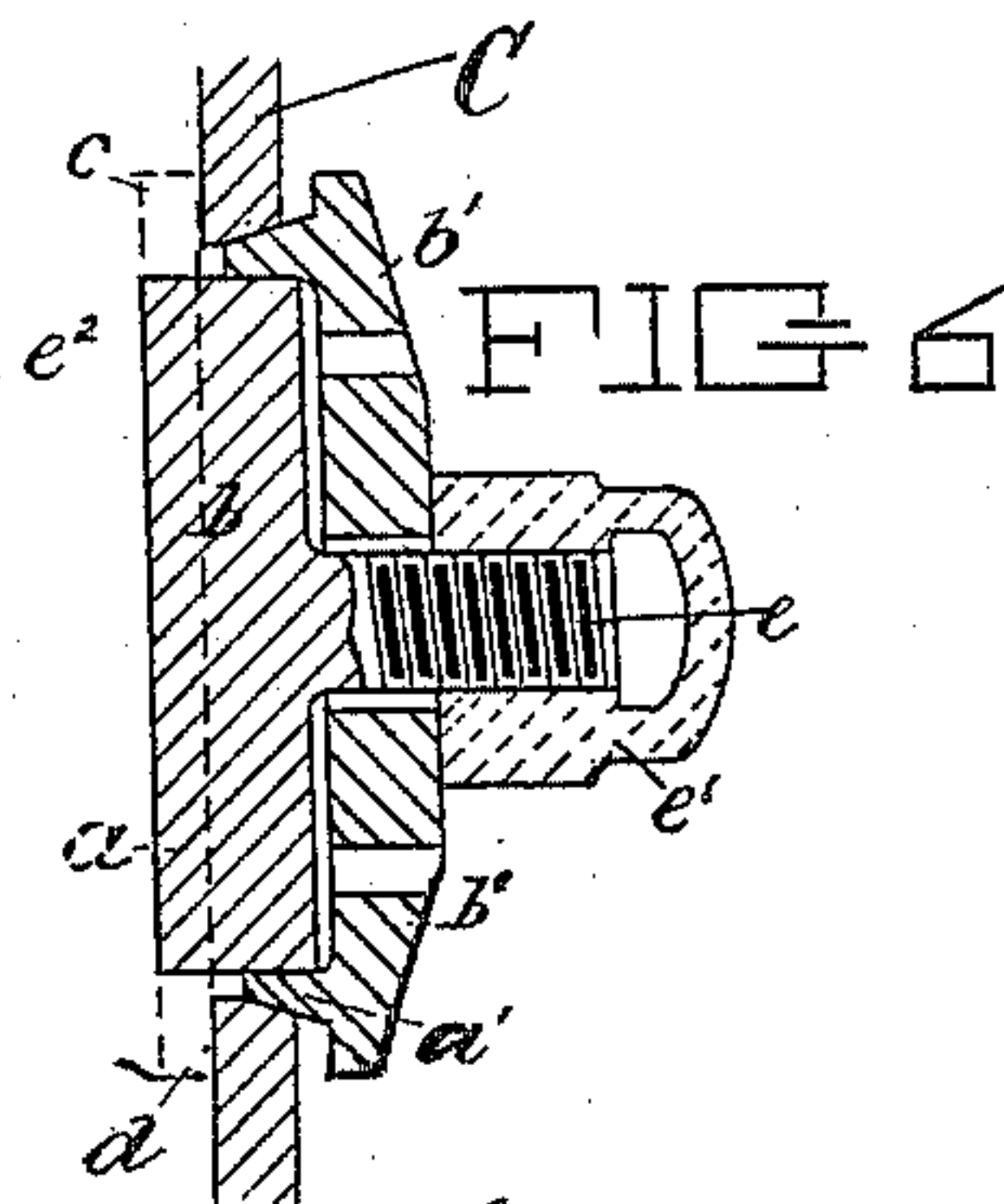
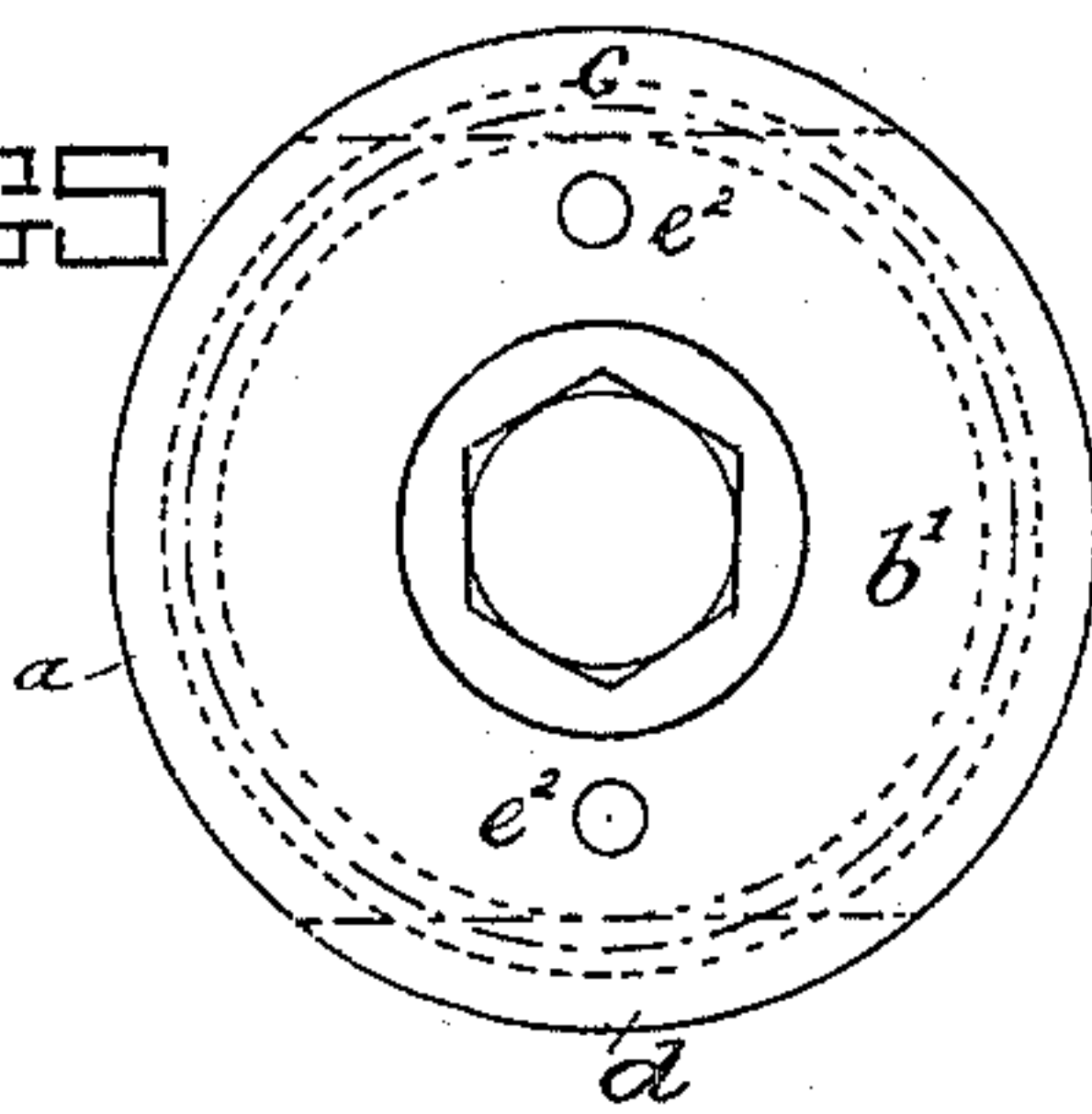


FIG 5



Witnesses:  
Walter Allen  
F. A. Hopkins.

Inventor  
Prosper Hanrez.  
by Herbert W. Jenner.  
Attorney.

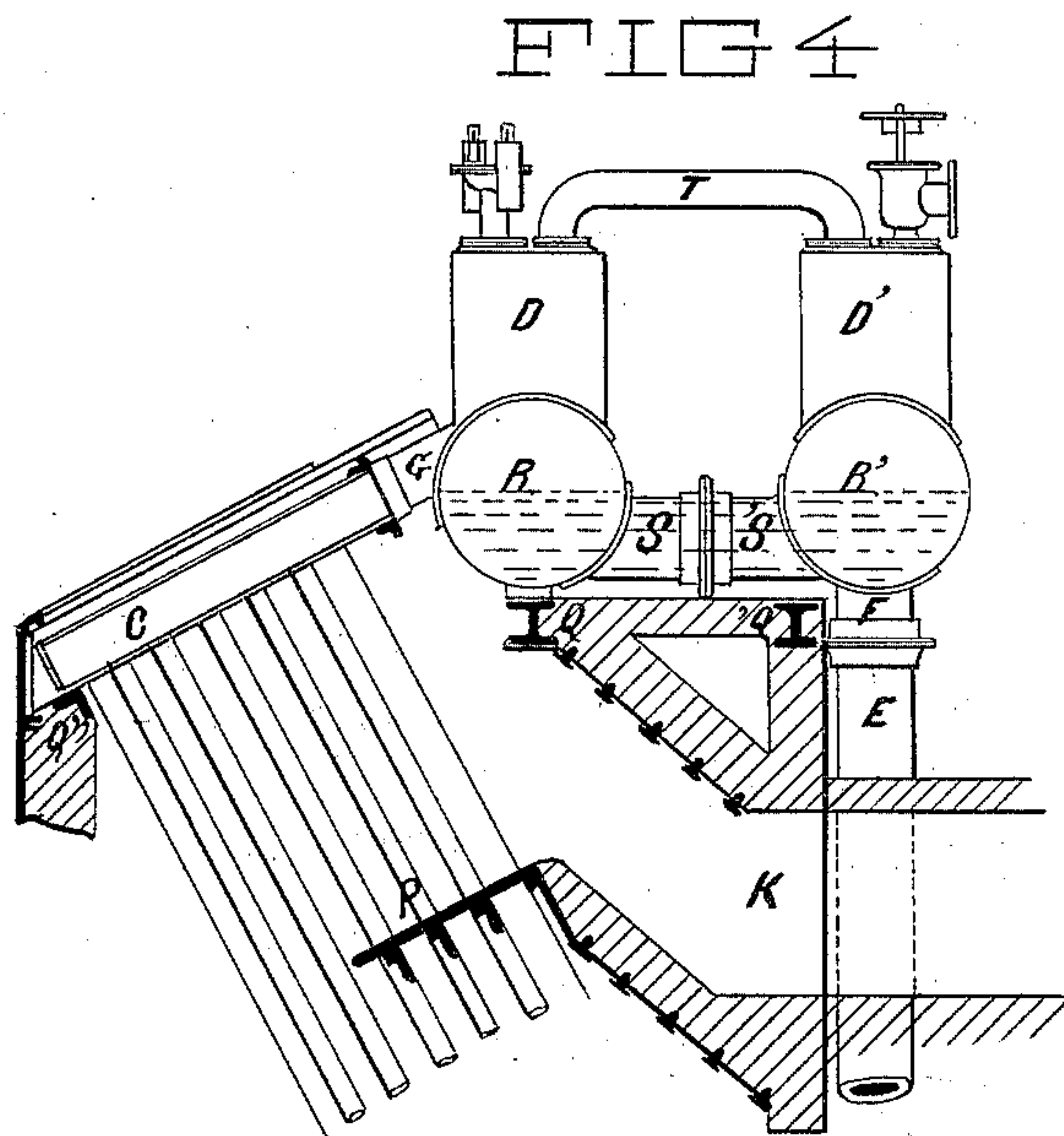
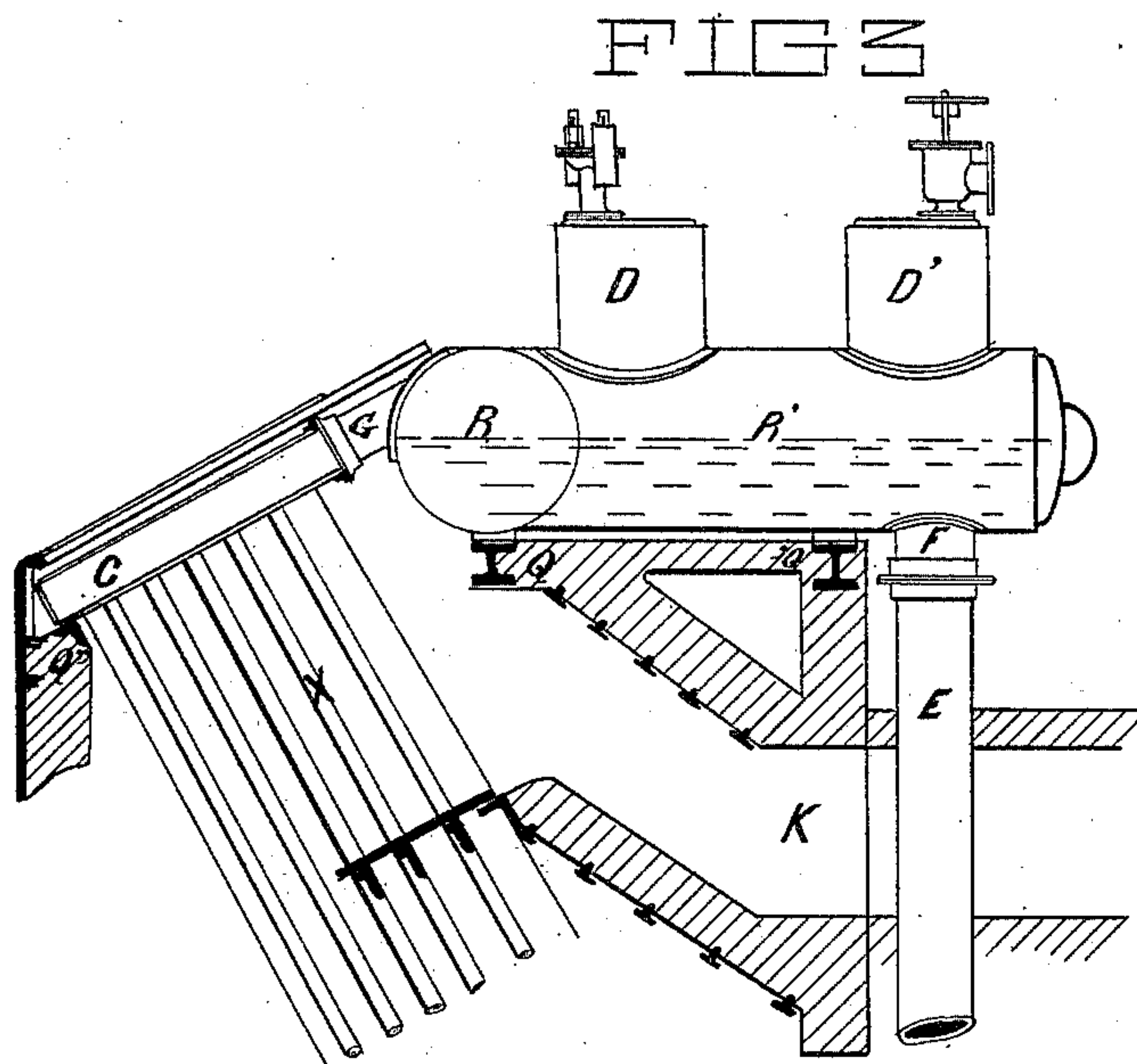
(No Model.)

2 Sheets—Sheet 2.

P. HANREZ.  
STEAM BOILER.

No. 411,191.

Patented Sept. 17, 1889.



Witnesses:  
Walter Allen  
F. A. Hopkins

Inventor  
Prosper Hanrez  
by Herbert W. Jenner.  
Attorney.



# UNITED STATES PATENT OFFICE.

PROSPER HANREZ, OF BRUSSELS, BELGIUM.

## STEAM-BOILER.

SPECIFICATION forming part of Letters Patent No. 411,191, dated September 17, 1889.

Application filed July 2, 1889. Serial No. 316,310. (No model.) Patented in Belgium August 25, 1888, No. 83,025, and in France January 29, 1889, No. 195,700.

*To all whom it may concern:*

Be it known that I, PROSPER HANREZ, a subject of the King of Belgium, residing at Brussels, in the Kingdom of Belgium, have  
5 invented certain new and useful Improvements in and Connected with Steam-Boilers; and I do hereby declare the following to be 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  
10 use the same.

Letters Patent have been obtained for this invention in France, No. 195,700, dated January 29, 1889, and patent of addition to same  
15 dated May 22, 1889, and in Belgium, No. 83,025, dated August 25, 1888, and patent of addition to same, dated May 22, 1889.

My invention consists in certain improvements in and connected with steam-boilers, particularly of the type specified in my patent,  
20 No. 384,972, of June 26, 1888.

The present improvements consist as hereinafter fully described and claimed.

In the drawings, Figure 1 is a vertical section of a boiler constructed on my principle.  
25 Fig. 2 is a front elevation of the same. Figs. 3 and 4 are sections of two other arrangements of steam-receiver. Figs. 5 and 6 show the construction of self-closing cover.

Similar letters denote similar parts in all of these figures.

Referring to Figs. 1 and 2, the columns or beams *p p* rest on the ground and support, with the assistance of the cross-girders *Q Q' Q''*, the tube-box *C* and receiver *R R'*, and since all the other parts of the boiler are fixed to these the whole is supported without the aid of the masonry. The receiver *R R'* is formed in two parts, of which the one *R* has  
40 its axis placed in the direction of the breadth or face of a boiler, and is directly connected by a long extension or intervening chamber to the upper tube-box *C*, in which are fixed the tubes *X*. The other part *R'* of the receiver is at right angles to the first part *R* and carries the domes *D D'*. An internal pipe *T* is arranged to pass into these domes and into the receiver *R'*. It is open at the top of the dome *D* and is curved back toward  
50 the base of the dome *D'*, as illustrated in

Fig. 1, so as to throw down the water carried by the steam into the funnel *V*, the lower end of which is submerged in the receiver *R'*, and the steam rises toward the steam-pipe *M*. The receiver *R'* is joined to the  
55 lower tube-box *C'*, in which are fixed the lower ends of the tubes *X* by the pipe *E*, which is connected to the tube-box *C'* by the tubular extension *F*. A blow-off cock *H* is fixed at the bottom of this pipe *E*.  
60

In Fig. 3 the connection *G* of the box *C*, instead of being connected to the lower part of the receiver *R*, as in Fig. 1, is connected to the upper part of it above water-level. According to a modification of this arrangement  
65 the steam-receiver is formed of two cylinders *R R'*, as illustrated in Fig. 4, having their axes parallel to the front of the boiler, and connected together by the pipes *SS'*, riveted to the lower sides of the two cylinders below water-level.  
70 A pipe *T*, which may be placed either outside or inside, connects the two domes *D D'*, which are riveted on the two receivers *R R'*. In this case the funnel *V* (described in reference to Fig. 1) is dispensed with, not being  
75 required, since the steam only arrives in the dome *D'* after passing through the dome *D*, the water-level being, as described, above the pipes *SS'*. With this arrangement the cylinder *R'* is simply rejoined to the lower box  
80 *C'* by two pipes *E*, which pass on either side of the smoke-flue *K*, and are connected to the box *C'* by two extensions, such as illustrated at *F* in Fig. 1.

A further improvement connected with and  
85 for use in combination with the type of boiler described in my above-mentioned patent relates to the arrangement of fire-grate. The ordinary grate, with bars arranged horizontally or nearly so, has a disadvantage when  
90 used for this type of boiler with water-tubes strongly inclined toward the vertical, in that the flames and products of combustion are too strongly diverted from direct impingement upon the tubes. To obviate this, I have  
95 designed an arrangement which consists in disposing the fire-bars transversely and strongly inclined toward the tubes, thus forming a series of steps with horizontal airways, as illustrated at *Z*, Fig. 1. By this arrange-  
100



ment the draft causes the flames to impinge directly upon the lower part of the water-tubes. In combination with the tube-boxes of this type of boiler I use the construction 5 illustrated in Figs. 5 and 6, of self-closing covers for the holes in the front plate of the boxes C, opposite each tube, to allow access thereto for cleaning and other purposes. The covers are formed of two coned parts  $b\ b'$ , of 10 which the one  $b$  has a horizontal flange  $a$ , larger than the hole to be closed, while the part  $b'$  has a vertical flange  $a'$ , coned on both interior and exterior surfaces, which fits exactly into the hole, which is itself coned in 15 an outward direction, as shown in Fig. 6. In order to get the part  $b$  into the inside from the outside of the box, the sides or parts  $c\ d$  of the flange  $a$  are cut away. The part  $b$  has a central screwed spindle  $e$  passing 20 through a corresponding hole in the part  $b'$ . It is plain that if after introducing the part  $b$  into the box and applying the part  $b'$  the two are forced together by the nut and screw  $e'\ e$  a hermetic closure is effected, 25 all the cones being forced into contact, and the part  $b$  will always be held firmly by internal pressure, its flanges  $a$ , where not cut away, being in contact with the interior surface of the box. Holes  $e^2\ e^2$  are formed in the 30 part  $b'$  to permit the escape of any water or air which may become impounded between the two parts.

What I claim as my invention, and desire to secure by Letters Patent, is—

35 1. In a boiler, the combination, with the steeply-inclined water-tubes and the tube-boxes at each end of the tubes, of a receiver formed in two parts having their respective steam and water spaces in free communica- 40 tion with each other, one of the said parts being connected to the upper tube-box and the second said part being connected with the lower tube-box, and a steam-outlet connected

to the steam-space of the said second part but not directly communicating with the steam- 45 space of the said first part of the receiver, substantially as set forth.

2. In a boiler, the combination, with the steeply-inclined water-tubes and the tube-boxes at the ends of the tubes, of a receiver 50 formed in two parts placed at right angles with each other and having their respective steam and water spaces in free communication with each other, the internal steam-pipe and dip-funnel, a chamber connecting the up- 55 per tube-box to one part of the receiver, a pipe connecting the second part of the receiver with the lower tube-box, and a steam-outlet connected to the steam-space of the said second part of the receiver above the 60 said dip-funnel, substantially as and for the purpose set forth.

3. In a boiler, the combination, with the steeply-inclined water-tubes, the tube-boxes at each end of the tubes, and the receiver 65 communicating with the said tube-boxes, of an inclined fire-grate consisting of a series of substantially horizontal bars arranged in steps below the lower parts of said tubes, whereby the flames are caused to impinge 70 against said tubes, substantially as set forth.

4. The combination, with a tube-box provided with a circular conical hole, of the circular plate provided with screw  $e$  and the flanges  $a$ , the plate  $b'$ , provided with a circular conical flange fitting between said circular 75 plate and the edge of the hole in the tube-box, and a nut screwed upon the projecting end of screw  $e$  and bearing against plate  $b'$ , substantially as and for the purpose set forth. 80

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

PROSPER HANREZ.

Witnesses:

GEORGE BEDE,

AUG. GÉNARD.