

(No Model.)

2 Sheets—Sheet 1.

S. SMITH.

FEEDING AIR TO FURNACES.

No. 300,150.

Patented June 10, 1884.

Fig. 1.

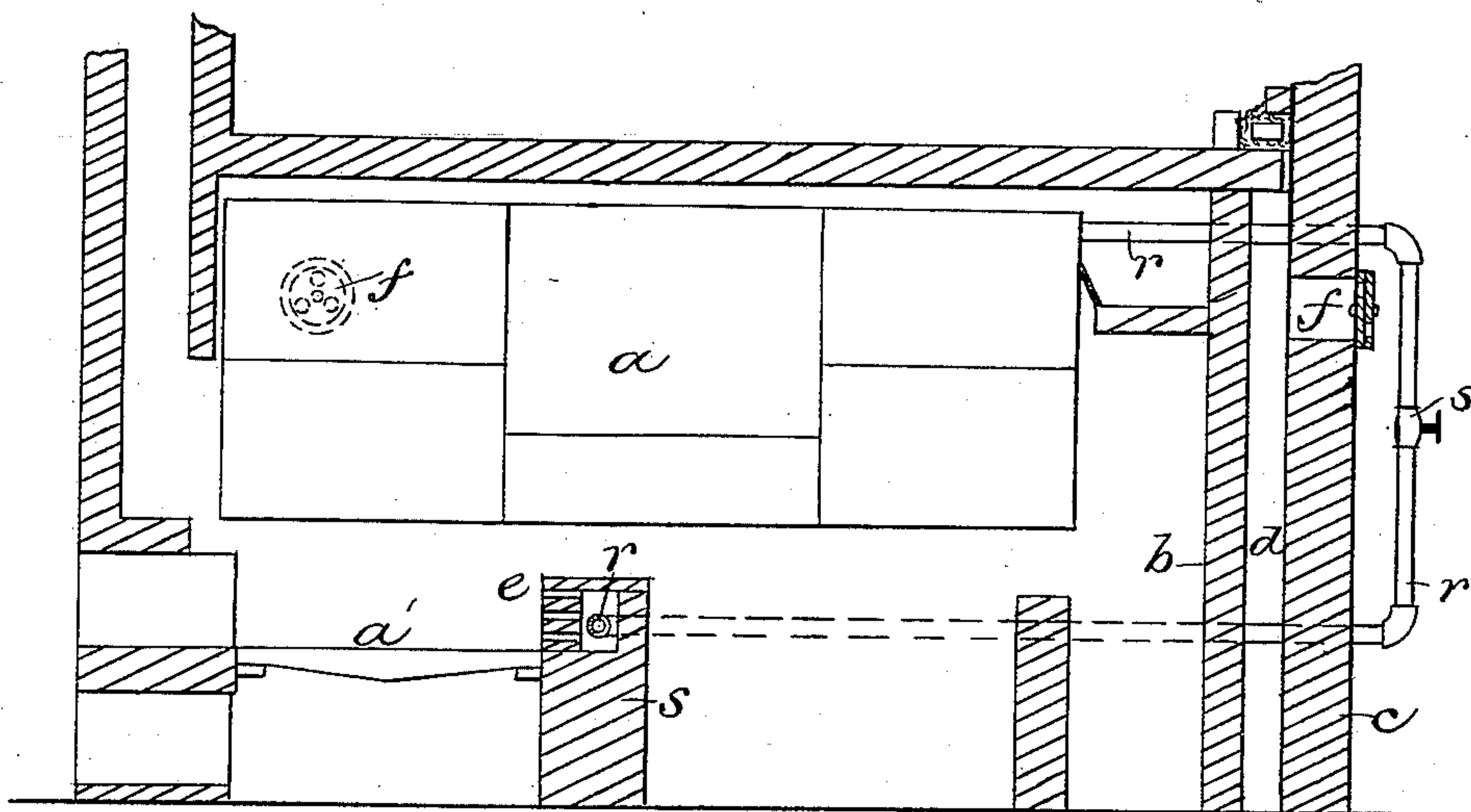
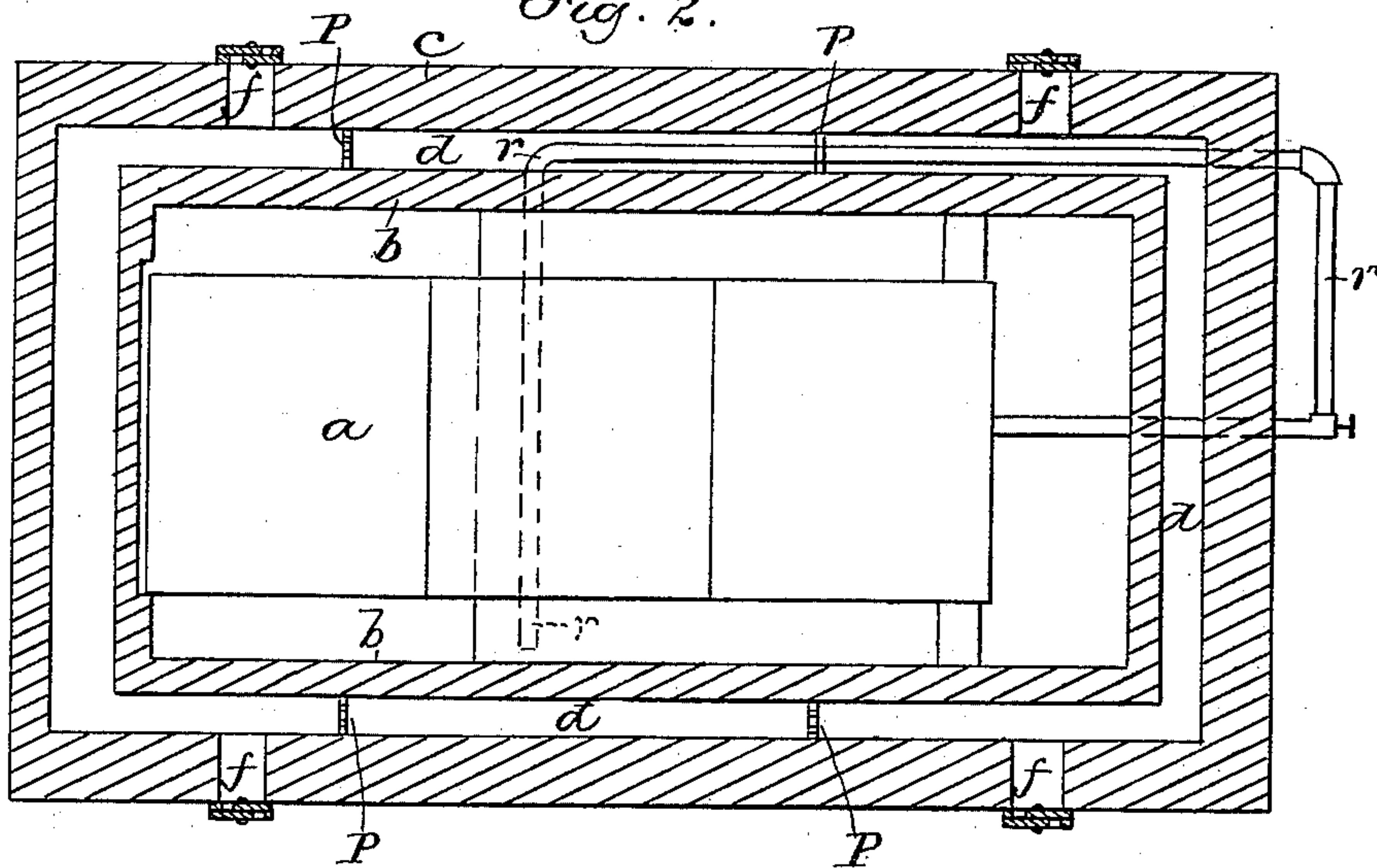


Fig. 2.



Witnesses.

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(No Model.)

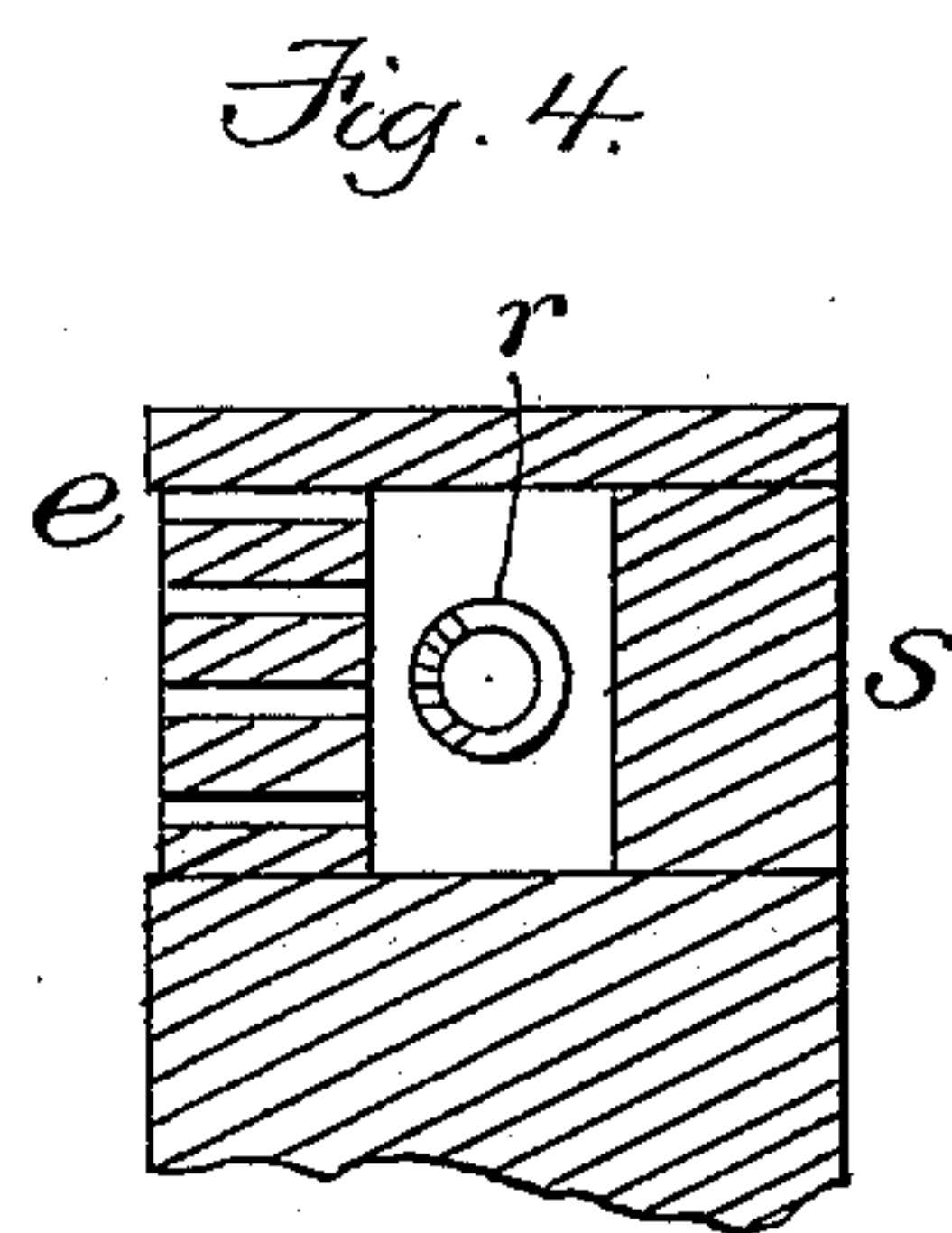
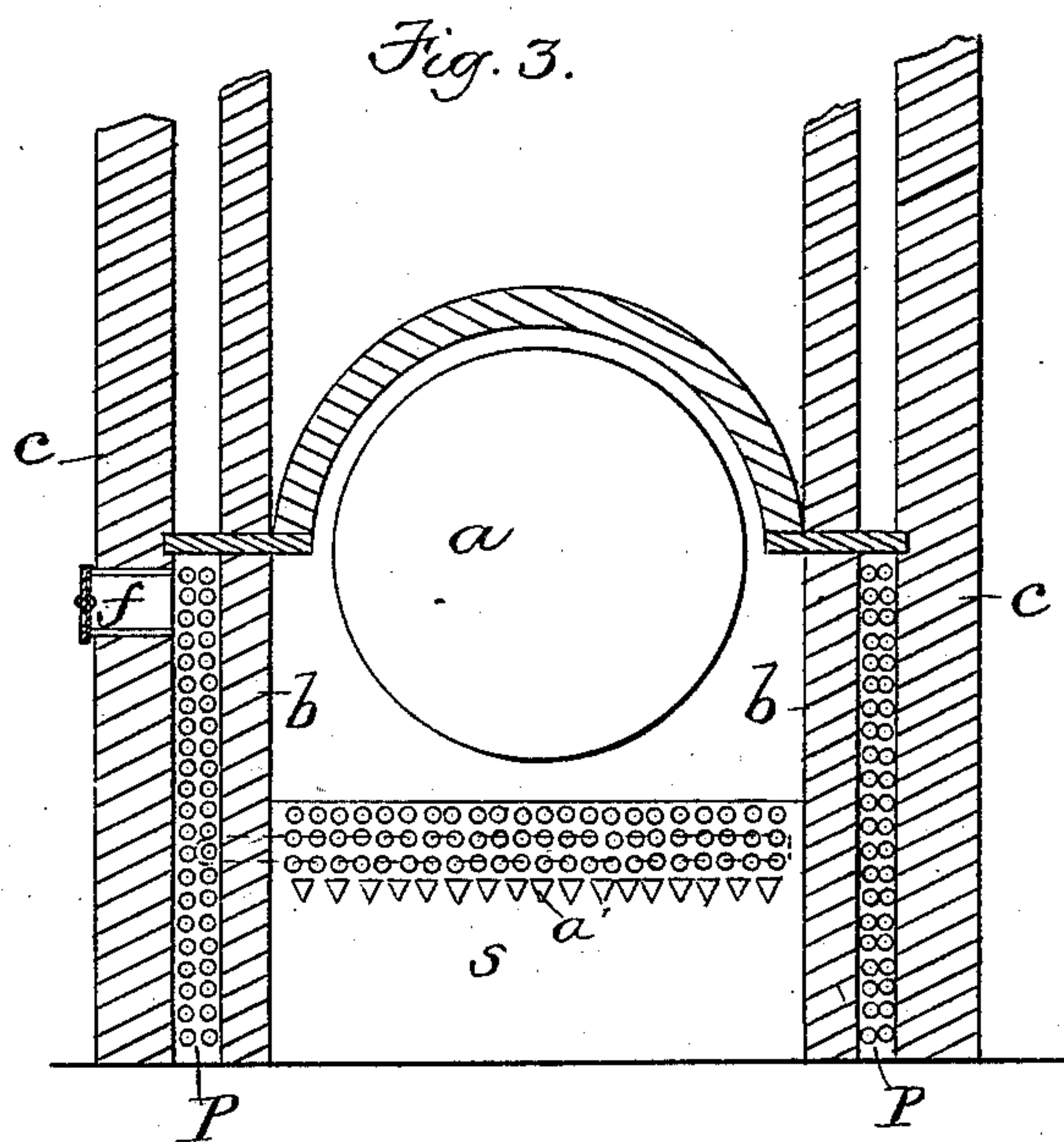
2 Sheets—Sheet 2.

S. SMITH.

FEEDING AIR TO FURNACES.

No. 300,150.

Patented June 10, 1884.



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UNITED STATES PATENT OFFICE.

SIDNEY SMITH, OF CAMBRIDGE, MASSACHUSETTS.

FEEDING AIR TO FURNACES.

SPECIFICATION forming part of Letters Patent No. 300,150, dated June 10, 1884.

Application filed November 6, 1883. (No model.)

To all whom it may concern:

Be it known that I, SIDNEY SMITH, of Cambridge, in the county of Middlesex and State of Massachusetts, have invented certain Improvements in Feeding Air to Furnaces, of which the following is a specification.

This invention has for its object, first, to provide improved means for supplying the furnaces of steam-boilers with heated air to support and promote combustion; secondly, to provide means for supplying superheated steam to such furnaces either alone or mixed with heated air.

My invention consists in the provision of double walls surrounding the boiler and containing an air-space, into which cold external air is admitted and warmed by the conducted heat from the furnace, the heated air passing to the furnace through mixers in the bridge-wall or other suitable part of the furnace, said air-space being provided with perforated distributing-plates between the points where the cold air enters and the heated air is delivered to the furnace, whereby the air is distributed throughout the entire air-space and subjected most advantageously to the heated surface of the inner wall.

The invention also consists in the provision of a pipe communicating with the steam-space of the boiler and extending to points behind the mixers, where said pipe is finely perforated, so as to deliver steam against the highly-heated surfaces of said mixers, through which the steam passes in a superheated condition to the fire, all of which I will now proceed to describe and claim.

Of the accompanying drawings, forming a part of this specification, Figure 1 represents a longitudinal vertical section of a boiler-casing provided with my improvements. Fig. 2 represents a horizontal section of the same. Fig. 3 represents a transverse vertical section, and Fig. 4 represents an enlarged section of the mixer in the bridge-wall.

The same letters of reference indicate the same parts in all the figures.

a represents an ordinary tubular boiler.

b represents a vertical inner wall surrounding the boiler, and *c* represents a larger wall surrounding the wall *b*, and separated from the latter by an air-space, *d*.

s represents the bridge-wall in the rear of the grate *a'*. Said wall is provided with a mixer, *e*, consisting of a plate of suitable refractory material set in the bridge-wall and provided with numerous small perforations extending from an air-passage in said wall to the interior of the furnace, said passage communicating with the air-space *d*. The side walls of the furnace may also be provided with similar mixers, all communicating with the air-space *d*. The outer inclosing-wall, *c*, is provided with registers *f*, (see Fig. 1), through which cold air is admitted to the space *d*, where it becomes heated by contact with the heated inner wall and passes through the mixer to the fire, becoming additionally heated in its passage through said mixer. The fire is thus supplied with hot air. I prefer to place one or more plates or partitions, *P*, in the space *d*, provided with numerous small perforations, said perforations being so located that the air will necessarily pass through the perforations thereof on its way to the mixers. The current of air entering the registers is thus finely subdivided, so that it is more thoroughly and uniformly heated in its passage through the space *d* than would be the case if its volume were unbroken.

r represents a pipe communicating with the steam-space of the boiler, and extending through the air-space *d* into the chamber or passage behind the perforated mixers in the bridge-wall or in the sides of the furnace, or in both. The portion of said pipe extending into the passages behind said mixer is provided with numerous fine perforations, preferably about the size of a needle, for the escape of steam into said passage, the steam mingling with the heated air and passing through the perforations of the mixer to the fire. The pipe *r* is provided with a valve, *s*, located so as to be conveniently reached. When the mixer has become highly heated, and has also heated the pipe *r*, the valve *s* may be opened, so as to permit a small quantity of steam to pass from the boiler to the mixer. Steam at sixty pounds pressure has a temperature of 292½°. The mixer, with a good fire in the furnace, will have a temperature at the inner surface of the perforated wall thereof of 700° or 800°, and would heat the pipe *r* to a tempera-

ture of 300° to 400°, so that the steam will be superheated as it passes into and over the coal in the furnace.

It will be readily seen that the thick perforated plates composing the mixers, exposed as they are to the full heat of the furnace, and being composed of soapstone, fire-brick, or other refractory material, acquire a high degree of heat, and that the steam, coming in contact with the rear surfaces of said plates and passing through the perforations therein, cannot fail to become intensely superheated when it reaches the fire, the result being a great increase in the activity of combustion, as compared with a fire promoted only by hot air through the mixers.

I know that it is not new to supply air and steam in jets to the furnace of a steam-boiler, and that various means for supplying and distributing the same have been patented to James Mahony, No. 240,434, April 19, 1881, and No. 259,325, June 13, 1882. I do not claim anything he shows and claims; but

What I do claim, and desire to secure by Letters Patent, is—

1. The combination, with a boiler, of inner and outer inclosing-walls separated by an air-

space, and having registers for the admission of air, perforated distributing-plates arranged in the air-space, and the mixer or mixers having connection with said air-space, substantially as shown and set forth.

2. The combination of a boiler having inner and outer inclosing-walls separated by an air-space, and with a mixer or mixers having connection with said air-space, registers for the admission of air, and perforated distributing-plates arranged within the air-space, with a steam-pipe extending from the steam-space of the boiler to the space behind the mixers, and having a perforated portion in close proximity to said mixers adapted to mingle superheated steam with the heated air supplied to said mixers from the air-space, substantially as set forth.

In testimony whereof I have signed my name to this specification, in the presence of two subscribing witnesses, this 29th day of October, 1883.

SIDNEY SMITH.

Witnesses:

C. F. BROWN,
A. L. WHITE.