

(No Model.)

J. ABELL.
STRAW BURNING FURNACE.

No. 316,216.

Patented Apr. 21, 1885.

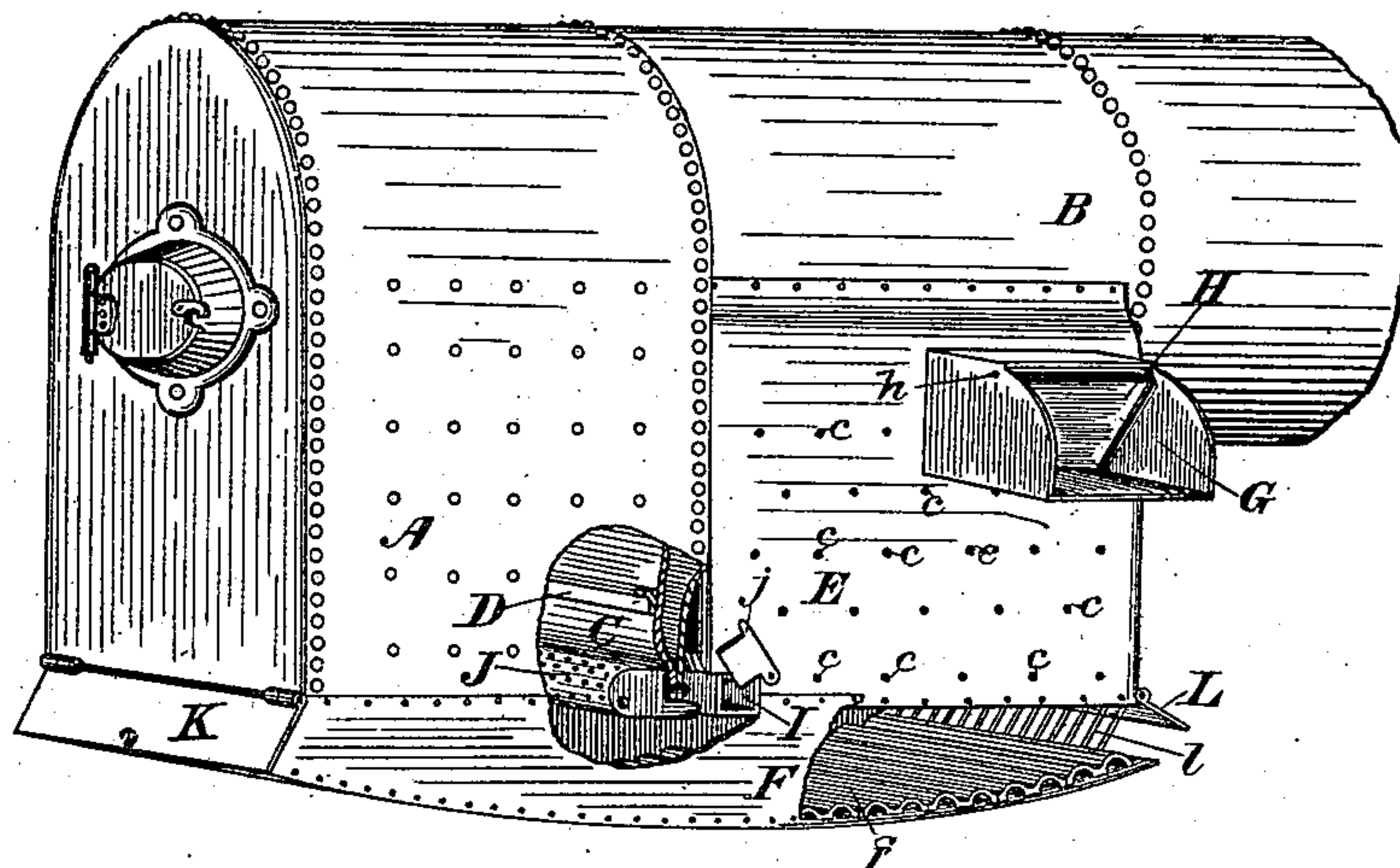


Fig. 1.

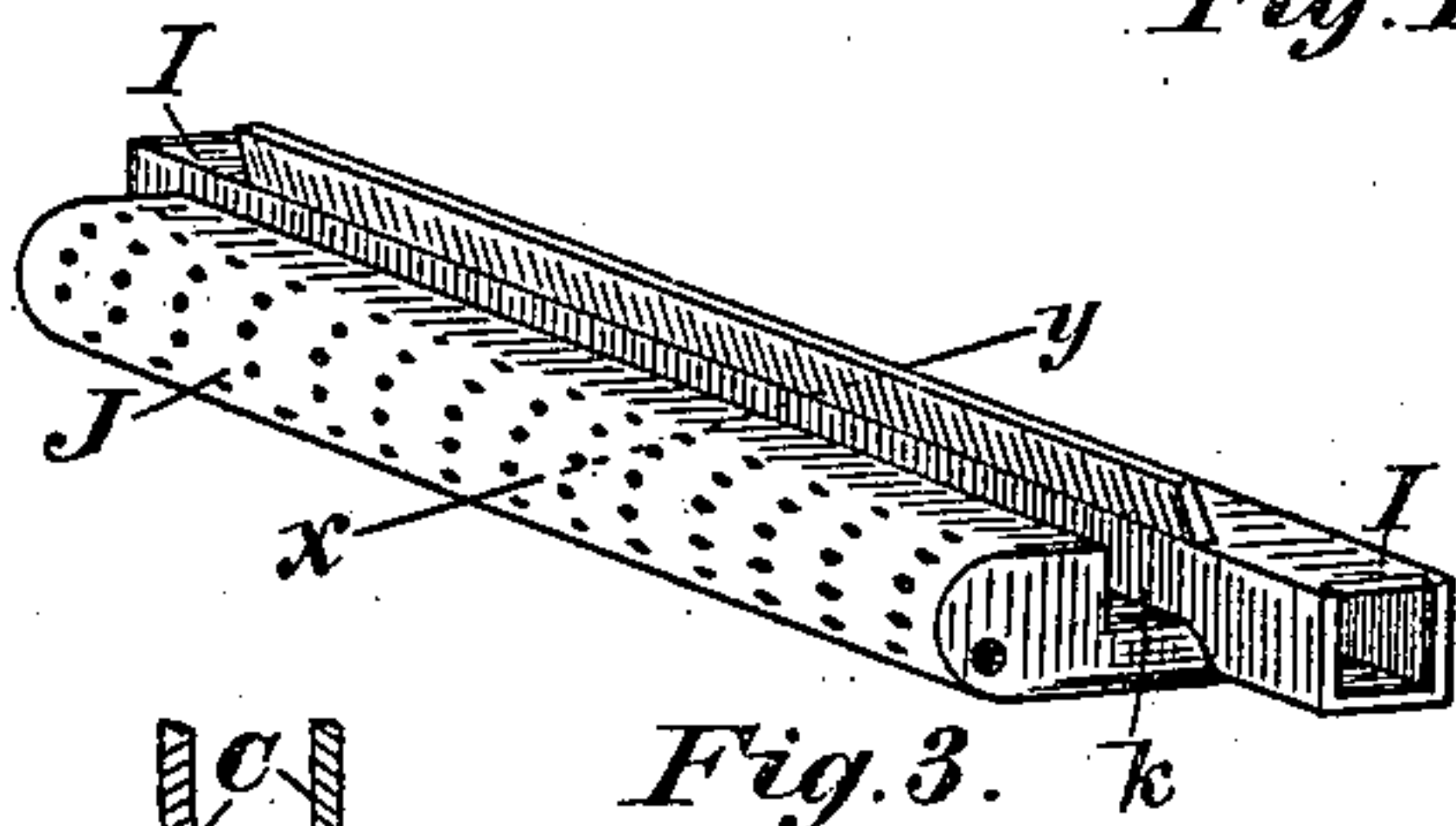


Fig. 3.

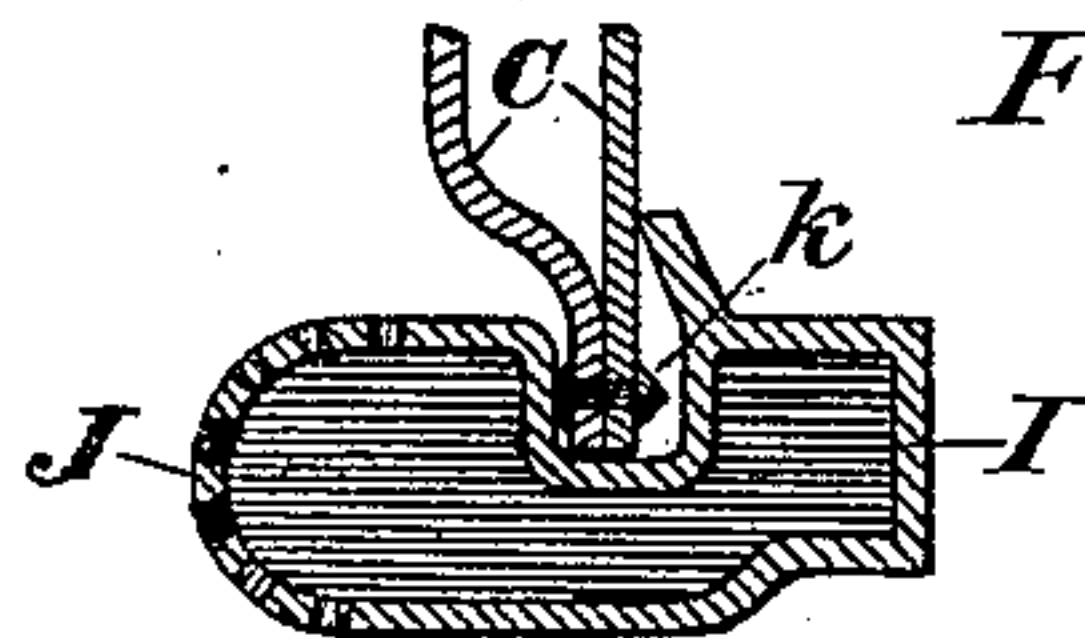


Fig. 4.

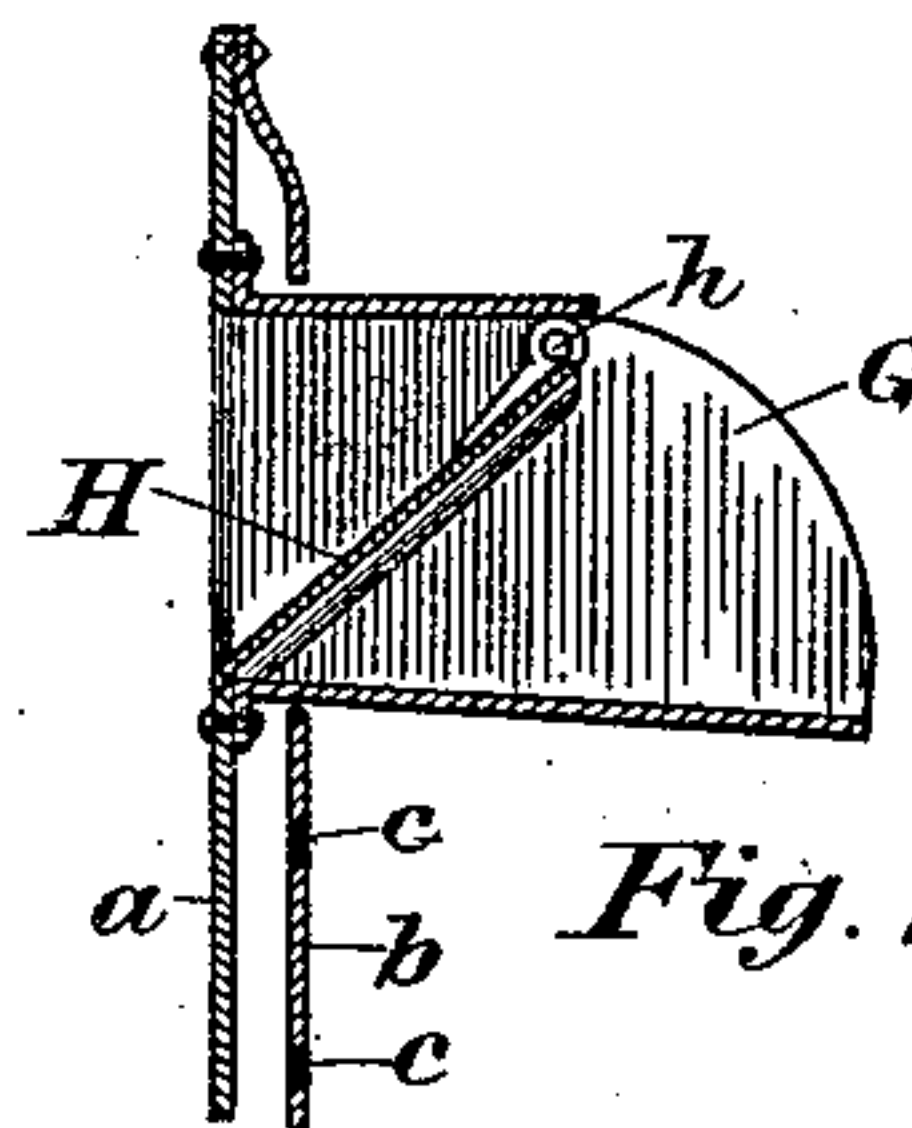


Fig. 2.

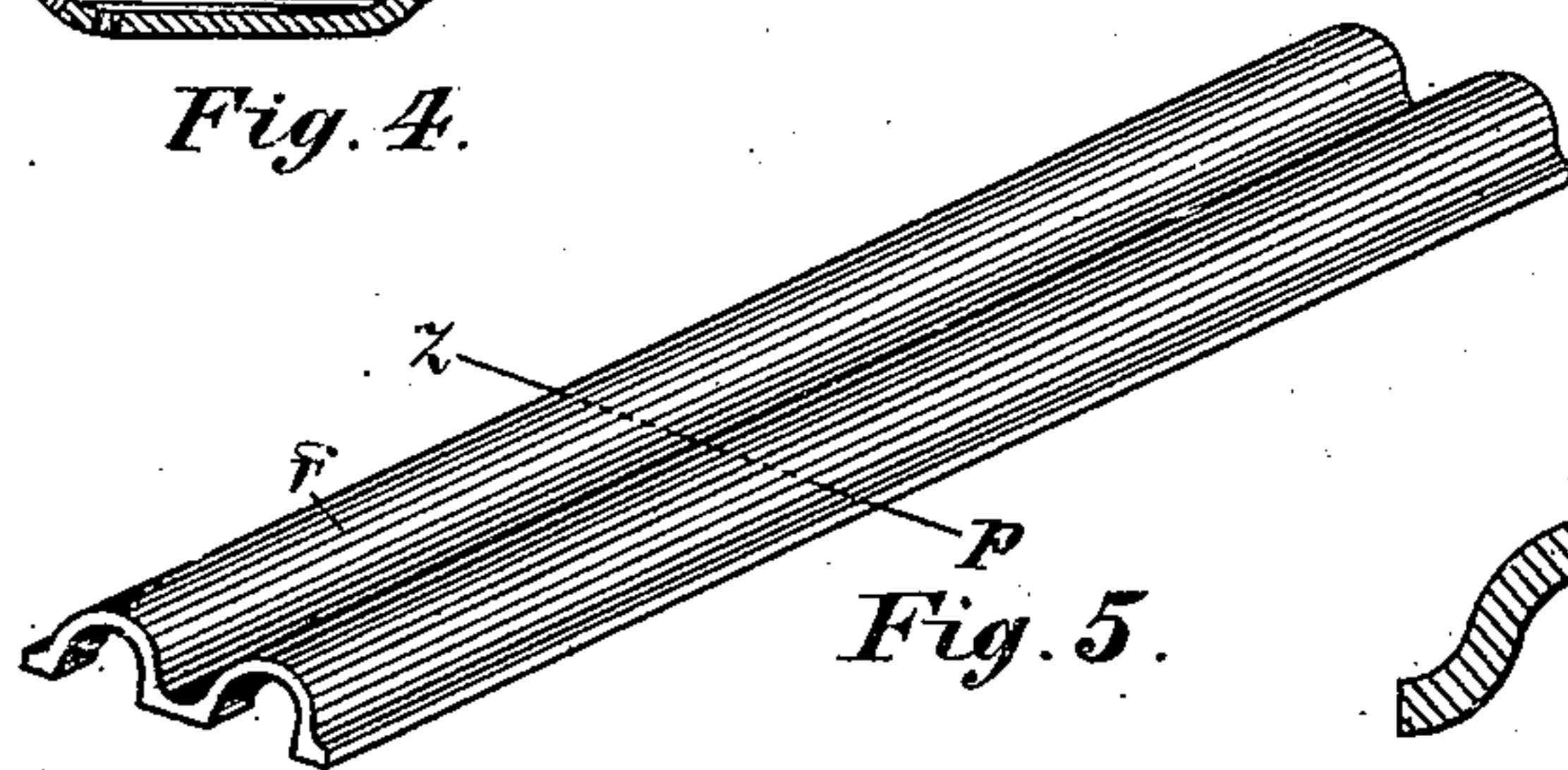


Fig. 5.

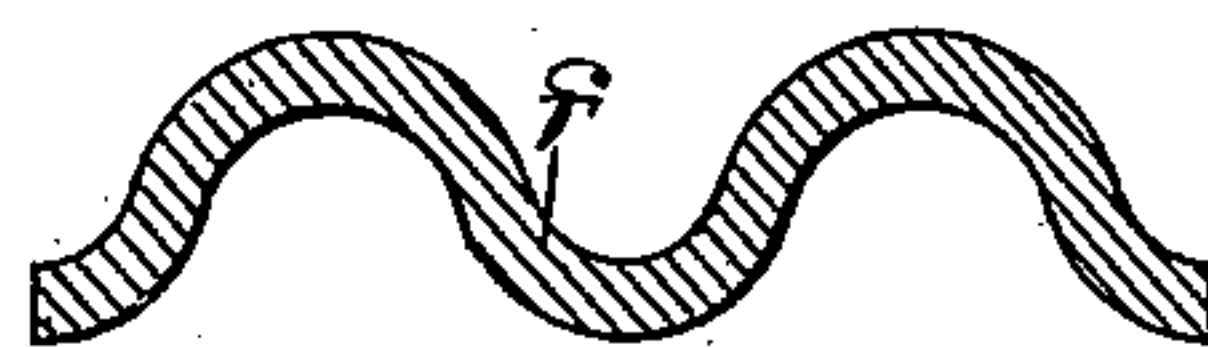


Fig. 6.

Witnesses.

W. J. Graham
Chas. Baldwin

Inventor.

John Abell.
by Douglas C. Ridout & Co.
Attys.

UNITED STATES PATENT OFFICE.

JOHN ABELL, OF WOODBRIDGE, ONTARIO, CANADA.

STRAW-BURNING FURNACE.

SPECIFICATION forming part of Letters Patent No. 316,216, dated April 21, 1885.

Application filed August 25, 1884. (No model.) Patented in Canada September 3, 1884, No. 20,112.

To all whom it may concern:

Be it known that I, JOHN ABELL, of the village of Woodbridge, in the county of York, in the Province of Ontario, Canada, manufacturer, have invented certain new and useful Improvements in Straw-Burning Furnaces; and I do hereby declare that the following is a full, clear, and exact description of the same.

The object of the invention is to construct a steam-boiler in which straw or similar vegetable matter may be used for generating steam as well as coal or similar fuel now generally adopted for that purpose; and it consists, essentially, in constructing the boiler with two distinct furnaces or combustion-chambers, one of which is constructed in the ordinary manner, while the other is specially arranged and adapted to produce the most perfect combustion of straw or similar vegetable matter, the said straw-furnace being provided with peculiarly-arranged dampers and connected to the coal-furnace so that the products of combustion from the straw will pass through the tubes in the same manner as the products of combustion from the ordinary coal-furnace, substantially as hereinafter more particularly explained.

Figure 1 is a perspective view of a steam-boiler, showing the location of the two furnaces, a portion of the figure being made in section, so as to expose sufficient of the interior to exhibit its special construction. Fig. 2 is an enlarged sectional detail of the doorway through which the fuel is fed into the straw-furnace. Fig. 3 is an enlarged perspective detail of the air-chamber arranged to protect the bottom of the leg of the boiler immediately over the passage-way between the two furnaces, and at the same time supply air for accelerating the combustion of the particles of fuel which may escape from the straw into the coal-furnace. Fig. 4 is an enlarged cross-section of Fig. 3 through xy . Fig. 5 is an enlarged perspective detail showing the form of the straw-furnace bottom. Fig. 6 is an enlarged cross-section through zp of Fig. 5.

As the boiler and furnaces are made in all their parts in the ordinary manner, except in the specific details which I illustrate and will particularly describe, it is not necessary to exhibit in the drawings the entire construction

of the boiler and its furnaces, it being sufficient to state that all parts not specially described are to be made in a proper and workmanlike manner according to the construction of similar or corresponding parts in steam boiler and furnaces as now made.

A is an outside view of an ordinary coal-furnace or fire-box connected in the usual manner to the cylindrical shelf B, which is provided with flues of the ordinary description connecting, as usual, with the interior of the furnaces or fire-boxes A. The portion of the leg of the boiler marked C extends below the bracket D, which supports the end of the grate-bars, which, however, are not shown in the drawings. This leg C, which is hollow and connects in the usual way to the interior of the boiler, separates the furnace or fire-box A from the straw-furnace E, except there is a passage-way between the bottom of the leg C and the ash-pan bottom F, which extends below both furnaces A and E. The portion of the ash-pan bottom F below the furnace E has a corrugated plate, f , placed on top of it, so as to catch the burning particles of fuel being consumed in the furnace E. This corrugated plate f is made substantially as shown in Figs. 5 and 6. The ends of the plate, as shown in Fig. 5, are flattened, so as to form bearings to rest on the bottom F, while the bearings of the corrugations are simply ogee in shape, as shown in Fig. 6. This peculiar form of corrugated plate f permits its expansion and contraction without injury. As shown in Fig. 2, the sides of the straw-furnace E are made double, an air-space being left between the two plates a and b , which is provided with fresh air through the holes c , made in the outer plate, d .

The feed-scoop G is riveted to the inner plate, a , as shown in Fig. 2, and is provided with a door, H, which is hinged at h and extends at an angle inwardly, so that it will always close by its own gravity, and consequently will not remain open an instant longer than is necessary to permit the passage of the fuel through the feed-scoop G into the straw-furnace E.

Figs. 3 and 4 exhibit the construction of the air-chamber I J. The portion of this chamber marked I extends to the outside of the furnace E, and its end or ends is or are provided with

dampers *j*, so that the supply of fresh air may at any time be cut off from the said air-chamber. The portion of this air-chamber marked *J* extends into the furnace *A*, and is perforated, 5 as indicated, so as to permit the escape of the air from the chamber *J* into the said furnace.

It will be noticed that the bottom of the leg *C* fits into a recess, *k*, and that an air-chamber, *I J*, constructed as described, forms a complete 10 protection for the bottom of the leg *C*, which might otherwise be injured from the intense heat produced in the passage-way during the consumption of the fuel within the furnace *E*.

Having described the general mechanical 15 construction of the parts of the furnace involved in my invention, a few words will suffice to explain the operation of the furnace and the specific duty of each particular part.

When the furnace *A* is to be used, grate-bars 20 of the ordinary kind are placed in it, which bars rest on the brackets *D* in the usual manner, and the furnace *A* is manipulated exactly in the same way as though no supplemental or straw furnace *E* were attached. When, how- 25 ever, I wish to use the straw-furnace *E*, I remove the grate-bars, close the damper *K*, and open the other damper, *L*, the opening at this latter damper being protected by fingers *l*, so that the loose fuel which may be within the 30 furnace *E* cannot escape, while free admission of air is admitted through the damper. The straw or similar fuel is then fed through the

feed-scoop *G*, and, being set on fire, will consume with great rapidity, the supply of fuel 35 being kept up by feeding through the scoop *G*, the door *H* closing instantly every time that the supply of fuel passes it. The flame from the chamber *E* passes through the passage-way below the air-chamber *I J* into the furnace *A*, 40 and thence through the tubes in the ordinary way. As the flame passes upwardly past the perforated bottom *J* the heated air admitted from the said chamber intensifies the combustion, so as to thoroughly consume all particles 45 of fuel carried by the flame, which would otherwise lodge in the ends of the tubes and destroy the satisfactory operation of the furnace, which has been one of the principal defects in other straw-burning furnaces made previous 50 to my invention.

What I claim as my invention is—

1. The perforated air-chamber *I J*, located on the bottom of the leg *C* between the furnaces *A* and *E*, substantially as and for the 55 purpose specified.

2. A straw-furnace, *C*, provided with a damper, *L*, and fingers *l*, in combination with a corrugated plate, *f*, substantially as and for the purpose specified.

Toronto, August 12, 1884.

JOHN ABELL.

In presence of—

CHARLES CLINTON BALDWIN,
JOHN DOWNEY.