

No. 798,417.

PATENTED AUG. 29, 1905.

C. W. JEWETT.
FIRE BOX AND GRATE.
APPLICATION FILED APR. 23, 1904.

3 SHEETS—SHEET 1.

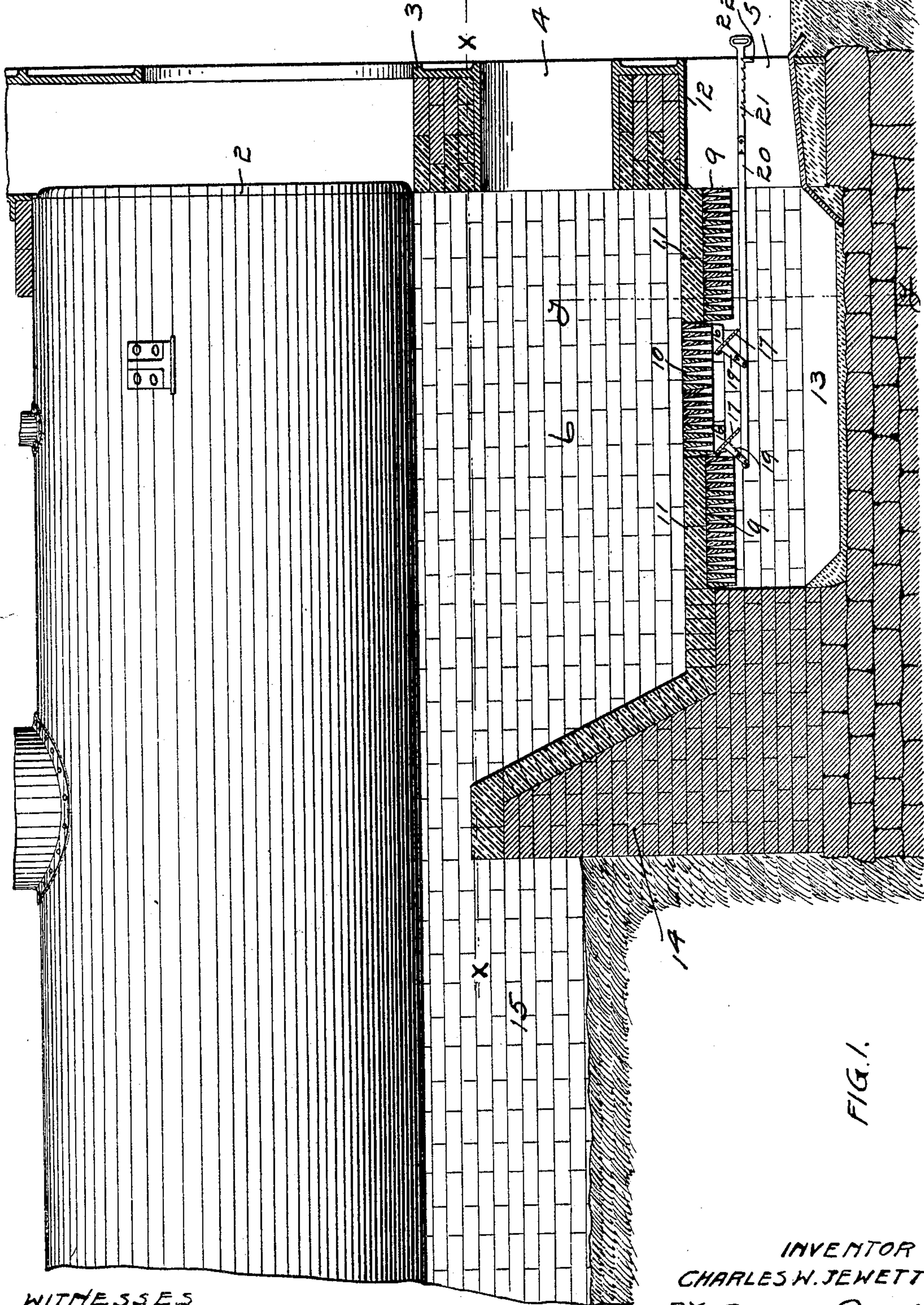


FIG. 1.

WITNESSES
M. M. Davis
M. Hagerly

INVENTOR
CHARLES W. JEWETT
BY *Paul & Paul*
HIS ATTORNEYS

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3 SHEETS—SHEET 2.

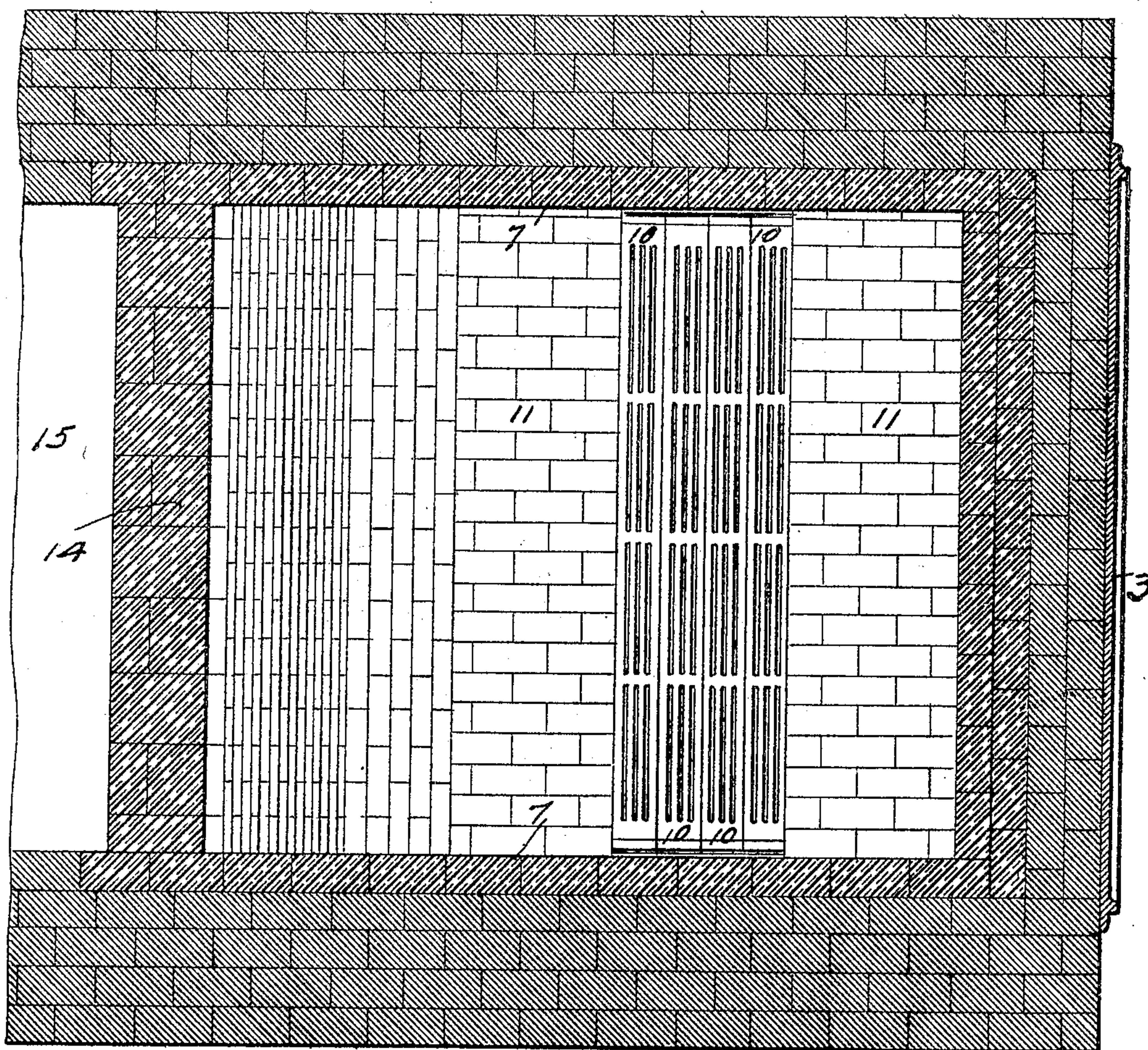
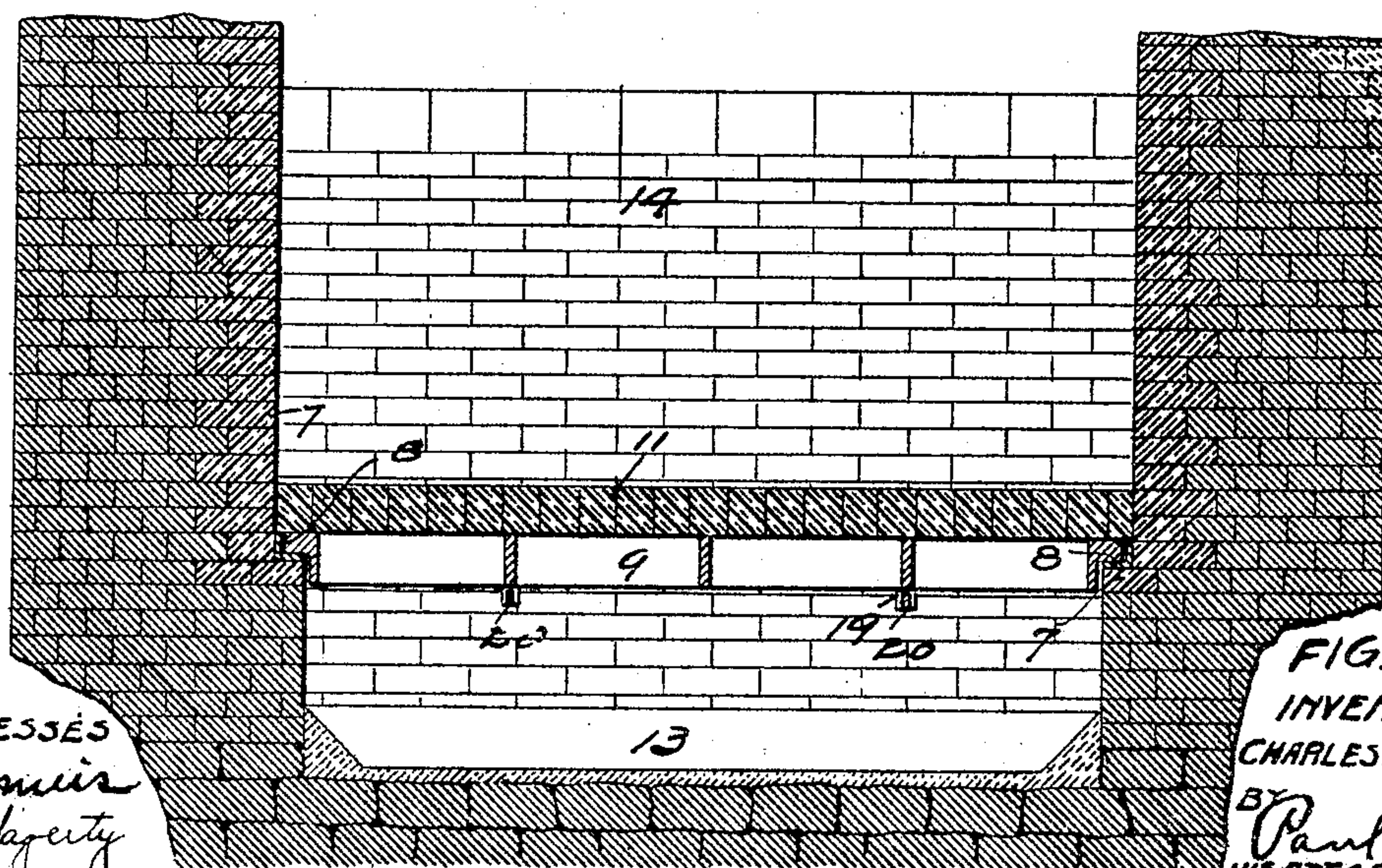


FIG. 2.-x-x



WITNESSES
M. W. Jones
M. Hagerty

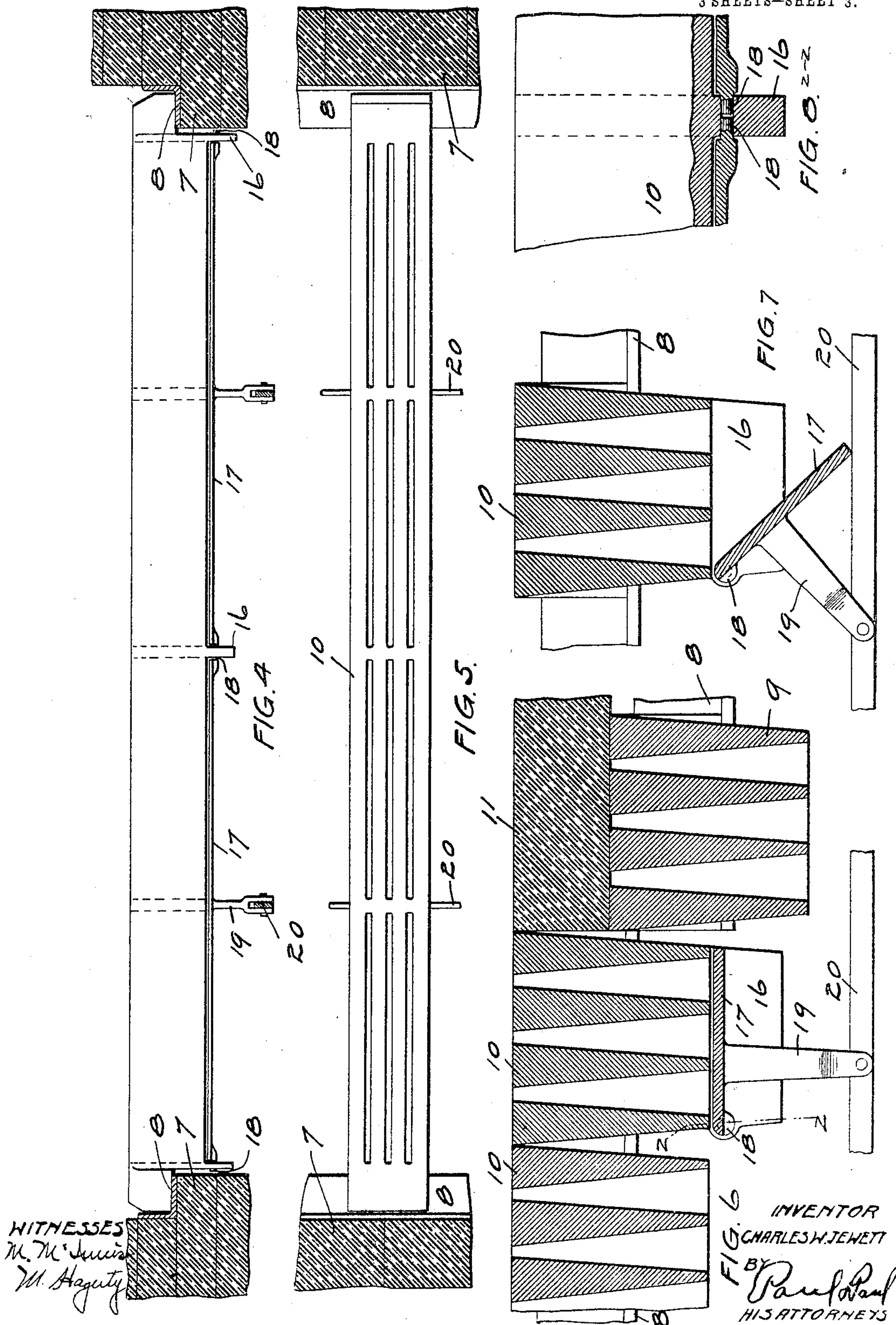
FIG. 3-78
INVENTOR
CHARLES N. JEWETT
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3 SHEETS—SHEET 3.



UNITED STATES PATENT OFFICE.

CHARLES W. JEWETT, OF BLACKDUCK, MINNESOTA.

FIRE-BOX AND GRATE.

No. 798,417.

Specification of Letters Patent.

Patented Aug. 29, 1905.

Application filed April 23, 1904. Serial No. 204,514.

To all whom it may concern:

Be it known that I, CHARLES W. JEWETT, of Blackduck, Beltrami county, Minnesota, have invented certain new and useful Improvements in Fire-Boxes and Grates, of which the following is a specification.

In the operation of a wood-burning boiler great difficulty has been and is now experienced in burning and keeping up steam with semidry or freshly-cut green wood, and some kinds of such wood have been found to be absolutely unfit for use in the fire-box of an ordinary boiler. The result is that steam plants using wood-burning boilers, particularly when located in sections of the country where green wood is much more plentiful than dry, have found it necessary in the successful operation of the plant to keep a large supply of dry wood on hand, in which a considerable amount of money must constantly be invested.

The primary object, therefore, of my invention is to provide a fire-box and grate wherein semidry and green or wet wood can be readily burned without reducing the steam-generating capacity of the boiler or entailing additional labor upon the fireman.

A further object is to effect a saving in the amount of fuel consumed, provide better combustion in the fire-box, and reduce the quantity of ashes resulting therefrom.

A further object is to prevent the boiler-front and grate from becoming overheated and burning out, thereby effecting a large saving in the annual expense of running a steam plant.

A further object is to reduce the radiation of heat from the boiler-front and render the boiler-room more comfortable for those employed therein.

Further objects of the invention will appear from the following detailed description.

The invention consists generally in providing a comparatively large fire-box and closing the grate-surface therein, leaving only a comparatively small open area near the middle of the grate and box.

Further, the invention consists in providing means for cutting off the flow of air through the open section of the grate.

Further, the invention consists in various constructions and combinations, all as here-

inafter described, and particularly pointed out in the claims.

In the accompanying drawings, forming part of this specification, Figure 1 is a longitudinal vertical section of a boiler-setting and grate embodying my invention, the boiler being shown in elevation. Fig. 2 is a horizontal section on the line *x x* of Fig. 1. Fig. 3 is a vertical transverse section on the line *y y* of Fig. 1. Fig. 4 is a detail sectional view showing the grate-section in the fire-box. Fig. 5 is a plan view of the same. Fig. 6 is a detail transverse section of the grate, showing the damper in its closed position. Fig. 7 is a detail sectional view showing the damper in its open position. Fig. 8 is a section on the line *z z* of Fig. 6.

In the drawings, 2 represents a boiler of ordinary type, and 3 the boiler-front, having the usual fuel and ash-pan openings 4 and 5.

6 is a fire-box of more ample dimensions than usual in apparatus of this kind, having at each end abutment-walls 7, supporting angle-bars 8, whereon the grate is arranged.

I have shown the grate composed of three sections, two on the outside, represented by reference-numeral 9, and an intermediate section 10. All of these grate-sections are preferably dropped from six to ten inches below the normal grate-level in a boiler of this type, and the two outside sections are below the level of the middle one and covered with fire-brick 11, whose upper surface is flush substantially with the top of the middle section. (See Fig. 1.) These brick effectually close the outside grate-sections against the passage of air and also prevent air from entering the fire-box between the grate and a wall 12, that separates the fuel and ash-pan openings. The middle grate-section is open to allow the entrance of air into the fire-box and extends the full length of the grate from one side of the fire-box to the other at right angles to the usual arrangement of a grate in a boiler-setting. The effect of this arrangement is to form a close air-tight floor above the grate, leaving only a space open in the middle of the grate and about one-third of its width and above the middle of the ash-pan 13 beneath.

A bridge-wall 14 is provided on the back side of the fire-box, rising to a point near the bottom of the boiler, the area of the space be-

tween said wall and boiler being substantially that of the open section of the grate, as I have found this proportion to be productive of the best results. Back of the bridge-wall I provide the usual combustion-chamber 15. I have found, however, that a greater portion of the combustion will take place within the fire-box.

The effect of closing the surface of the grate on each side of a narrow opening extending through the middle thereof is to very materially increase the natural draft and produce a quicker and more perfect combustion of the fuel. The air rushing through the opening in the grate will have the effect of a forced draft, and I am able to burn wet or green wood and easily make and keep up steam in a boiler with such wood as a fuel as cannot be successfully burned in a boiler-grate of ordinary construction. The bridge-wall is higher than it is ordinarily built and serves to confine the products of combustion in the fire-box and causes the better consumption of the gases therein and conserves a considerable portion of the heat energy that is usually wasted. The air rising through the limited open area of the grate will keep the bottom of the bars cool at all times and prevent them from becoming overheated and burning out. With a strong draft, such as is created in a fire-box and grate of this type, there will be less radiation toward the front of the boiler, and consequently it will not become overheated and burned out, and the expense of maintaining a plant of this kind will be considerably reduced and the temperature of the boiler-room will be far more comfortable than such rooms ordinarily are.

It is desirable in an apparatus of this kind to provide some means for regulating the flow of air through the open grate-section, and I therefore provide a series of depending flanges 16, one preferably at each end and one in the middle of the open grate-section. Between these flanges I provide dampers 17, having studs 18 journaled in said flanges and provided with depending arms 19, to which horizontally-arranged operating-rods 20 are attached. Notched handle-bars 21 are pivotally connected to the outer ends of said bars and are arranged to slide over a plate 22 in the side wall of the ash-pan opening. The dampers are adapted to swing up under the side bars of the open grate-section and close the space between them against the passage of air, and thereby reduce temporarily the open area of the grate, and by this contrivance the person in charge can readily regulate the draft according to the condition of the fire and the character of the fuel being used.

In the operation of the apparatus the fire having been built on the open grate-section and the dampers properly adjusted will as the fuel is added spread over the closed area of

the grate until a bed of coals is formed thereon and kept alive by the air-currents through the open section and from the freshly-supplied fuel.

I have found that any kind of wood can be burned in a fire-box of this type and that not only a cheaper grade of fuel can be used, but a less quantity will be needed to generate the required pressure of steam, and I attribute this result to the better combustion that takes place in the fire-box. I have also found that less labor is required to keep up the necessary pressure of steam and that the expense of fuel is not only considerably reduced, but the incidental expense for repairs arising from the overheating of the grate and boiler-front is very much less than usual in a plant of this kind.

I have shown a grate structure upon each side of the open section; but it will be understood without illustration that any other suitable support for this fire-brick may be employed without departing from my invention, which consists, essentially, in providing a fire-box floor with areas closed against the passage of air and an area that is open to the passage of air.

I claim as my invention—

1. A fire-box having side walls and a front wall provided with fuel and ash-pit openings, and a bridge-wall in the rear of said box opposite said openings, in combination with grate-sections supported by said side walls and having an opening extending across the box from one side wall to the other, there being floors of refractory material such as fire-brick on each side of said sections and on substantially the same level thereof, and the area of the opening in said grate-sections being substantially the same as the area of the passage above said bridge-wall, substantially as described.

2. The combination, with a fire-box having fuel and ash-pit openings, of an open grate-section arranged near the middle of said box and extending transversely thereof from one side wall to the other, imperforate floors of refractory material such as fire-brick provided on each side of said open grate-section and on substantially the same level as said open section and extending across the fire-box from one side wall to the other, and dampers arranged beneath the forward and rear edges of said open grate-section and arranged to cut off the passage of air through the same, and means for operating said dampers, substantially as described.

3. The combination, with a fire-box having fuel and ash-pit openings, of an open grate-section arranged near the middle of said box and extending from one side wall to the other, said section being composed of a series of bars 10, the forward and rear bars being provided on their under side with depending lugs, dam-

pers hinged in said lugs and adapted to be
swung up against the under side of said bars
to regulate the passage of air through the
same, bars 9 provided upon each side of said
5 bars 10 and below the level thereof and also
extending from one side of the wall of the
fire-box to the other, and fire-brick 11 sup-
ported upon said bars 9 and closing them to
the passage of air, and the top of said fire-

bricks being on a level substantially with the 10
top of said bars 10, substantially as described
and for the purpose specified.

In witness whereof I have hereunto set my
hand this 30th day of March, 1904.

CHARLES W. JEWETT.

In presence of—

M. D. STONER,

C. G. JOHNSON.