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PATENTED MAR. 20, 1906.

E. PORRITT.
BOILER AND FURNACE.

APPLICATION FILED AUG. 12, 1905.

2 SHEETS—SHEET 1.

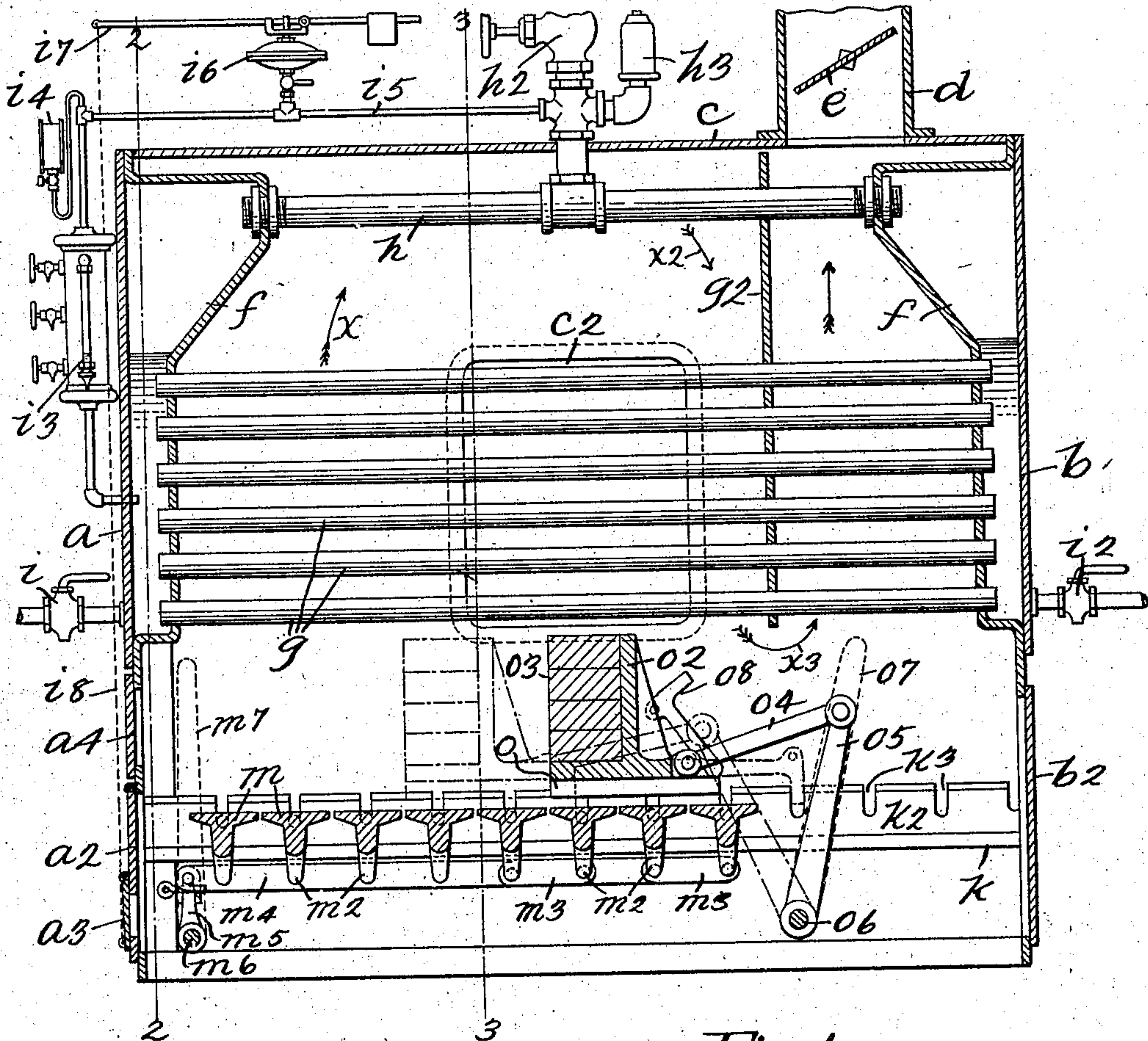


Fig. 1.

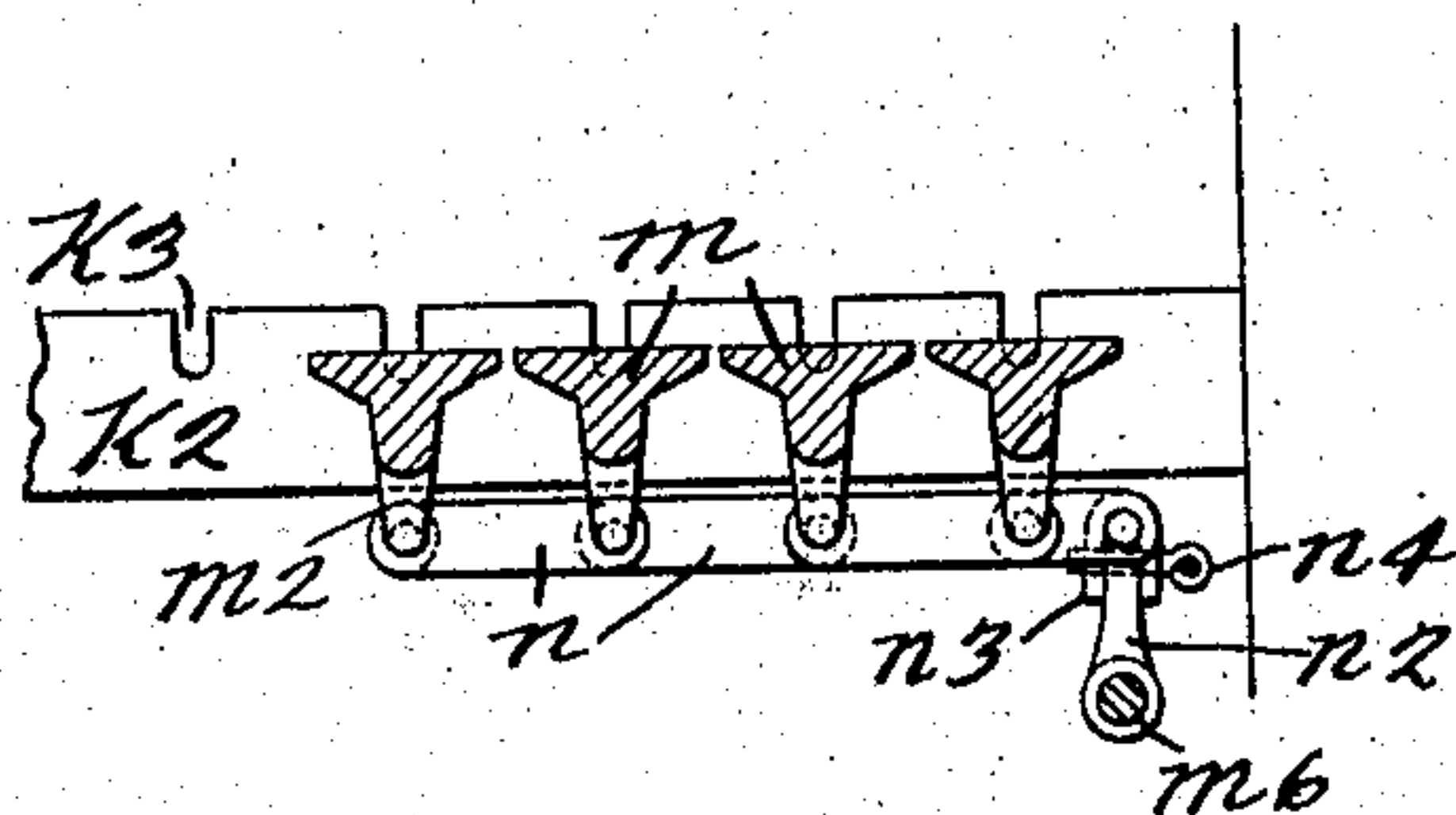


Fig. 4.

WITNESSES

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INVENTOR

BY

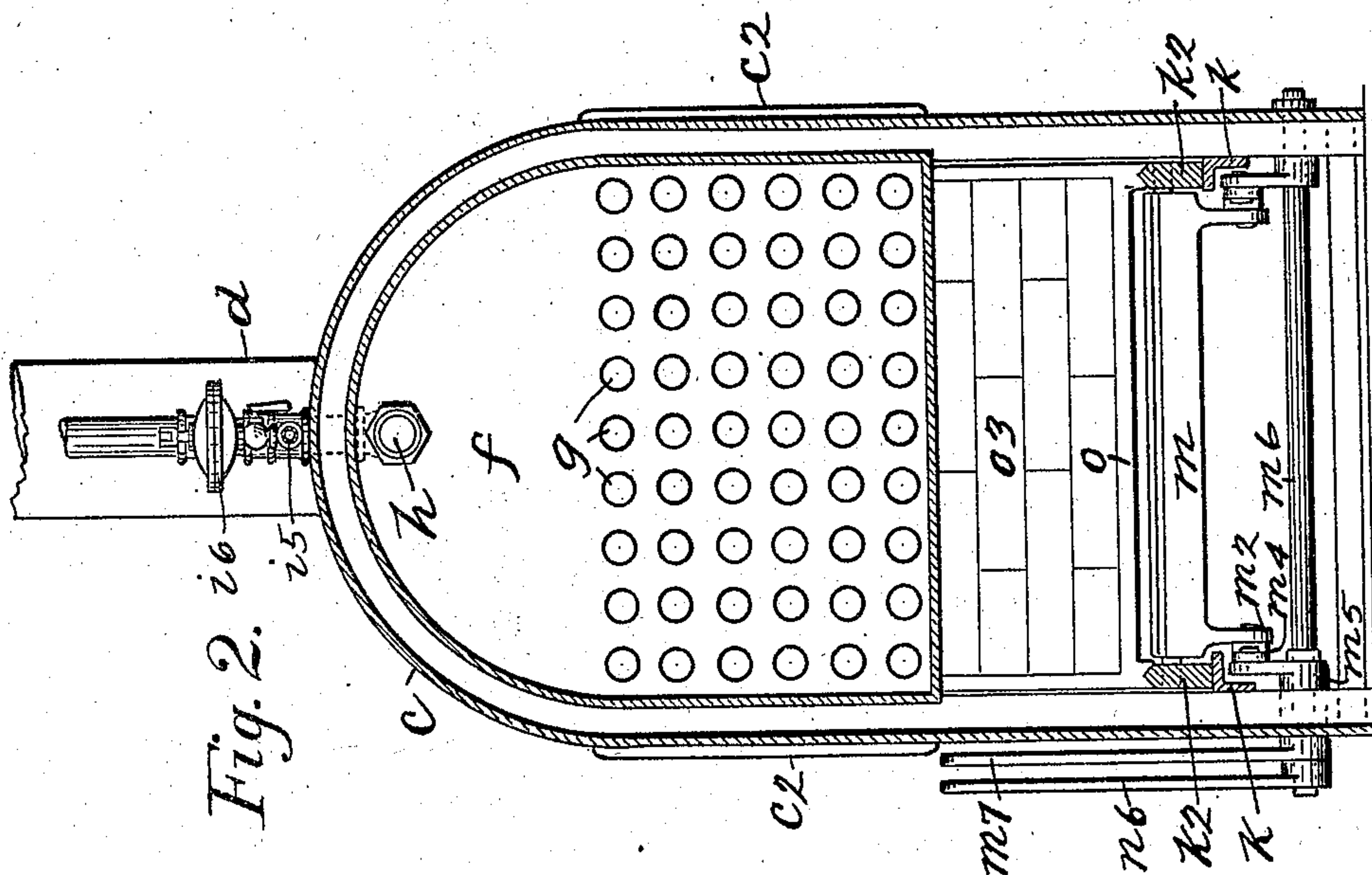
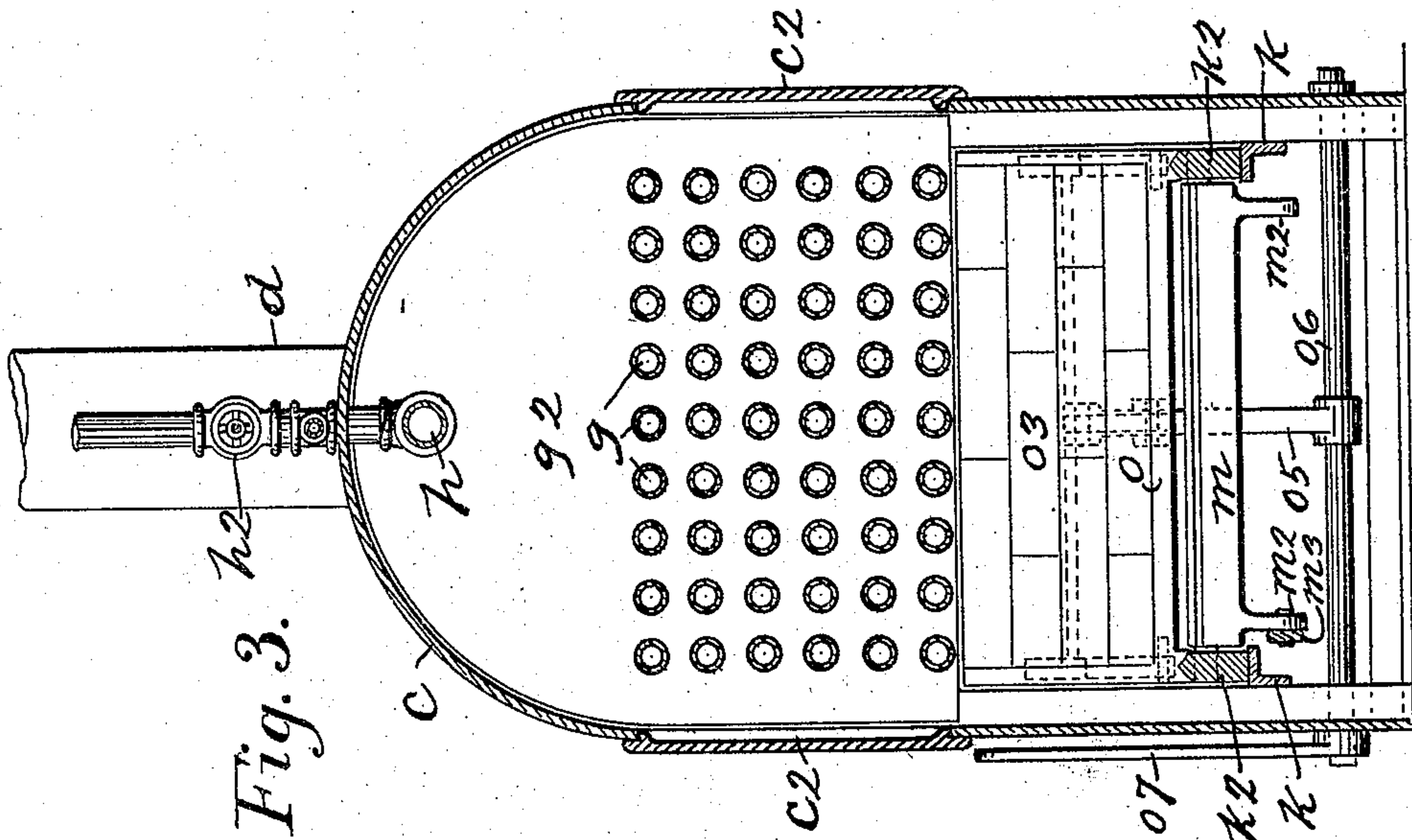
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ATTORNEYS

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2 SHEETS—SHEET 2.



WITNESSES

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UNITED STATES PATENT OFFICE.

EDWIN PORRITT, OF NEW YORK, N. Y.

BOILER AND FURNACE.

No. 815,636.

Specification of Letters Patent.

Patented March 20, 1906.

Application filed August 12, 1905. Serial No. 273,883.

To all whom it may concern:

Be it known that I, EDWIN PORRITT, a citizen of the United States, residing at New York, in the county of New York and State of New York, have invented certain new and useful Improvements in Boilers and Furnaces, of which the following is a specification, such as will enable those skilled in the art to which it appertains to make and use the same.

The object of this invention is to provide a new and improved steam boiler or generator, preferably of the water-tube type, wherein the grate area of the furnace may be varied at will, a further object being to provide a boiler or steam-generator, preferably of the water-tube type, wherein the area of the water-tubes subjected to direct heat may be varied at will, and a still further object being to provide a boiler or steam-generator of the type specified wherein the grate-bars are made readily accessible for substitution or repair and in which the said bars may be agitated or reversed in their entirety or in part from without, if desired; and with these and other objects in view the invention consists in a boiler or steam-generator constructed as hereinafter described and claimed.

The invention is fully disclosed in the following specification, of which the accompanying drawings form a part, in which the separate parts of my improvement are designated by suitable reference characters in each of the views, and in which—

Figure 1 is a longitudinal vertical section taken through a boiler constructed according to my invention; Fig. 2, a section on the line 2 2 of Fig. 1; Fig. 3, a section on the line 3 3 of Fig. 1, and Fig. 4 a fragmentary view of a portion of the grate-bars.

In the drawings forming part of this specification I have shown a boiler and furnace provided with a front plate *a*, a back plate *b*, and a jacket *c*, connecting the same, and the jacket *c* is provided with a flue *d*, in which is mounted a damper *e*. The front *a* is provided, as shown in Fig. 1, with an ash-pit door *a*², upon which is mounted a draft-door *a*³, and said front is also provided with a firing-door *a*⁴, while the back plate *b* is provided with a door *b*² and the jacket *c* with doors *c*², one arranged on each side of the boiler.

Mounted at each end of the boiler and secured to the front and rear members thereof, as clearly shown in Fig. 1, are two casings *f*, which are in communication with each other

by means of the usual water-tubes *g*, and the tops of the casings *f* are connected with each other by means of a steam-pipe *h*, arranged above the water-level of the boiler, and said steam-pipe *h* is provided with a valve *h*² and a safety device *h*³ and is preferably arranged within the jacket *c*, as clearly shown, and one of the casings *f* is provided with an inlet *i*, and the other casing *f* is provided with an outlet *i*², by means of which water may be admitted and removed from the said casings and from the water-tubes *g*.

At *i*³ I have shown a water-gage and at *i*⁴ a steam-gage, which are connected with the pipe *h* by means of a pipe *i*⁵, in which is mounted a diaphragm *i*⁶, provided with an arm *i*⁷, to the one end of which is secured a chain *i*⁸, the lower end of which is connected with the draft-door *a*³, and the damper *e* may also be connected with the diaphragm *i*⁶, if desired, this, however, not being shown in the drawings, as it forms no part of this invention.

Slidably mounted on the water-tubes *g* and on the pipe *h* is a partition *g*², which may be moved backwardly or forwardly thereon either from the doors *c*² or from the door *b*², and when the partition *g*² is moved forwardly the area of the water-tubes *g* being subjected to direct heat is reduced, as will be seen, and when the partition *g*² is moved backwardly the direct heating area of the water-tube *g* is increased.

Arranged on either side of the boiler or in the furnace portion thereof beneath the water-tubes *g* are supports *k*, upon each of which is mounted a bar *k*², which is wedge-shaped on its upper surface, and the bars *k*² extend the full length of the furnace and are slidably upon the supports *k*, as will be readily seen by reference to Figs. 2 and 3 of the drawings, and the bars *k*² are also provided with a plurality of recesses *k*³, which are adapted to receive the ends of grate-bars *m* of any preferred construction, the ends, however, of the grate-bars *m* being circular in cross-section to permit of movement in the recesses *k*³.

The grate-bars *m* are provided with downwardly-directed lugs *m*², and the lugs *m*² of a predetermined number of the said grate-bars are connected at one end of said bars by means of links *m*³, which are in turn connected with a rod *m*⁴, which is pivotally connected with an arm *m*⁵, mounted on a shaft *m*⁶ and rotatable thereon, and the arm *m*⁵ is pro-

vided with a bar m^7 outside of the boiler, and it will be seen that when the bar m^7 is moved a portion of the grate-bars m is agitated or reversed and the fuel thereon is shaken or dumped, as will be understood. The remaining grate-bars m are connected in a similar manner at the opposite ends thereof with links n , which are in operative connection with an arm n^2 , secured to the shaft m^6 , and the shaft m^6 is provided with a bar n^6 at the outer end thereof, by means of which the grate-bars m , connected by means of the links n , may be agitated or dumped, and the connection of the links n with the arm n^2 is detachably made by means of a band n^3 , held in place thereon by means of a pin n^4 . This construction is also applicable to the connection of the rod m^4 with the arm m^5 , and the reason for it will be hereinafter described.

Slidably mounted on the wedge-shaped tops of the bars k^2 is a plate o , provided with an upwardly-directed member o^2 , and upon the plate o are placed the usual fire-brick o^3 , and the usual bridge is formed thereby, and to the rear of the plate o is pivoted a rod o^4 , which is in turn pivoted to an arm o^5 , secured to a transverse shaft o^6 , passing through the furnace and beneath the grate-bars thereof, and the shaft o^6 is provided with a bar o^7 outside of the boiler and by means of which it may be operated, and when the bar o^7 is moved backwardly or forwardly the bridge o is moved correspondingly, and the grate area is increased or decreased correspondingly. Pivottally connected with each side of the plate o at the rearward end thereof are dogs o^8 , which are adapted in their lowermost position to be engaged by the recesses k^3 of the slide-bars k^2 , and the normal position of the dogs o^8 is that shown in full lines in Fig. 1.

If it is desired to remove one of the grate-bars m for substitution or repair or access thereto is desired for any reason, all that is necessary is to open the ash-pit door a^2 , disconnect the grate-bars or their connections from the arms m^5 and n^2 , and then by means of the bar o^7 move the bridge o to its extreme backward position, at which time the dogs o^8 are dropped into the corresponding recesses k^3 , and when the bar o^7 is drawn forwardly the slide-bars k^2 are forced out of the furnace a distance equal to the movement of the bridge o , and if it is desired to draw the grate-bars out a still further distance the same may be done manually, and any one of the grate-bars m may then be removed or said bars may be chipped or scraped very readily.

After the repairs to or scraping of the grate-bars m have been attended to the slide-bars k^2 are forced to their innermost position, as shown in Fig. 1, and the grate-bars m are then in readiness for use and are again connected with the arms m^5 and n^2 , as previously described.

By means of this construction it will be seen that the grate area may be varied at will, as may also the area subjected to direct heat of the water-tubes g , and fire of sufficient proportions may be built to suit the requirements of the weather if my invention is used as a heating-furnace or to generate a given amount of steam-pressure if it is used for any other purpose, and a great economy of fuel results from this construction, not alone because of the reduced grate area, but because of the rapidity with which steam is generated in my boiler.

In practice I prefer to form the upper portions of the casings f into enlarged steam-drums, which are subjected to a portion of the heat, as is also the pipe h , and the steam therein is thereby superheated, and the heat from the furnace flows upwardly in the direction of the arrow x until it reaches the jacket c , at which time it is deflected in the direction of the arrow x^2 and around the bottom of the plate g^2 , as shown at x^3 , and thence upwardly through the flue d . In this manner the portion of the water-tubes g over the available grate-surface is subject to direct heat, the rearward portion thereof in front of the plate g^2 to indirect heat, as is also that portion of the water-tubes to the rear of the plate g^2 . It will be seen that both the steam-drums and the steam-pipe h , as well as the water-tubes, are subjected to some heat for their entire length, and this heat or the degree thereof is variable according to the grate area.

By dividing the grate-bars into separate sets, as herein described, and providing means for agitating and operating each set separately it will be seen that the bridge may be adjusted for the use of the front set of grate-bars only or for the use of both sets of grate-bars or for the use of the front set and a part of the rear set. It will also be seen that by means of my invention ready access to the grate-bars is obtained, and the same may be readily removed from the furnace and replaced, and it will be obvious that the details of the construction shown and described may be modified within the scope of this application, as various changes in and modifications of the said construction may be made without departing from the spirit of this invention or sacrificing its advantages, and, with this reservation,

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

1. In a steam-generating apparatus, a furnace-casing having a front door, side bars movable longitudinally in the opposite sides of the furnace-casing and outwardly through the front door, grate-bars mounted loosely between said side bars and pivottally supported thereby and detachable therefrom and divided into separate sets, one set of said grate-bars being detachably connected with

longitudinally-arranged link members, and the other set of said bars being also detachably connected with other longitudinally-arranged link members, devices on the outer side of the furnace-casing in operative connection with said link members for operating the separate sets of grate-bars separately, a longitudinally-movable bridge mounted on the side bars, and means for moving said bridge longitudinally of said bars over the grate-bars, substantially as shown and described.

2. In a steam-generating apparatus, a furnace-casing having a front door, side bars movable longitudinally in the opposite sides of the furnace-casing and outwardly through the front door, grate-bars mounted loosely between said side bars and pivotally supported thereby and detachable therefrom and divided into separate sets, one set of said grate-bars being detachably connected with longitudinally-arranged link members, and the other set of said bars being also detachably connected with other longitudinally-arranged link members, devices on the outer side of the furnace-casing in operative connection with said link members for operating the separate sets of grate-bars separately, a longitudinally-movable bridge mounted on the side bars, and means for moving said bridge longitudinally of said bars over the grate-bars, and for locking the same in any desired position, substantially as shown and described.

3. In a steam-generating apparatus, a furnace-casing provided with longitudinally-arranged side bars movable outwardly through a front door, a plurality of grate-bars divided into sets and pivotally supported between said side bars and detachable therefrom, each

set of said grate-bars being connected with link members, devices mounted on the outer side of the furnace-casing and in operative connection with the separate link members for agitating the separate sets of grate-bars separately, a bridge movable over said side bars and grate-bars longitudinally of the furnace-casing, means for moving said bridge, and devices for locking said bridge in the desired position, substantially as shown and described.

4. In a steam-generating apparatus, a furnace-casing provided with longitudinally-arranged side bars movable outwardly through a front door, a plurality of grate-bars divided into sets and pivotally supported between said side bars and detachable therefrom, each set of said grate-bars being connected with link members, devices mounted on the outer side of the furnace-casing and in operative connection with the separate link members for agitating the separate sets of grate-bars separately, a bridge movable over said side bars and grate-bars longitudinally of the furnace-casing, means for moving said bridge, and devices for locking said bridge in the desired position, said furnace-casing being also provided in the opposite sides thereof with doors and with a transverse partition movable longitudinally of said casing, substantially as shown and described.

In testimony that I claim the foregoing as my invention I have signed my name, in presence of the subscribing witnesses, this 11th day of August, 1905.

EDWIN PORRITT.

Witnesses:

C. E. MULREANY,
F. A. STEWART.