No. 728,362. PATENTED MAY 19, 1903.

T. R. BUTMAN.

MECHANICAL STOKER.

APPLICATION FILED JULY 22, 1901.

NO MODEL. 2 SHEETS—SHEET 1.

Fig. 1.

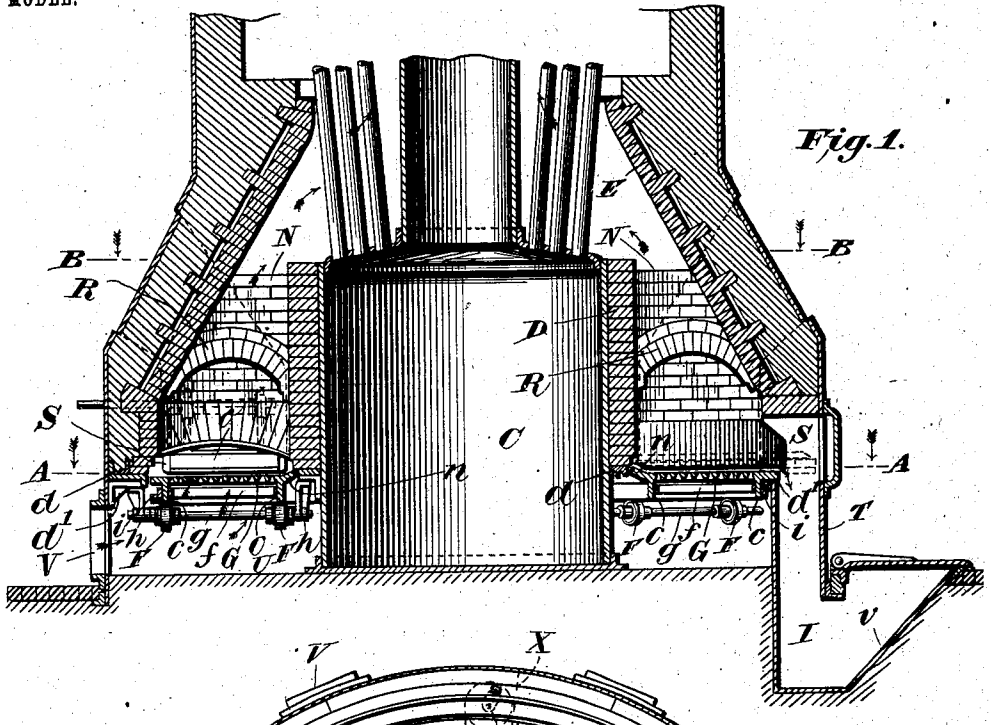
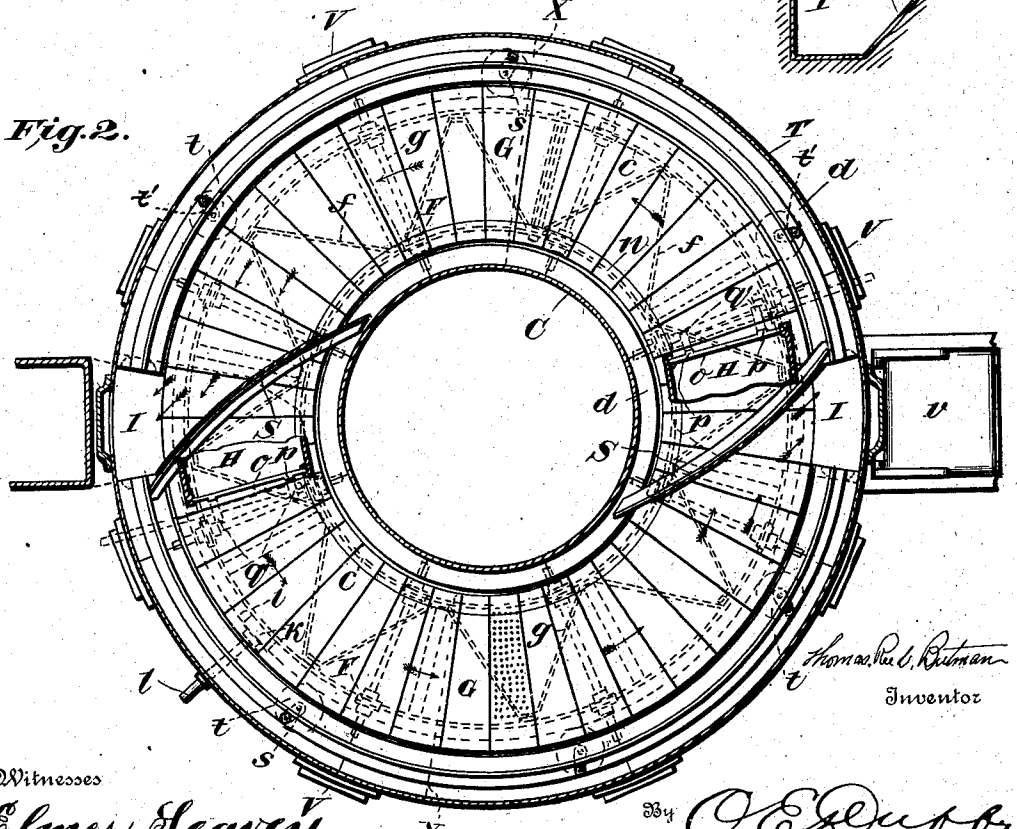


Fig. 2.



Witnesses

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NO MODEL. 2 SHEETS—SHEET 2.

Fig. 4.

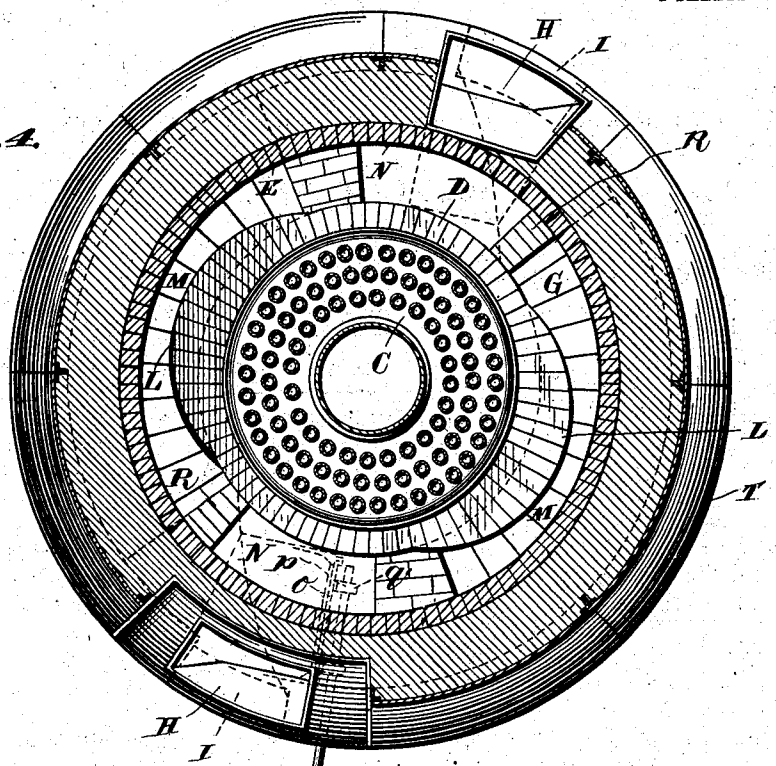


Fig. 5.

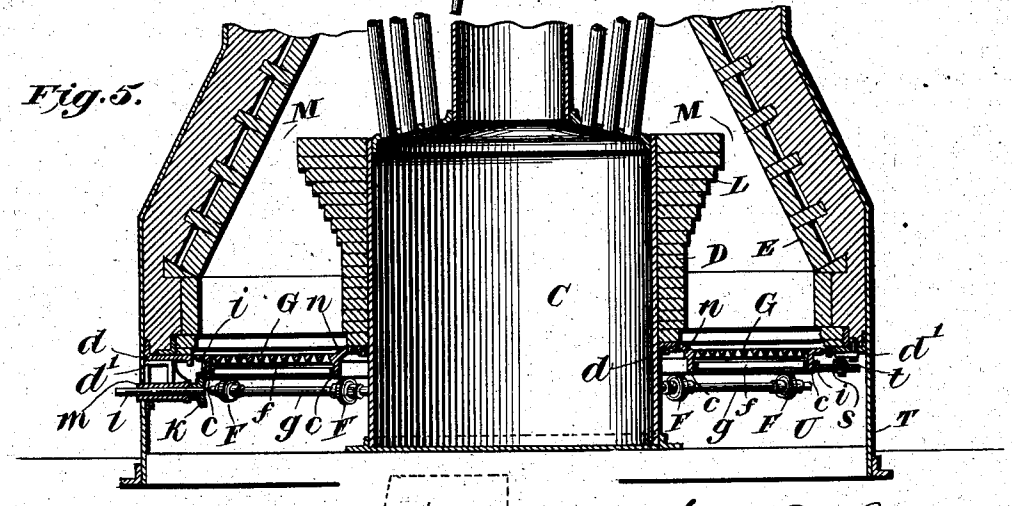
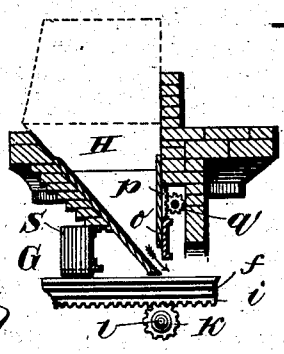


Fig. 3.



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UNITED STATES PATENT OFFICE.

THOMAS REED BUTMAN, OF CHICAGO, ILLINOIS.

MECHANICAL STOKER.

SPECIFICATION forming part of Letters Patent No. 728,362, dated May 19, 1903.

Application filed July 22, 1901. Serial No. 69,172. (No model.)

To all whom it may concern:

Be it known that I, THOMAS REED BUTMAN, a citizen of the United States, residing at Chicago, in the county of Cook and State of Illinois, have invented certain new and useful Improvements in Mechanical Stokers; 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 use the same.

Figure 1 is a vertical section through the furnace. Fig. 2 is a horizontal section through the furnace, taken on line A A, Fig. 1. Fig. 3 is a vertical section through the coal-hopper. Fig. 4 is a horizontal section on line B B, Fig. 1; and Fig. 5 is a vertical section through the furnace, showing the means for rotating the grate and the reduction of the outlet for gases at certain points in the furnace.

My invention relates to improvements in rotary mechanical stokers, designed more particularly for the vertical type of boilers.

It consists of a frame for carrying the grates composed of two rings of different diameters held together by diagonal braces and supported upon roller-bearings and moved horizontally by suitable gear-wheels.

C is the lower drum of a vertical tubular boiler. Surrounding this drum is a fire-wall D, which forms the inner wall of the circular furnace. This wall is supported on the bracket *d*, secured around the drum C. A similar bracket *d* is supported in the outer wall of the furnace and supports the outer fire-wall E of the furnace. Between the fire-walls, near their base, is located the grate-supporting frame, which consists of two rings *c c*, which are secured together by the diagonal braces *f f*. (Shown in Figs. 1 and 5 and in dotted lines in Fig. 2.) This frame is supported on the wheels F F on the shafts *g g*, which are journaled in the bracket-bearings *h h*, that are secured to the brackets *d' d'*. On the outer ring *c* is secured a continuous rack *i*, with which meshes the pinion *k* on the shaft *l*, journaled in the bracket-bearing *m*. It will be seen that upon revolving the shaft *l* by any well-known means the frame will make a continuous rotary motion. Upon the rotatable frame are placed the grates G, which in this instance are shown to be perforated segmental plates. The inner edges *n* of the segmental plates incline upward at an angle, thereby preventing the fuel from coming in contact with the inner wall of the furnace while the grate is rotating, and outer end has a flat and perforated surface for the same purpose.

Located above the surface of the annular rotating grate are placed, preferably at opposite points, the fuel-hoppers H. These hoppers are provided with controlling-gates *o o* for regulating the distribution of coal upon the grate, the gate being operated by a rack *p* and pinion *q*, the shaft of the latter projecting outside of the furnace-walls. The discharge-mouth of these hoppers is narrower than the length of the grate-bars, so that the coal will not be discharged against the walls of the furnace.

Immediately back of each hopper H is located a scrape-plate S, placed diagonally across the rotating grate and at a suitable angle and position to intercept and transfer to the outer edges of the grate the ash and clinkers resting thereon and discharge the same into a pit I. The pit is fitted with a dove-fitting door *v*. Upon the under side of bracket *d'* is also secured the shaft *s* for the guide-wheels *t* of the rotating grate-frame. These wheels prevent any lateral movement of the grate while rotating and are adjustable and eccentrically attached, being carried by the link *t'*.

One hopper may be sufficient to supply the fuel to the grate; but two or more are preferable, as they permit of a much slower movement of the rotary grate. It will be seen that the annular grate surrounds the lower drum or shell of the boiler and that the inner wall of the furnace abuts against the drum and is supported by brackets riveted to the same. The outer inclosing wall is of circular construction with cone-shaped top, so inclined inwardly as to form a combustion-chamber, with annular space for discharging the heated gases in such a manner as to cause them to impinge effectively upon the heating-surface of the boiler. The fuel is supplied from the hoppers and is carried forward by the rotating grate. Some time will elapse before it is in an active state of combustion, and as it approaches the scraper-plate the energy of combustion is exhausted, and for these rea-

sons the temperature at each extreme will be much lower than in the intermediate space. Therefore in order to uniformly distribute the heat to the boiler from the point of most intense combustion the inner wall is so constructed as to gradually approach the outer wall and form a smaller opening for the escape of the heated gases directly over the point of intense combustion, causing said gases to seek a freer outlet over the portion of the furnace of lower temperature. This is shown in Figs. 4 and 5 of the drawings, in which the inner wall D is extended at L toward the outer wall E, thereby forming the narrow passage-ways M M, which gradually enlarge into the passages N N. Short arches R R are located over the discharge-gates O O of the fuel-supply to prevent the gases and smoke or unconsumed gases from escaping direct to the furnace, but to compel them to pass over the fuel that has arrived at an active state of combustion.

The outer casing T of the chamber U, situated below the rotary grate, is provided with a series of draft-doors V, with register-openings for the purpose of regulating the admission of air for supporting combustion. The annular chamber U is provided with partition X to prevent air admitted to the fire from passing to that portion of the grate-surface when the combustion is completed.

It will be understood that modification may be made in several details of my invention without departing from the spirit thereof, and therefore do not wish to confine myself to the exact form shown and described.

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

1. In an annular furnace the combination of an annular rotating grate with a fuel-hopper directly over and arranged to discharge the fuel on the grate, a carriage-bed and wheels therefor, a scraper arranged across the rotating grate and horizontally-located adjustable guide-wheels secured to pivoted links secured to the outer fire-wall for keeping the rotating frame on said wheels of carriage-bed.

2. In an annular furnace, the combination of an annular rotating grate composed of perforated grate-bars, a carriage-bed and wheels therefor, horizontally-attached pivotal links, carrying adjustable guide-wheels, said links being secured to the outer fire-wall, for keeping the rotating frame in place on the said wheels of carriage-bed.

3. In an annular furnace the combination of an annular rotating grate, composed of perforated grate-bars, said grate-bars having upwardly-inclined dead sections at their inner ends and horizontal dead sections at their outer ends.

4. In an annular furnace the combination of the rotatable grate with the hoppers over the grate and the annular discharge-openings for the heated gases reduced in area at a point between the hoppers.

5. In an annular furnace the combination of a vertical boiler, an annular grate surrounding the same, said grate composed of perforated grate-bars having imperforate end sections, and a circular wall surrounding the boiler forming the inner lining of the combustion-chamber and protecting the boiler from intense heat.

6. The combination in an annular furnace of an annular grate, a vertical boiler, an inner wall adapted to surround the cylinder water-base thereof, an inwardly and upwardly inclined outer wall, said outer and inner walls forming a congested annular throat or flue, the said outer wall extending above said throat for deflecting the products of combustion against the water-tubes above the cylinder water-base.

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

THOMAS REED BUTMAN.

Witnesses:
HENRY A. GATES,
CARL CARLSEN.