

Furnaces for Steam-Boilers.

Patented Feb. 3, 1874.

Fig. 1.

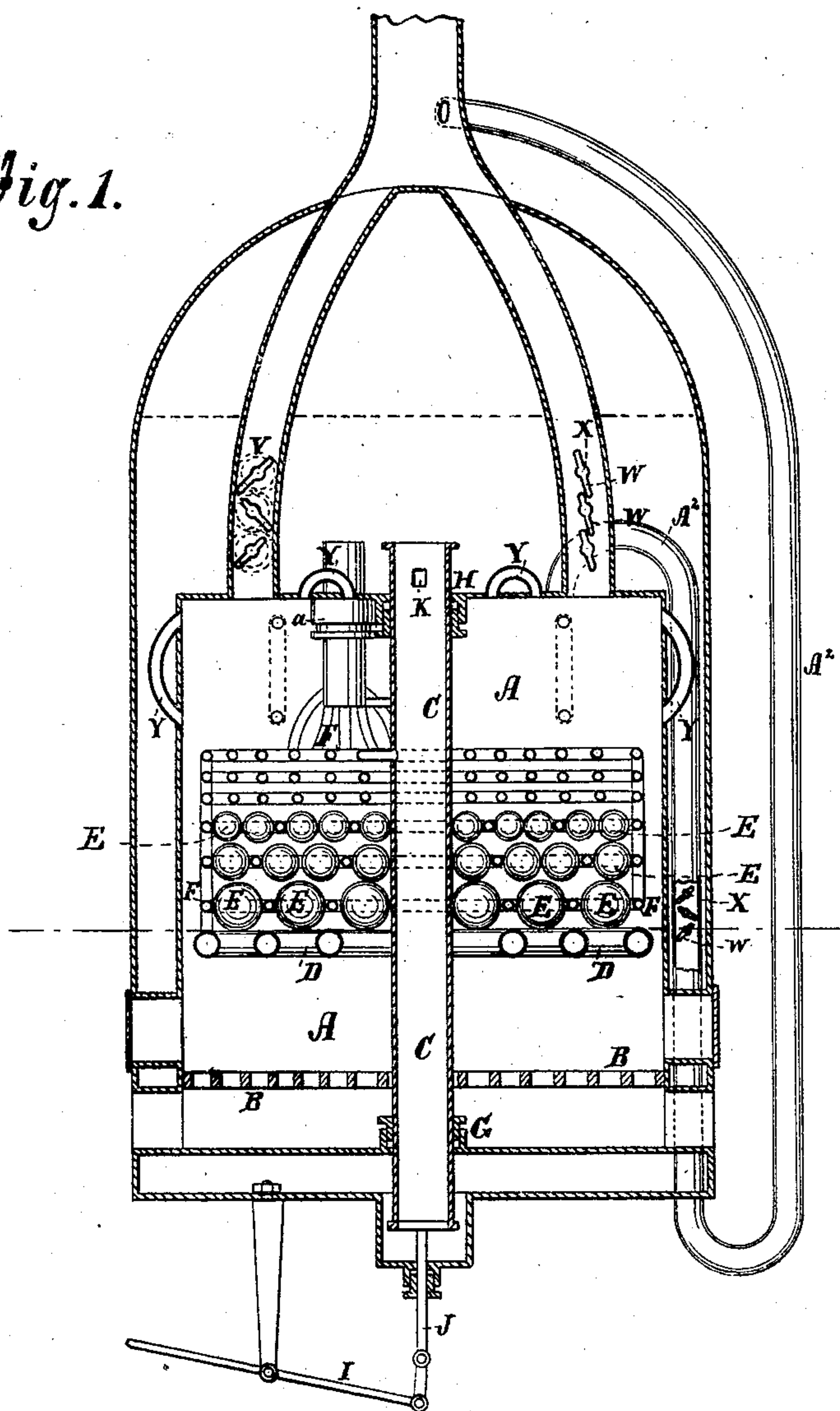
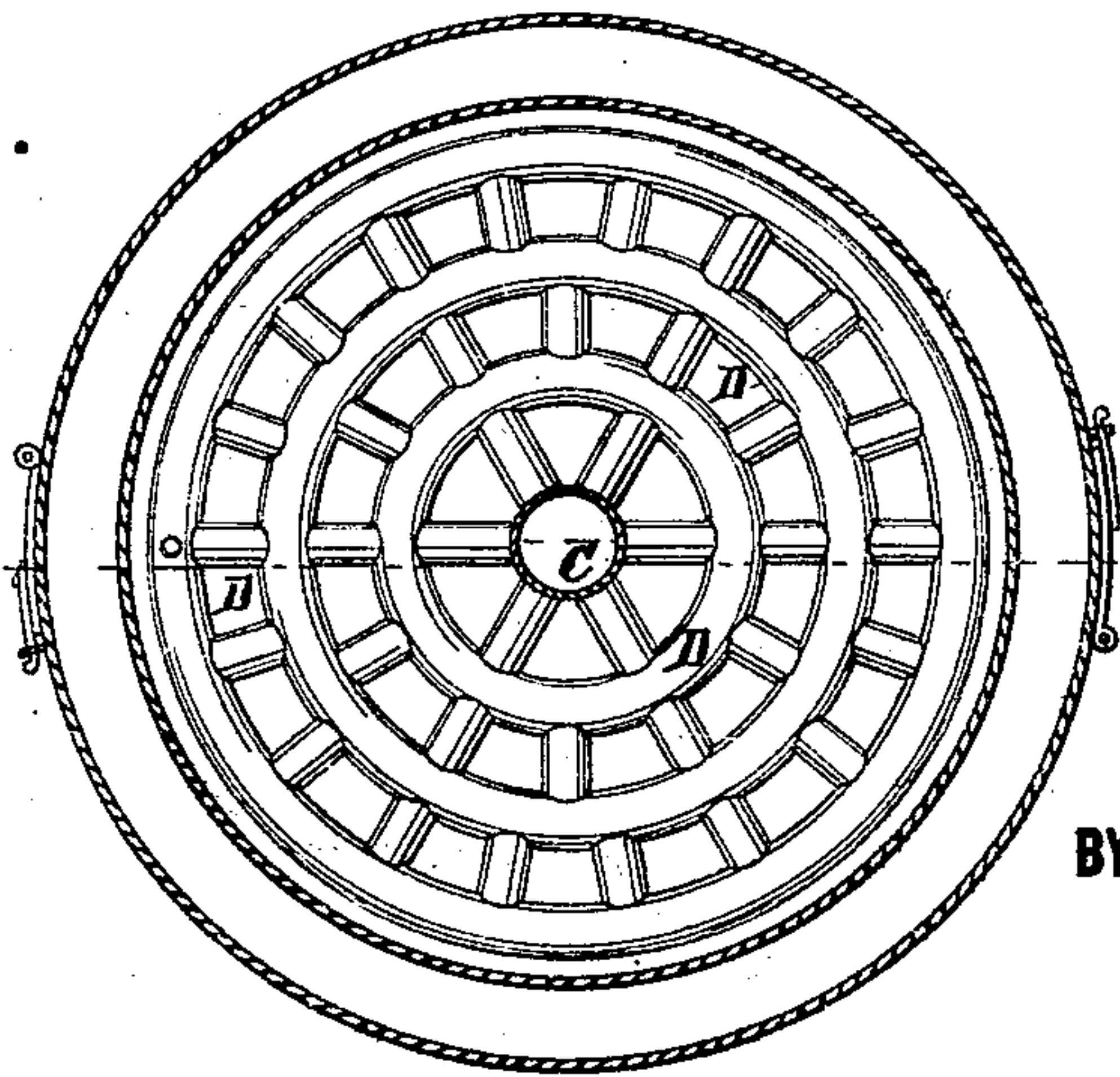


Fig. 2.



A Sonnensteinhof.
Siegfried

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DANIEL T. CASEMENT, OF PAINESVILLE, OHIO.

IMPROVEMENT IN FURNACES FOR STEAM-BOILERS.

Specification forming part of Letters Patent No. **147,043**, dated February 3, 1874; application filed December 18, 1873.

To all whom it may concern:

Be it known that I, DANIEL THOMAS CASEMENT, of Painesville, in the county of Lake and State of Ohio, have invented a new and Improved Steam-Boiler, of which the following is a specification:

My invention relates to improvements in furnaces for steam-boilers having balls, blocks, or scraps of iron, steel, or other metal combined with them for facilitating combustion by the impinging of the gases and other products of combustion upon the red-hot surfaces of said balls or other objects as they rise from the fire below, the said balls, blocks, &c., and the grate-bars for holding them, being adjustable up and down to temporarily make room for "stoking," and the grate-bars for holding the balls or other pieces of metal having water circulating through them for protection against heat; and it consists of a strong hollow vertical tube at the center of the fire-space, extending from the water-space at the bottom up through the fire and into the water-space above the crown-sheet with stuffing-joints, and having the grate for supporting the balls or other pieces of metal attached to it, said grate being composed of tubes which receive the water for protecting them from said vertical tube, and deliver it at the outer part to a coil which secures the balls against bearing on the side walls of the furnace, and also circulates between the balls to keep them from fusing, and for generating steam, and finally discharges into the central supporting-tube or into the space above the crown-sheet, all in a way calculated to promote an efficient circulation of the water in the said grate for its protection, and to promote rapid generation of steam. The invention also consists in hollow dampers arranged in the smoke-stack for utilizing the waste heat.

Figure 1 is a sectional elevation of a portion of a steam-boiler with my improvements, and Fig. 2 is a horizontal section.

Similar letters of reference indicate corresponding parts.

A is the fire-space; B, the grate for the fuel; C, the vertical tube for supporting the balls or scraps; D, the grate for the balls; E, the balls; F, the coil connecting with the outer portion of the grate and confining the

balls from the walls of the furnace, also preventing them from fusing, and also for discharging into the main pipe for promoting the circulation of water in the grate and the generating of steam. G is the lower stuffing-box; H, the upper one; I, the supporting and adjusting lever; J, a rod connecting them for raising the grate and lowering it. Any approved power apparatus may be connected to the lever for operating and supporting the grate, which, in some cases, will be very heavy. In order that the opening of the pipe C at the upper end will not in any case rise above the water-level, said pipe is slotted at K to make an opening through the side, and the tube of the stuffing-box may be extended downward as much as necessary to keep it covered. The same arrangement may be provided at the bottom, if necessary, but with a well, X, in the bottom, as here shown; for the tube C, it will not probably be required. If it is desirable not to have a water-space below the ash-pit, in order to make more room for the latter, the well may be connected to the water-spaces at the sides by tubes. To protect the tube C from being burned and roughened, so as not to work well in the upper stuffing-box, the packing-joint may be arranged in the water-space and a protecting-tube may extend downward from the crown-sheet around the pipe for some distance, and, in addition thereto, that portion of the tube working in the packing-joint may be made wholly or in its exterior portion of metal having greater heat-resisting power than iron. By the circulation of the coil F between and around the balls they will be largely benefited by protection from heat, and the generating of the steam will be largely increased. The vertical tube will also largely aid in the generating of steam. The coil F is in this example made to fill a considerable portion of the fire-space above the balls, which do not need to be very high for the purposes for which they are used to increase the steam-generating capacity, and it may enter the pipe C for returning the steam to the boiler; but in this case, being made in several separate coils, they are made to connect directly with the crown-sheet by a stuffing-joint, *a*, so that they can rise and fall with the grate. Several short coils are considered

better for keeping full of water than one long coil. The return-tubes Y in the crown-sheet also aid in utilizing the heat. In the flues I arrange a series of hollow dampers or valves, W, with water connections through their axes for a circulation through them to take up as much of the remaining heat as possible before passing off into the flues, and these valves or gates will be connected by gear-wheels V, (shown dotted,) so arranged that by turning one for opening or shutting it the others will be turned by it in like manner, but in reverse direction, so that when they are partly open they afford a zigzag course for the heat, which is thus caused to impinge directly against the side of one gate as it escapes from the one below, thus obtaining the best possible effect on the water contained in the valves. This plan is alike applicable to horizontal flues, and may be extended any required length in either kind. Besides the direct escape-flues in the top of the boiler, I also propose to have one or more return-flues, A², extending from the crown-sheet down through the water-space, out at or near the bottom, and up to the escape-pipe, with these water-dampers X in them for sending the draft through them to utilize all of the heat thereof in excess of that of the water in the boiler at the lowest part, where it is the coolest. Jet-pipes, one or more, are arranged

for discharging jets of steam against the balls and the coil of water-pipe in connection therewith for cleaning out the ashes from time to time, and, if necessary, to prevent the draft set up by the jets when discharged against the under side from drawing up the fire or any portion of it. I will have dampers between the fire and the balls, to be closed to relieve the fire of the suction.

Having thus described my invention, I claim as new and desire to secure by Letters Patent—

1. The tubular grate for holding the balls, attached to a central vertically-adjustable tube, C, and connected at the outer part to a coil, F, circulating around and between the balls, and returning to the central tube or directly to the water-space, substantially as specified.

2. The combination of a coil, F, with the balls E and their supporting-grate D, for the protection of the balls and for generating steam, substantially as specified.

3. A series of hollow dampers or gates arranged in the flues, and having connections for a water circulation through them to utilize the escaping heat, substantially as specified.

DANL. T. CASEMENT.

Witnesses:

T. B. MOSHER,
ALEX. F. ROBERTS.