No. 628,740. Patented July 11, 1899.

C. J. BELL.

FURNACE FEEDER AND GRATE.

(Application filed June 17, 1898.)

No Model.) 2 Sheets—Sheet 1.

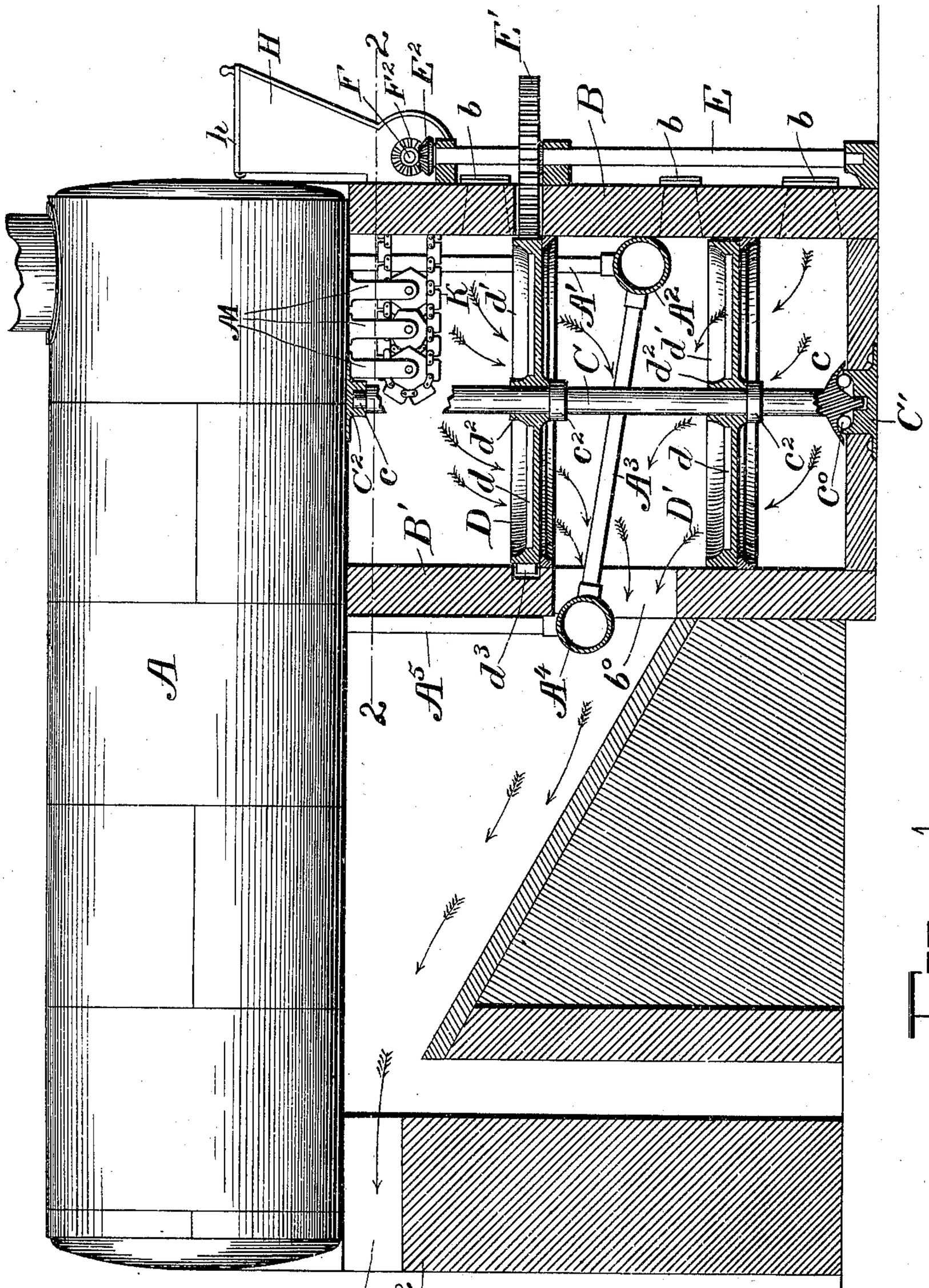

Fig. 1.

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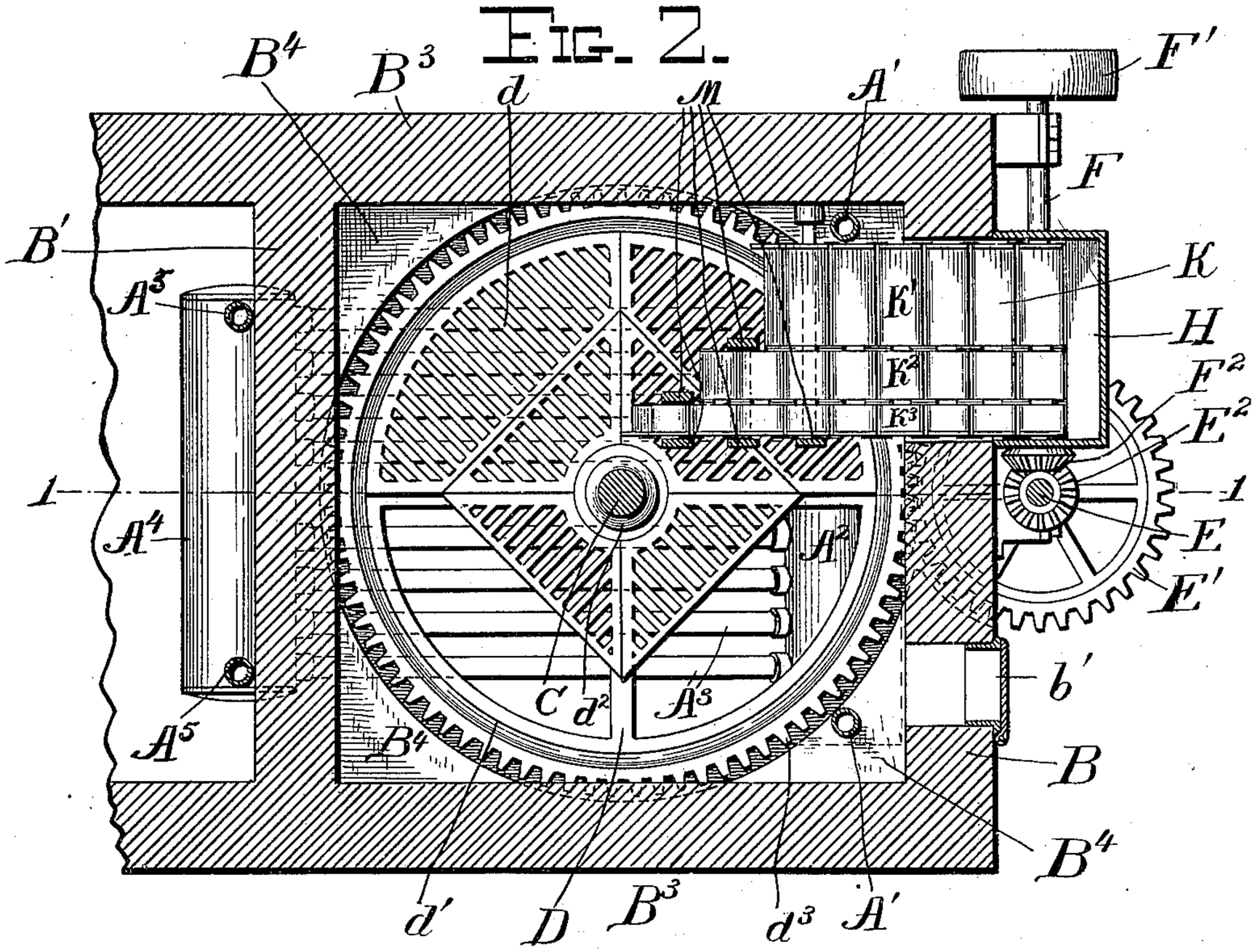
(No Model.) 2 Sheets—Sheet 2.

FIG. 2.



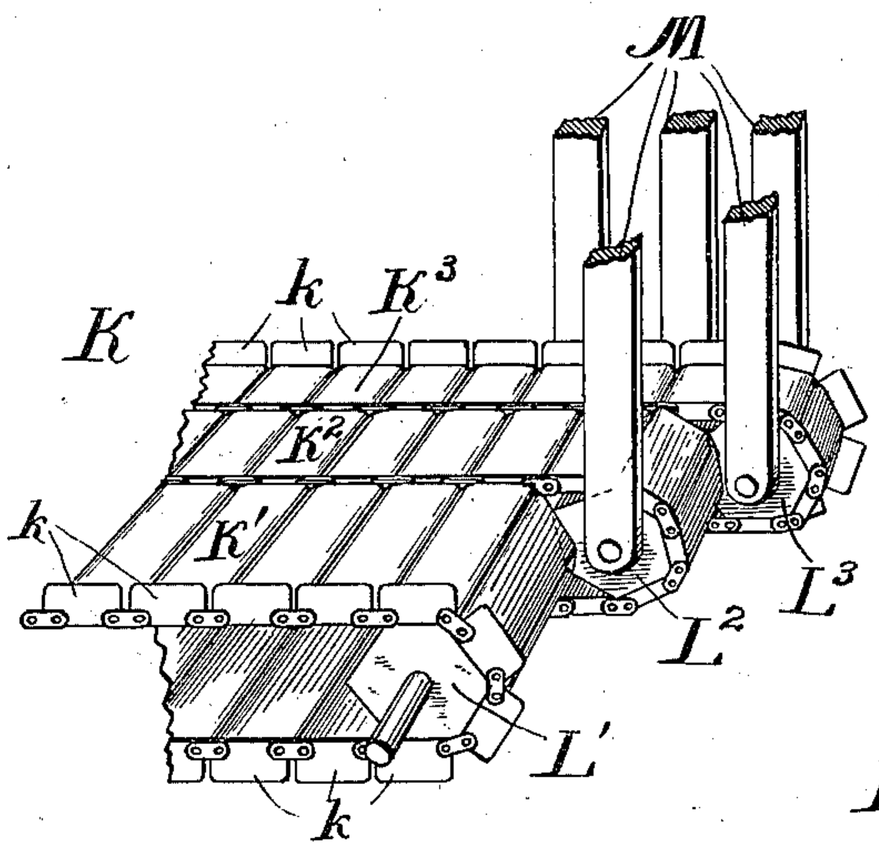


FIG. 3.

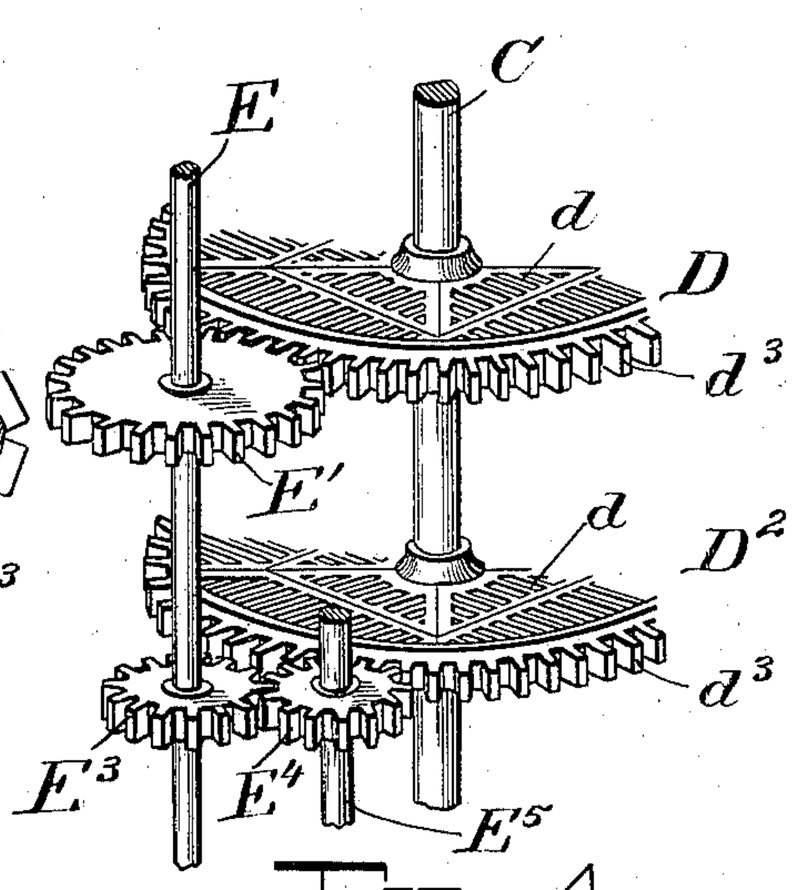


FIG. 4.

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UNITED STATES PATENT OFFICE.

CHARLES J. BELL, OF NEW ORLEANS, LOUISIANA.

FURNACE FEEDER AND GRATE.

SPECIFICATION forming part of Letters Patent No. 628,740, dated July 11, 1899.

Application filed June 17, 1898. Serial No. 683,725. (No model.)

To all whom it may concern:

Be it known that I, CHARLES J. BELL, a citizen of the United States, residing at New Orleans, in the parish of Orleans and State of Louisiana, have invented certain new and useful Improvements in Furnace Feeders and Grates; 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.

My invention relates to improvements in furnaces; and it consists more especially in certain improvements in rotary grates, their arrangement and disposition, and in means for supplying fuel to the grates and distributing the same uniformly over the said grates.

My invention will be understood by reference to the accompanying drawings, in which the same parts are indicated by the same letters throughout the several views.

Figure 1 represents a section through the furnace along the line 1 1 of Fig. 2, showing the boiler in elevation and omitting parts of the connections for carrying off the products of combustion. Fig. 2 represents a section on the line 2 2 of Fig. 1 and looking down, the parts being enlarged. Fig. 3 is a perspective view of a portion of the series of endless aprons for feeding the fuel to the rotary grates; and Fig. 4 is a perspective view of two superimposed rotary grates, with means for driving the same in opposite directions, the same representing a modification of my invention.

A represents the boiler, which may be of any standard or preferred type and which is connected by the vertical water-legs A′ to the horizontal heating-drum A^2 and then by the inclined water-tubes A^3 to the horizontal heating-drum A^4, which latter is connected by the vertical water-legs A^5 to the boiler A, the circulation of water through these water-legs and heating-drums being down A′ and up A^3 and A^5. The boiler is supported upon the walls B, B′, and B^2, and the general construction and arrangement of the furnace, except in connection with the revolving grates and means for supplying fuel thereto, may be varied at will, not being a part of my present invention.

B^3 B^3 represent the side walls of the furnace. The front wall B is perforated above and below the grates and is provided with doors, as at *b*, while the wall B′ is perforated, as at b^0, to allow the passage therethrough of the products of combustion. The front wall may also be perforated, as shown at *b*′ in Fig. 2, to allow for the admission of air above the upper grate, or all the air may be allowed to pass down through the hopper H, if preferred. The back wall B^2 may be perforated, as at b^2, to allow the smoke to pass through.

C represents a vertical spindle journaled, as at *c*, in the plate C′ at the bottom of the furnace and also in the plate C^2 at the top of the furnace. Ball-bearings c^0 may be provided to lessen the friction, if desired. This shaft C is provided with set collars or shoulders c^2, on which rest the hubs d^2 of the rotary grates D and D′. These grates are made circular, as shown, and are built up of sections *d*, some of which are shown omitted in Fig. 2, so that the parts beneath may be seen.

The grate-walls D are preferably flanged upward, as at *d*′, to hold the fuel thereon, and may be provided with cog-teeth d^3, preferably projecting into a recess in the wall of the furnace, as shown in Figs. 1 and 2. The lower grate D′ may be allowed to remain stationary, the shaft C rotating therein, or it may be fast on the shaft C and rotated therewith with the same speed that the upper grate D rotates, or it may be driven at a greater or less speed than the upper grate and in the same direction, or, as is shown in Fig. 4, it may be driven in the opposite direction from the upper grate. The means for rotating the upper grate are shown in Figs. 2 and 4, in which E represents a vertical shaft, carrying the cog-wheel E′ and the miter-gear E^2, the latter meshing with the miter-gear F^2 on the shaft F, which shaft is driven by the pulley F′ from any convenient source of power, or may be driven in any other convenient way, or, if preferred, the pulley might be placed on the shaft E, and thus this shaft may be driven directly, if preferred.

When the fire-box is square, as shown in the drawings, the corners are closed, as at B^4, to conform to the shape of the grates and prevent the draft from passing around the grates.

It will be obvious, however, that the fire-box might be made round to accomplish the same result.

The fuel is fed into the hopper H, which is provided with a hinged cover *h*, and may be adjusted to admit the inflow of air, if desired. In the base of this hopper runs a series K of endless aprons K′, K², and K³. There may be a plurality of these aprons, their number depending upon the size of the revolving grate; but I prefer in ordinary practice three of these aprons, the one, K′, delivering fuel to the grate near its periphery being broader than the other two and the one delivering fuel to the grate near its center being narrower. These different aprons may be run at the same rate of speed or their speed may be varied by varying the size of the driving-drums, which are fast on the shaft F′. These driving-drums are precisely similar to the inner drums L′, L², and L³, (shown in Fig. 3,) and it will be obvious that if the drum L′ be larger than L² and L² be larger than L³ a more rapid speed will be given to the carrier K′ than would be given to the carrier K², while the latter would move faster than the carrier K³, and thus the amount of fuel delivered to the center of the grate, where the superficial area is less or the velocity of the revolution is slower, would be proportionately less than toward the periphery of the grate, where the area is greater and the velocity faster.

The driving-drums on the shafts F′ may, if desired, be all the same size or may be one long drum, the width of the aprons K′, K², and K³ regulating the supply of fuel, the wider apron K′ of course carrying more fuel than the smaller apron K² when revolved at the same speed.

The driving-drums and inner drums are preferably made angular, as shown, each side of the polygon formed by a section of one of the drums corresponding to a little over the width of a slat of the carrier or apron. These slats are secured together by the usual links or chains and are of course made of metal. The ends of the slats may be provided with flanges *k* to prevent the fuel from falling off laterally, as shown in Fig. 3, or it might be preferable to provide fixed end plates, between which the slats travel, as is well known in carriers or aprons of like construction used in the various arts. The inner or end drums L′, L², and L³ are journaled in hangers M, suspended from the boiler or other part of the furnace in any convenient way.

The fuel, being fed into the hopper and the carriers K′, K², and K³ being in operation, is thrown on the upper grate D, where it is partly burned, and parts of the fuel with the ashes drop through onto the lower grate D′, where the combustion is completed. The paths of the inflowing air and of the products of combustion are indicated by the arrows in Fig. 1.

It will be obvious that various modifications of the herein-described apparatus might be made which could be used without departing from the spirit of my invention.

Having thus described my invention, what I claim, and desire to secure by Letters Patent of the United States, is—

1. In a furnace, the combination with a rotating grate, of a carrier for supplying fuel thereto, composed of a plurality of endless aprons of different widths, the narrower apron delivering the fuel near the center of the grate, and the broader apron delivering fuel near the periphery thereof, substantially as described.

2. In a furnace, the combination with a rotating grate; of a carrier for feeding fuel thereto consisting of a plurality of endless aprons of unequal widths, and traveling at unequal speeds, the narrower apron delivering the fuel near the center of the grate, and the broader apron delivering the fuel near the periphery thereof, substantially as described.

3. In a furnace, the combination with a pair of superimposed grates, and means for rotating the upper grate, of means for feeding fuel to the upper grate, consisting of a carrier composed of a plurality of endless aprons of unequal widths, the narrower apron delivering the fuel near the center of the grate, and the broader apron delivering the fuel near the periphery thereof, substantially as described.

4. In a furnace, the combination with a pair of superimposed grates, and means for rotating the upper grate, of means for feeding fuel to the upper grate consisting of a carrier composed of a plurality of endless aprons of unequal widths and traveling at unequal speeds, the narrower apron delivering the fuel near the center of the grate, and the broader apron delivering the fuel near the periphery thereof, substantially as described.

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

CHARLES J. BELL.

Witnesses:
MELTON W. BELL,
JOHN J. SAUCIER.