J. LEVEY.

GRATE.

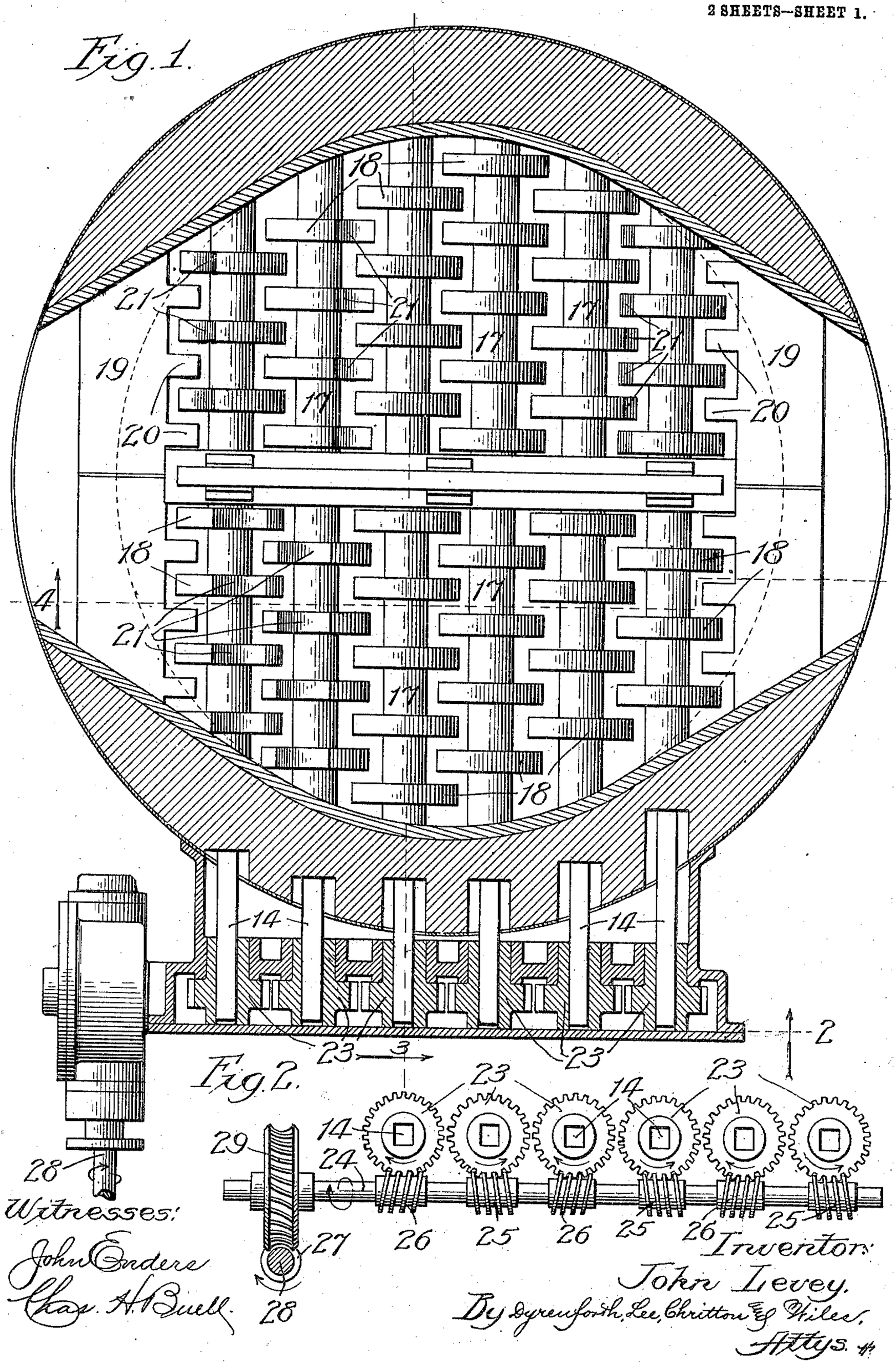
APPLICATION FILED MAR. 28, 1910.

965,589.

Patented July 26, 1910.

2 SHEETS—SHEET 1.

Fig. 1.



Witnesses:

John Enders

Chas. A. Buell.

Inventor:

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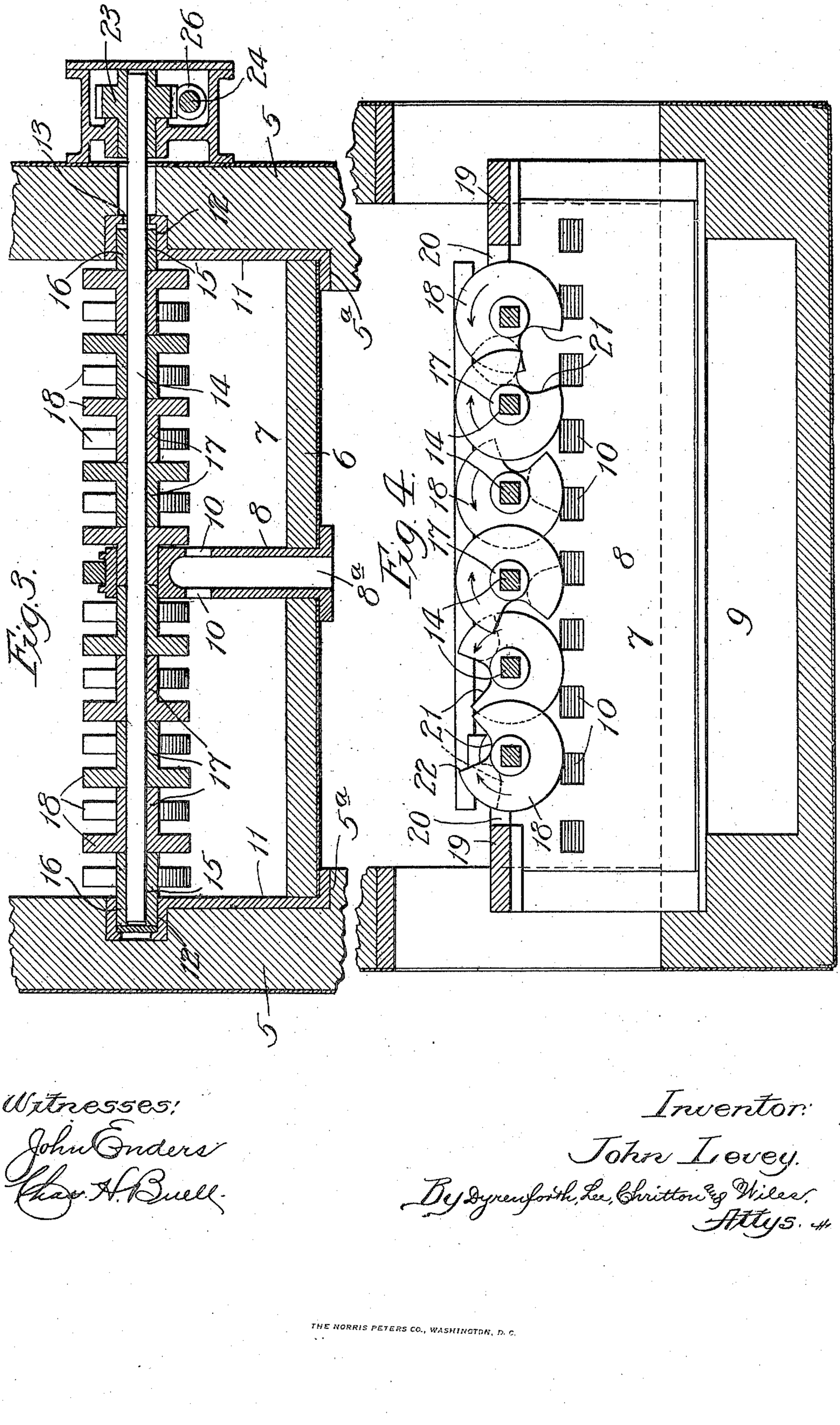

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UNITED STATES PATENT OFFICE.

JOHN LEVEY, OF CHICAGO, ILLINOIS, ASSIGNOR TO JOHN WILLIAMSON, OF CHICAGO, ILLINOIS.

GRATE.

965,589. Specification of Letters Patent. **Patented July 26, 1910.**

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To all whom it may concern:

Be it known that I, JOHN LEVEY, a citizen of the United States, residing at Chicago, in the county of Cook and State of Illinois, have invented a new and useful Improvement in Grates, of which the following is a specification.

My invention relates particularly to improvement in grates used in furnace-constructions where the conditions are favorable to the formation of large masses of clinkers during the operation of the furnace, as in the case of generators forming a part of the apparatus commonly used for the manufacture of "water-gas".

As grates have heretofore been constructed the formation of a mass of clinkers on the grate commences soon after the furnace is heated to the desired degree, and continues to form regardless of the operation of the grate, and becomes thicker as the operation of the furnace continues, with the result of filling the bottom of the fire-pot with a mass of clinker which not only presents a barrier to the free draft through the fire-bed but necessitates the drawing of the furnace and the removal of the clinker with attendant relatively high cost for labor, and expense by reason of the furnace being out of commission while cooling, during the time the clinker is being removed, and while being again heated to a degree sufficient for performing the generating function.

My object is to provide a construction of grate which will operate to prevent the formation of such masses of clinkers and thus permit the furnace to operate indefinitely, and cause the ashes in the fire-pot of the furnace to be discharged therefrom at such intervals as to cause combustion in the furnace to be rendered uniform throughout the period of operation.

My invention in its preferred embodiment is illustrated in the accompanying drawings, in which—

Figure 1 is a horizontal sectional view taken through a furnace equipped with my improved grate, showing the latter in plan, and the operating mechanism therefor in horizontal section; Fig. 2 is a section taken at the line 2 on Fig. 1 and viewed in the direction of the arrow; Fig. 3 is a section taken at the line 3 on Fig. 1 and viewed in the direction of the arrow; and Fig. 4, a section taken at the line 4 on Fig. 1 and viewed in the direction of the arrow.

The walls of the furnace in connection with which I have chosen to illustrate my invention are represented at 5, and are formed with shouldered portions 5^a at their opposite sides upon which a horizontal partition 6 forming the floor of the ash-pit 7 is supported. Supported on the partition 6 and extending crosswise of the furnace is a conduit 8 opening at its lower end into an air-chamber 9 below the partition 6 as indicated at 8^a, and provided in its opposite walls with ports 10 spaced apart as represented in Fig. 4 and communicating with the ash-pit 7, this conduit serving to conduct air introduced into the chamber 9 into the ash-pit from which it passes through the grate, hereinafter described, into the fire-bed supported thereon to augment combustion, all as well understood in the art.

The inner surface of opposed walls of the furnace are provided with linings 11 in the form of metal plates, formed at equal intervals with circular sockets 12 arranged in opposed horizontal series above the partition 6 as represented in Fig. 3, and forming bearings for shafts hereinafter referred to, the sockets on one side of the furnace containing openings 13 concentric with the inner circular walls of the sockets containing them.

Extending across the bottom of the furnace and through the conduit 8 and the openings 13, are parallel shafts 14 spaced apart and of square-shape in cross-section, these shafts fitting into square openings 15 in circular sleeves 16 journaled in the opposed pairs of bearings 12 as represented of one shaft in Fig. 3, whereby the shafts are free to be rotated in these bearings as hereinafter described, the shafts 15 extending beyond one wall of the furnace as illustrated. Each shaft on opposite sides of the conduit 8 carries a plurality of sleeves 17 rotatable therewith, the sleeves on the shafts on one side of the conduit 8 being provided at their left-hand ends with circular disks 18 and the sleeves on the other side of the conduit also carrying disks 18 but on their right-hand ends, the disks 18 by being located as described on the ends of the sleeves carrying them, being spaced apart a distance equal to approximately twice their thick-

ness, though they may be located closer or farther apart as desired. The disks 18 on adjacent shafts are arranged in staggered relation to each other and overlap as represented in Fig. 1. The outer ones of the shafts 14 are paralleled by plates 19 secured in the furnace-walls and provided with inwardly-extending lugs 20 which are staggered with relation to the disks 18 on these shafts and overlap them as illustrated in Fig. 1. Each disk 18 contains in its periphery a recess 21 preferably of curved form provided with a cutting edge 22, these recesses in the construction illustrated being of a width equal to approximately one-sixth of the circumference of the disks containing them. The shafts of adjacent pairs thereof are adapted to be rotated toward each other as represented by the arrows in Fig. 3, in a manner hereinafter explained, the disks 18 on each pair of adjacent shafts being so positioned with relation to each other that the recesses 21 therein are located the same distance from a vertical plane located midway between these pairs of shafts but on opposite sides thereof, as illustrated in Fig. 4, whereby when the shafts are rotated the recesses of adjacent opposing disks will simultaneously occupy uppermost position as represented by the pair of disks illustrated in the left-hand end of Fig. 4, for a purpose hereinafter explained.

The means for rotating the shafts preferably comprise a gear 23 on each shaft 14, these gears being arranged in line with each other and of the same size, a worm-shaft 24 located beneath the gears 23 and extending crosswise thereof and provided with alternating right and left-hand threaded-sections 25 and 26, respectively, which mesh with the gears 23, as represented in Fig. 2; and a driving worm 27 on a shaft 28 operated from any suitable power-device and meshing with a worm-gear 29 rigid with the worm-shaft 24, whereby the shafts are rotated simultaneously and in the directions hereinbefore described.

In the operation of the grate the fire-bed, as the recesses in adjacent opposing disks are carried to uppermost position, settles sufficiently into the recesses, which in this position virtually form a channel across the grate, to cause the cutting edges 22, as the disks 18 continue to rotate, to be forced toward each other into the fire-bed, and as the recesses move from uppermost position to a position in which they open in a direction toward each other, these cutting-edges cut through the mass in the recesses or channel 21 severing it from the remainder of the fire-bed, the mass thus dislodged being carried downward between the adjacent disks 18 and the recesses 21 therein and finally discharged into the ash-pit. The disks 18 are preferably arranged sufficiently close to each other, as illustrated, so as to prevent discharge of the mass on the grate through the spaces between the disks into the ash-pit when the unbroken curved portions of their peripheries travel against the mass, and thus the fire-bed is undisturbed, excepting when the recesses are brought into operation as described for separating from the fire-bed portions thereof.

The operation briefly stated consists in intermittently cutting through the bed on the grate by a biting action and discharging the portions thus separated from the mass below the grate. It will be manifest that by operating a grate in this manner the formation of large masses of clinkers is prevented as the disks operate to cut through the mass and thus break up, and discharge through the grate, those portions of the mass which if not broken up would form the nucleus of large masses of clinkers the existence of which would not only necessitate the stopping of the furnace for their removal, but would impair the usefulness of the furnace.

It is preferred that the grate be so constructed as to cause the removal of portions of the mass as described throughout a portion only of the cross-sectional area of the furnace at one time, and for this purpose I so arrange the disks that the opposing pairs of recesses will operate on the fire-bed one after the other. In the construction illustrated the disks 18 between the partition 8 and the shaft-operating mechanism are so positioned on their several pairs of shafts as to cause the recesses to extend at an angle of about 120° to each other, and the disks on the opposite ends of the pairs of shafts to bear the same relation to each other, the disks between the partition and shaft-operating means being so positioned that the recesses therein extend at an angle of about 60° to the recesses in the disks on the opposite ends of the respective shafts, whereby the recessed portions of the disks between the partition and shaft-operating means on the two shafts at the left-hand side of Fig. 1 will first operate to separate portions of the fire-bed on the grate above them; the next disks to operate on the fire-bed, as described, will be the disks on these same shafts on the opposite side of the partition; the next disks to operate will be the disks between the partition and shaft-operating means on the two central shafts, and so on throughout the remainder of disks, whereby when the disks on the shafts at the right-hand side of Fig. 1 on the side of the partition farthest from the shaft-operating means have operated as described, the disks on the two shafts at the left-hand side of Fig. 1 and between the partition and shaft-operating means will be in position to again operate, all as illustrated in Fig. 4, whereby the disks operate in succession, for the purpose stated.

Where the disks are so positioned on the shafts as to cause their recesses to operate upon the fire-bed in succession for removing portions of the latter throughout a portion only of the area of the grate at one time, the work required to be performed by the shaft-operating means is reduced to the minimum and thus the grate may be operated with comparatively low power.

While I have illustrated and described a particular embodiment of my invention I do not wish to be understood as intending to limit my invention to the particular embodiment shown, as various changes and modifications may be made without departing from the spirit of my invention.

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

1. A grate formed of revoluble members carrying disks spaced apart and containing recesses in their peripheries, said members being operatively connected together to cause them to rotate simultaneously, the recesses in the disks on the different members being disposed in varying positions about said members, whereby the disks on different members operate at different times to remove portions from the fire-bed.

2. A grate formed of revoluble members carrying disks spaced apart and containing recesses in their peripheries, and means operated from a common source for simultaneously rotating said members, the recesses in the disks on the different members being disposed in varying positions about said members, whereby the disks on different members operate at different times to remove portions from the fire-bed.

3. A grate formed of pairs of revoluble members carrying disks spaced apart, arranged in staggered and overlapping relation, and containing recesses in their peripheries, the recesses in the members of each pair co-acting to form pockets, and means connecting said members together to cause the latter to operate simultaneously, and the members forming the pairs thereof to operate toward each other, the recesses in the disks on the different members being disposed in varying positions about said members, whereby the disks on the different members operate at different times to remove portions from the fire-bed.

JOHN LEVEY.

In presence of—
R. A. SCHAEFER,
JOHN WILSON.