No. 809,202. PATENTED JAN. 2, 1906.

A. K. MANSFIELD & S. M. FELTON.

MECHANICAL STOKER.

APPLICATION FILED JAN. 28, 1904.

2 SHEETS—SHEET 1.

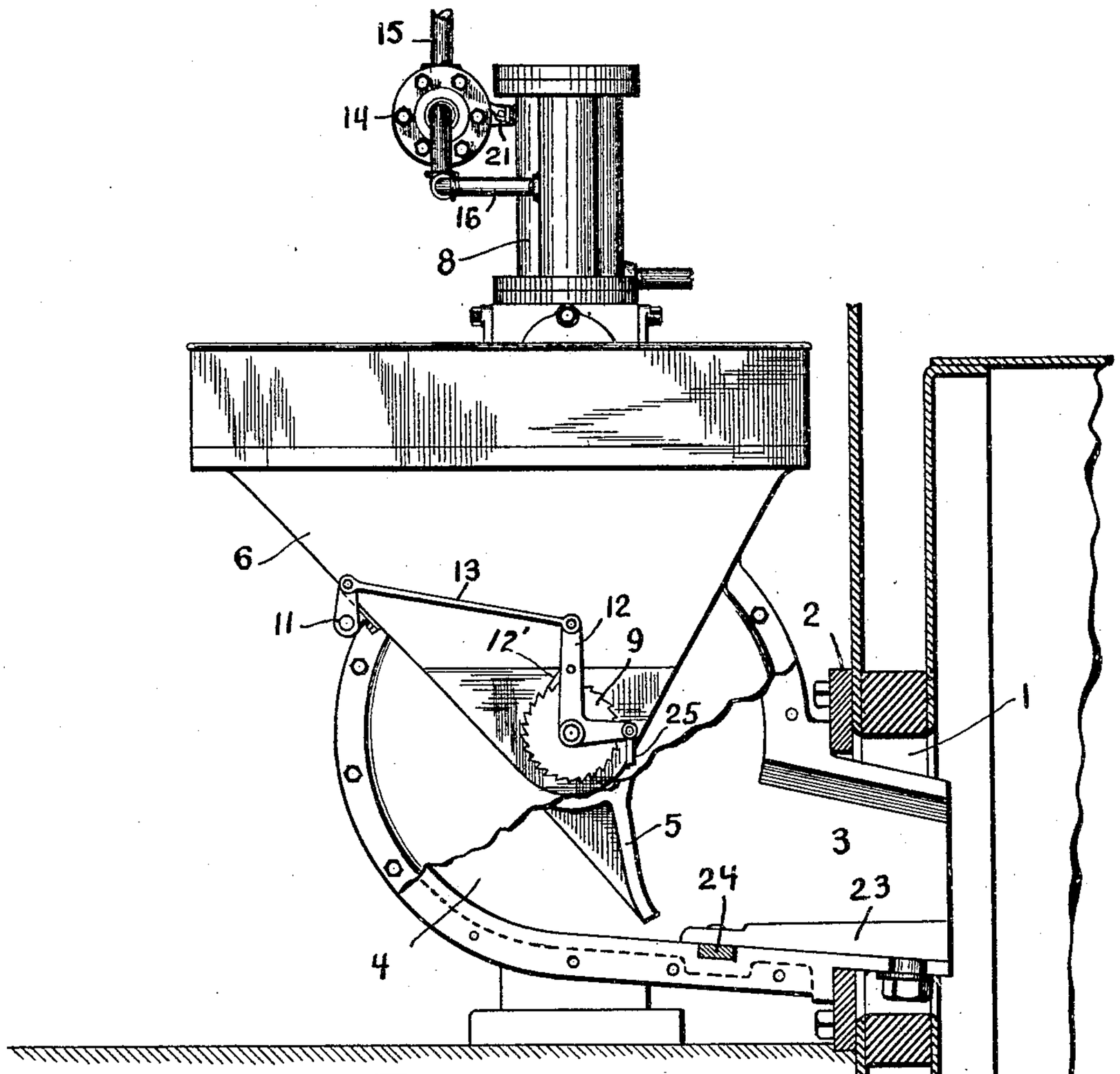

FIG. 1.

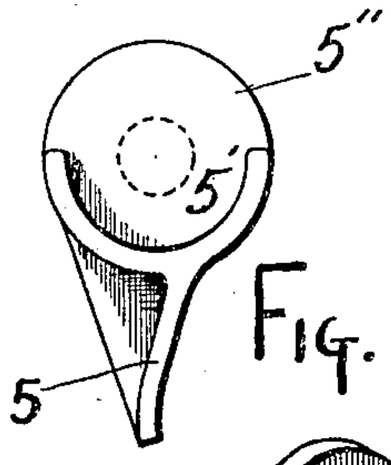

FIG. 2.

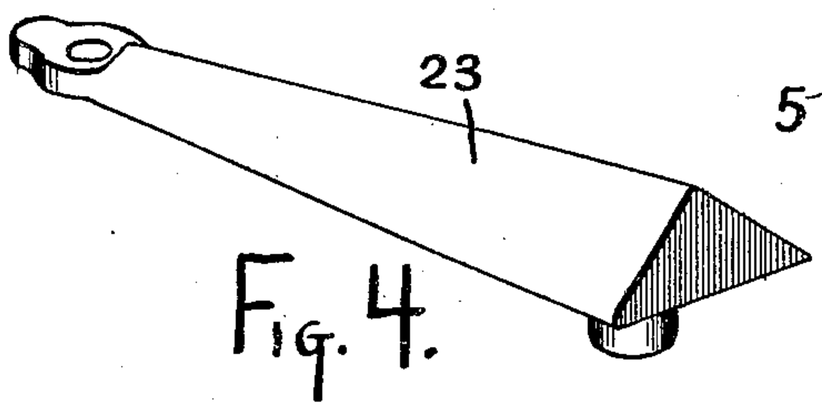

FIG. 4.

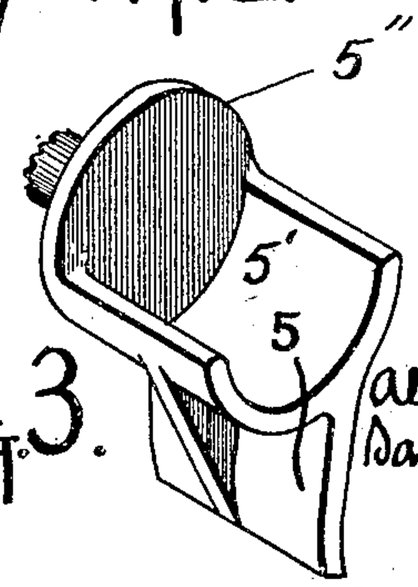

FIG. 3.

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2 SHEETS—SHEET 2.

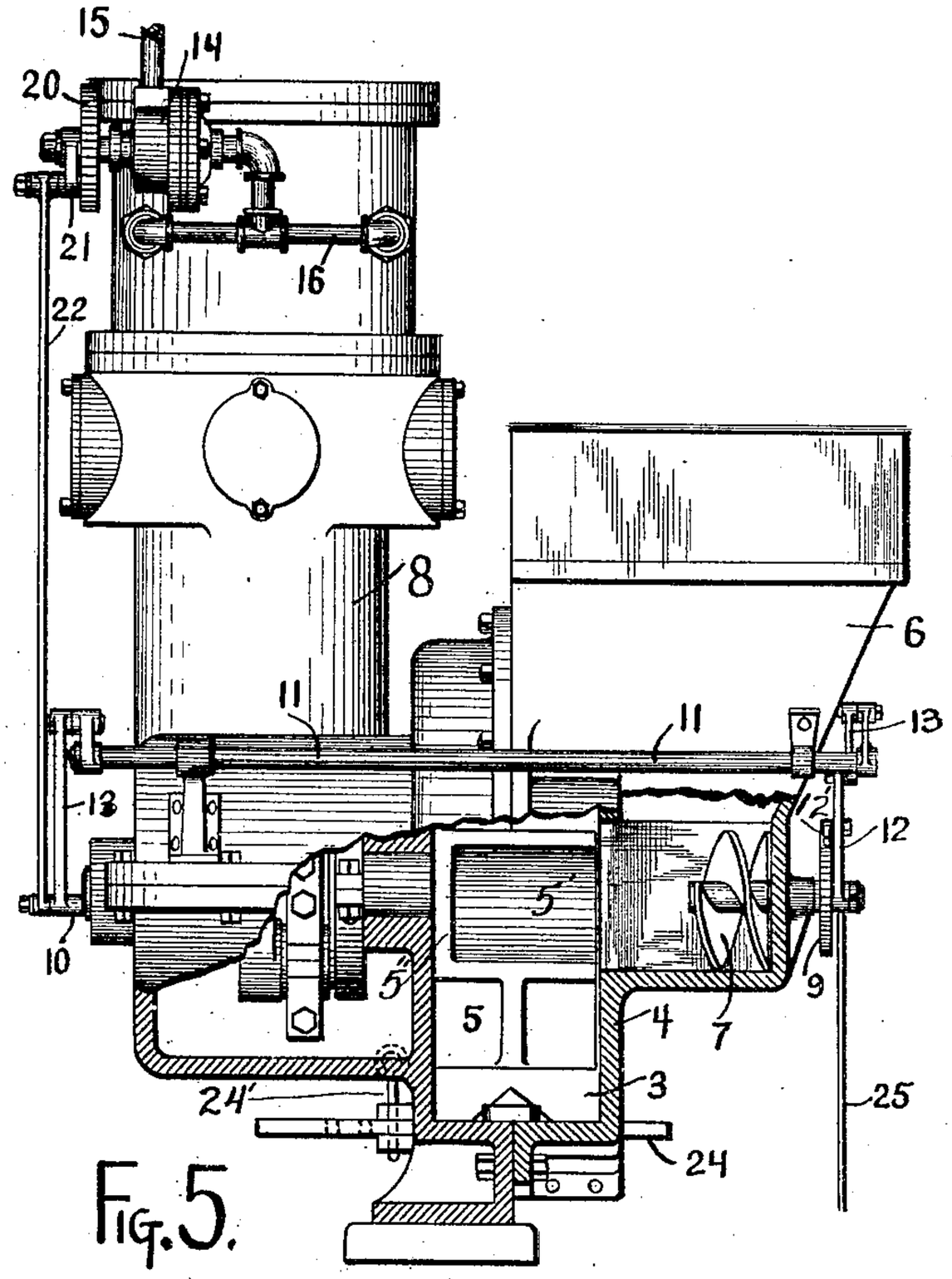

Fig. 5.

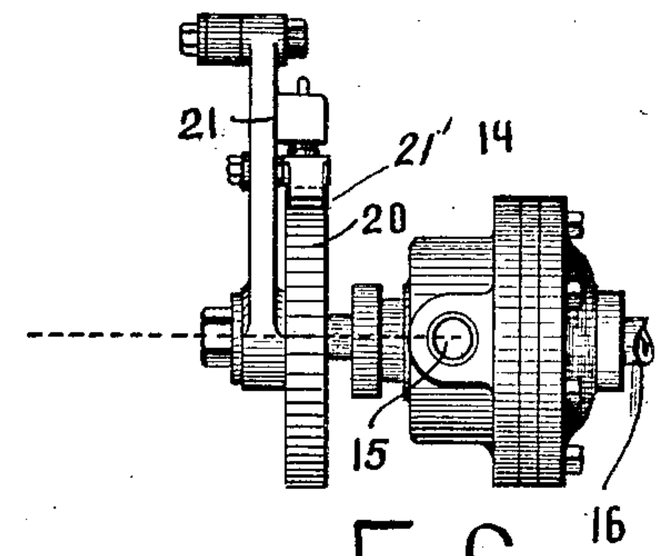

Fig 6

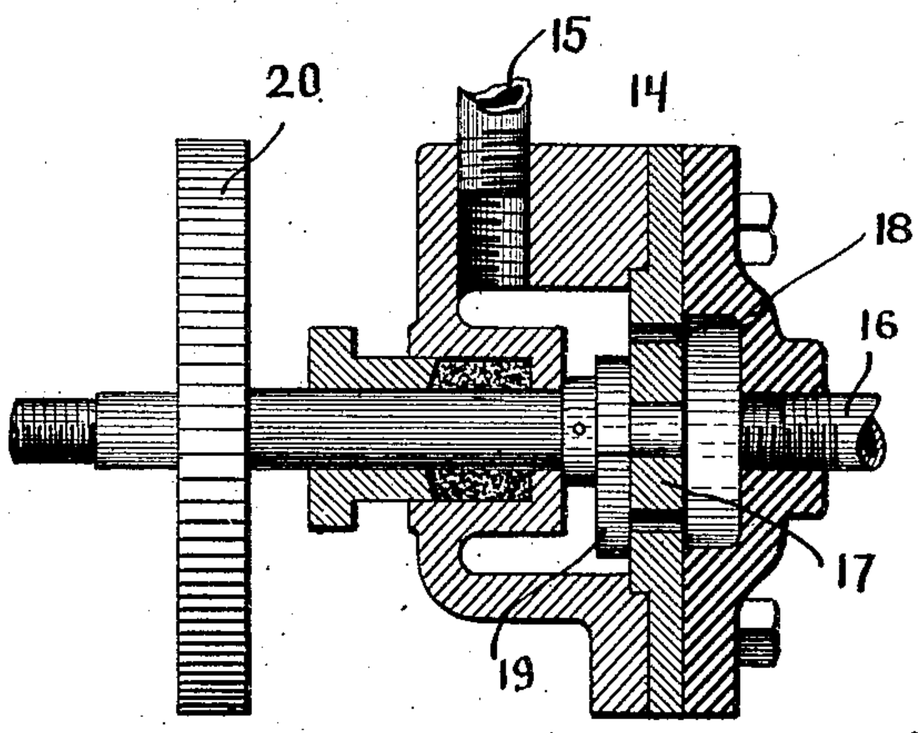

Fig. 7.

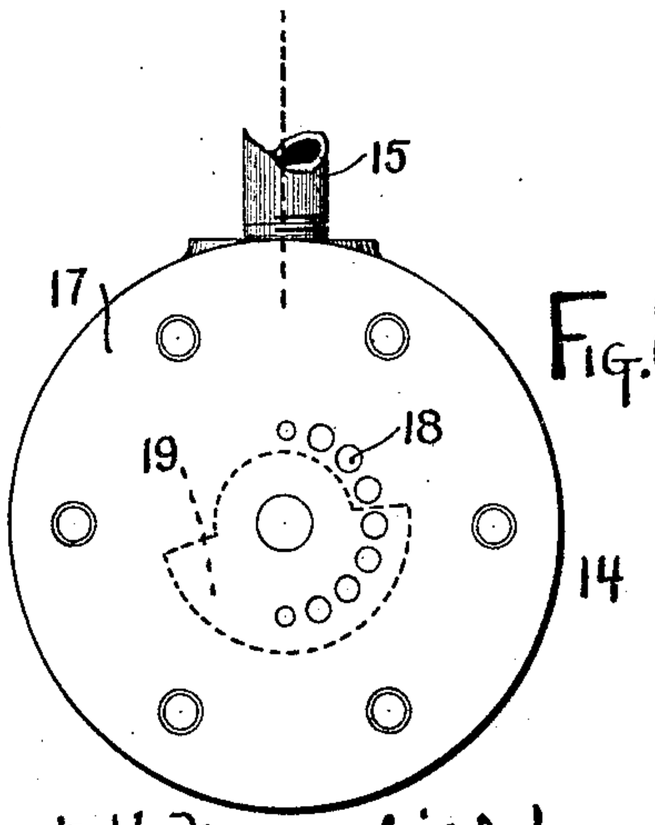

Fig. 8.

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UNITED STATES PATENT OFFICE.

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MECHANICAL STOKER.

No. 809,202. Specification of Letters Patent. Patented Jan. 2, 1906.

Application filed January 28, 1904. Serial No. 190,941.

To all whom it may concern:

Be it known that we, ALBERT K. MANSFIELD, residing in Salem, Columbiana county, Ohio, (post-office address, No. 125 Lincoln avenue, Salem, Ohio,) and SAMUEL M. FELTON, residing in Chicago, Cook county, Illinois, (post-office address, Grand Central station, Chicago, Illinois,) citizens of the United States, have invented certain new and useful Improvements in Mechanical Stokers, of which the following is a specification.

This invention, pertaining to improvements in mechanical stokers, will be readily understood from the following description, taken in connection with the accompanying drawings, in which—

Figure 1 is a side elevation of a stoker exemplifying our invention, shown in connection with the feed-opening of an ordinary locomotive-boiler, a portion of one of the side plates of the stoker being broken away to exhibit the interior construction; Fig. 2, an end elevation of the feed-wing which effects the delivery of the coal into the fire-box; Fig. 3, a perspective view of the feed-wing; Fig. 4, a perspective view of the deflector arranged in the discharge-nozzle to adjust the horizontal angle of discharge; Fig. 5, a front elevation, part vertical section, of the stoker; Fig. 6, a plan of the self-varying throttle-valve; Fig. 7, a vertical section of the throttle, and Fig. 8 an elevation of the throttle with its bonnet removed.

In the drawings, 1 indicates the fire-door opening of an ordinary locomotive-boiler; 2, an escutcheon-plate rigidly secured thereat; 3, the nozzle of the stoker projecting through the escutcheon-plate and into the door-opening; 4, a circular feed-chamber to which the nozzle is tangent; 5, a feed-wing mounted for rotation in the feed-chamber; 5′, an axial recess or pocket in the hub of the feed-wing; 5″, an end wall to this pocket, whose opposite end is open; 6, a hopper delivering into the feed-chamber at the center of one of its side walls; 7, a short conveyer at the foot of the hopper to facilitate the passage of the coal from the hopper into the feed-chamber and to effect to some extent the regulation of the discharge of coal into the feed-chamber; 8, an engine whose shaft is the shaft of the feed-wing, the illustration showing a double engine with its cranks set quartering, this engine being merely typical of a suitable motor for giving motion to the moving parts of the device; 9, a ratchet-wheel on the shaft of the conveyer; 10, an eccentric-pin carried by the engine-shaft; 11, a rock-shaft; 12, a pawl-arm with a pawl coöperating with ratchet-wheel 9; 12′, the pawl carried by this arm; 13, link-and-arm work connecting the rock-shaft with the eccentric-pin 10 and with pawl-arm 12, whereby the rotation of the engine-shaft gives intermittent motion to the conveyer; 14, a special self-varying throttle-valve for the engine; 15, the steam-supply pipe to the throttle-valve; 16, the steam-pipe from the throttle-valve to the engine; 17, a partition between the two pipes 15 and 16; 18, a series of holes through this partition; 19, a plate coöperating with the partition and serving as it rotates to cover a greater or less number of the holes through the partition; 20, a ratchet-wheel on the spindle of disk 19; 21, a pawl-arm and pawl coöperating with ratchet-wheel 20; 21′, the pawl just referred to; 22, a link connecting eccentric-pin 10 with pawl-arm 21, whereby the rotation of the engine-shaft gives step-by-step rotation to throttle-disk 19; 23, a deflecting-rib extending fore and aft of the coal-discharge nozzle 3, this deflecting-rib being disposed upon the floor of the nozzle and pivoted at one end so that it may be angularly adjusted upon the floor; 24, an adjusting-bar connected with the free end of the deflecting-rib and serving as means for adjusting it, the illustration showing this adjusting-bar as being provided with a detent-pin to hold it in selected position; 24′, the detent-pin; and 25 a link extending downwardly from the pawl-arm of the conveyer, which may, if desired, be employed in giving motion to a shaking-grate if such grate be employed in connection with the stoker.

It will be noted that the wing 5 comprises a hub and a blade portion.

The coal from the hopper enters the feed-chamber 4 horizontally at the center of the chamber, the passage of the coal being facilitated and regulated by the conveyer 7. The entering coal goes axially into the pocket of the feed-wing hub and is dumped by it into the lower portion of the feed-chamber, where it is acted upon by the wing-blade and thrown into the furnace with a speed that is regularly increasing or diminishing successively. There is thus no destructive shearing action

upon the coal between the feed-wing and the margin of the passage leading the coal into the chamber. The end wall 5″ of the pocket of the feed-wing prevents the coal from reaching the farther wall of the chamber and getting between that wall and the hub of the feed-wing.

The coal enters the feed-chamber 4 in an obvious manner and the feed-wing dashes it into the fire-box. The distance to which the coal will be thrown into the fire-box will be dependent upon the velocity with which the feed-wing is turning, and in order that the delivery upon the grate may be distributed in a fore-and-aft direction provision is made for automatically and continuously altering the speed of the motor, so that the coal will be thrown at one time at a near point on the grate, then farther inwardly, then still farther inwardly, then less far inwardly, and so on, a distribution being thus effected from the front to the back of the grate. This is accomplished by means of the self-varying throttle-valve. As the disk rotates its segment first uncovers but few of the holes 18, thus resulting in a comparatively slow motion of the motor and in a comparatively gentle delivery of the coal upon the grate, the continued rotation of the disk effecting a more liberal supply of steam to the motor, resulting in a more violent and more distant discharge of the coal until the segment has uncovered all the holes and has given the engine its maximum quantity of steam, after which it begins to close the openings and reduce the speed of the engine, and so on and on. The segment of the disk is incapable of completely closing the entire series of openings at one time, and thus cannot entirely shut off all the steam and stop the motor. The discharge of coal would be in a general direction straight outward from the nozzle; but by angularly adjusting the deflecting-rib 23 the delivery of coal may be deflected laterally, by which means a satisfactory sidewise distribution of the coal may be effected and the delivery may be specially directed to thin places in the fire.

We claim as our invention—

1. In a stoker, the combination, substantially as set forth, of a circular feed-chamber having a tangential nozzle and having a central feed-opening through one of its sides, a supply-hopper communicating with said feed-opening, a rotary feed-wing mounted in said feed-chamber and having a recess in axial prolongation of said feed-opening, and mechanism for rotating the feed-wing.

2. In a stoker, the combination, substantially as set forth, of a circular feed-chamber having a tangential nozzle and having a central feed-opening through one of its sides, a supply-hopper communicating with said feed-opening, a rotary feed-wing mounted in said feed-chamber and having a recess in axial prolongation of said feed-opening, mechanism for rotating the feed-wing, and an angularly-adjustable deflecting-rib mounted in said nozzle.

3. In a mechanical stoker, the combination, substantially as set forth, of a circular feed-chamber having a tangential discharge-nozzle, a feed-wing having an axial recess mounted for rotation in the feed-chamber, a feed-hopper having communication with the central portion of the feed-chamber and arranged to feed endwise into the axial recess of the feed-wing, a conveyer at the juncture of the hopper and feed-chamber, and mechanism for giving motion to said wing and to said conveyer.

4. In a mechanical stoker, the combination, substantially as set forth, of a feed-chamber having a discharge-nozzle, a feed-hopper arranged to deliver coal thereto, a rotary discharge device mounted upon a horizontal axis within the feed-chamber to expel the coal therefrom into the furnace, a fluid-pressure motor for rotating the discharge device continuously, a throttle-valve provided with a variable opening controlling the supply of fluid to said motor, and mechanism operated by the motor to actuate said throttle-valve, whereby the speed of rotation of said discharge device is automatically subjected to successive changes.

5. The combination of a feed-chamber having a horizontal discharge-nozzle at its base, a rotary wing provided with an axial recess and mounted for rotation in said feed-chamber, a feed-hopper having communication with the central portion of the feed-chamber and arranged to feed endwise into the axial recess of said wing, a motor, transmitting mechanism between the motor and said wing, and additional transmitting connections from the motor adapted to be connected with the shaking-grate.

6. In a mechanical stoker, the combination, substantially as set forth, of a feed-wing provided with a hub and blade mounted for rotation upon a horizontal axis and having at its hub an axial recess with an opening opposite the blade, and means for delivering coal into said recess and for guiding the coal when dumped from the recess and acted upon by the wing.

7. In a mechanical stoker, the combination, substantially as set forth, of a feed-wing provided with a hub and blade mounted for rotation upon a horizontal axis and having at its hub an axial recess with an end wall and with an opening opposite the blade, and means for delivering coal into said recess and for guiding the coal when dumped from the recess and acted upon by the wing.

8. In a mechanical stoker, the combination substantially as set forth, of a feed-wing provided with a hub and blade mounted for rotation upon a horizontal axis and having

at its hub an axial recess with an opening at one end and with an opening opposite the blade, and means for delivering coal endwise into said recess and for guiding the coal when dumped from the recess and acted upon by the wing.

9. In a mechanical stoker, the combination, substantially as set forth, of a feed-wing provided with a hub and blade mounted for rotation upon a horizontal axis and having at its hub an axial recess open at one end and side, and a chamber inclosing said wing and having an inlet to deliver coal to said recess and an outlet for coal dumped from said recess and acted upon by the wing.

10. In a mechanical stoker, the combination, substantially as set forth, of a feed-chamber having a horizontal discharge-nozzle at its base and having a feed-opening leading into its side, a conveyer disposed within said feed-opening, a rotary shaft, and a wing carried by said shaft within said feed-chamber and having an axial recess communicating with said feed-opening and adapted to receive the fuel advanced therethrough by the conveyer, the inner wall of said axial recess coinciding substantially with the margin of said feed-opening.

11. In a mechanical stoker, the combination, substantially as set forth, of a feed-chamber having an outlet and a feed-opening, a rotary shaft, and a feed-wing carried by said shaft and disposed within said chamber and having its inner portion disposed at such radial distance from the axial line of the shaft as to provide the wing with an axial recess within the field swept through by said wing, said axial line being arranged to receive fuel entering through said feed-opening.

12. In a mechanical stoker, the combination, substantially as set forth, of a feed-chamber having a feed-opening leading into one of its sides, a rotary conveyer mounted at said feed-opening and adapted to feed fuel therethrough, a shaft mounted in the side of the feed-chamber opposite the conveyer and in axial line therewith, and a feed-wing having an axial recess carried by the shaft within the chamber.

13. In a mechanical stoker, the combination, substantially as set forth, of a feed-chamber having a horizontal discharge-nozzle and having a feed-opening leading into one of its sides, a shaft mounted in the chamber in axial alinement with said feed-opening, and a rotary wing disposed within the feed-chamber and carried by said shaft and having its inner portion at a distance from the common axial line of the shaft and feed-opening, whereby said wing is provided with an axial recess surrounded by the field swept through by said feed-wing, said axial recess being arranged to receive fuel entering through said feed-opening.

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G. C. DEANE.