W. T. HANNA.

MECHANICAL STOKER.

APPLICATION FILED MAR. 12, 1910.

991,614.

Patented May 9, 1911.

2 SHEETS—SHEET 1.

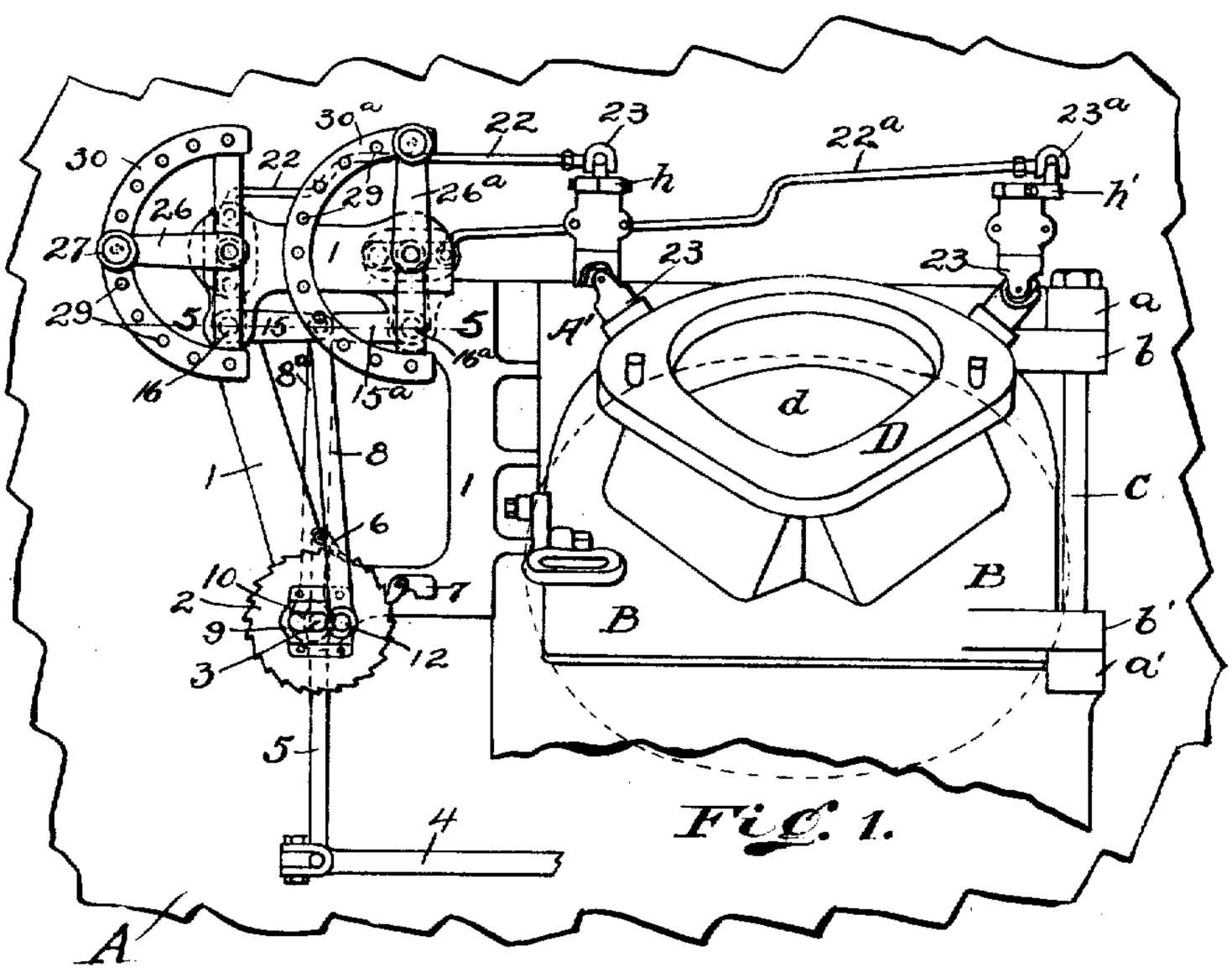

Fig. 1.

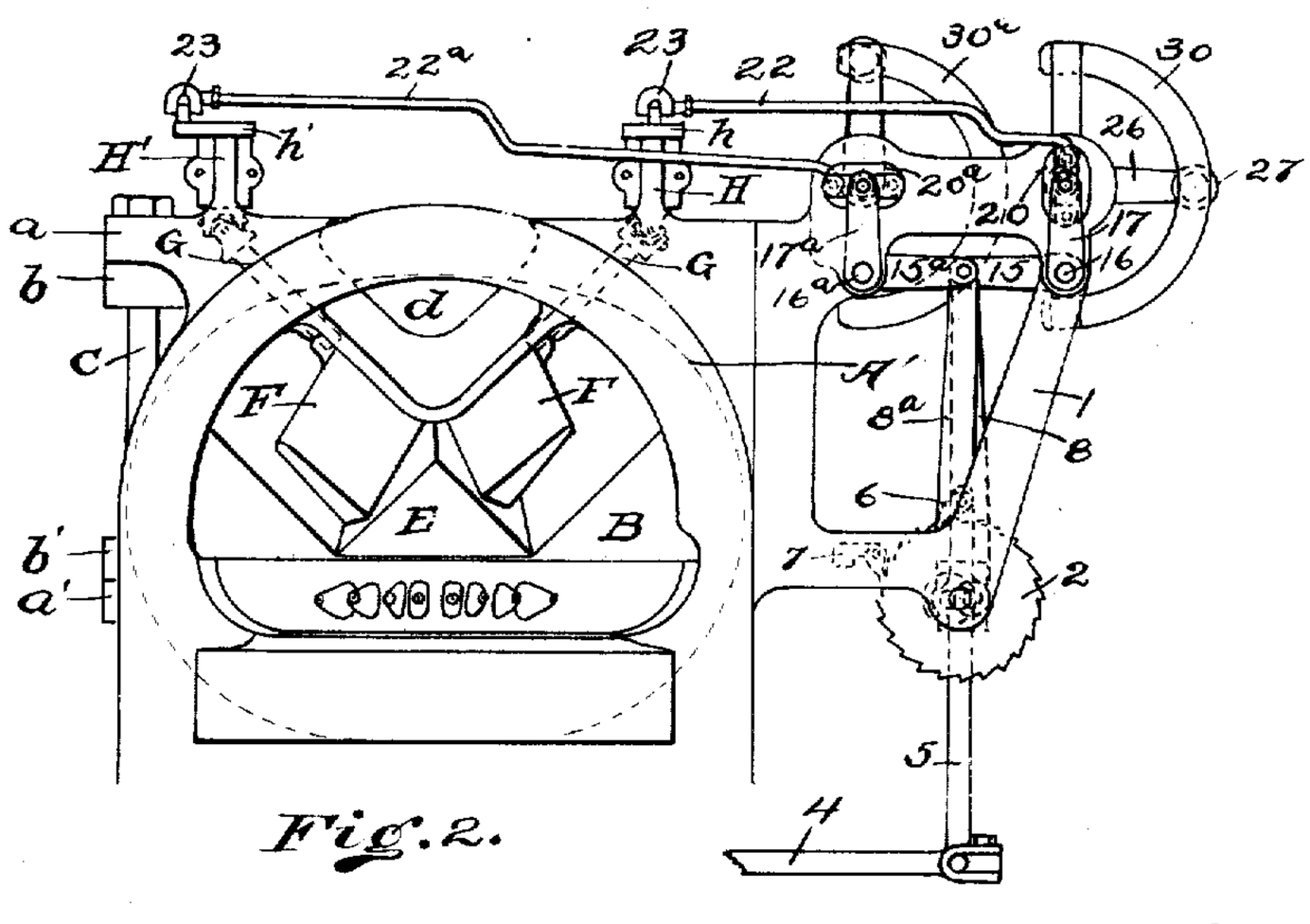

Fig. 2.

Witnesses
C. M. Palmer Jr.
W. T. Reinhold

Inventor
William T. Hanna,
by George B. Gartinson.
Attorney

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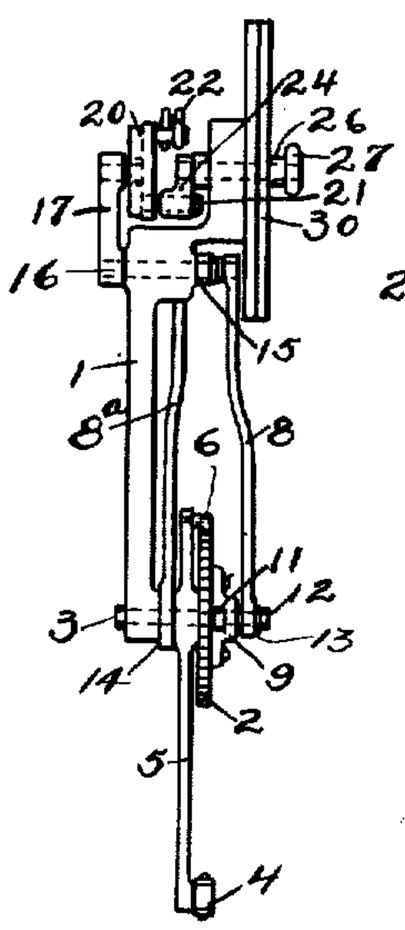

Fig. 3.

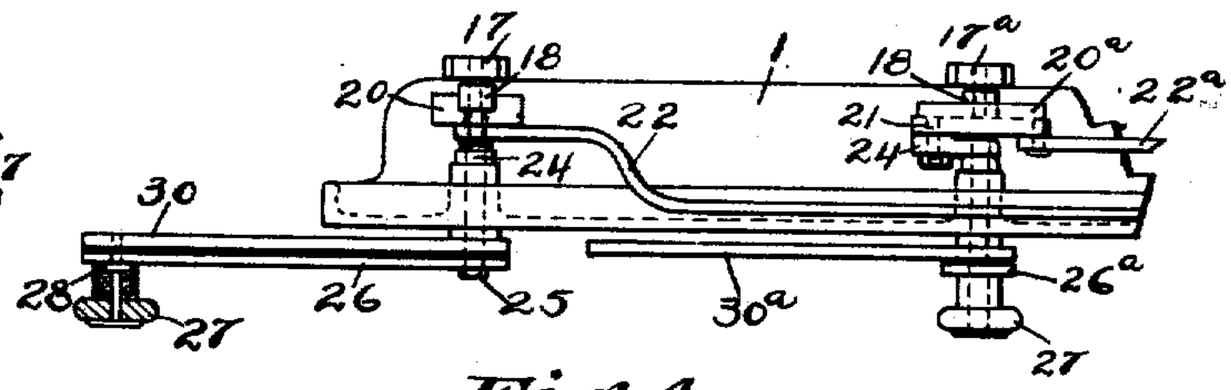

Fig. 4.

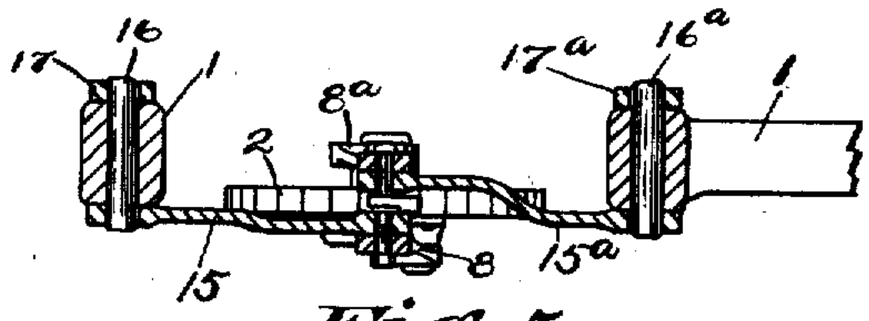

Fig. 5.

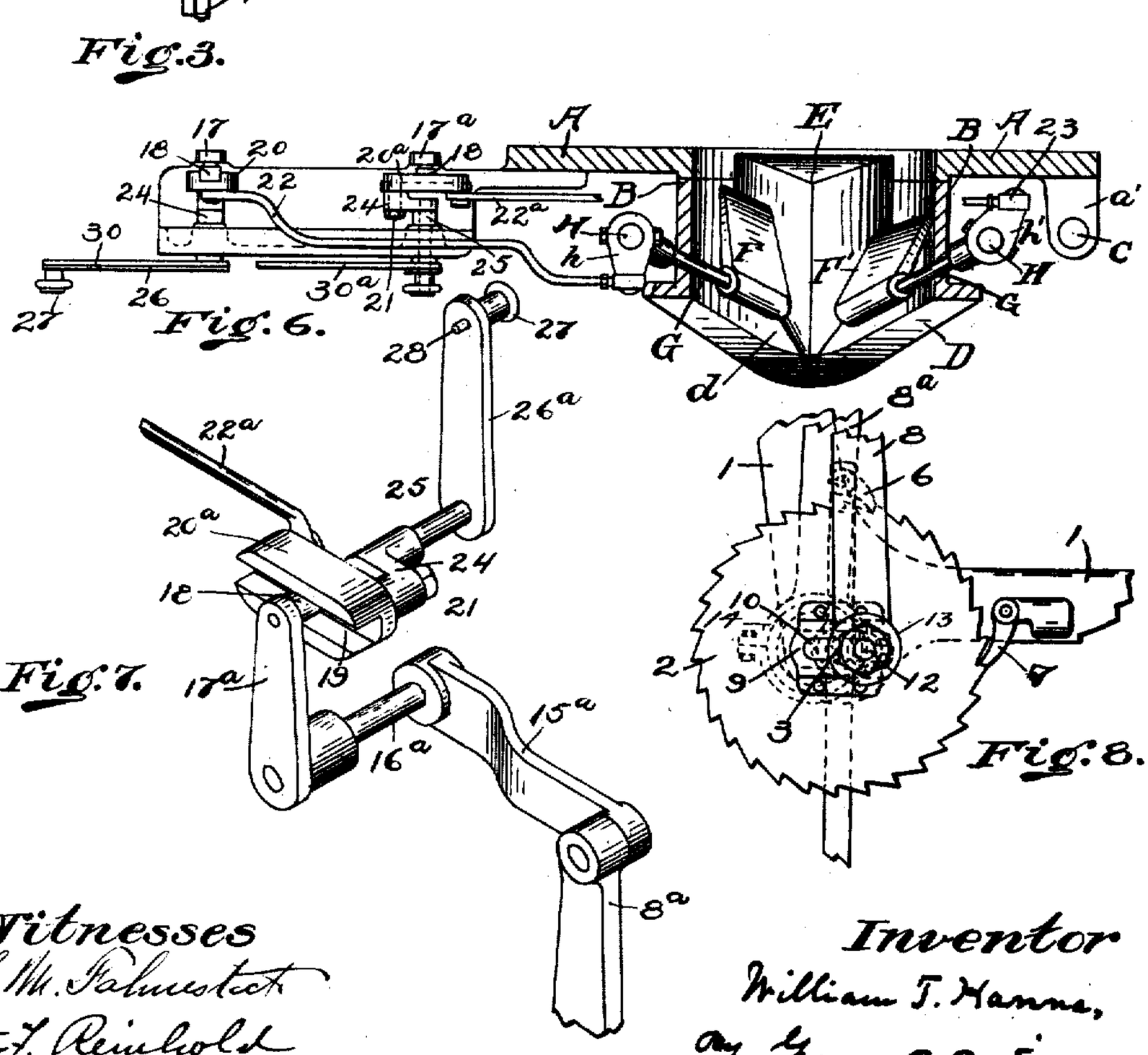

Fig. 6.

Fig. 7.

Fig. 8.

Witnesses
C. M. Falmestock
V. J. Reinhold

Inventor
William T. Hanna,
by George B. Gartinson,
Attorney

UNITED STATES PATENT OFFICE.

WILLIAM T. HANNA, OF CINCINNATI, OHIO, ASSIGNOR OF TWO-THIRDS TO MARTHA A. HANNA AND ONE-THIRD TO CLYDE P. JOHNSON, OF CINCINNATI, OHIO.

MECHANICAL STOKER.

991,614. Specification of Letters Patent. Patented May 9, 1911.

Application filed March 12, 1910. Serial No. 548,945.

To all whom it may concern:

Be it known that I, WILLIAM T. HANNA, a citizen of the United States, residing at Cincinnati, in the county of Hamilton and State of Ohio, have invented certain new and useful Improvements in Mechanical Stokers, of which the following is a specification.

My invention relates to that class of stokers in which a feed plate, with guide-wings adapted to oscillate thereon, is employed for mechanically directing the flow of the fuel as it enters the furnace from the fuel conduit, and the object of the invention is to provide improved means for actuating the guide wings.

My invention consists in the parts and combination and arrangement of parts hereinafter described and claimed.

I have illustrated my invention as applied to a blast-feed locomotive stoker, but showing only so much of the stoker construction as will suffice to show the connection of the invention therewith.

In the drawings, Figure 1 is a front elevation of a portion of the fire front of a locomotive furnace equipped with my invention; Fig. 2 a rear elevation of the same; Fig. 3 a side elevation of the guide-wing actuating mechanism; Fig. 4 an enlarged plan view of a portion of the same; Fig. 5 a section on the line 5—5 of Fig. 1; Fig. 6 a plan view including the fire door frame; Fig. 7 a skeleton perspective view showing the relationship of certain of the operating parts; and Fig. 8 an enlarged detail of a ratchet wheel and the connecting parts.

A designates the furnace front, A' the fire door frame the usual fuel opening being indicated in dotted lines, B the fire door, *a* hinge knuckles on the door frame, *b* hinge knuckles on the door, C the hinge pintle, D a plate secured to the fire door to which the fuel conduit may be attached and provided with an opening *d* through which fuel may pass from the fuel conduit to the interior of the furnace, and E a feed plate projecting within the door opening. The feed plate is preferably angular in cross section with its upper faces forming a ridge like that of a pitch roof, and the plate preferably slopes downwardly from the feed to the discharge end.

F, F', are guide wings, preferably in the form of rectangular plates, mounted at their rear ends upon pivot shafts G, G', in such manner that, by rocking the pivot shafts, the guide wings may be swung upwardly and downwardly upon the upper faces of the feed plate.

H, H, are rock shafts mounted in brackets *a'* projecting from the door frame, and having a jointed connection with the guide wing pivot shafts and provided with crank arms *h* and *h'* whereby they may be rocked.

Feed plates and guide wings of the same general type are disclosed in my pending applications, Serial Numbers 282,142, filed October 10, 1905, and 373,908, filed May 16, 1907, and the parts thus far described, except as elements in new combinations, constitute no part of the present invention.

The reference numeral 1 designates a bracket extending from the door frame, 2 a ratchet wheel loosely mounted upon a pivot shaft 3 mounted in bracket 1, 4 a bar adapted to be reciprocated by any suitable connection with the stoker engine (not shown), 5 a lever pivotally connected with bar 4, fulcrumed on pivot shaft 3 and carrying a pallet 6 adapted to engage with the teeth of the ratchet wheel and to actuate the wheel, 7 a weighted pawl adapted to prevent reverse movement of the ratchet wheel and to retard its direct action; and 8 and 8ª arms eccentrically connected with the ratchet wheel. I prefer to mount one of the eccentric arms in such manner that its bearing may be readily shifted relatively to the axis of the ratchet wheel. In the form shown 9 is a plate fixed to the ratchet wheel and provided with a slot 10 extending across the axis thereof and with a recess 11 to receive the head of a bolt 12, carrying a disk 13 upon which the eccentric arm 8 is loosely mounted. The bolt may be secured in either end of the slot by screwing up the nut which also clamps the disk in a fixed position. The other arm 8ª is mounted upon a cam 14. By changing the position of the bolt, which serves as the eccentric shaft of arm 8, from one end of slot 10 to the other end, the direction of motion of arm 8 relatively to that of arm 8ª may be reversed. At their free ends, the eccentric arms are pivotally connected with cranks, 15 and 15ª, adapted to actuate rock shafts 16 and 16ª mounted in bracket 1. To the other ends of the rock

shafts are fixed cranks, 17 and 17ª, carrying upon their wrist pins rollers, 18, adapted to travel in grooves 19 in levers 20 and 20ª These levers are fulcrumed at one end upon pivot bolts 21, and are pivotally connected at their other ends to rods 22 and 22ª which are connected by universal joints 23 with the cranks *h* and *h'* which actuate the guide wing rock shaft. The pivot bolts 21 are carried by cranks 24 fixed to pivot shafts 25 mounted in the bracket and adapted to be actuated by hand bars 26 and 26ª. The hand bars carry at their free ends, knobs 27 having spring pins 28 adapted to take into selected holes in series of holes 29 arranged in the arc of a circle in segmental plates 30 and 30ª.

It should be noted that the arcs of travel of the rollers 18 are fixed, that the cranks 17 and 17ª carrying the rollers are positively driven and are adapted to actuate the levers, and that the positions of the pivot bolts 21, which serve as fulcrums for the levers, may be changed, relatively to the arcs of travel of the rollers, by means of the hand bars acting through pivot shafts 25 and cranks 24. The action of the levers upon the guide-wing actuating rods is therefore largely dependent upon the position of the lever fulcrums relatively to the arc of travel of the rollers. I have illustrated hand bar 26 as extending horizontally and secured midway of the segmental plate. This positions the fulcrum of lever 20 in the same vertical plane with roller 18 when the latter is in the center of its arc of travel and the lever will be actuated through its entire possible sweep and thereby cause guide wing F to be oscillated through its entire sweep. I have illustrated hand bar 26ª as extending vertically with its knob and upward. This positions the fulcrum of lever 20ª in substantially the same horizontal plane with roller 18ª and the roller will ride in the groove without imparting any substantial movement to the lever. With the lever in this position guide wing F' will be stationary at the bottom of its sweep. Reversing the position of the hand bar would reverse the position of lever 20ª and the guide wing would be stationary at the top of its sweep. By positioning the hand bar at any angle between the upper half of the segmental plate the guide wing may be caused to oscillate to and fro from its low position through any desired part of its possible sweep. By positioning the hand bar at any angle between the vertical and the horizontal upon the lower half of the segmental plate the guide wing may be caused to oscillate to and fro from its high position through any desired part of its possible sweep. With both guide wings oscillating through their entire sweep, the fuel is discharged with practical uniformity from the entire width of the feed plate. With both guide wings stationary at the bottom of their sweep the fuel is delivered from the outer edge of the plate on both sides. With one guide wing stationary at the top and the other stationary at the bottom, the feed is delivered at one edge only. With one guide wing stationary at the top and the other oscillating through its entire sweep the feed is distributed with practical uniformity from one side to the center line of the plate.

The operation is as follows: Bar 4 is reciprocated and imparts movement to lever 5 which, through pallet 6, actuates the ratchet wheel 2. Movement of the ratchet wheel imparts movement to the eccentric arms, 8 and 8ª, which, through cranks, 15 and 15ª, rock shafts 16 and 16ª and the roller carrying cranks, 17 and 17ª cause the rollers 18 and 18ª to travel in the grooves 19 and 19ª in levers 20 and 20ª. The pivot bolts 21 and 21ª being positioned as shown in the drawings, roller 18 will rock lever 20 to and fro and movement of the lever will reciprocate rod 22 which, acting through crank *h*, rock shaft H and pivot shaft G, will cause guide wing F to be oscillated through its entire sweep. Roller 18ª will impart no effective movement to lever 20ª and guide wing F' will be practically stationary at the bottom of its sweep. By positioning hand bar 26ª so that its position will correspond with that of hand bar 26, both levers will be actuated to their full extent and both guide wings will be actuated through their full sweep. By positioning the hand bars at other angles the guide wings may be actuated from top or bottom through any desired portions of their full sweep and either may be actuated through one portion of its sweep while the other is actuated through a different portion. By changing the position of bolt 12 from the position shown to the other of slot 10 in plate 9 the eccentric arm 8 may be caused to move upward while arm 8ª moves downward and travel of the feed plates will then be in reverse direction.

While I have illustrated the feed plate as angular in cross section, any desired form may be used without departing from the spirit of my invention.

I claim as my invention:

1. The combination with a furnace door casing of a bracket; a feed plate; guide wings adapted to oscillate thereon; rods intermediately connected with and adapted to actuate the guide wings; a ratchet wheel pivotally mounted on the bracket; means for actuating the ratchet wheel; arms eccentrically connected with the ratchet wheel; and connections between the eccentric arms and the guide-wing actuating rods whereby the latter may be actuated.

2. The combination with a furnace door

casing of a bracket; a feed plate; guide wings adapted to oscillate thereon; rods intermediately connected with and adapted to actuate the guide wings; a ratchet wheel pivotally mounted on the bracket; means for actuating the ratchet wheel; arms eccentrically connected with the ratchet wheel; crank connections between the eccentric arms and the guide-wing actuating rods whereby the latter may be actuated; and means for adjusting the throw of the cranks.

3. The combination with a furnace door casing of a bracket; a feed plate; guide wings adapted to oscillate thereon; rods intermediately connected with and adapted to actuate the guide wings; a ratchet wheel pivotally mounted on the bracket; means for actuating the ratchet wheel; arms eccentrically connected with the ratchet wheel; crank connections between the eccentric arms and the guide-wing actuating rods whereby the latter may be actuated; and means for adjusting the throw of the cranks independently of each other.

4. The combination with a furnace door casing of a bracket; a feed plate; guide wings adapted to oscillate on the feed plate; pivot shafts adapted to actuate the feed plates; rock shafts adapted to actuate the pivot shafts; rods adapted to actuate the rock shafts; a ratchet wheel pivotally mounted upon the bracket; a reciprocating arm; a lever arm pivotally connected therewith; a pallet carried by the lever arm adapted to actuate the ratchet wheel; arms eccentrically connected with the ratchet wheel; and connections between the eccentric arms and the rods which actuate the guide-wing rock shafts whereby the latter may be actuated.

5. The combination with a furnace door casing of a bracket; a feed plate; guide wings adapted to oscillate on the feed plate; pivot shafts adapted to actuate the feed plates; rock shafts adapted to actuate the pivot shafts; rods adapted to actuate the rock shafts; a ratchet wheel pivotally mounted upon the bracket; a reciprocating arm; a lever arm pivotally connected therewith; a pallet carried by the lever arm adapted to actuate the ratchet wheel; arms eccentrically connected with the ratchet wheel; crank connections between the eccentric arms and the rods which actuate the guide-wing rock shafts whereby the latter may be actuated; and means for adjusting the throw of the cranks.

6. The combination with a furnace door casing of a bracket; a feed plate; guide wings adapted to oscillate on the feed plate; pivot shafts adapted to actuate the feed plates; rock shafts adapted to actuate the pivot shafts; rods adapted to actuate the rock shafts; a ratchet wheel pivotally mounted upon the bracket; a reciprocating arm; a lever arm pivotally connected therewith; a pallet carried by the lever arm adapted to actuate the ratchet wheel; arms eccentrically connected with the ratchet wheel; crank connections between the eccentric arms and the guide-wing rock shafts whereby the latter may be actuated; and means for adjusting the throw of the cranks independently of each other.

7. The combination with a furnace door casing of a bracket; a feed plate; guide wings adapted to oscillate thereon; rods intermediately connected with and adapted to actuate the guide wings; a ratchet wheel pivotally mounted on the bracket; means for actuating the ratchet wheel; arms eccentrically connected with the ratchet wheels; cranks pivotally connected with the eccentric arms; rock shafts adapted to be actuated by the cranks; cranks fixed to the driving ends of the rock shafts; rollers carried by the wrist pins of the cranks; and levers having grooves adapted to receive the rollers, the levers being fulcrumed at one end and pivotally connected at the other end with the guide-wing actuating arms.

8. The combination with a furnace door casing of a bracket; a feed plate; guide wings adapted to oscillate thereon; rods intermediately connected with and adapted to actuate the guide wings; a ratchet wheel pivotally mounted on the bracket; means for actuating the ratchet wheel; arms eccentrically connected with the ratchet wheel; cranks pivotally connected with the eccentric arms; rock shafts adapted to be actuated by the cranks; cranks fixed to the driving ends of the rock shafts; rollers carried by the wrist pins of the cranks; levers having grooves adapted to receive the rollers, the levers being fulcrumed at one end and pivotally connected at the other end with the guide-wing actuating rods; and means for changing the position of the fulcrum of the levers relatively to the arcs of travel of the rollers.

9. The combination with a furnace door casing of a bracket; a feed plate; guide wings adapted to oscillate thereon; rods intermediately connected with and adapted to actuate the guide wings; a ratchet wheel pivotally mounted on the bracket; means for actuating the ratchet wheel; arms eccentrically connected with the ratchet wheels; cranks pivotally connected with the eccentric arms; rock shafts adapted to be actuated by the cranks; cranks fixed to the driving ends of the rock shafts; rollers carried by the wrist pins of the cranks; pivot shafts mounted in the bracket, hand bars fixed to the pivots; cranks carried by the pivot shafts; pivot bolts carried by the cranks; levers fulcrumed at one end on the pivot bolts and pivotally connected at the other

end with the guide-wing actuating rods and having grooves adapted to receive the rollers; and means for securing the hand bars in selected positions.

10. The combination with a furnace door casing of a bracket; a feed plate; guide wings adapted to oscillate thereon; arms intermediately connected with and adapted to actuate the guide wings; a ratchet wheel pivotally mounted on the bracket; means for actuating the ratchet wheel; arms eccentrically connected with the ratchet wheel; means for changing the position of the eccentric axis of one of the arms relatively to that of the other arm; and connections between the eccentric arms and the guide-wing actuating rods whereby the latter may be actuated.

11. The combination with a furnace door casing of a bracket: a feed plate; guide wings adapted to oscillate thereon; arms intermediately connected with and adapted to actuate the guide wings; a ratchet wheel pivotally mounted on the bracket; means for actuating the ratchet wheel; a plate secured to the ratchet wheel and having a slot extending across the center thereof; a bolt adapted to be secured in either end of the slot; a disk carried by the bolt; an arm loosely mounted thereon; another arm eccentrically connected with the ratchet wheel; and connections between the arms and the guide-wing actuating shafts whereby the latter may be actuated.

WILLIAM T. HANNA.

Witnesses:
AUGUST W. BRUCK,
EDWARD BOOCH.