Feb. 20, 1945. F. J. PALMER 2,370,067

STOKER

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Fig. 1.

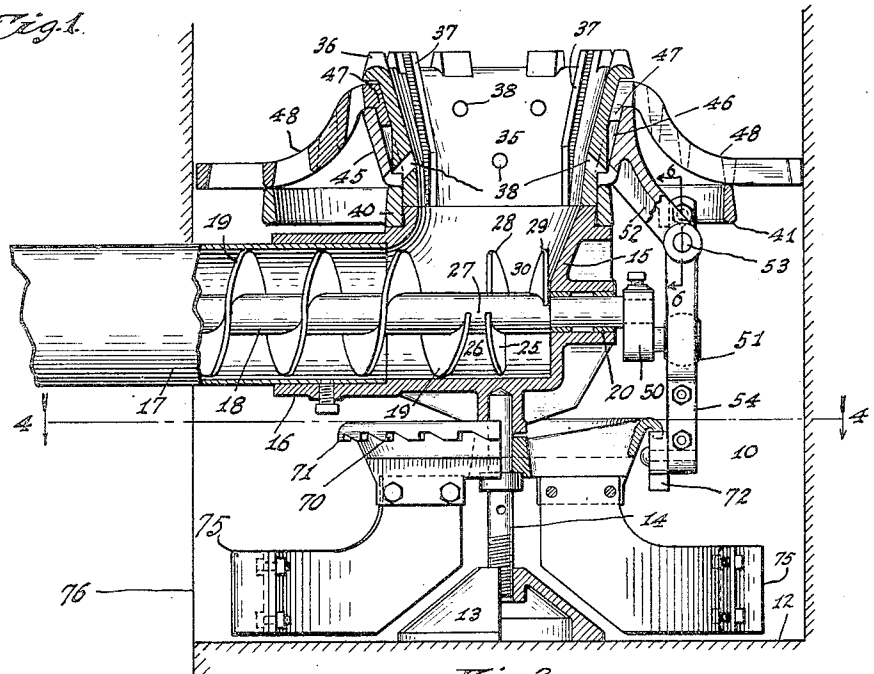


Fig. 2.

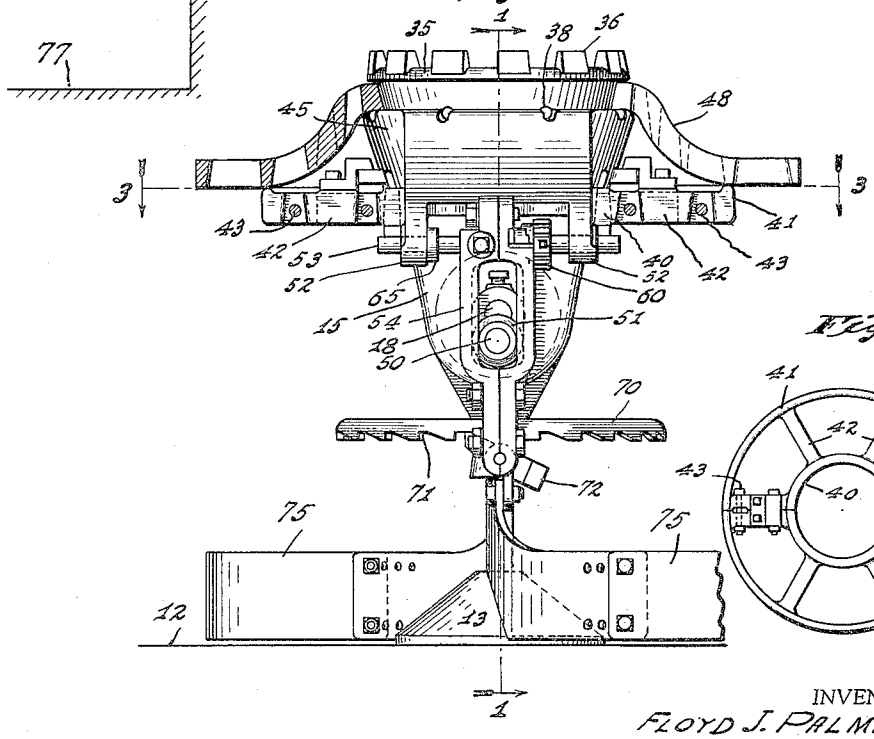


Fig. 3.

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Fig. 4.

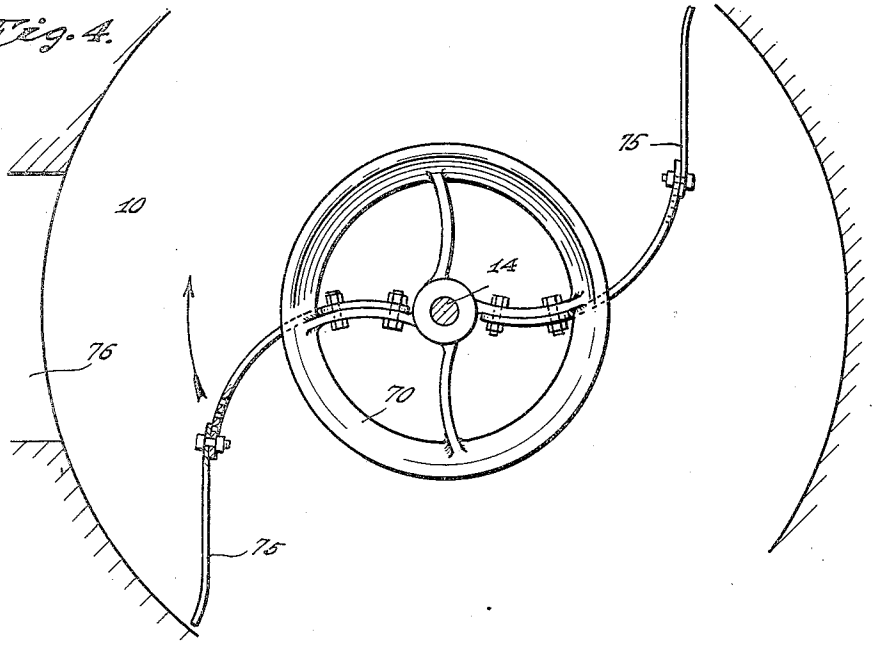


Fig. 5.

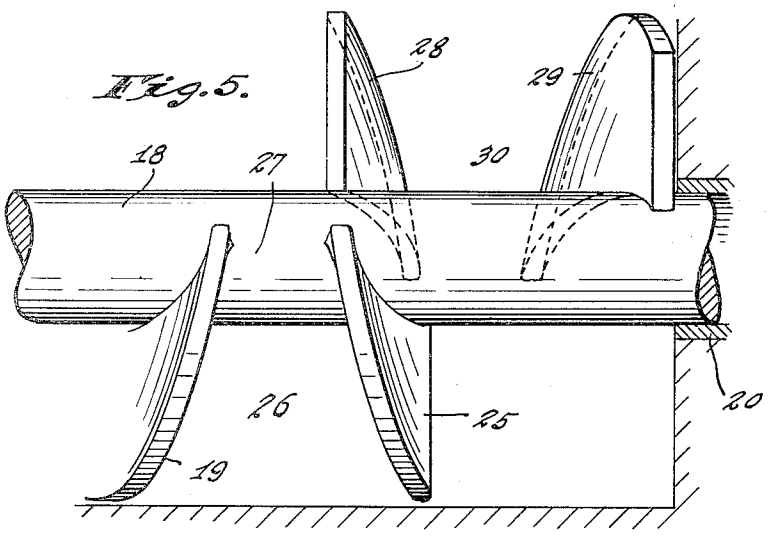


Fig. 6.

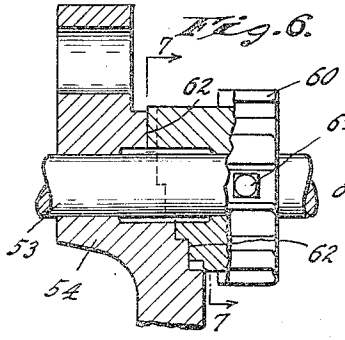
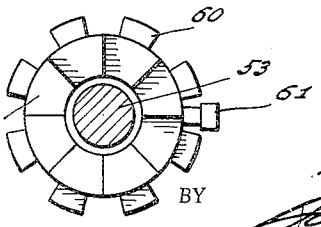


Fig. 7.



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2,370,067

STOKER

Floyd J. Palmer, Cleveland, Ohio

Application August 28, 1939, Serial No. 292,164

11 Claims. (Cl. 110—45)

My invention relates to stokers, and particularly to stokers of the type in which the fuel is fed into the lower portion of a retort by means of a generally horizontal feed-screw. It is the primary object of my invention to prevent packing of fuel against the rear wall of the retort as the result of the action of the feed-screw and to insure positively an upward feeding and uniform distribution of fuel within the retort. Another object of my invention is to coke the coal, yet to prevent the formation of large coke-masses within the retort. A further object of my invention is to produce an improved and simplified means for oscillating the grate associated with the retort.

In carrying out my invention I form the feed-screw, within the lower portion of the retort, with one or more pockets having side walls which diverge outwardly in the direction of feed-screw rotation, one side wall of each of such pockets conveniently being formed as a continuation of the helical flight of the feed-screw. Such pocket or pockets are centered approximately with reference to the axis of the retort; and as the feed-screw rotates, the action of the angularly disposed pocket-walls positively forces the fuel laterally of the feed-screw and upwardly into the retort. The retort is formed with an oscillatable bowl to which the grate is connected, such bowl being oscillated by a crank on the rear end of the feed-screw shaft. The interconnection of this crank to the retort-bowl is adjustable so as to vary the angle through which the retort-bowl oscillates.

The accompanying drawings illustrate my invention: Fig. 1 is a vertical section through the lower portion of a furnace showing my stoker in place therein; Fig. 2 is an end elevation of the stoker; Fig. 3 is a plan view of the grate support; Fig. 4 is a horizontal section on the line 4—4 of Fig. 1; Fig. 5 is an enlarged fragmental elevation of the inner end of the feed screw; Fig. 6 is a section on the line 6—6 of Fig. 1; and Fig. 7 is a section on the line 7—7 of Fig. 6.

The furnace illustrated in the drawings has a lower portion 10 in which the stoker is mounted and an upper portion or combustion chamber. The inner end of the stoker mechanism is supported from the floor 12 of the furnace by means including a base member 13 and a screw 14, the latter having its upper end received in a recess in the retort and its lower end screw-threadedly mounted in the base member 13. By adjusting the screw 14, the retort may be disposed at the desired height.

The stoker includes a retort-throat 15, desirably in the form of a casting, having a laterally projecting neck 16 in which the inner end of the fuel-feed tube 17 is received. Within the fuel-feed tube 17 I mount a feed-screw consisting of a central shaft 18 and a helical flight 19, the inner end of the shaft 18 conveniently being supported by a suitable bearing 20 in the rear wall of the retort-throat 15.

The helical flight 19 terminates short of the rear wall of the retort-throat 15, and opposite its end I provide on the shaft 18 a helically disposed vane 25 which is of opposite hand to the flight 19. The inner end of the flight 19 and and the vane 25 co-operate to form a pocket 26 the side walls of which diverge in the direction of rotation of the feed-screw. As the screw rotates, the converging side walls of the pocket 26 exert on the fuel a pressure which is reflected in a positive tendency of the fuel to rise in the retort-throat. I have found it advantageous to leave the narrow end 27 of the pocket 26 open, the width of the opening 27 being somewhat greater than the maximum size of the fuel particles fed through the tube 17. By this expedient I am enabled to prevent fuel particles of relatively large size from becoming wedged in the narrow end of the pocket 26 and from jamming against the side walls of the retort-throat.

While one of the pockets 26 will produce a very noticeable and positive upward feeding of fuel in the retort, I find it desirable to provide the feed-screw with two such pockets. Accordingly, I have shown in Figs. 1 and 5 a helically disposed vane 28, which is mounted on the opposite side of the shaft from the vane 25, and a second helically disposed vane 29 mounted on the shaft 18 in opposed relation to the vane 28. The vane 28 may be, in effect, a continuation of the flight 19, and is of the same hand as the flight 19. The vane 29 is of opposite hand and co-operates with the vane 28 to form a second feed pocket 30, the action of which on the fuel is substantially the same as that of the pocket 26. The pockets 26 and 30 are disposed approximately symmetrically relative to the axis of the retort, so that their action on the fuel will be centered relatively to the retort and will result in an even distribution of fuel in the bowl.

Mounted for oscillatory movement above the retort-throat 15 is a retort-cap 35 having a central passage alined with the fuel-discharge opening in the retort-throat 15. Desirably the upper end of the retort-bowl 35 is provided with spaced bosses 36 and the inner surface of the retort-cap

with vertically extending ribs 37. As the retort-cap is oscillated by means to be described hereinafter, the bosses 36 and the ribs 37 agitate the fuel within the retort-cap and prevent the formation of any large coke masses. Tuyères 38 extending through the wall of the retort-cap provide for the admission of the air necessary for combustion.

Upon the upper end of the retort-throat 15 I mount a grate-support having a hub portion 40 and a rim 41 interconnected by radially extending arms 42. Desirably, the grate-support is divided diametrically into two parts held together by clamp bolts 43. The hub portion 40 of the grate-support has sufficient extent vertically to receive both the upper end of the retort-throat 15 and the lower end of the retort-cap 35, and it thus serves to maintain the retort-bowl in proper position on the throat.

Surrounding the retort-cap 35 above the hub 40 of the grate-support is a ring 45 which is operatively interconnected to the retort-cap for oscillation therewith. Pockets 46 in the inner surface of the ring 45 receive lugs 47 on the inner end of grate-segments 48 which fill the annular space between the retort-cap and the walls of the furnace. The peripheral portion of the grate formed by the segments 48 is materially lower than the top of the retort-cap 35, the segments being supported by the rim 41 of the grate-support.

For the purpose of oscillating the retort-cap 35 and the grate, the shaft 18 projects rearwardly through the bearing 20 and is provided in rear thereof with a crank 50 upon which is rotatably and slidably mounted a ball member 51. The ring 45 is provided with a pair of outwardly and downwardly extending arms 52 which receive a rod 53 disposed in the plane of rotation of the crank 50. I mount on the rod 53 a yoke 54 provided with a vertical slot the sides of which are grooved to receive the ball member 51 on the crank 50. As the feed screw 18 rotates, the crank 50 causes the yoke 54 to oscillate, and this motion of the yoke is transmitted to the ring 45, retort-cap 35, and grate 48.

I find it desirable, in order to accommodate the stoker to the burning of different types of fuel, to vary the angle through which the retort cap and grate oscillate as the result of the action of the crank 50. To accomplish this result, I may make the rod 53 slidable in the arms 52, may secure the yoke 54 to the rod, and may make the yoke narrower than the distance between the arms 52. By this means, I provide a lost-motion connection between the yoke and the ring 45; and by varying the extent of the lost-motion which this type of connection affords, I can vary the angular extent of oscillatory movement of the retort-cap and grate.

The means employed to vary the lost-motion connection between the yoke 54 and the ring 45 may take various forms. That shown in the drawings comprises a collar 60 which may be secured to the rod 54 in various positions of angular adjustment by means of a set screw 61. The surface of the collar 60 adjacent the yoke 54 is provided with an annular series of steps 62 axially spaced at suitable intervals, and a corresponding surface of the yoke 54 is complementarily formed as indicated in Fig. 6. It will be obvious that by rotating the collar 60 on the shaft 54 it may be held in various positions of axial adjustment relative to the yoke 54. If desired, further adjustment of the lost motion between the yoke 54 and ring 45 may be secured by providing on the rod 53 one or more spacing collars 55.

The oscillatory movement effected by the crank 50 may be availed of to keep the furnace-floor 12 free of ashes which fall through the grate 48. To this end, I may support from the screw 14 a rotatable member 70 having a peripheral flange provided with an annular series of ratchet teeth 71 disposed in position to co-operate with a pawl 72 pivotally mounted on the lower end of the yoke 54. To the member 70 I secure one or more arms 75 which extend outwardly and rearwardly in the direction of rotation of the member 70 in position to sweep the floor 12 and carry ashes thereon into the opening 76 of an ash pit 77.

I claim as my invention:

1. In a stoker, a retort having a stationary lower portion and an annular cap supported from said lower portion for oscillation about a vertical axis and forming an upwardly extending continuation of the retort, means for feeding fuel into the lower portion of said retort, said means including a feed screw, said screw being provided exteriorly of said retort with a crank, a lost-motion connection between said crank and said retort cap for oscillating the latter, and means for varying the extent of the lost-motion of such connection.

2. In a stoker, a retort having a stationary lower portion and an annular cap supported from said lower portion for oscillation about a vertical axis and forming an upwardly extending continuation of the retort, a continuously rotatable crank, a lost-motion connection between said crank and said retort cap for oscillating the latter, and means for varying the extent of the lost-motion of such connection.

3. In a stoker, a retort having a stationary lower portion and an oscillatable cap supported from said lower portion, a rotatable crank, a yoke having a slotted portion receiving said crank, said yoke having a sliding lost-motion connection with said retort-cap, and means for varying the extent of the lost-motion of said connection.

4. In a stoker, a retort having a stationary lower portion and an oscillatable cap supported from said lower portion, an ash-sweep mounted for rotation below said retort, a rotatable crank, a member associated with said crank to be oscillated by rotation thereof, a lost-motion connection between said member and said retort-cap, means for varying the extent of the lost-motion of said connection, and ratchet means interconnecting said member and said ash sweep and acting to impart intermittent rotation to the latter.

5. In a stoker, a retort having a stationary lower portion and an oscillatable cap supported from said lower portion, an ash-sweep mounted for rotation below said retort, an oscillatable member, a lost-motion connection between said member and said retort-cap, means for varying the extent of the lost-motion of said connection, and ratchet means interconnecting said member and said ash sweep and acting to impart intermittent rotation to the latter.

6. In a stoker, a retort having a stationary lower portion, an oscillatable annular grate surrounding said retort, a continuously rotatable crank, a yoke having a slotted portion receiving said crank, said yoke having a sliding lost-motion connection with said grate, and means for varying the extent of the lost-motion of said connection.

7. In a stoker, a retort having a stationary lower portion, an oscillatable annular grate surrounding said retort, an ash-sweep mounted for rotation below said retort, a rotatable crank, a member associated with said crank to be oscillated by rotation thereof, a lost-motion connection between said member and said grate, means for varying the extent of the lost-motion of said connection, and ratchet means interconnecting said member and said ash sweep and acting to impart intermittent rotation to the latter.

8. In a stoker, a retort having a stationary lower portion, an oscillatable annular grate surrounding said retort, an ash-sweep mounted for rotation below said retort, an oscillatable member, a lost-motion connection between said member and said grate, means for varying the extent of the lost-motion of said connection, and ratchet means interconnecting said member and said ash sweep and acting to impart intermittent rotation to the latter.

9. In a stoker, a retort having a stationary lower portion and an annular cap supported from said lower portion for oscillation about a vertical axis and forming an upwardly extending continuation of the retort, means for feeding fuel into the lower portion of said retort at a predetermined rate, and mechanism jointly operable with said fuel-feeding means for oscillating said retort cap, said mechanism being adjustable to vary the extent of movement of said retort cap relative to said predetermined rate of fuel-feed.

10. In a stoker, a retort having a stationary lower portion, an oscillatable annular grate surrounding said retort, means for feeding fuel into the lower portion of said retort, said means including a rotatable feed screw, and mechanism operated by said feed screw for oscillating said grate, said mechanism comprising a crank carried by said feed screw exteriorly of said retort, a lost-motion connection between said crank and said grate, and means for varying the amount of the lost-motion of such connection to vary the extent of grate movement relative to the extent of feed-screw movement.

11. In a stoker, a retort having a stationary lower portion, an oscillatable annular grate surrounding said retort, means for feeding fuel at a predetermined rate to the lower portion of the retort, and mechanism for oscillating said grate, said mechanism comprising a rotatable crank driven in a single direction at a speed bearing a fixed ratio to said predetermined rate of fuel-feed, a lost-motion connection between said crank and grate, and means for varying the amount of the lost-motion of said connection to vary the extent of grate movement relative to said rate of fuel-feed.

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