

April 15, 1924.

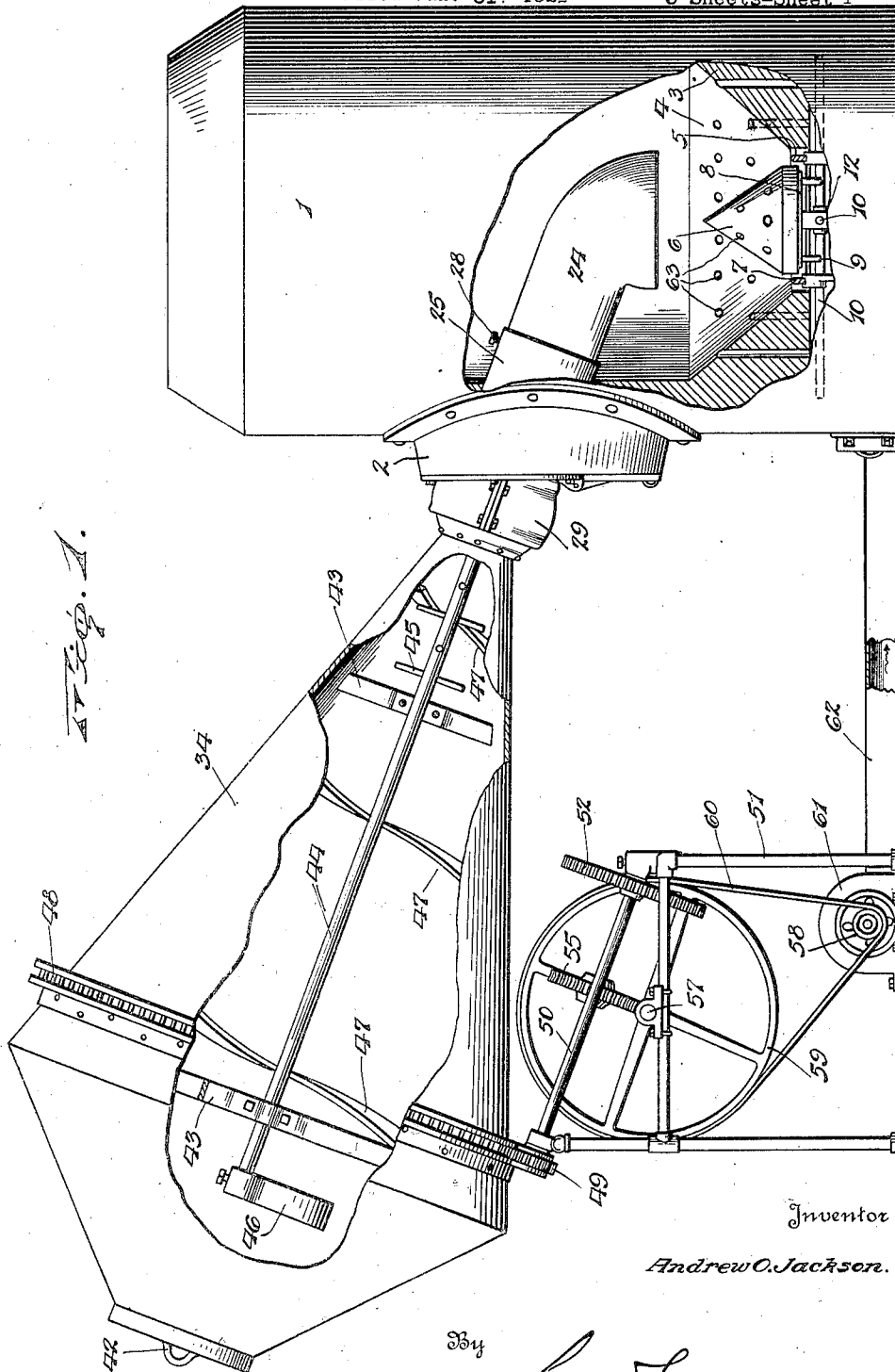
A. O. JACKSON

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STOKER

Filed Jan. 31, 1922

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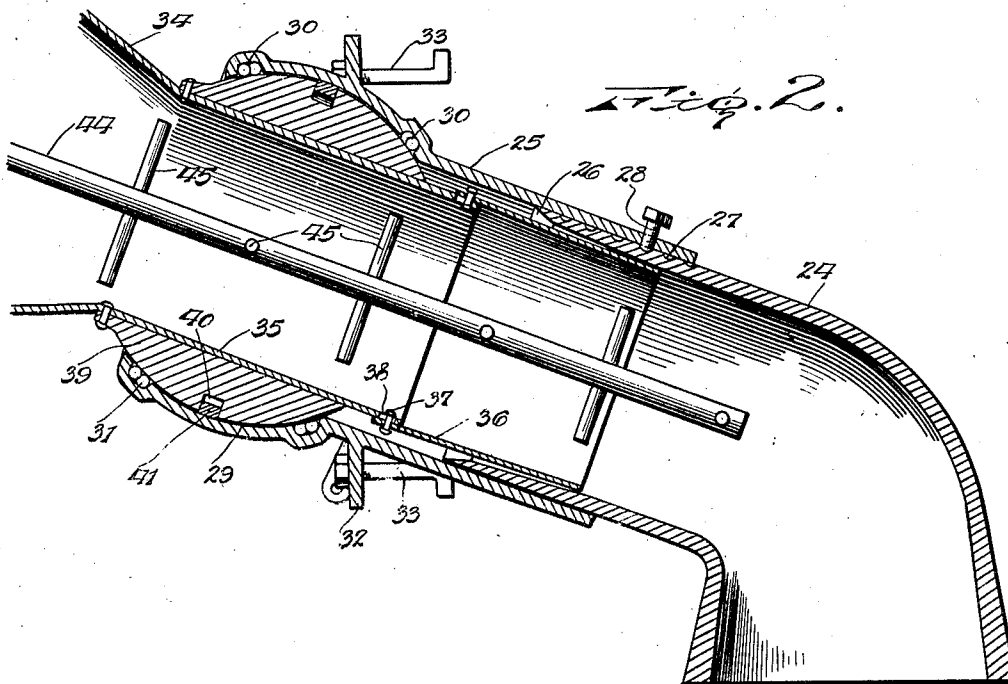
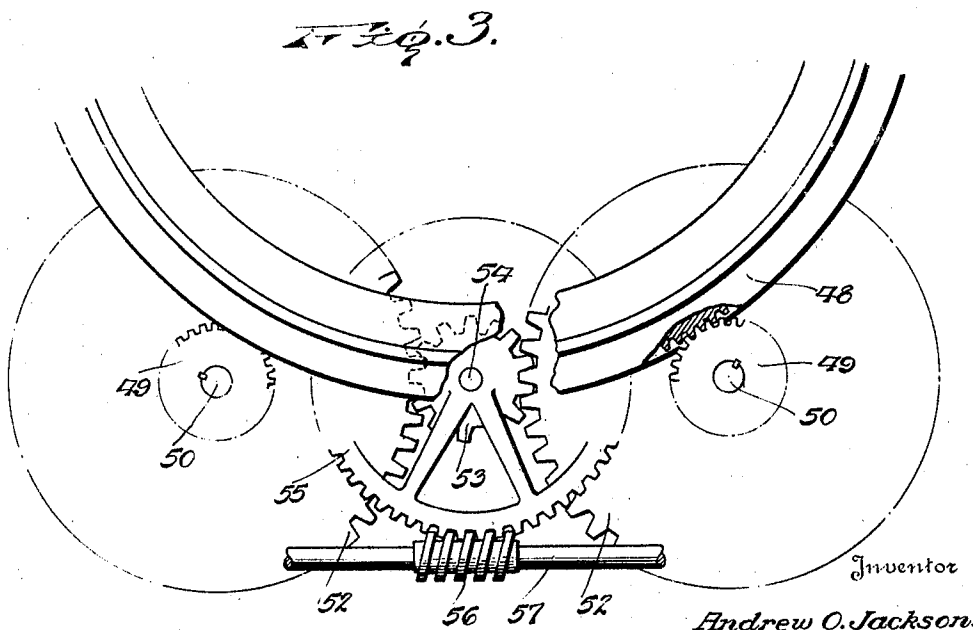
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Inventor

*Andrew O. Jackson.*

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Lacey Lacey, Attorneys

April 15 , 1924.

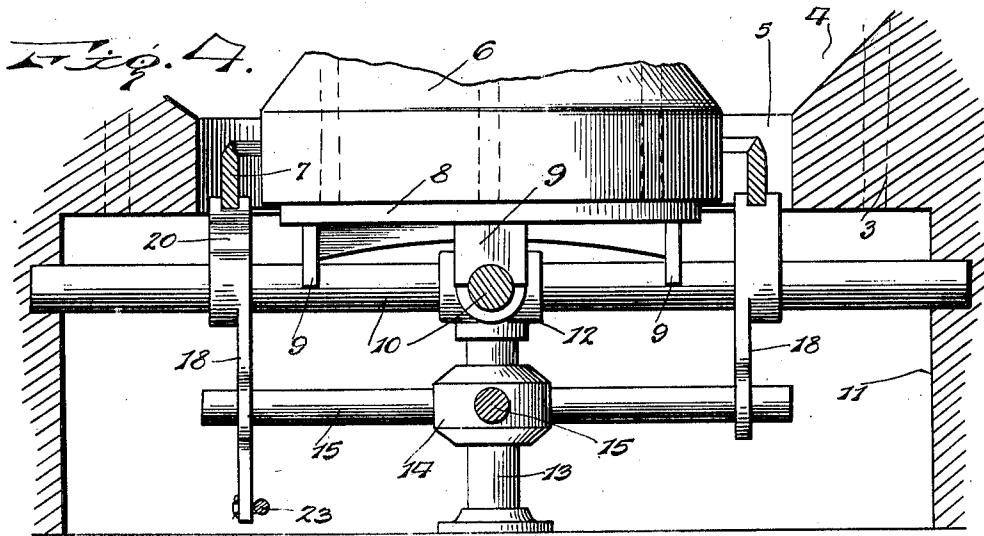
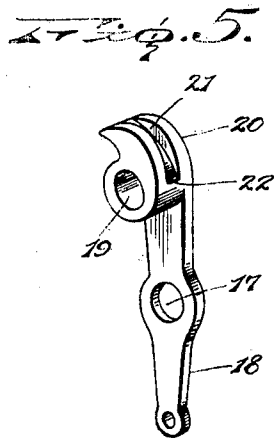
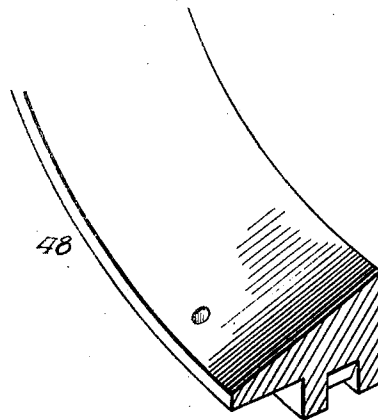
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## UNITED STATES PATENT OFFICE.

ANDREW O. JACKSON, OF OREGON CITY, OREGON.

STOKER.

Application filed January 31, 1922. Serial No. 532,962.

*To all whom it may concern:*

Be it known that I, ANDREW O. JACKSON, a citizen of the United States, residing at Oregon City, in the county of Clackamas and State of Oregon, have invented certain new and useful Improvements in Stokers, of which the following is a specification.

This invention relates to means for stoking furnaces and has special reference to means for permitting the successful use of fine fuel, such as chips, sawdust, or cut wood. One object of the invention is to provide means whereby the fuel will be automatically fed to the combustion chamber of the furnace as needed, means being provided to prevent choking or clogging of the fuel in its passage to the combustion chamber. Another object of the invention is to provide means whereby the fuel will be fed to and spread on the fire in proper amounts to insure free burning without smothering or choking the fire, and a still further object of the invention is to provide a novel construction whereby the ashes and clinkers may be readily discharged when necessary. Other objects of the invention will appear incidentally in the course of the following description, and the invention resides in certain novel features which will be particularly pointed out in the claims following the description.

In the accompanying drawings—

Figure 1 is a side elevation, with parts broken away, of an apparatus embodying my invention;

Fig. 2 is an enlarged longitudinal section through the discharge spout of the fuel-feeding mechanism;

Fig. 3 is an enlarged detail view of a portion of the gearing whereby the fuel-feeding mechanism is operated;

Fig. 4 is an enlarged sectional elevation through the lower portion of the combustion chamber of the furnace;

Fig. 5 is a detail perspective view of one of the operating arms whereby the fuel supporting ring may be manipulated to effect discharge of accumulated clinkers.

Fig. 6 is a detail of the hopper gear ring.

In the drawings, the reference numeral 1 indicates a furnace which may be constructed of the usual materials and may be of any desired dimensions. This furnace is provided with a fuel-feeding door frame 2 in one side and in its lower portion is constructed with an annular wall 3 which is

flared upwardly, as shown at 4, from a central opening 5. Disposed concentrically within the said opening and rising therefrom is a conical body 6 which serves as a deflector and central support for the body of fuel within the combustion chamber or fire basket, while within the said opening 5, between the wall thereof and the base of the conical body 6, is a ring 7 which serves as a support for the fuel being burnt. The conical body 6 is carried by a base plate 8 from which depend lugs 9 having notches in their lower edges whereby they may rest upon and be carried by the supporting bars 10, the ends of which are supported in the lower walls 11 of the furnace. The arms 10 intersect at a point in axial alinement with the body 6 and are connected at said point by a coupling 12 which rests upon and is supported by the upper end of a post 13 rising within the ash pit of the furnace, as will be readily understood. Rotatably mounted upon the post 13 below the coupling 12 is a block 14 from which radial arms 15 extend and the outer ends of the said arms 15 engage in openings 17 in the lower depending portions of levers 18, the said levers being constructed near their upper ends with openings 19 whereby they may be pivotally supported upon the upper arms or bars 10. Disposed above the openings 19 are enlarged heads 20 which have their upper surfaces grooved, as indicated at 21, to engage the lower edge of the grate ring 7 and have the base walls of said grooves disposed eccentrically to the openings 19, as shown at 22, whereby oscillation of the levers will effect raising and lowering of the ring. It will be readily understood that the lower arms 15 may oscillate in a horizontal plane about the post 13 and thereby serve to effect simultaneous oscillation of all the levers 18. One of the levers 18 is extended below the cooperating arm 15 and has a shaker bar or rod 23 attached thereto, the said shaker bar or rod extending through the front of the furnace whereby it may be easily manipulated when necessary. It will be readily noted that the ring 7 is narrower than the space between the wall 3 and the body 6 so that normally the ashes may readily drop through the said space. The fuel will be supported by said ring and when clinkers are formed, they will accumulate upon the ring. If the handle or shaker bar 23 be reciprocated, the levers 18

will be oscillated and the ring 7 will be thereby raised and lowered so that the clinkers resting on said ring will be loosened and shaken up and thereby caused to drop through the spaces at the sides of the ring.

The fuel is deposited upon the body 6 and the wall 3 from a chute or delivery spout 24 which extends inwardly from the door frame 2 and has its inner end turned downwardly co-axially with the body 6. As shown most clearly in Fig. 2, the upper outer end of the chute or spout 24 fits within the lower end of a sleeve 25 and its inner surface at its extremity is flared somewhat, as shown at 26. In the outer surface of the chute 24, I provide a plurality of notches or recesses 27 which are adapted to be engaged by a set bolt 28 mounted in the sleeve 25 whereby the sleeve and chute may be relatively longitudinally adjusted. The outer end portion of the sleeve 25 is formed into a socket 29 substantially spherical in form and provided with internal annular grooves 30 forming raceways for the anti-friction balls 31. The sleeve 25 is further provided with an external annular flange 32 in which hook bolts 33 are mounted to pass through the opening in the frame 2 and engage the inner end of said frame whereby the sleeve may be securely fastened to the frame. The sleeve 25 forms the lower bearing support for a hopper 34 which is substantially conical in form and terminates at its lower end in a nozzle 35 which extends through the socket 29 and is equipped with an extension 36 which projects from the nozzle into the chute 24, as shown clearly in Fig. 2. The extension 36 is connected with the nozzle 35 by bolts or pins 37 playing in slots 38 in the nozzle so that a somewhat flexible joint is provided which will permit the extension to accommodate varying angular relations between the nozzle and the chute. Around the nozzle, I secure the globular or convex rib or collar 39 provided with a peripheral annular groove or seat 40 receiving an expansion ring 41 which engages closely against the inner surface of the socket 29 and thereby prevents the leakage of air between the socket and the collar, while the spherical formation of these members and the anti-friction bearings 31 permit free turning movement of the nozzle and the collar in the operation of feeding the fuel. The outer end of the hopper 34 is equipped with a door or cover 42 to facilitate the entrance of fuel into the hopper and within the hopper are bearing arms 43 which support a shaft 44 disposed upon the axis of the hopper. The lower end of this shaft 44 is equipped with radial arms or stirrers 45 which enter into the fuel and serve to separate the parts of the same as it is fed to and through the spout 24 by the rotation of the hopper, and a weight or its equivalent 46 is secured upon

the upper end of the shaft 44 to hold the same stationary while the hopper rotates about it. On the inner surface of the hopper, I provide a spiral rib or flange 47 which acts upon the fuel within the hopper as the hopper rotates so as to feed the fuel forward to and into the chute or delivery spout 24.

Secured exteriorly about the hopper is a gear ring 48 with which meshes pinions 49 secured upon shafts 50 which are journaled in suitable bearings upon a frame 51 below the hopper and are disposed obliquely on lines parallel with the shaft 44. The lower ends of the shafts 50 carry gears 52 which mesh with a pinion 53 secured upon the lower end of a countershaft 54 disposed between and parallel with the shafts 50 so that the said shafts 50 will be simultaneously rotated in the same direction and power imparted to the gear ring 48 to rotate the hopper. The shaft 54 carries a worm gear 55 which meshes with a worm 56 upon a shaft 57 which is mounted transversely upon the frame 51 and is connected with a motor, indicated conventionally at 58, through any convenient gearing. In the present illustration, I have shown a band pulley 59 upon the shaft 57 and a belt 60 trained around the said pulley and a driving pulley on the motor shaft.

The motor also directly actuates a fan within the fan casing 61 and the outlet 62 of said fan casing leads directly into the ash pit of the furnace so that a constant steady draft will be provided through the fire-box.

It is thought the operation and advantages of my apparatus will be readily understood from the foregoing description, taken in connection with the accompanying drawings. The fuel is deposited in the hopper 34 and the hopper is rotated steadily and continuously through the operation of the motor. The fuel is to be delivered into the hopper in such quantities that it will fill the chute and occupy substantially all of the space between the exit of the chute and the fire basket 4 and deflector 6. As the hopper rotates, the fuel will be fed forwardly to the lower end thereof and through the nozzle 35 and extension 36 by the action of the spiral rod or flange 47 and as the fuel will be caused to impinge upon the stirrers 45, the small pieces of the fuel will be loosened and separated so that clogging will be prevented. The upwardly flared fuel basket 4 and the conical deflector 6 serve to prevent the collection of a large quantity of the fuel upon the grate ring 7 so that the fuel presented to the fire will be only such a quantity as may be readily consumed thereby, the result being that the fire is not retarded by a large body of fuel through which it cannot rapidly work its way but will burn steadily and

will consume all the fuel without waste. This result is further attained by reason of the fact that there is no back draft through the fuel-feeding mechanism, the fuel preventing the flow of air through the chute and the entrance of any appreciable amount of air being cut off by the closure 42. Moreover, the sleeve 25 fits closely within the door frame 2 so that the only air that can enter the fire chamber is that supplied thereto through the ash pit from the fan in the casing 61. It will be noted that draft openings 63 are shown extending vertically through the fire wall 3 and the deflector 6 but these openings may be, and in smaller furnaces generally are, omitted. In large furnaces, I prefer to use these openings as greater draft through the fire and better combustion is thereby obtained. My apparatus is not complicated in the construction or arrangement of its parts and will operate automatically so that excessive care upon the part of the attendants will not be needed.

25 Having thus described the invention, what is claimed as new is:

1. The combination with a furnace, of a chute supported rigidly at the wall of the furnace and extending downwardly within the furnace, a hopper supported outside the furnace and having its delivery end fitted within the chute, means for rotating the hopper, and means for causing travel of fuel in the hopper to and into the chute as the hopper is rotated.

2. The combination with a furnace, of fuel delivery means secured rigidly in and extending downwardly through the wall of the furnace, a hopper supported outside the furnace and having its delivery end fitted within the fuel delivery means, means for rotating the hopper, a spiral conveyer flange on the inner wall of the hopper, a shaft disposed within the hopper on the axis of the same, means for holding said shaft relatively stationary, and stirrers carried by said shaft.

3. The combination with a furnace, of a fuel delivery chute within the furnace, a sleeve fitting around and secured to the receiving end of said chute and secured rigidly in the wall of the furnace, a hopper supported outside the furnace with its axis inclined downwardly to the sleeve and the chute, a spout extending from the delivery end of the hopper within the said sleeve, means for rotatably supporting the spout

within the sleeve, and means for rotating the hopper.

4. The combination with a furnace, of a downwardly inclined fuel-feeding chute within the furnace, a sleeve fitted about the receiving end of the chute and secured rigidly in the wall of the furnace, the chute being secured to the sleeve and longitudinally adjustable relative thereto, a downwardly inclined hopper having its lower end rotatably fitted within the sleeve, and means for rotating the hopper.

5. The combination with a furnace, of a fuel-feeding chute disposed within the furnace, a sleeve secured rigidly in the wall of the furnace and fitted about the receiving end of the chute and having a substantially spherical socket at its outer end, a downwardly inclined hopper having its delivery end extending into the sleeve, a spherical collar on the delivery end of the hopper fitting within the socket at the outer end of the sleeve, means within the hopper for causing fuel therein to move into the chute during rotation of the hopper, and means for rotating the hopper.

6. The combination with a furnace, of a chute supported at the wall of the furnace and extending downwardly within the furnace, a downwardly inclined hopper supported outside the furnace and having its discharge end fitting within the chute, means for rotating the hopper, a spiral conveyer rib on the inner wall of the hopper, bearings within the hopper, a stationary shaft fitted through said bearings on the axis of the hopper, stirrers on said shaft, and a pendent weight secured on the shaft.

7. The combination with a furnace, of a sleeve secured rigidly in and extending through the wall of the furnace, a chute secured in the sleeve and extending downwardly therefrom within the furnace, the bore of the chute being flared at its outer end, a hopper supported outside the furnace and having a spout extending axially into and rotatably fitted in the sleeve, a tubular extension loosely mounted on the spout and fitting within the flared portion of the chute, means for rotating the hopper, and means within the hopper for agitating fuel and effecting movement of the same to the chute.

In testimony whereof I affix my signature.

ANDREW O. JACKSON. [L. &]