

March 14, 1933.

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1,901,203

COAL FEEDER

Filed Feb. 9, 1931

2 Sheets-Sheet 1

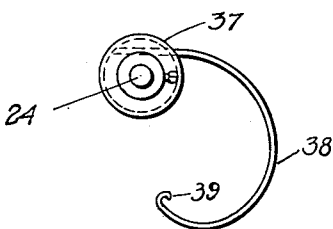
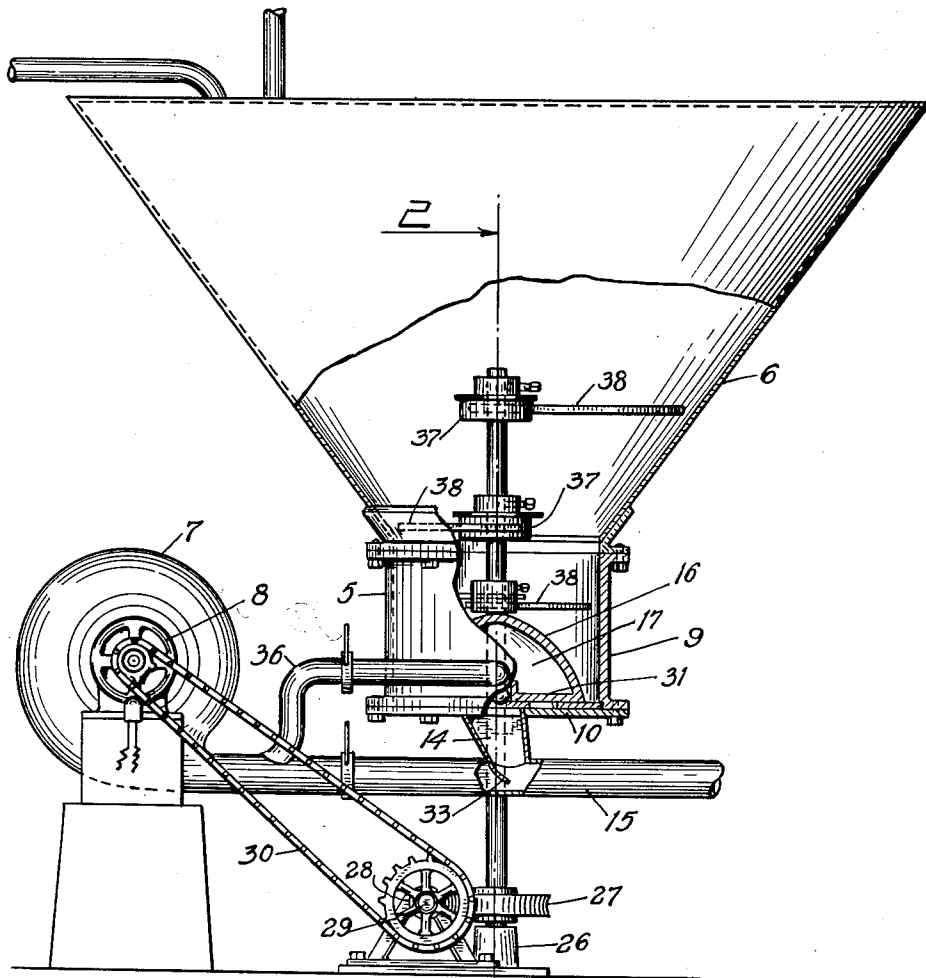


Fig. 5.

Fig. 1.

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March 14, 1933.

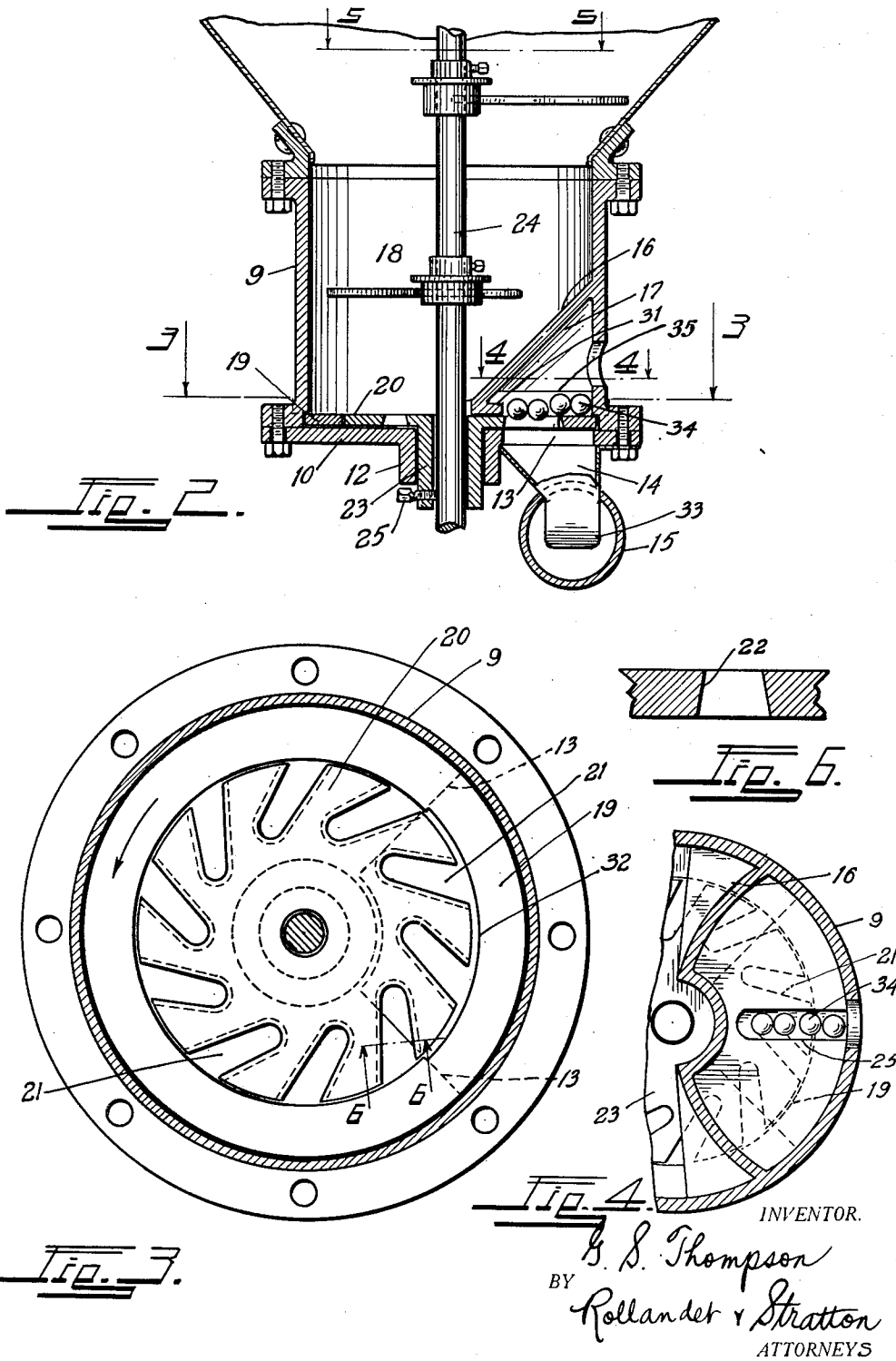
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UNITED STATES PATENT OFFICE

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COAL FEEDER

Application filed February 9, 1931. Serial No. 514,510.

This invention relates to a feeder for furnaces and its principal object resides in the provision of a simple and practical apparatus for automatically feeding finely divided coal at a predetermined rate.

Another object is to provide in connection with the feeder, a novel means for agitating the coal as it moves to the feeder, for the purpose of effecting a free and unobstructed movement of the coal in the operation thereof.

A further object is to provide self-acting means for freeing the coal from the feeder for its discharge from the apparatus, and still other objects reside in details of construction and in novel arrangements and combinations of parts as will be fully brought out in the course of the following description.

In the accompanying drawings in the several views of which like parts are similarly designated,

Figure 1 is a sectional elevation of the feeder,

Figure 2, a vertical section taken on the line 2—2, Figure 1, but drawn to a larger scale,

Figure 3, a further enlarged section along the line 3—3, Figure 2,

Figure 4, a fragmentary section along the line 4—4, of Figure 2,

Figure 5, a section taken on the line 5—5, Figure 2, and

Figure 6, an enlarged section on the line 6—6, Figure 3.

In Figure 1 of the drawings, the feeder designated in its entirety by the numeral 5, is supplied with powdered or otherwise finely divided coal from a bin 6. A rotary fan 7 driven from an electric motor 8 produces an air stream into which the coal is fed by the feeder and which carries it to the furnace. The motor also drives the operating mechanism of the feeder as will hereinafter be more fully explained.

The feeder comprises an axially vertical, preferably cylindrical shell or housing 9, which at its open upper end connects with the funnel-shaped coal bin 6. The lower end of the housing is exteriorly flanged for the connection of a bottom plate 10. This plate has

a central downwardly extending bearing 12 for the rotary parts of the feeder, as shown in Figure 2, and it has a segmental discharge-opening 13 which, by means of a chute 14, connects with the pipe 15 through which the air stream from the fan, is conducted to the furnace.

A conoidal partition 16 formed integral with the housing 9 and slanting inwardly from the wall of the housing toward the axis of the same, provides a compartment 17 which covers the discharge-opening 13, hereinbefore referred to, and separates it from the main part 18 of the housing which connects with the coal supply. Supported upon the bottom plate 10 and extending circumferentially into a peripheral rabbet at the inner surface of the wall of the housing is an annular spacer-ring 19, and fitted for rotation within the ring is the rotary feed disk 20, whose function is to convey the coal in predetermined small quantities from the main chamber 18 of the housing into the compartment 17.

The feed disk has a series of equidistant slots 21, which slant tangentially to a circle concentric with the periphery of the disk. The slots are open at the periphery of the disk, their edges are undercut as shown at 22 in Figure 6, and the slots taper from their open ends inwardly to their closed ends, as best shown in Figure 3.

It will be observed that the shape of the slots as stated, increases their areas outwardly from the center of the disk as well as downwardly, i. e., in the direction in which the coal is discharged from the housing, the object being to provide for a free and unrestricted movement of the coal carried in the slots, into the discharge opening of the housing when the slots move into register therewith.

The disk 20 has a hub 23 fitted in the bearing 12 of the bottom-plate 10 and secured to a vertical shaft 24 by means of a set-screw. The shaft extends through the housing and the bin and it is supported for rotation in a step-bearing 26.

A worm-wheel 27 on the shaft, is engaged by a worm 28 on a jack shaft 29 which through

the intermediary of a sprocket chain 30 is driven from the electric motor 8. The shaft thus connected is rotated at a constant velocity and its rotation causes the feed disk to move in the direction of the arrow in Figure 3, upon the bottom of the housing.

A flange 31 projecting inwardly from the lower edge of the conoidal partition 16 seals the compartment 17 from the main chamber 18 of the housing.

The spacer-plate 19 is recessed at its inner edge, as at 32 in Figure 3, in conformity with the discharge-opening 13 in the bottom of the housing, so that when the slots 21 of the feed disk are brought in register with the opening, the bodies of coal carried in the slots are left without support at the periphery of the disk and are, therefore, free to drop through the discharge-opening into the chute 14. A deflector 33 in the pipe 15 at the end of the chute prevents the air from interfering with the free downward passage of the coal into the pipe.

A series of balls 34 are supported by the feed disk inside the compartment 17, and are held against lateral displacement between two parallel flanges 35. The balls are free for vertical movement and they are proportioned to partially enter the slots of the disk, as shown in Figure 2.

In the operation of the feeder, these balls engaged by the edges of the slot, vibrate in a dancing motion and by their weight aid in loosening the coal from the edges of the slots 21 for its free discharge into the chute 14.

If so desired, the compartment may be connected with the fan, as by means of a valve-controlled branch pipe 36, shown in Figure 1. By admitting air under pressure into the compartment, the downward movement of the coal is expedited, but it is to be understood that the supply of air to the compartment is not an essential in the operation and, under favorable conditions, may be dispensed with.

In order to loosen the coal in the bin and insure its free movement into the slots of the feed disk, one or more agitators are provided. These agitators, fixed on the vertical shaft, are of peculiar value in that they automatically adjust themselves to varying degrees of density of the coal in the bin and the housing.

With this object in view, each agitator consists of a collar 37 fixed on the shaft and a resilient spiral 38 projecting outwardly from the collar, as shown in Figure 5. The spiral may be of round or flat section and being supported only at its end connected with the collar, it is free for outward deflection. The outer end 39 of the spiral is hook-shaped to undercut the coal. When the bin and the housing are full or partially full, the pressure of the coal tends to wind the spiral about the axis of the shaft and its radius being short-

ened, the power necessary to turn it, is decreased. Now, as the coal in the central portion of the bin or housing, is fed away, the spring correspondingly expands, its radius increases and its hook-shaped end undercuts the coal to such an extent that the coal falls by its own weight. As the coal falls, the spring is again buried therein and the operation is repeated.

In the operation of the feeder, the finely divided coal loosened by the agitators, falls into the slots of the feed-disk, and by the rotary motion thereof, is carried in measured quantities into the compartment 17. During movement of the disk, surplus coal is scraped off its surface by the edge of the partition 16.

When the slots of the disk move in register with the discharge-opening 13, their ends are opposite to the recess 32 of the spacer-ring, the edge of which is undercut as indicated in Figure 2. The bodies of coal in the slots of the disk are thus unsupported and the constant up and downward movement of the balls 34, causes the coal to be freed from the edges of the slots. The coal dropping into the chute 14 is carried to the furnace by the air stream in the pipe 15. It will be noticed that the direction of rotation of the disk is such that the coal in the filled slots, tends to move toward the open ends of the slots at the periphery of the disk. Owing to the tapering shape of the slots, the coal, therefore, disengages the edges of the same, and the downward movement of the coal from the slots into the discharge-opening 13, is further aided by the undercut or beveled shape of the edges.

The capacity of the apparatus may be varied by changing the speed of the shaft or by substituting a larger or smaller feed disk for the one in use, in which case a correspondingly proportioned spacer-ring takes the place of the other. By means of the feeder the coal is delivered to the furnace in measured quantities and at regular predetermined intervals thereby maintaining a fire of constant temperature with a minimum consumption of fuel.

What I claim and desire to secure by Letters Patent is:

1. A coal feeder comprising a housing having a discharge-opening and having a spaced partition dividing the housing into a compartment over the discharge-opening and a supply-chamber exteriorly of the compartment, a rotary disk having an opening to convey coal from the chamber through the space of the partition, into the compartment for its delivery through the discharge-opening, gravity-impelled bodies in the compartment to effect the discharge of coal from the opening of the disk, and means for rotation of the disk.

2. A coal feeder comprising a housing hav-

ing a discharge-opening and having a spaced partition dividing the housing into a compartment over the discharge-opening and a supply-chamber exteriorly of the compartment, a rotary disk having an opening to convey coal from the chamber through the space of the partition, into the compartment for its delivery through the discharge-opening, balls disposed in the compartment, for free up-and-downward motion, to effect the discharge of coal from the opening of the disk, and means for rotation of the disk.

3. A coal feeder comprising a housing having a discharge-opening and having a spaced partition dividing the housing into a compartment over the discharge-opening and a supply-chamber exteriorly of the compartment, a rotary disk having slots open at its periphery, to convey coal from the chamber, through the space of the partition, into the compartment, for its delivery through the discharge-opening, there being an undercut recess in the compartment, opposite the periphery of the disk, and means for rotation of the disk.

4. A coal feeder comprising a housing having a bottom provided with a discharge-opening and having a partition spaced from the bottom and dividing the housing into a compartment over the discharge-opening and a supply-chamber exteriorly of the compartment, a spacer-ring upon the bottom, a rotary, slotted disk fitted in the ring and disposed to convey coal from the chamber through the space of the partition, into the compartment for its delivery through the discharge-opening, the ring having a recess opposite the periphery of the disk, within the compartment, and means for rotation of the disk.

5. A coal feeder comprising a housing having a bottom provided with a discharge-opening and having a partition spaced from the bottom and dividing the housing into a compartment over the discharge-opening and a supply-chamber exteriorly of the compartment, a spacer-ring upon the bottom, a rotary, slotted disk fitted in the ring and disposed to convey coal from the chamber through the space of the partition, into the compartment, for its delivery through the discharge-opening, the ring having an undercut recess opposite the periphery of the disk, within the compartment, and means for rotation of the disk.

In testimony whereof I hereunto affix my signature.

GEORGE S. THOMPSON.