May 1, 1934. R. E. BRESSLER 1,956,789

STOKER FEED STRUCTURE

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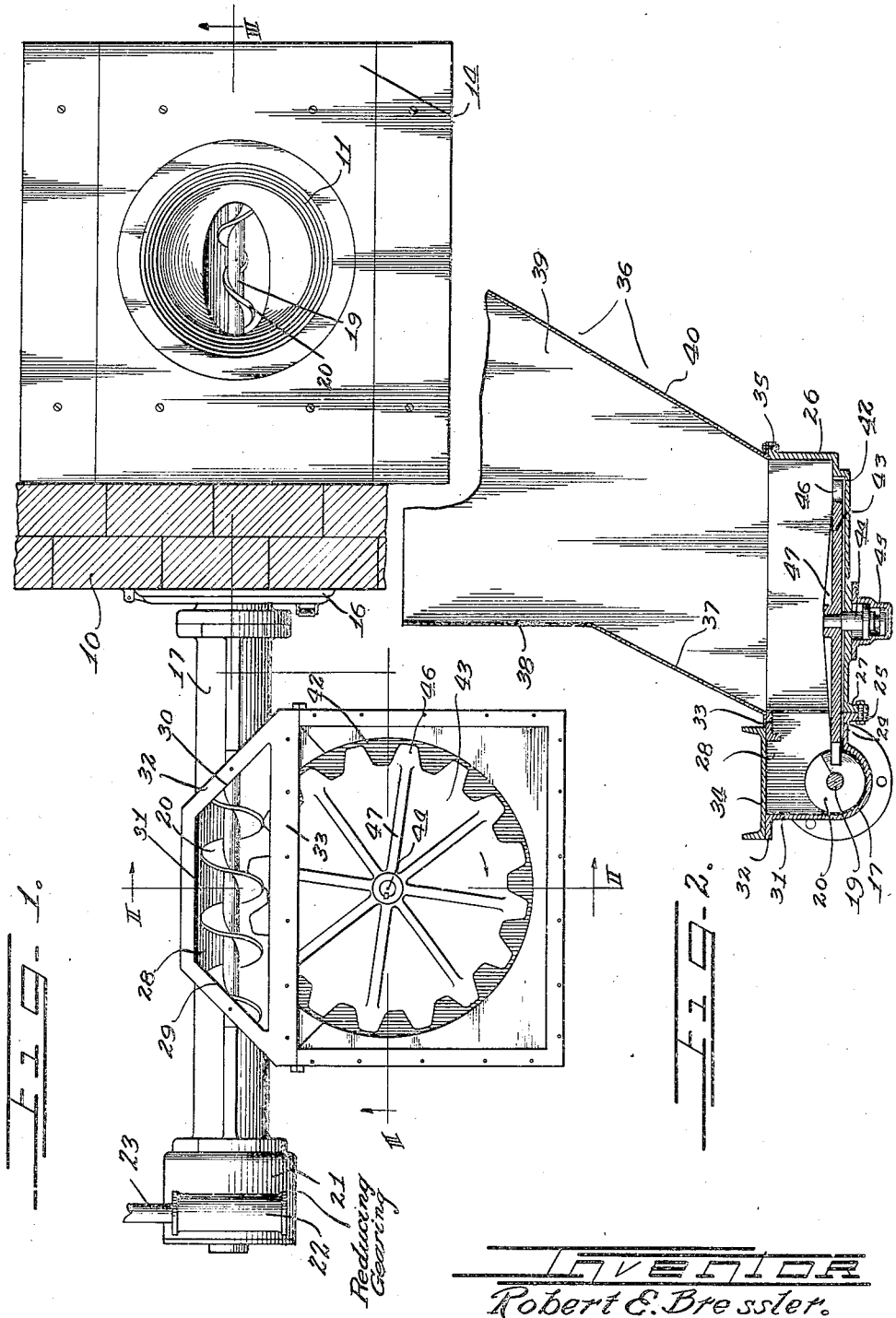


FIG. 1.

FIG. 2.

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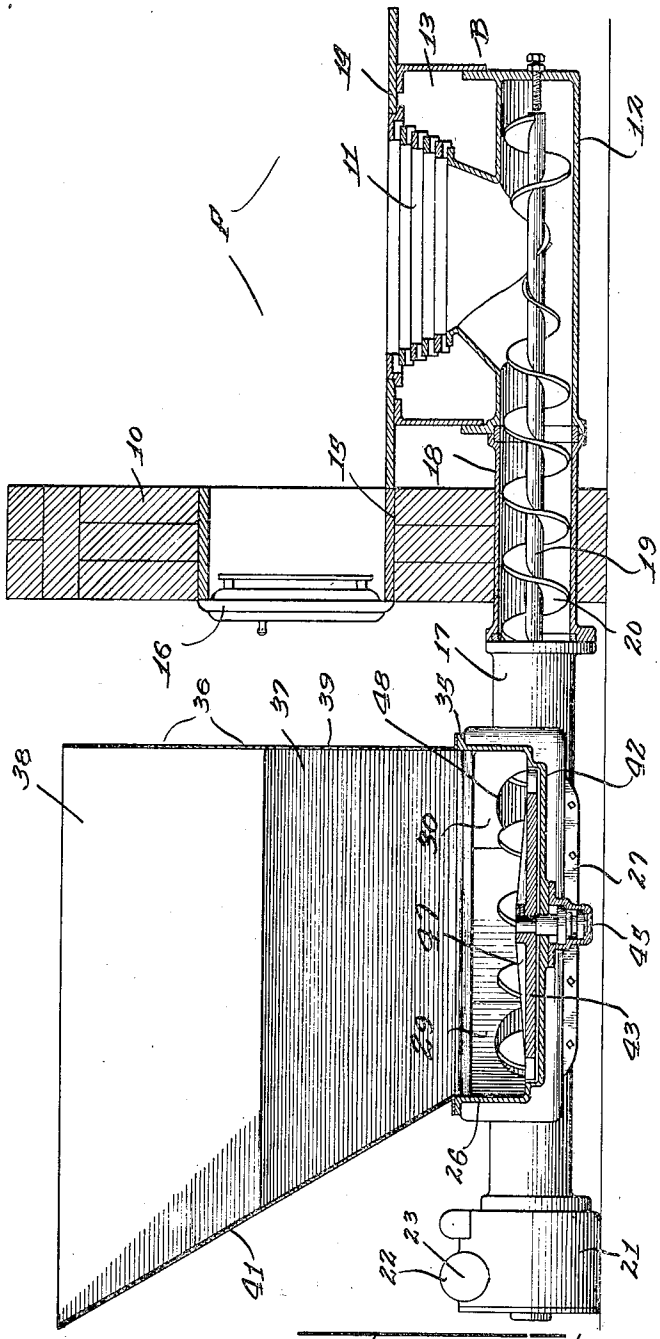


Fig. 3.

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STOKER FEED STRUCTURE

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3 Claims. (Cl. 110—45)

This invention relates to underfeed stoker mechanism and particularly to improved construction, arrangement and operation of the hopper structure for feeding fuel to the conveyor screw which conveys the fuel to a burner structure within the furnace.

In the usual arrangement in connection with underfed stoker furnaces, a clean-out door is provided in the front wall of the furnace in alignment with the burner and grate and vertically above the conveyor screw duct leading to the burner. The hopper structure for supplying fuel to the conveyor screw is generally located directly above the screw duct and in front of the furnace clean-out door. It is very desirable that ready access may be had to the furnace burner and grate when the clean-out door is open in order that bars or other tools may be readily inserted for cleaning out clinkers and so forth. Where the hopper structure is directly in front of the clean-out door the cleaning out operation will be materially interfered with and will be made quite laborious. In some instances the hopper structure is set back a sufficient distance from the front of the furnace so that ready access may be had to the clean-out door, but such arrangement requires a long stretch of the conveyor screw and duct between the hopper structure and the furnace, thus materially increasing the cost.

The main object of my invention is to offset the hopper structure laterally from the screw conveyor duct and from the clean-out door so that unobstructed access may be had to the furnace through the clean-out door while at the same time the hopper structure may be set up close to the furnace front to cut down the length of conveyor screw and duct to a minimum.

A further object of the invention is to offset the hopper structure laterally of the conveyor screw duct so that fuel will be fed from the hopper structure laterally into the duct to be received by the screw for conveyance to the furnace burner.

Still another object is to offset the hopper structure laterally of the conveyor screw duct and to provide a removable cover for the duct above the lateral outlet of the hopper structure which cover can be readily removed to give full and unobstructed access to the duct and screw without spilling any fuel from the hopper and so that the screw can be readily cleared if any packing or other obstruction has occurred, particularly at the point where the fuel starts on its way from the hopper structure to the burner.

A further object is to provide means at the bottom of the hopper structure for keeping the fuel in the hopper agitated so that it will flow freely toward the conveyor screw, and particularly for easing the pressure of the fuel at the outlet of the hopper trough and keeping the outer end of the screw at the outlet of the hopper supplied with fuel so that the feed from the hopper to the screw will be uniform.

A further object, accomplished by the offsetting of the hopper structure laterally from the conveyor screw duct, is a hopper structure of large capacity and with the hopper side wall adjacent to the hopper outlet into the conveyor screw overhanging the bottom of the hopper and the agitating member therein so that there can be no arching or packing of the fuel in the hopper above the outlet end, with the result that there will be a continuous uninterrupted feed of fuel from the hopper to the screw.

The above enumerated and other features of the invention are shown incorporated in the structure illustrated on the drawings, in which drawings

Figure 1 is a plan view of a stoker structure and burner, the front wall of a furnace being shown in section and the hopper shell being removed from the hopper structure base;

Figure 2 is a section on plane II—II of Figure 1;

Figure 3 is a section on plane III—III of Figure 1.

I have shown the front wall 10 of a furnace F within which is a burner structure B. The burner structure comprises a tuyere basin 11 communicating at its lower end with the cylindrical fuel conveyor duct 12, the space between the duct and the basin forming an air chamber 13 to which air for combustion is supplied by any suitable means (not shown). Flush with the top of the tuyere basin is an ash receiving or dead plate 14, and in the front wall of the furnace with its lower wall flush with the dead plate is the door frame 15 closed at its front end by a door 16, this door controlled passageway giving access to the dead plate and the tuyère basin for clean-out purposes.

In front of the furnace wall is the stoker and feed structure comprising the conveyor duct 17 which is coupled to the intermediate duct 18 extending through the furnace wall below the door frame 15, this intermediate duct being coupled to the duct 12 below the tuyere basin, and through these aligned ducts extends the conveyor screw structure 19 whose shaft supports the helical conveyor blade 20. Secured to the outer end of

the outer duct 17 is a gear case 21 which houses reduction gearing (not shown) connected with the end of the conveyor screw, and extending transversely of the housing 21 is another housing 22 which contains a driving element such as a worm (not shown), which is driven by a suitable motor (not shown) by way of the shaft 23.

Describing now the feed and hopper means for feeding fuel to the screw, the outer duct 17, intermediate its ends, has the laterally extending inlet neck 24 terminating in a flange 25, and adjacent to this neck is the base 26 of the hopper structure which is secured to the neck by means of its flange 27 which may be detachably bolted to the flange 25 of the neck, the hopper structure base 26 thus feeding laterally through the neck into the conveyor screw duct 17.

The conveyor duct 17 has an enlargement with the opening 28 in its upper wall, the end walls 29 and 30 defining this opening converging so that the opening is of trapezoidal shape as shown in Figure 1. To strengthen these end walls and also the outer vertical wall 31 rising from the duct, these walls have the laterally extending flange 32 in alignment with the top wall 33 of the neck 24, and this wall and the flanges form a seat for a detachable cover 34 for closing the opening 28.

In alignment with the wall 33 is the seating flange 35 surrounding the rim of the hopper structure base 26 and on this flange and on the wall 33 is supported the hopper shell 36 which may be detachably secured to the wall and flange by screws or other fastening means. The hopper shell is constructed to be of large capacity and with its upper part displaced laterally to one side of the clean-out door 16 in the front wall of the furnace so that this door will be readily accessible for the application of cleaning tools into the furnace. The lower portion 37 of the side wall of the hopper shell is inclined away from the neck 24 and the upper portion 38 of this side wall may be vertical, this wall 38 being well to one side of the clean-out door 16 so as to afford unobstructed access to the door. The rear wall 39 of the hopper shell may be vertical as shown in Figure 3 and the hopper structure may be thus set quite close to the furnace wall but without obstructing the clean-out door. The outer wall 40 of the hopper shell may be inclined outwardly and may be parallel to the side wall portion 37, while the front wall 41 of the hopper shell may be inclined away from the vertical rear wall 39. A hopper structure of large capacity is thus provided but so shaped and set that it will not interfere with unobstructed and easy access to the furnace when the clean-out door 16 is open. The overhanging portion 37 of the side wall of the hopper shell also serves another very important purpose, namely, to prevent arching or packing of coal in front of or in the passageway through the neck 24 to the conveyor screw.

Describing now the agitating and feed mechanism, the hopper structure base 26 whose body is of rectangular cross section has a shallow cylindrical depression or pocket 42 in its botom which communicates through the neck 24 with the screw casing section 17, and in this pocket the agitator member 43 is rotatable. This agitator member may be a cylindrical disc secured on a central supporting shaft 44 which has bearing in the bearing frame 45 secured to and depending from the base 26. The disc has teeth 46 along its perimeter whose pitch is such that they may mesh with the helical blade 20 of the conveyor screw within the conveyor duct 17 so that as the conveyor screw is rotated the disc or agitator member 43 will be rotated. I have shown radially extending agitator ribs 47 on the top side of the disc.

Describing the operation, when fuel is charged into the hopper and the motor is started to rotate the conveyor screw, the agitator member 43 will rotate in the direction of the arrow indicated on Figure 1. As the agitator member rotates, the ribs and the teeth thereon, as they move away from the outlet 48 will tend to carry sufficient coal in a direction away from the outlet to prevent coal flowing down in the hopper from settling and packing at the outlet, through which outlet the fuel travels on its way to the furnace. The teeth and ribs will tend to divert the coal toward the portion of the screw in the section 17 so that the feed from the hopper to the screw will be uniform and packing and clogging will be prevented. If there should be any clogging for any reason, the cover 34 can readily be removed from the opening 28 over the screw trough and the outlet opening 48 will then be readily accessible so that any obstruction may be cleaned out. By having this access opening 28 to the screw entirely at one side of the hopper shell, there will be no spilling or loss of coal from the hopper while the cover 34 is removed.

The overhanging wall portion 37 of the hopper shell materially assists the agitator member in keeping the coal loose and free as it travels from the hopper structure through the neck 24 and to the conveyor screw.

As the feed of the fuel from the hopper structure to the conveyor screw is in a lateral direction, the screw will be free of the dead weight of the fuel and less power will be required to turn the conveyor screw. As the outlet opening 48 is in the inclined end wall 30, this outlet opening will be at an angle with the axis of the conveyor screw, and this arrangement will also tend to prevent packing of coal into the outlet end of the duct 17. These various structural features all cooperate to assure free, easy and uniform feed of coal from the hopper structure to the conveyor screw and the stoker structure may be very economically operated.

The structure and arrangement of the hopper mechanism permits setting of the hopper close to the furnace but at one side so as to clear the clean-out door 16 for ready access, and the hopper structure may be of large capacity. The close-up setting of the hopper structure also reduces the length of the outer conveyor screw duct 17 and correspondingly reduces the length of the conveyor screw thus saving considerable cost of manufacture.

I have shown a practical and efficient embodiment of the various features of my invention, but I do not desire to be limited to the exact construction, arrangement and operation shown and described as changes and modifications may be made without departing from the scope of the invention as defined in the appended claims.

I claim as follows:

1. In underfeed stoker mechanism, the combination of a burner, a fuel conveyor duct leading to said burner, a conveyor screw rotatable within said duct and means for driving the same, a hopper structure arranged at one side of said duct having a horizontal bottom and connected to feed fuel entirely horizontally into said duct and to the conveyor screw therein, and an agitator member on the bottom of said hopper struc-

ture mounted to rotate on a vertical axis and being geared to said conveyor screw for rotation thereby.

2. In underfeed stoker mechanism, the combination of a burner, a fuel conveyor duct leading to said burner, a conveyor screw in said conveyor duct and means for driving said screw, said duct having a side inlet for fuel, a hopper structure having a horizontal bottom and located entirely at one side of said duct and connected to feed fuel entirely horizontally through said side inlet to the screw within said duct, an agitator disc at the bottom of said hopper structure mounted to rotate on a vertical axis and having teeth around its periphery meshing with said conveyor screw whereby said disc is rotated when said conveyor screw operates.

3. In underfeed stoker mechanism, the combination of a burner, a fuel conveyor duct leading to said burner, a conveyor screw in said conveyor duct means for driving said screw, said duct having an enlargement forming a space for receiving fuel to be fed by the screw, said enlargement being of trapezoidal horizontal cross-section whereby to provide a diagonally extending outlet from said space for the fuel to be delivered to said burner, a hopper structure having a horizontal bottom and located entirely at one side of said enlargement and having a side outlet, said enlargement having a side inlet registering with said hopper outlet whereby fuel will move horizontally from said hopper bottom into said space, said hopper bottom having a cylindrical pocket, a toothed disc mounted in said pocket to rotate on a vertical axis and having its teeth projecting into said enlargement space for meshing engagement with said screw, the direction of rotation of said disc by said screw being such that said disc will tend to withdraw fuel from the front of said diagonal outlet and shift it toward the opposite end of said space whereby to prevent packing and clogging at said outlet and produce uniform feeding of the fuel through said outlet and towards the burner.

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