

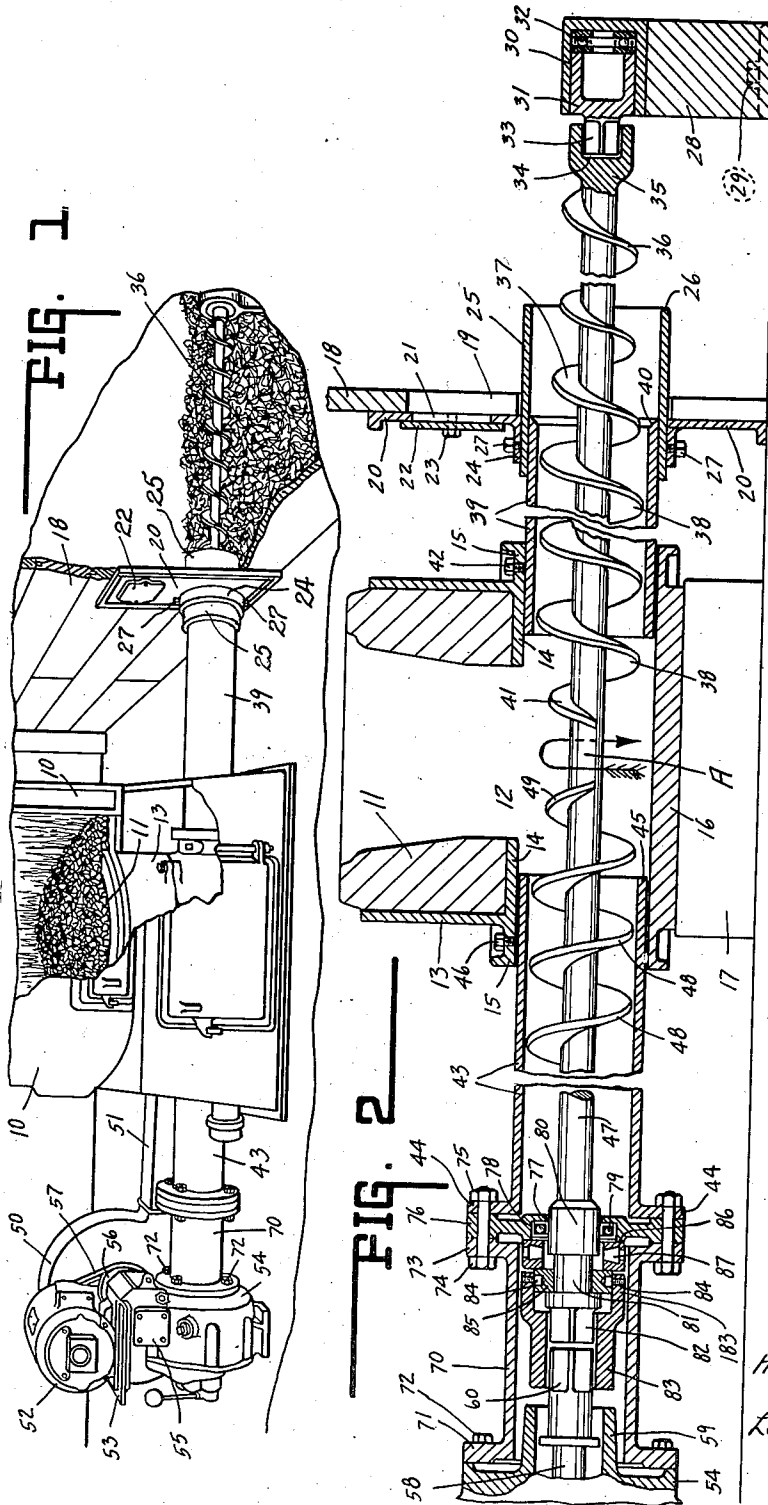
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LINE DRIVE AND FEED FOR STOKERS

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LINE DRIVE AND FEED FOR STOKERS

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This invention relates to a direct feeding device for supplying solid fuel from a bin to a furnace, boiler, or the like.

The chief object of this invention is to provide a feeding device of the aforesaid character, which may be readily applied to standard structures and with the minimum of change thereto.

The chief feature of the invention consists in the screw conveyor, its mounting, its drive and its adjustability.

The full nature of the invention will be understood from the accompanying drawing and the following description and claims:

In the drawing Fig. 1 is a perspective view of the lower portion of a furnace structure and a coal or coke bin with the invention applied thereto, parts being broken away to show other parts in detail.

Fig. 2 is an enlarged vertical sectional view of the invention.

In the drawing, 10 indicates a furnace or boiler structure of conventional character and having an underfeed retort 11 provided with the intake opening 12 at its lower end, and associated with a casing 13 having the two aligned sleeve portions 14 with lateral extensions 15, the sleeve portions being connected together as at 16 at the lower and side portions and the retort and casing being suitably supported as at 17. The numeral 18 indicates one wall of the bin and the wall closest to the fuel consuming device. An opening 19 is cut therein and the same is outlined by a cover plate 20 suitably secured to the bin structure.

The cover plate includes an aperture 21 which forms an inspection opening and this is closed by a detachable cover secured to the cover plate or frame 20 as at 23. This opening permits the householder to inspect the fuel supply and also permits the householder to insert a poker, or the like, to insure fuel movement in the bin by gravity to the feed mechanism or to remove obstructions from the worm in tube 25.

The cover plate 20 includes a tubular extension 24 and slidably mounted therein is a sleeve 25, the coaxial position of which is adjusted and sleeve 25 may include a rounded bin exposed end 26. The sleeve is secured by means of set screws, or the like, 27 in the adjusted position.

Mounted within the bin is a support 28 suitably secured to the floor of the bin as at 29, or to the opposite wall and the support includes a socket 30 in which is mounted a rotatable member 31 bearing against a thrust bearing structure 32 seated in the socket.

Member 31 terminates in a tongue 33 which is seatable in a complementarily formed polygonal socket 34 formed in the end 35 of the screw conveyor. In the present instance, the bin exposed portion of the screw conveyor includes a screw thread or flight 36 which is of considerably less diameter than the diameter of the sleeve 25 although the reverse may be used. Immediately adjacent the bin wall and plate 20, the flight gradually is enlarged in diameter, as indicated at 37, until approximately in the plane of the plate, the flight portion 38 of the screw is approximately the diameter of the conduit 39. The conduit 39 has a tapered end 40. Conduit 39 is telescopically associated with sleeve 25.

It will be thus apparent when the screw is rotated, the solid fuel is pulled toward the retort 11 and that by moving the sleeve 25 toward and away from the retort, the proper adjustment is obtained so that the fuel pulled into the sleeve structure or conduit arrangement is sufficient for supplying the proper amount of fuel to the rotor. The tapered edge 40 insures that there will be no appreciable stopping of the fuel in its movement toward the retort. Sleeve 25, however, does give a more or less bulking effect producing a packing of the fuel in tube 39 which prevents smoke from backing up into the bin.

In certain forms of the invention member 28 is adapted for wall anchorage instead of floor anchorage. Also in other forms of the invention the shaft portion has flight 36 extended to the end and the flight merely rotates in socket 30 or may project entirely through support 28.

The flight 38 immediately beneath the intake 12 of the rotor in the present instance is shown tapered as at 41. The lateral projecting portion 15 mounts a set screw, or set screws, 42 which rigidly secure the conduit 39 to one of the sleeve portions 14 of the base structure.

By means of this arrangement, the effective length of the conduit 39 between the bin and the fuel consuming device may be adjusted within the limits shown in Fig. 2. This insures a minimum amount of conduit cutting so that exact overall dimensions are not necessary and thus conduits of various lengths may be carried in stock, for example, differing in length by 6" intervals.

Another conduit 43 includes a flange portion 44 at one end and its opposite end 45 is telescopically associated with the other sleeve portion 14, aligned with the before mentioned sleeve portion 41 so that the two conduits 39 and 43 are in axial alignment. The telescopically asso-

ciated end of the conduit 43 is also adjusted longitudinally and is secured in said adjusted position by set screw means 46, or the like. Thus, the same type of accommodation is provided and this is important, because the entire length of the screw may necessitate the positioning of the power unit at a greater or less distance from the fuel consuming device and the accommodation thus provided permits of such adjustable positioning.

Enclosed within conduit 43 is the shaft 47 carrying a reverse flight 48, in the present instance shown tapered as at 49, the flights 38 and 48 being oppositely directed and having reduced diameters near the intake 12 of the rotor which is the discharge of the screw conveyor construction. Flights 38 and 48 do not necessarily have to be tapered.

In Fig. 1 of the drawing, 50 indicates a fan housing discharging through conduit 51 to the fuel consuming device. A motor 52 is mounted on a base 53 formed as a part of the power unit including the casing 54. Within casing 54 is a gear such as a worm wheel, for example, meshing with a worm, the shaft of which is approximately in alignment with the plate 55—see Fig. 1—and which shaft projects outwardly and carries a pulley 56 driven by a V-belt or chain 57, in turn driven by the motor. The rotor in the fan housing 50 may be mounted on this same shaft. Thus, a high speed motor operates the fan at reduced speed and through the gearing specified or one of equivalent character, rotates the fuel feeding worm through mechanism now to be described and at a slower speed.

The worm wheel, for example, includes the shaft extension 58 which projects through and beyond the tubular portion 59—see Fig. 2—of the gear casing. It terminates in a squared end 60, or the like. A sleeve 70 has a flanged portion 71 suitably secured as at 72 to the gear casing. It also has at its opposite end a flange 73 which through the bolts 74 and nuts 75 detachably connects the flange 44 of conduit 43 thereto. Thus, conduit 43 is supported by the gear casing.

Interposed between the two flanges 73 and 74 is a plate 76 which is apertured as at 77 and is recessed or socketed coaxially therewith as at 78. Mounted therein is a sealing structure 79 that rotatably supports an enlargement 80 of the screw shaft 47. The enlargement 80 includes an annular recess or channel 81 and also terminates in a polygonally formed end 82, similar to the end 60 of the gear shaft 58.

A coupling 83 slidably receives the two squared ends 60 and 82 and the enlarged extension 183 of said coupling has rigidly secured to it as at 84 a collar 85 that is seated in the groove 81 of the screw shaft. Interposed between the collar 85 and the face 86 of the socketed plate 76 is a cone thrust bearing construction 87.

By means of coupling 83, the gear shaft rotates the screw and by means of the tube 70 and bearing 85 therein the screw shaft 47 is rotatably supported in a relatively fixed bearing. Tube 70 preferably is packed with grease. The other end of the shaft 47 is supported in the bearing 30 formed in bracket or support 28 as previously described.

Features of interest hereinbefore disclosed, are the tapered flight section between the coal bin worm and the conduit feed worm, the adjustable tubular section constituting an adjustable throat in connection with said tapered worm portion whereby the amount of coal picked up in

the bin is regulated. This construction also has the advantage that it prevents smoke backing up into the bin by securing a packing condition of the fuel. This adjustment also permits the amount of fuel supplied at the intake to be regulated in accordance with the different grades of fuels used.

As indicated at "A" in Fig. 2, the shaft may be welded together and this welding must be one wherein the shafts are in axial alignment. If desired, a suitable coupling may readily connect these two ends together if a separation occurs at this point. Should it be found desirable to have a separation in the feed worm or screw somewhere in between portion 37 and portion "A" and this connection not be of welded character, a suitable coupling construction may be utilized and when it is utilized, then the worm portions immediately adjacent the coupled portions would be relieved so that the speed of fuel conveyance would be accelerated due to the retardation in view of the gap in the worm structure necessitated by the inclusion of a coupling type connection.

Another feature of the invention is that the major portion of the thrust is taken out next to the gear case and this thrust is opposed to the thrust of the drive. In some instances the type of thrust bearing illustrated in the right hand portion of Fig. 2 may be eliminated and a simple bearing substituted therefor. Also in certain installations the adjustable connection illustrated between member 34 and the bin portion of the worm screw may be eliminated. Preferably, however, this form is utilized because it is possible to insure positive alignment even though the support 28 be positioned such that the end of the worm shaft structure is not positioned exactly, having relation to the distance from the retort and in that case the slip type connection 33—34 permits of this adjustability.

While the invention has been described in great detail and similarly illustrated in the foregoing specification and drawing, respectively, the same is to be considered illustrative and not restrictive in character. Several modifications herein-after suggested as well as others which will readily suggest themselves to persons skilled in this art, are all considered to be within the broad scope of this invention, reference being had to the appended claims.

The invention claimed is:

1. The combination with a solid fuel receiving device, and a solid fuel reservoir, of a fuel transferring device including a screw type conveyor structure including conduit means and screw means therein, said conduit means having a discharge intermediate its ends in registration with and discharging to the fuel receiving device, and an intake in the reservoir, the screw means projecting into the reservoir beyond the effective conduit intake, and projecting oppositely beyond the conduit discharge, the screw means having opposite flights on opposite sides of the conduit discharge, a support in the reservoir for the projecting portion of the screw means, and power means at the opposite end of the screw means for rotating same for withdrawing solid fuel from the reservoir and supplying same to the fuel receiving device.

2. The combination with a solid fuel receiving device and a solid fuel reservoir, of a fuel transferring device including a screw type conveyor structure including conduit means and screw

5. The combination with a solid fuel receiving device and a solid fuel reservoir, of a fuel transferring device including a screw type conveyor structure including conduit means and screw means therein, said conduit means having a discharge intermediate its ends in registration with and discharging to the fuel receiving device, and an intake in the reservoir, the screw means projecting into the reservoir beyond the effective conduit intake, and projecting oppositely beyond the conduit discharge, the screw means having opposite flights on opposite sides of the conduit discharge, a support in the reservoir for the projecting portion of the screw means, and power

8. The combination with a solid fuel receiving device, and a solid fuel reservoir, of a fuel transferring device including a screw type conveyor structure including conduit means and screw means therein, said conduit means having a discharge intermediate its ends in registration with and discharging to the fuel receiving device, and an intake in the reservoir, the screw means projecting into the reservoir beyond the effective conduit intake, and projecting oppositely beyond the conduit discharge, the screw means having opposite flights on opposite sides of the conduit discharge, a support in the reservoir for the projecting portion of the screw means, power means at the opposite end of the screw means for rotating same for withdrawing solid fuel from the reservoir and supplying same to the fuel receiving device, the reservoir exposed screw means having a tapered flight portion, and the conduit

means including an adjustable extension cooperating therewith for fuel supply regulation, and thrust bearing means interposed between the screw means and conduit means and adjacent the power connection to the screw means.

9. The combination with a solid fuel receiving device, and a solid fuel reservoir, of a fuel transferring device including a screw type conveyor structure including conduit means and screw means therein, said conduit means having a discharge intermediate its ends in registration with and discharging to the fuel receiving device, and an intake in the reservoir, the screw means projecting into the reservoir beyond the effective conduit intake, and projecting oppositely beyond the conduit discharge, the screw means having opposite flights on opposite sides of the conduit discharge, a support in the reservoir for the projecting portion of the screw means, power means at the opposite end of the screw means for rotating same for withdrawing solid fuel from the reservoir and supplying same to the fuel receiving device, the reservoir exposed screw means having a tapered flight portion, and the conduit means including an adjustable extension cooperating therewith for fuel supply regulation, and bearing means interposed between the support and the reservoir exposed portion of the screw means.

10. In a solid fuel consuming device having a fuel receiving device, aligned sleeve portions terminating in laterally exposed portions, aligned conduct portions slidably seatable in the sleeve portions and spaced apart, said spacing being in vertical alignment with the fuel receiving device, screw conveyor means in the conduit portions and having oppositely directed flights, and means rigidly securing the conduit portions in aligned adjusted position in the sleeve portions.

11. In an arrangement as defined by claim 1, characterized by the addition of a detachable connection included in the conduit means between the reservoir and fuel receiving device.

12. In a stoker feed device, the combination with a fuel storage bin having an opening therein, a fuel receiving device, a fuel supplying tube structure therebetween and supported by the fuel receiving device, and a fuel conducting worm therein, of a bin plate structure closing the bin opening and having a tube receiving opening registering with the bin opening, a tube enveloping means registering with the bin opening and supporting said tube structure, the bin end of the tube structure being exposed to the bin and the worm projecting into the bin for exposure to the contents thereof, an extension for the fuel supplying tube structure extending oppositely beyond the fuel receiving device, power means for worm rotation,

the last mentioned tube structure extension having operative connection with the power means for tube structure extension support, the connection between the tubular extension and power means being of detachable character, and a detachable connection between the worm and the power means, said worm including an extension within the tubular extension, the worm-power connection being of detachable character and in substantial registration with the first mentioned means detachable connection.

13. In a stoker feed device, the combination with a fuel storage bin having an opening therein, a fuel receiving device, a fuel supply tube structure therebetween and supported at one end by the fuel receiving device, and a fuel conducting worm therein, of a bin plate structure registering with the bin opening, a tube enveloping means registering with the bin opening and having a tube receiving opening and supporting said tube structure, the tube structure and worm projecting into the bin, the bin projecting end of the worm being exposed to bin contents for an appreciable length by said tube structure, said plate structure having an opening above the tube receiving opening, closure means for the higher opening, means detachably securing the closure means to the plate structure, the bin enclosed portion of the worm having a flight effectively tapering from the bin to the bin end of the worm, means within the bin operatively supporting that end of the worm and appreciably remote from the bin plate structure, and driving means at the opposite end of the worm for worm movement.

14. In a stoker feed device, the combination with a fuel storage bin having an opening therein, a fuel receiving device, a fuel supply tube structure therebetween and supported at one end by the fuel receiving device, and a fuel conducting worm therein, of a bin plate structure registering with the bin opening, a tube enveloping means registering with the bin opening and having a tube receiving opening and supporting said tube structure, the tube structure and worm projecting into the bin, the bin projecting end of the worm being exposed to bin contents for an appreciable length by said tube structure, said plate structure having an opening above the tube receiving opening, closure means for the higher opening, means detachably securing the closure means to the plate structure, means within the bin operatively supporting that end of the worm and appreciably remote from the bin plate structure and for rotation, and driving means at the opposite end of the worm for worm movement.

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