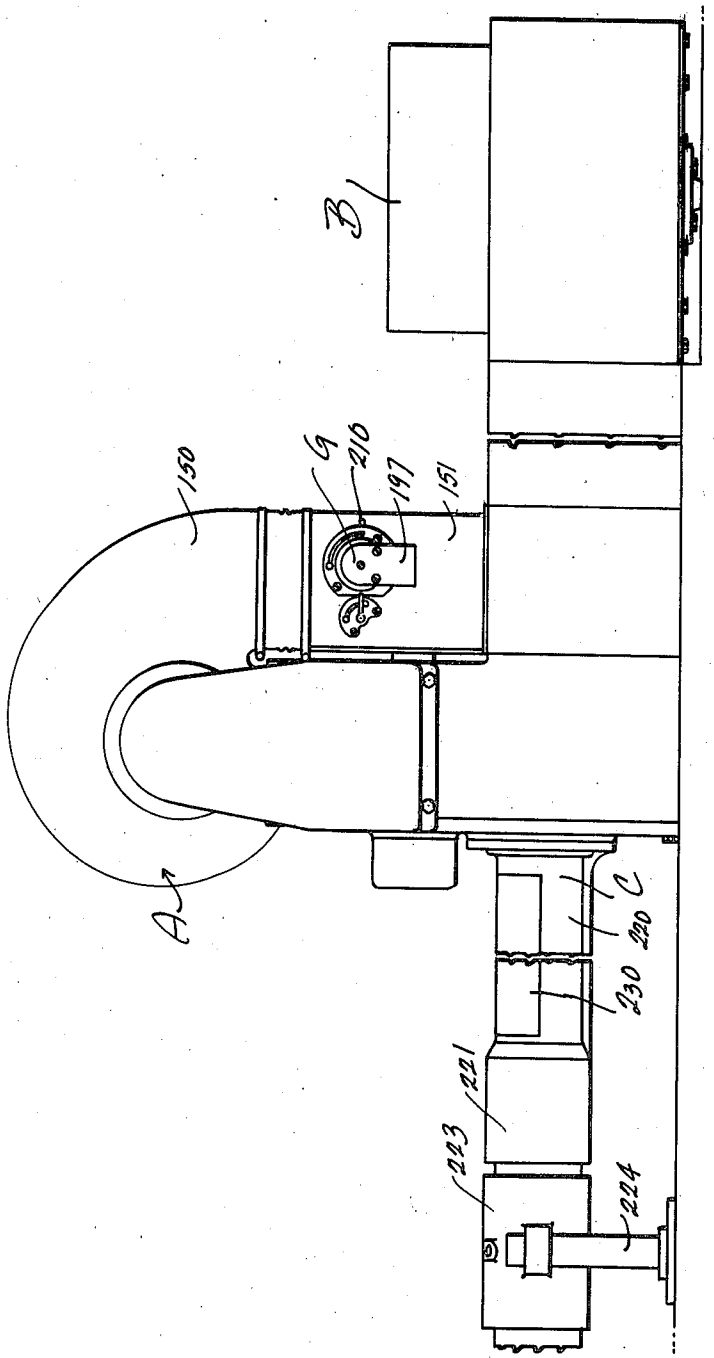
Aug. 3, 1948. J. C. SCOTT 2,446,492

UNDERFEED DOMESTIC STOKER

Filed April 22, 1941 5 Sheets-Sheet 1

FIG. 1.



INVENTOR.
John C. Scott

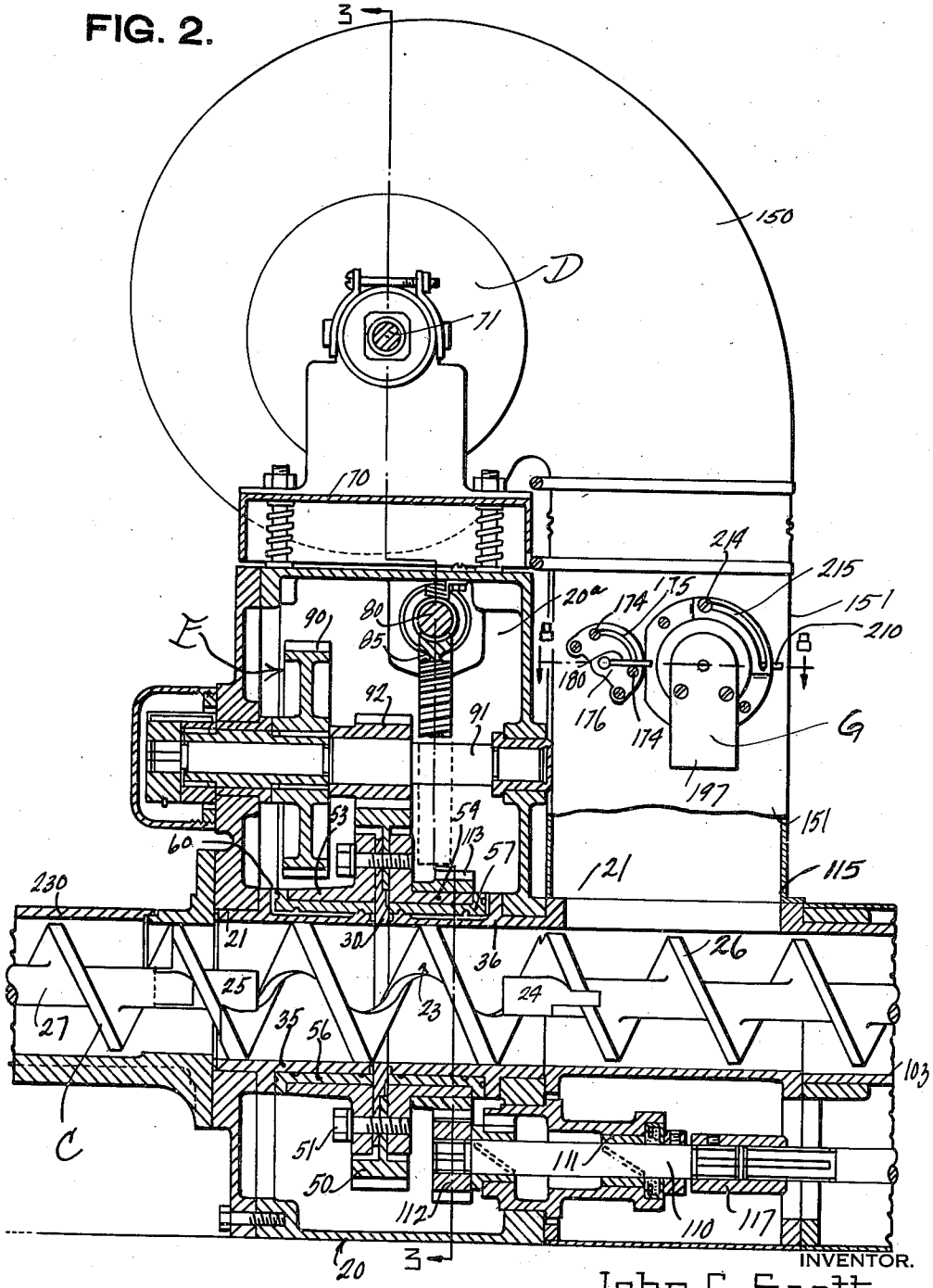
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Aug. 3, 1948. J. C. SCOTT 2,446,492

UNDERFEED DOMESTIC STOKER

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FIG. 2.



INVENTOR.

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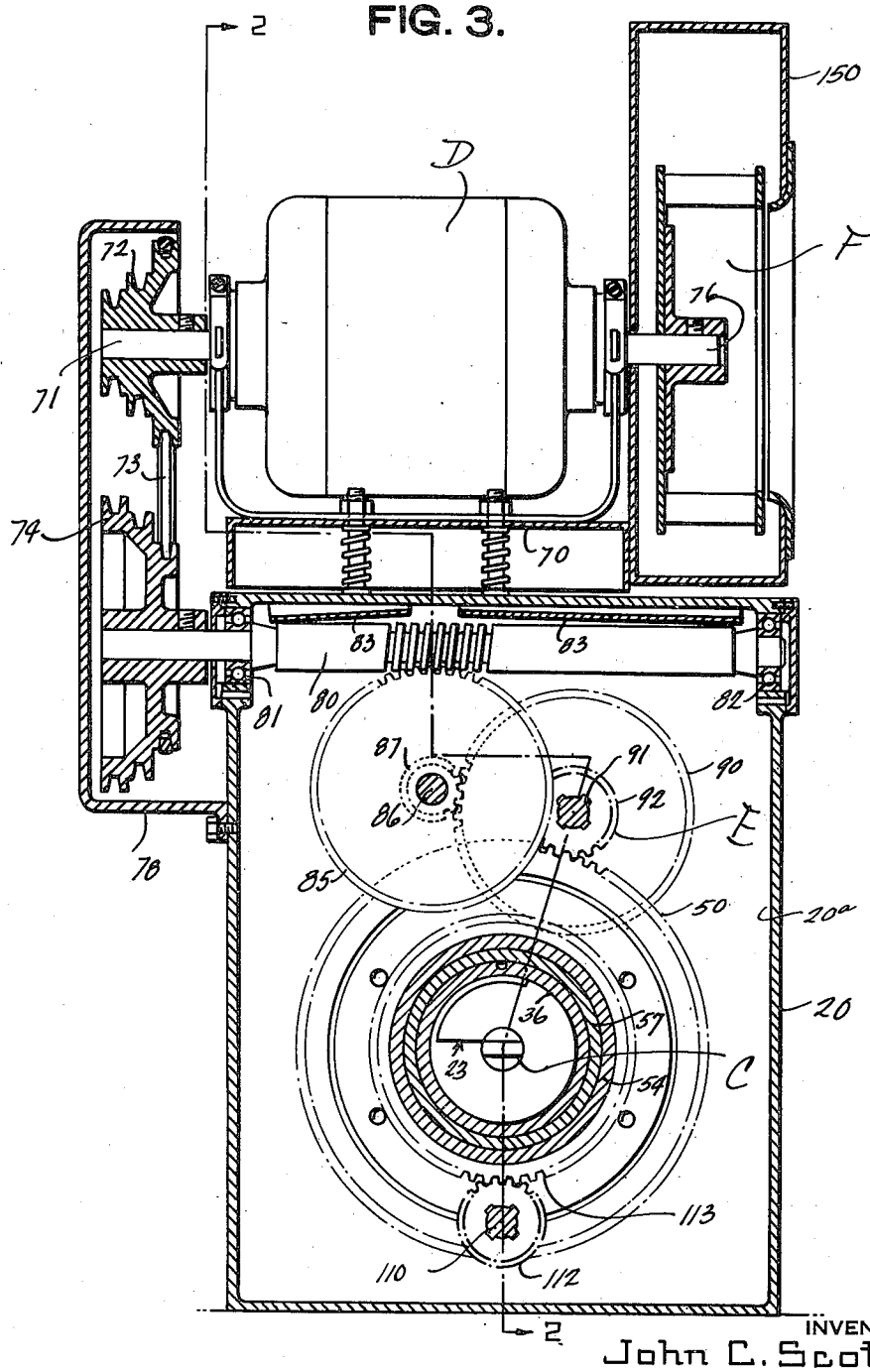
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UNDERFEED DOMESTIC STOKER

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FIG. 3.



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UNDERFEED DOMESTIC STOKER

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FIG. 4.

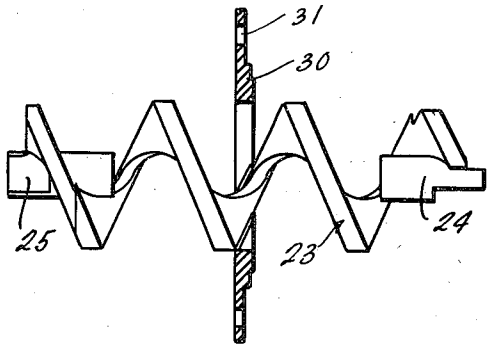
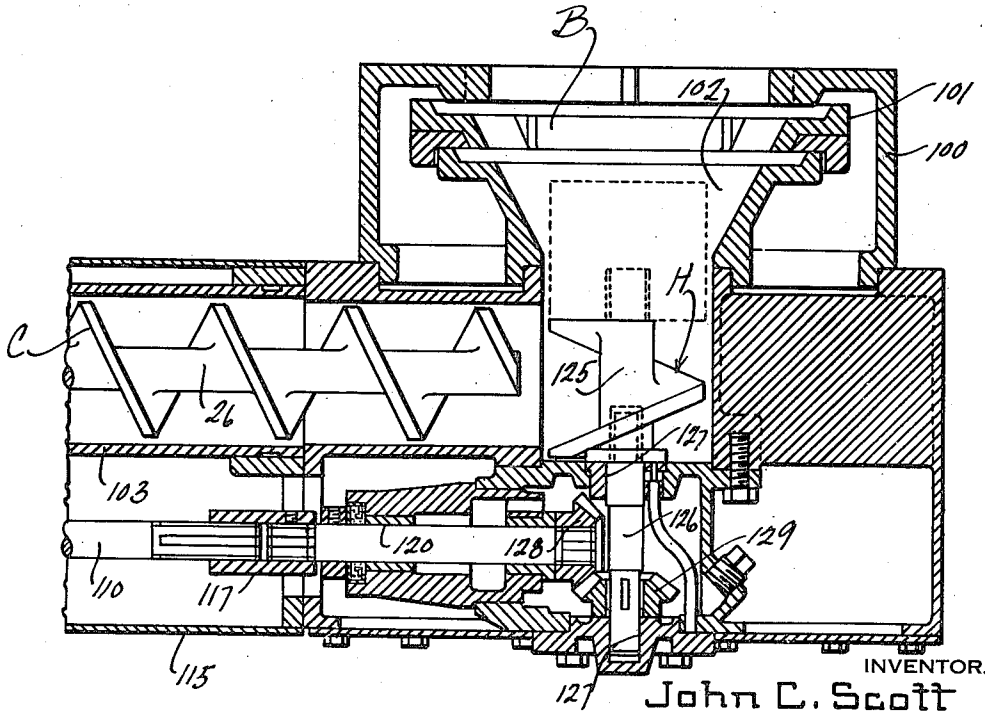


FIG. 5.



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UNDERFEED DOMESTIC STOKER

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FIG. 7.

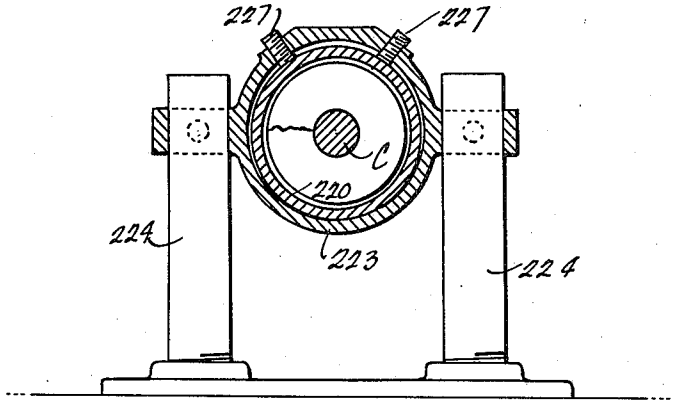
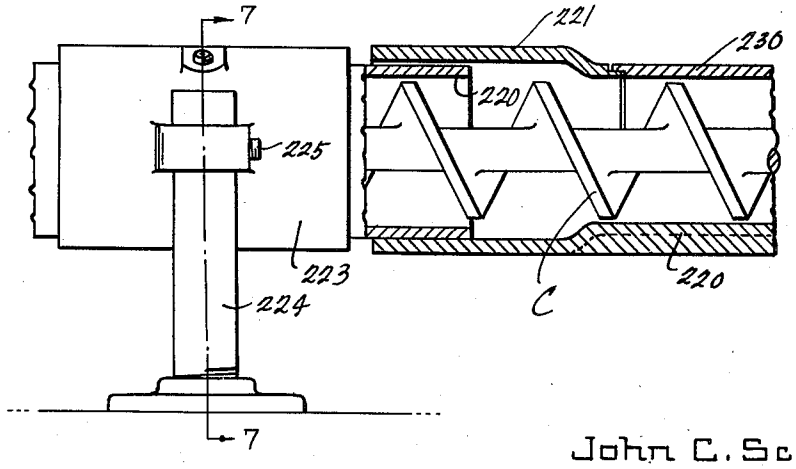


FIG. 6.



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Patented Aug. 3, 1948

2,446,492

UNITED STATES PATENT OFFICE

2,446,492

UNDERFEED DOMESTIC STOKER

John C. Scott, Beckley, W. Va., assignor to The New River Company, Mount Hope, W. Va., a corporation

Application April 22, 1941, Serial No. 389,803

15 Claims. (Cl. 110—45)

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This invention relates to improvements in underfeed domestic stokers.

The primary object of this invention is the provision of a stoker of the underfeed type, which can be compactly assembled, and in which the dimensions of parts between the power unit and burner are standardized.

In conventional bin-feed type of stokers, it has been usual to: (*a*) place the power unit at the coal bin and drive the conveyor screw by a shaft extending into the coal; (*b*) place the power unit on the opposite side of the boiler or furnace from the coal tube, or (*c*) use a complicated transfer system in which coal is pulled into the feed box by one screw and then carried into the burner by another. These methods are mainly objectionable because they require expensive installation costs and are not compactly arranged. Floor space adjacent the burner is usually limited, so that its conservation is desirable.

With my improved underfeed domestic stoker, the dimensions between the power unit and burner are standardized and; parts are so arranged as to conserve floor space, and the installation costs are less than with any of the above mentioned conventional installations. Furthermore, my arrangement enables the conveyor or feed screw from the power unit to the bin to be adjusted in length to suit conditions, with comparative ease.

In the drawings, wherein for the purpose of illustration is shown only a preferred embodiment of the invention,

Figure 1 is a side elevation of the improved underfeed stoker.

Figure 2 is a cross sectional view taken through the drive gearing mechanism; substantially on the line 2—2 of Figure 3.

Figure 3 is a vertical sectional view taken through the motor and reduction gearing of the conveyor screw; substantially on the line 3—3 of Figure 2.

Figure 4 is a detail of a section of the conveyor screw.

Figure 5 is a fragmentary vertical sectional view taken through the burner head or fire box, showing the horizontal and vertical feed screw arrangements associated therewith.

Figure 6 is a fragmentary sectional view showing the manner in which an extension section of the conveyor screw and feed housing is supported.

Figure 7 is a vertical sectional view taken substantially on the line 7—7 of Figure 6.

In the drawings, wherein similar reference characters designate corresponding parts

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throughout the several views, the letter A may generally designate the improved underfeed domestic stoker. It includes a burner head or fire box B; horizontal feed screw construction C; motor D; speed reduction gearing E for the drive of the horizontal feed screw construction C; blower fan F; air regulation and control means G, and a vertical feed screw construction H.

The power plant portion of the improved stoker A preferably includes a supporting casing 20 having openings 21 therein through which the feed screw construction C extends. The portion of the feed screw construction C which extends through openings 21 consists of a coreless screw body 23, shown best in Figure 4 of the drawings, having a plurality of spiral convolutions and at the ends thereof being provided with axial male and female extensions 24 and 25 adapted to be detachably connected with the shaft portions of the adjacent conveyor screw sections 26 and 27. The conveyor screw section 26 is of standardized length, and positioned between the power unit and the burner head B. The other screw section 27 may be of any desired length, and usually is constructed of a plurality of sections to suit the distance from the power plant or unit to the coal bin or storage compartment. Both of these sections 26 and 27 are provided with axial shafts and have spiral convolutions thereon, as shown in the drawings.

Referring again to the coreless screw section 23 the same is provided with a relatively thin ring shaped portion 30 integrally connected at a peripheral edge of the central convoluted portion. The disc is provided with transverse bolt receiving openings 31 therein.

The coreless screw section 23 is assembled in the casing 20 upon stationary sleeve portions 35 and 36. The latter have pressed fits in the openings 21 of the casing 20, as best shown in Figure 2 of the drawings; the adjacent ends of the sleeves 35 and 36 being pressed at their edges against the ring shaped portion 30 of the section 23, as shown in Figure 2 of the drawings. It is to be noted that the thicknesses of adjacent ends of the sleeve are reduced, so as to provide an oil tight fit. The internal diameter of the sleeves 35 and 36 is the same as the opening through the disc 30; the edges of the spiral convolutions having a sliding fit within the sleeve portions 35 and 36, as shown in Figure 2 of the drawings.

Referring in detail to the drive gearing E, the disc portion 30 of the conveyor shaft section 23 has a ring shaped gear 50 bolted thereto as at 51. These bolts 51 also secure hub extensions 53 and

54 to opposite sides of the web of the gear 50; the said hubs having bronze bearing sleeves 56 and 57 pressed therein so as to rotate therewith. The bearing sleeves 56 and 57 receive the major lengths of the conveyor screw supporting sleeves 35 and 36 therein and receive the thrust of the conveyor screw section 23. Suitable oil ducts 60 may lead from the gear box compartment 20a between the bearings 56—57 and the outer surfaces of the stationary supporting sleeves 35—36, as shown in Figure 2.

Referring at this time to other details of the power plant, the motor D is mounted by a spring supported platform 70 upon the top of the casing 20. It has a shaft extension 71 at one end provided with a drive pulley 72. A belt 73 is trained thereupon and also upon another pulley 74 of the drive gearing. The other end of the motor shaft, designated at 76 has a blower fan F keyed therewith.

The pulleys 72—74 and their belt 73 are located in a suitable auxiliary housing 78, and the pulley 74 is keyed upon a worm 80 rotatably mounted in bearings 81 and 82 at the top of the gear casing 20, as shown in Figure 3. These bearings are kept lubricated from oil troughs 83.

The speed reduction aand drive gearing E preferably includes a worm gear 85 meshing with the worm 80 and keyed upon a shaft 86. The latter also has a pinion 87 keyed thereon and meshing with a larger gear 90. The latter is keyed upon a counter shaft 91. A pinion 92 is keyed upon shaft 91 and meshes with the gear 50 above described as being keyed with the conveyor screw section 23. Both of the shafts 86 and 91 are similarly mounted in bearings upon the gear box 20, shown in Figure 2 of the drawings.

Referring to the fire box construction B, the same includes a casing 100 having the conventional tuyères assemblage 101 therein, arranged so as to permit the air supplied by the fan to mix with the coal as the latter is forced into the fire box compartment 102.

The conveyor screw section 26, as before mentioned, is drive connected with the section 23, as shown in Figure 2 of the drawings, and is housed at 103. The tubular housing 103 opens into the lower portion of the fire box compartment 102, and the coal is conveyed from the section 23 via the section 26 to the fire box compartment.

Special vertical feed means H is provided for forced feeding of the coal into the upper portion of the fire box compartment 102. This consists of a horizontal shaft 110 suitably mounted in bearings 111 in the gear casing 20 and having a pinion 112 keyed therewith meshing with the gear 113. The latter has a keyed fit upon the hub sleeve 54 of the gear 50 above described, and as shown in Figure 2 of the drawings. The shaft 110 is located immediately below the conveyor feed screw, and is suitably housed in a portion 115 of the air casing leading to the fire box. The horizontal shaft 110 is divided into several sections which are connected by flexible couplings 117 so as to permit of the accurate mounting of the shaft section adjacent to the fire box. This shaft section is mounted in suitable bearings 120.

The vertical feed screw 125 has a vertical shaft section 126 mounted in suitable bearings 127 in the fire box casing assemblage and is provided with a bevel gear 129 meshing with a bevel gear 128 keyed to the end of the shaft 110. The feed screw portion 125 directly faces the terminal end of the horizontal conveyor screw section 26 and

feeds the coal upwardly into the fire box compartment 102 to the desired height. The provision of this vertical feed screw eliminates crushing of the coal at the bottom of the retort and enables the finer coal to be uniformly admixed with the other aggregate, so that an even burning of the coal in the fire box is assured.

In connection with the introduction of forced air, the blower assemblage includes a fan F housed within compartment of casing 150, the compartment of the casing outlets thru a vertical duct 151 into a box or casing 115. The latter is open to the compartment wherein the conveyor screw section 26 is disposed. Clearances between this screw section and the housing 103 within which it rotates, as will be noted from Figures 2 and 5 of the drawings, permit the air under forced pressure to enter the fire box at the location of the vertical feed screw construction H. It will be noted that within the duct 151 there is disposed a damper control construction which may consist of any conventional thermostatically controlled damper arrangement.

The conveyor screws 27 are housed in suitable feed tubes 220, and a number of these may be provided, since the length from the power plant to the coal storage location may vary. To that end the tube section 220 may be enlarged at 221 to receive the ends of an adjacent section 220, as shown in Figure 6 of the drawings. The tube sections 220 are provided with supports consisting of sleeves 223 mounted for vertical adjustment upon suitable standards 224 and held in proper adjustment by means of set screws 225. Suitable clamping screws 227 hold the tubes 220 in position. If desired, inspection segments 230 may be placed in certain parts of the tubes 220, for the purpose of inspecting the conveyor screws, etc.

Various changes in the shape, size and arrangement of parts may be made to the form herein shown and described, without departing from the spirit of the invention or the scope of the claims.

I claim:

1. In a stoker, the combination of a conveyor tube, a rotary screw mounted for rotation in said tube, said screw comprising end sections each having shaft portions and spiral convolutions thereon, and an intermediate section provided with coreless convolutions, said intermediate section at the ends thereof having stub shaft portions for connection with the shafts of the other sections, and a driving gear connected with the intermediate screw section.

2. As an article of manufacture, a conveyor screw section for stokers comprising coreless spiral convolutions having end stub shaft portions, and means for connecting a driving gear to the outer periphery of the coreless spiral portion of said conveyor screw at a location between the stub shaft portions.

3. In a stoker, the combination of relatively spaced rotary conveyor screw sections, a drive gearing casing, an intermediate conveyor screw section comprising a plurality of coreless spiral convolutions having end stub extensions detachably connected with the above mentioned spaced conveyor screw sections, a drive gear peripherally connected with the intermediate conveyor screw section, stationary sleeve sections upon the gear casing at each side of the drive gear, bearing means connected with the drive gear and externally bearing upon said sleeve sections, and means for driving the drive gear.

4. In a drive mechanism for conveyor feed

screws, the combination of endwise spaced conveyor feed screws, tubular feed housings therefor, an intermediate coreless spiral conveyor screw section comprising a plurality of spiral convolutions having its end portions provided with means to key the same to the conveyor screw sections first mentioned, a drive gear having peripheral connection upon the coreless spiral of the intermediate conveyor screw section, tubular stationary sleeve sections receiving the intermediate screw section in rather close fitting contact therein at each side of said drive gear, and bearing means upon said sleeve sections for the drive gear.

5. As an article of manufacture, a conveyor screw section for stokers comprising a coreless spiral convoluted portion having intermediate its ends a peripherally attached ring-shaped drive attaching member the thickness of which at the passageway thereof which is exposed to passage of fuel therethru, is less than one-half of the overall diametrical dimension of the screw.

6. As an article of manufacture, a conveyor screw for stokers and the like comprising a coreless screw section, end axle stubs attached at the ends of the coreless screw portion, and a ring-shaped attaching disc disposed in a plane normal to the axis of the coreless screw section said ring having a passageway therethru of the same diameter as the overall diameter of the coreless screw section at the location of said ring, and the peripheral portion of the coreless screw section at the location where it extends thru the said ring being fixed with respect to the ring in the passageway of the ring.

7. In a stoker, the combination of a conveyor tube, and a continuous spiral screw rotatably mounted in the tube comprising end sections having spiral convolutions and axial shaft portions, an intermediate coreless screw section having spiral convolutions continuous with the spiral convolutions of the end sections, means detachably keying the ends of the coreless screw section to the axial shaft portions of the end sections, and means connected peripherally with the coreless screw section for driving the same and the end screw sections.

8. As an article of manufacture, a conveyor screw section for stokers and the like comprising coreless spiral convolutions having peripherally connected intermediate the ends thereof a ring-shaped drive attaching disc.

9. As an article of manufacture, a conveyor screw section for stokers and the like comprising coreless spiral convolutions having peripherally connected intermediate the ends thereof an outwardly disposed ring-shaped drive attaching disc, and conveyor attaching means at the ends of the coreless screw convolutions.

10. In a stoker conveyor the combination of spaced axially aligned rotary conveyor screw sections, conveyor tubes in which said rotary screw sections rotate, an intermediate coreless screw section of spiral convoluted form having end connections with the aforesaid screw sections, stationary conveyor screw supporting sleeves in closely spaced relation supporting the ends of said coreless screw section, a relatively thin annular member rigidly connected peripherally with the coreless screw section intermediate the ends of the latter and extending in relatively close fitting relation circumferentially in the space between the ends of said sleeve sections, a gear connected with said member externally of the sleeves for

driving said coreless screw section, and bearing means on said sleeves supporting said gear.

11. In a stoker conveyor the combination of spaced axially aligned rotary conveyor screw sections, conveyor tubes in which said rotary screw sections rotate, an intermediate coreless screw section of spiral convoluted form having end connections with the aforesaid screw sections, stationary conveyor screw supporting sleeves in closely spaced relation supporting the ends of said coreless screw section, a relatively thin annular member rigidly connected peripherally with the coreless screw section intermediate the ends of the latter and extending in relatively close fitting relation circumferentially in the space between the ends of said sleeve sections, a gear connected with said member externally of the sleeves for driving said coreless screw section, and bearing means on said sleeves supporting said gear consisting of soft metal bearing sleeves connected with said gear and rotatably bearing directly externally upon said sleeves.

12. As an article of manufacture, a conveyor screw for stokers and the like comprising a coreless screw section, a ring-shaped attaching disc disposed in a plane normal to the axis of the coreless screw section, said ring having a passageway therethru of substantially the ame diameter as the overall diameter of the coreless screw section at the location of said ring, and the peripheral portion of the coreless screw section at the location where it extends through said ring being fixed with respect to the ring and in the passageway of said ring.

13. In a stoker, the combination of a burner box, drive gearing, a horizontally disposed conveyor screw assemblage connecting the drive gearing with the burner box, including an intermediately disposed conveyor screw section to which said drive gearing is directly attached, a vertical lift screw for the burner box at the end of the horizontally disposed conveyor screw assemblage, a horizontally disposed shaft below the horizontal screw assemblage having connection at one end with said drive gearing at the intermediate section of said horizontally disposed screw assemblage and at its opposite end having a drive connection with the vertical lift screw.

14. In a stoker, the combination of a conveyor tube, a continuous spiral screw rotatably mounted in the tube comprising end sections and an intermediate coreless screw section continuous with the said end sections, conveyor driving means connected peripherally with the coreless screw section shaped to pack the coal at said coreless screw section just sufficient to prevent back passage of free draft along said conveyor tube, a burner at an end of said continuous spiral screw, and means for forcing a draft into the tube and along the continuous spiral screw at a location between said intermediate coreless screw section where the coal packs and said burner.

15. In a stoker construction the combination of a coal conveyor tube, and a continuous spiral conveyor screw mounted therein comprising end sections each having axial core portions and spiral convolutions thereabout, an intermediate coreless screw section comprising a plurality of screw convolutions each extending thru at least 360°, means detachably keying the ends of the coreless screw section to the adjacent ends of the end sections so as to provide a continuous extension of the screw convolutions of the end and intermediate sections of the spiral screw, and means connected

with the coreless screw section intermediate the ends thereof for driving said spiral screw.

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