Dec. 17, 1940. B. M. GUTHRIE 2,225,215

STOKER

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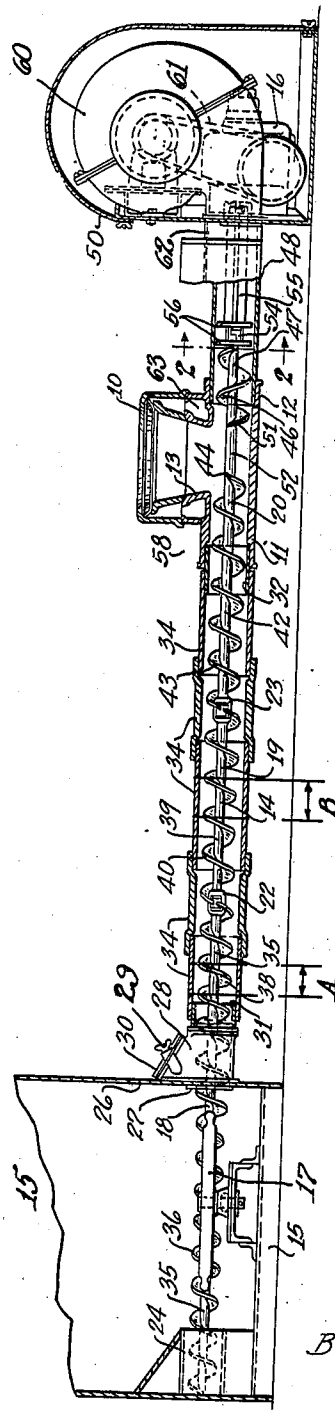


Fig. 1.

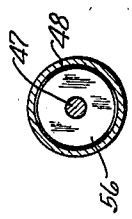


Fig. 2.

INVENTOR
Bernard Morse Guthrie.
BY Paul L. Krakow
ATTORNEY

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STOKER

Bernard Morse Guthrie, Chicago, Ill., assignor to Fairbanks, Morse & Co., Chicago, Ill., a corporation of Illinois

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2 Claims. (Cl. 198—64)

This invention relates to improvements in fuel feeding mechanism for stokers and the like, the invention having particular application to stokers of the under-feed type.

An object of the invention is found in the provision of an improved fuel feed mechanism for stokers, which through a novel construction and arrangement of the fuel feeding parts, attains an efficient and positive transfer of fuel through the feed conduit, and overcomes the tendency for the fuel to pack to an undesirable degree, in the conduit.

Another object resides in the provision of an improved fuel feeding mechanism including a conveyor tube or conduit extending between a retort and a source of fuel supply, such as a hopper or bin, and a fuel conveyor operable in the conduit, the conduit being formed to provide zones of reduced internal diameter near each end thereof and a zone of increased internal diameter intermediate its ends, whereby to attain desired conditions of fuel feed therethrough.

Another object is attained in the provision, in combination with a conveyor tube or conduit of the form above noted, of a conveyor device of helical or screw type located within the conduit, the screw conveyor being formed of sections differing in the pitch of the helical flights or screw blades thereon, whereby to improve the function of the conveyor, in cooperation with the novel form of conduit in which it operates.

A further object is attained in the provision, in combination with a screw conveyor of the improved form above noted, which is extended through the lower portion of a retort and projected therebeyond for connection to operating mechanism therefor, of a screw section of reversed flights for preventing the conveyance of fuel beyond the retort, and bearing means for the conveyor adjacent the reversed flights.

Further objects and advantages will appear from the following description and from the drawing, in which:

Fig. 1 illustrates a stoker system embodying the features of the invention, certain parts of the fuel feeding mechanism being shown in section to more clearly disclose certain of the improved features, and Fig. 2 is an enlarged transverse section of a part of the mechanism, as viewed from line 2—2 in Fig. 1.

Referring to the drawing by suitable characters of reference, 10 designates generally, a retort or burner assembly of the under-feed type. The retort assembly includes an upwardly opening fire pot 13 having a tubular, fuel-inlet extension 11 near the lower or bottom end and on one side thereof, and a similar tubular extension 12 on the opposite side of the fire pot and in axial alignment with the extension 11. A fuel conveyor 14 extends from a fuel hopper or bin 15 through the extension 11, beneath the firepot and through the extension 12 for coupling to a conveyor driving mechanism denoted generally at 16. In order to agitate the fuel in the bin 15 so as to assure fuel pick-up by the bin end of the fuel conveyor 14, there may be provided within the bin, a suitable agitator member 17. The agitator 17 may be of any well known type, as a spoked wheel suitably supported and arranged for rotative actuation by contact with the adjacent flights on the conveyor 14, in accordance with prevailing practice. The conveyor 14 is shown as comprised of three sections 18, 19 and 20, coupled together as at 22 and 23. In practice, the number of conveyor sections utilized will depend upon the distance between the retort 10 and fuel bin 15.

As shown, the bin structure includes a bearing 24 for the end of the conveyor, and a front wall 26 having a fuel outlet 27 through which the conveyor extends. Externally of the bin wall 26 and in register with the outlet 27 is a housing 28 which is open at its upper end. Such open end is normally closed by a cover 30 removably secured to the housing 28 by suitable wing nuts 29. Removal of the cover gives access to the interior of the housing 28 for removing spikes and other deleterious material collecting therein which if not removed, might cause damage to the conveyor and its driving mechanism. Extending between the housing 28 and the fire pot extension 11 is a tubular casing or conduit structure enclosing the conveyor 14. The conduit is comprised, by preference, of a section 31 connected in any suitable manner to the housing 28, the internal diameter of this section being such as to effect a minimum clearance with respect to the conveyor section 18 extending therethrough; a section 32 similar in form to the section 31, connected in any suitable manner to the extension 11, and a number of intermediate sections 34 of uniform internal diameter but larger than that of either of the end sections 31 and 32. The internal diameter of the extension 11 is by preference, substantially the same as that of the conduit section 32, while the internal diameter of the housing 28 when the cover 30 is assembled thereto, is substantially the same as that of the conduit section 31.

Section 18 of the conveyor comprises a shaft 35 having screw flights or helical blades 36 of a predetermined diameter and flights 38 of greater

diameter. The flights 36 are located within the bin 15, while the flights 38 extend partly within the bin, through the housing 28 and the conduit section 31 and partly within the adjacent conduit sections 34. The blades 36 and 38 are by preference, of equal pitch, as shown. Conveyor section 19 which is disposed wholly within the conduit sections 34, is comprised of a shaft 39 having screw flights 40 thereon of a diameter substantially equal to that of flights 38, but the pitch of these flights is greater than that of flights 36 and 38, to effect a more rapid feed of fuel through the conduit sections 34. Thus as shown in Fig. 1, the conveyor flights 38 are characterized by a pitch A, while the flights 40 are characterized by a predetermined greater pitch B. The conveyor section 20 which extends through the lower portion of the fire pot 13, is comprised of a shaft 42 having flights 43 thereon substantially equal in diameter and pitch to the flights 40, these flights terminating at 44 within the fire pot. Reversed screw flights 46 are formed on the end portion 47 of shaft 42, these flights and the shaft end 47 being disposed within the extension 12 and within a tubular casing 48 extending between the extension and a housing 50 for the conveyor driving mechanism 16. The reversed flights 46 serve to return to the fire pot any fuel which may enter the extension 12. It will be noted that the reversed flights terminate at 51 in the fire pot and spaced from the termination 44 of the fuel feeding flights 43. Thus the portion 52 of the shaft 42 disposed centrally of the lower portion of the fire pot is free of screw flights. Moreover, it will be observed that the oppositely directed flights 43 and 46 will coact to direct and urge the fuel upwardly in the fire pot, thus to effect a positive delivery of fuel thereto.

The shaft end 47 is coupled as at 54, to a conveyor driving element 55 which is operatively associated (not shown) with the driving mechanism 16. Adjacent the coupling 54 are a pair of disc elements 56, one thereof being carried by the shaft end 47 and the other by the element 55. The diameter of these discs conforms closely to the internal diameter of the casing 48 (Fig. 2), whereby the discs may serve as bearing elements for the conveyor shaft. The discs serve also, to close the casing 48 against movement of fuel therethrough.

As appears in Fig. 1, the mechanism enclosed by the housing 50 includes in addition to the conveyor driving mechanism 16, a suitable blower 60 for supplying combustion air to the burner 10. The blower which may be driven from the mechanism 16 in any suitable manner, as by the belt connection shown in broken lines at 61, delivers combustion air to the burner through an air conduit 62 leading to and communicating with the burner air chamber 63.

The functional cooperation between the improved conveyor and the novel form of conveyor conduit will be now described. The screw flights 36 and 38 conduct fuel from the hopper or bin, through the housing 28 and through the conduit section 31 into the conduit sections 34. By reason of the larger diameter of flights 38 relative to that of flights 36, and the minimum clearance between these flights and the housing 28 and conduit section 31, a slight packing of the fuel occurs through this zone, resulting in a positive movement of fuel through the bin outlet, housing 28 and conduit section 31. The slight packing of the fuel through the described zone, serves also to prevent leakage gases and smoke from the retort, from flowing into the bin.

The fuel leaving the conduit section 31 and conveyed through the sections 34, will be conducted through these sections by the conveyor at a more rapid rate, by reason of the increased pitch of the screw flights 40 and 43 over that of flights 38. Also, the fuel conveyed through conduit sections 34 will be substantially loosely fed therethrough by reason of the increased internal diameter of these sections over the conduit section 31, resulting in a greater clearance between sections 34 and the conveyor flights 40 and 43. The increased rate of fuel feed through the conduit sections 34, as attained by the greater pitch of the conveyor screw flights therein, serves also to prevent jamming of the fuel in these sections.

By reason of the minimum clearance between the conveyor flights 43 and the conduit section 32 and retort extension 11, the fuel fed therethrough will become slightly packed and will be thus fed to the retort in a positive manner. The packing of the fuel at this zone in the conveyor conduit structure, serves to prevent to a large degree, a back flow of gases and smoke from the retort.

The packing of the fuel in the zones of the conduit sections 31 and 32 is relatively slight, but sufficient to attain the purpose therefor, as hereinabove described. The degree of packing is, however, not such as to impose undue stress upon or loading of the conveyor and its driving mechanism, which otherwise might cause damage to the conveyor or stoppage thereof due to jamming.

It is to be understood that any number of conduit sections 34 and conveyor sections 19 may be utilized, depending upon the distance location of the retort 10 relative to the source of fuel supply, such as the bin 15. Also, it is to be noted that the structural features and arrangement of the parts comprising the fuel feeding system may be altered or modified without departing from the spirit and full intended scope of the invention, as defined by the appended claims.

I claim:

1. A fuel conveying assembly for stokers of domestic type, comprising a conveyor shaft, a plurality of helical flights on said shaft, one section of said flights being of a predetermined diameter and pitch, a second flight section contiguous to the first section, having flights of greater diameter, and a third section of flights of greater pitch, terminating inwardly of one end of the shaft, and a conduit structure enclosing substantially all of the flights of said second and third flight sections, said conduit assembly including conduit sections of an internal diameter greater than the diameter of the flights enclosed thereby, to provide a substantial operating clearance therebetween, whereby to facilitate an unrestricted conveyance of fuel therethrough, and spaced conduit sections of relatively short longitudinal extent, the internal diameter of each of the latter being restricted relative to the other conduit sections, to provide a minimum operating clearance with the flight portions enclosed thereby, whereby to effect a packing of the fuel conveyed through the restricted conduit sections.

2. A fuel conveying assembly for stokers of domestic type, comprising a conveyor shaft, fuel-conveying means on said shaft, including a section of helical flights of a predetermined diameter and pitch, a second section of helical flights of greater diameter, contiguous to said first sec-

tion, and a third section of helical flights of substantially the same diameter as the flights of said second section, but of greater pitch, said last section terminating inwardly of one end of the shaft, and a conduit structure enclosing a substantial portion of said fuel-conveying means and comprised of an end section having a restricted internal sectional area cooperating with said second section of helical flights to effect a minimum operating clearance therewith, an intermediate section of greater internal sectional area, providing a substantial operating clearance for the conveyor flights enclosed thereby, and an opposite end section of restricted internal sectional area substantially equal to that of said first conduit end section, said last end section cooperating with flight elements of said third flight section to effect a minimum operating clearance therebetween.

BERNARD MORSE GUTHRIE.