

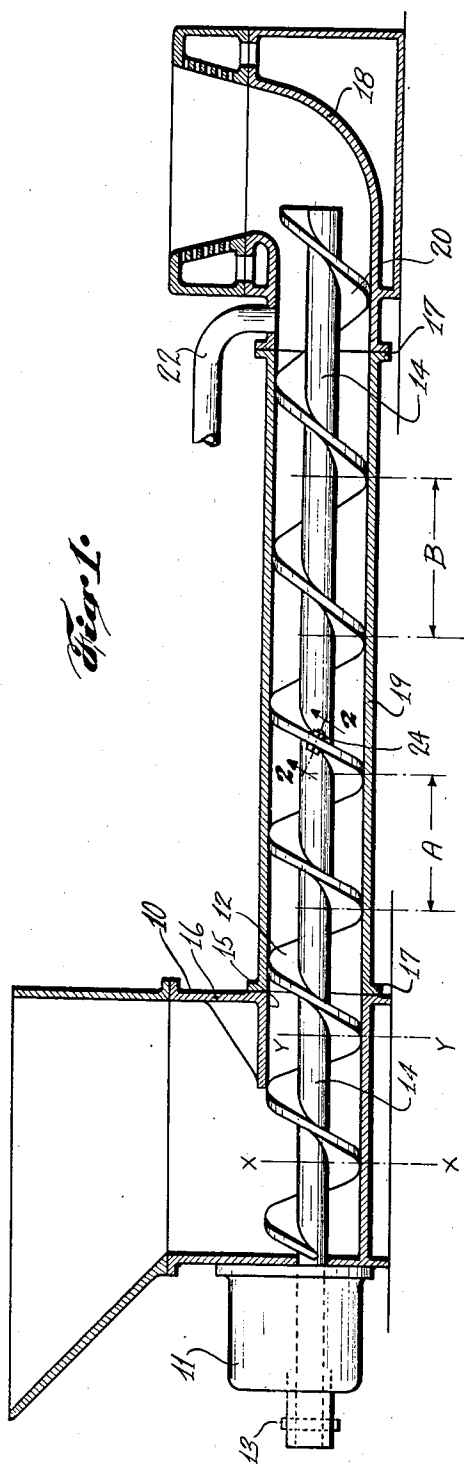
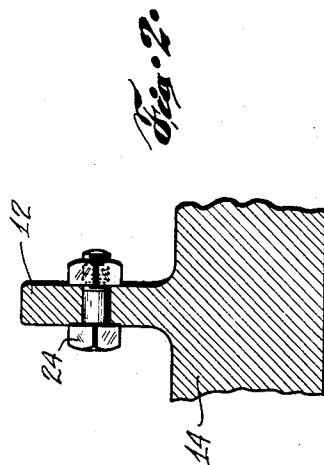
March 9, 1937.

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2,073,059

MECHANICAL STOKER

Filed June 6, 1935



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UNITED STATES PATENT OFFICE

2,073,059

MECHANICAL STOKER

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Application June 6, 1935, Serial No. 25,236

3 Claims. (Cl. 110-44)

This invention relates to improvements in mechanical stokers, and more particularly to stokers of the type employing a screw conveyor.

In one form of mechanical stoker, coal or other fuel is fed by a power-driven screw conveyor, from a hopper, through a conveyor casing or duct, into a retort where it is consumed. A common difficulty with this type of stoker is to be found in the occasional tendency of smoke to flow in a reverse direction from the retort, through the conveyor duct, and out through the hopper. Such a condition would, of course, render the use of the stoker objectionable.

As a means for overcoming this difficulty, it is common practice in some of the older prevailing types of stokers, to provide a by-pass air connection between, say, the combustion chamber air supply line and the conveyor duct, this connection to the duct being made at a suitable point, usually near the retort end thereof. Such an arrangement is intended to effect a region of high air pressure in the conveyor duct, for preventing a backflow of smoke through the duct. This arrangement, however, has not proven altogether satisfactory in preventing such backflow, since if the coal is not packed tightly enough in the worm and duct, the resistance to a backflow of air through the coal in the conveyor tube may be so slight as to prevent the formation of a region of high pressure in the conveyor tube. If for any reason the coal being conveyed along the duct should become loose enough, the consequent backflow of air may result in coal dust and smoke being discharged from the hopper.

If in a further attempt to overcome the noted objections, the bottom of the hopper and the worm are designed to pack the coal solidly throughout the length of the worm, an excessive amount of power will be required to force the coal through the connecting duct and into the retort. In some instances coal will become so tightly wedged between the conveyor duct and the worm, that the worm cannot revolve, with the result that the usual shear pin will be broken, or the driving motor stalled. Accordingly, the general objective of the present invention is attained in the elimination of the noted difficulties and objectionable features found in the heretofore prevailing stoker assemblies of the type described.

A further object of the present invention is to provide an improved conveyor structure for mechanical stokers of the type described. More specifically, a feature of the invention is to be found in the provision of a minimum operating

clearance between the screw conveyor and the conveyor duct, whereby to prevent packing of fuel between these two members. A further feature resides in the provision of means on the screw conveyor and spaced from the retort end thereof, adapted to cause the fuel to become packed over a portion of the conveyor adjacent said means. The region of packed fuel thus formed, allows a sufficient air pressure to be maintained in the conveyor duct for preventing a backflow of smoke through the hopper, and the length of the packed fuel zone is not such as would require an abnormal amount of power to drive the screw. In order to insure against any jamming of the screw conveyor as a result of the extension of the region of packed fuel beyond the packing means and toward the retort end of the conveyor duct, the pitch or lead of the screw, and hence the rate of movement of the fuel, is increased between the packing means and the retort end of the screw. The screw conveyor is thus characterized by a lesser pitch between the hopper end thereof and the packing means, or a point somewhat beyond the packing means, and a greater pitch from this point to the retort end of the screw.

A further object is to provide an improved screw conveyor structure for mechanical stokers of the type described, which will effectively prevent the escape of smoke from the hopper, and which will not add appreciably either to the cost or difficulty of manufacture.

Further objects and advantages will appear from the following detailed description of parts, and from the accompanying drawing, in which:

Fig. 1 is a vertical longitudinal sectional view of a stoker embodying the features of this invention, and Fig. 2 is an enlarged fragmentary sectional view of a portion of the conveyor screw, as taken along line 2-2 of Fig. 1.

Referring to the drawing, the numeral 10 denotes, generally, a stoker hopper of standard construction. A motor or other driving means 11, which may be secured to the frame of the hopper 10, is provided for operating a worm or conveyor screw 12, the driving connection thereto being, by preference, made through a shear pin 13. The structural details of the shear pin connection between the motor 11 and the shaft 14 of the conveyor need not be shown or described, as it forms no part of the present invention. The use of a shear pin, such as the pin 13, is conventional, and is utilized to sever the driving connection in the event of an excessive load upon the screw conveyor.

In the conveyor illustrated, the screw 12 there-

of is, by preference and for purposes of subsequent description, to be considered as including a plurality of sections or flights, each of one complete spiral revolution. For example, a flight may be considered as that portion of the screw between the lines $x-x$ and $y-y$, Fig. 1.

The hopper 10 is provided with a discharge opening 15 in an end wall 16 thereof. The conveyor extends along the bottom of, and projects beyond the hopper 10, through the discharge opening to a furnace retort generally designated by the numeral 18. The portion of the conveyor between the hopper and the retort is enclosed by a conduit 19, the conduit being secured at its ends, to the vertical walls of the hopper and retort respectively, in any suitable manner, as by flange joints 17.

As a means for preventing a backflow of smoke from the retort, through the conveyor conduit 19 and the hopper 10, air under a predetermined pressure is, by preference, introduced to the portion of the retort containing the free end 20 of the conveyor, the air being conducted from a suitable source of supply (not shown) through a duct 22. The duct 22 may be supplied directly from the principal source of supply for combustion purposes, or may be connected as a by-pass tube to be supplied from the main air duct directed to the wind box. The air thus supplied through duct 22 forms a pressure region about the fuel delivery end 20 of the conveyor, for preventing a backflow of smoke as above described. However, this result cannot be obtained unless the coal being conducted to the retort by the conveyor, is packed sufficiently to prevent a reverse flow of air from the pressure region through the conduit and out of the hopper. If, however, the fuel is so packed over any considerable part of the length of the conveyor, there results an excess requirement of driving energy, and an unwarranted torque demand on, say, the motor 11. In order to effect a relatively tight packing of the coal in the conveyor sufficient to constitute an effective seal, and yet to restrict in length the zone of such seal, a projection 24 is provided on a portion of the working surface of one of the conveyor flights. In practice, it has been found expedient to locate the projection on one of the intermediate flights, but somewhat nearer the discharge end of the conveyor. The projection may be formed as an integral part of the flight, or it may consist of a separate element, conveniently a bolt, as illustrated in the drawing, and located substantially midway between the shaft and periphery of the flight.

An excessive amount of power would be required to operate the conveyor, if the coal were packed tightly along its entire length, say as a result of the packing effect of the projection 24. This difficulty is overcome in the example disclosed, by forming the conveyor worm with certain flights of differing pitch. For example those flights between the projection 24 and the end flight in the hopper 10, are characterized by a pitch A, a substantially greater pitch B being given the flights between the projection 24 and the fuel discharge end 20 of the conveyor worm. Accordingly, in the operation of the conveyor worm or screw, the projection 24 will effect a relatively tight packing of the fuel in the flights preceding the projection. As a result of the increased pitch of the flights extending beyond the

projection to the discharge end of the worm, the packed fuel conveyed beyond the projection will be considerably loosened, whereby to relieve the conveyor driving motor of an excessive load which, otherwise, might result in damage to or complete stoppage of the motor. The tightly packed coal in the conveyor flights preceding the projection, serves effectively to confine the pressure region of air to that portion of the conveyor extending between the projection and the retort, and so serves to prevent the escape of smoke from the stoker into the furnace room or building. The presently improved construction also operates to minimize jamming of the worm conveyor in the conduit 19, by minimizing the length of the zone of packed fuel.

It will, of course, be understood that the present detailed description of parts and the accompanying drawing relate only to a preferred executional embodiment of the invention, and that substantial changes may be made in the described construction and arrangement of parts, without departing from the spirit and full intended scope of the invention.

I claim as my invention:

1. In a mechanical stoker, in combination, a hopper, a conveyor duct, a retort, a conveyor worm arranged to transfer fuel through the duct from the hopper to the retort, means projecting from a blade portion of the worm tending to pack the fuel in an intermediate zone of the duct, and means for supplying an auxiliary air stream under a positive pressure to a zone of the duct between said zone of packed fuel and the retort, the packed fuel in said intermediate zone of the duct coacting with said air supply means to direct said air stream toward and beneath the fuel bed in the retort.

2. In a mechanical stoker, in combination, a hopper, a conveyor duct, a retort, a conveyor worm arranged to transfer fuel through the duct from the hopper to the retort, a projection on one of the flights of said worm serving to pack the fuel in an intermediate zone of said duct, said conveyor worm having two different pitches, the portion of its length having the lesser pitch being located nearest the hopper, the remaining portion of greater pitch being located nearer said retort, and means for supplying air under positive pressure to the interior of said conveyor duct between said zone of packed fuel and the retort.

3. In a mechanical stoker, in combination, a conveyor duct, a hopper for supplying fuel to the duct, a conveyor worm operable in the duct, said conveyor worm having two different pitches, the portion of its length having the lesser pitch being located nearest the hopper, a projection on one of the flights located on the portion of the worm having the lesser pitch, said projection serving to pack the fuel conveyed by said worm in the zone of said projection, and an air inlet located in a portion of the conveyor duct in the region of that portion of the worm having the greater pitch, for admitting air into the conveyor duct, the air entering the duct through said inlet and said packed fuel in the zone of the projection coacting to prevent the flow of gases from the retort, through the conveyor duct and into the hopper.

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