

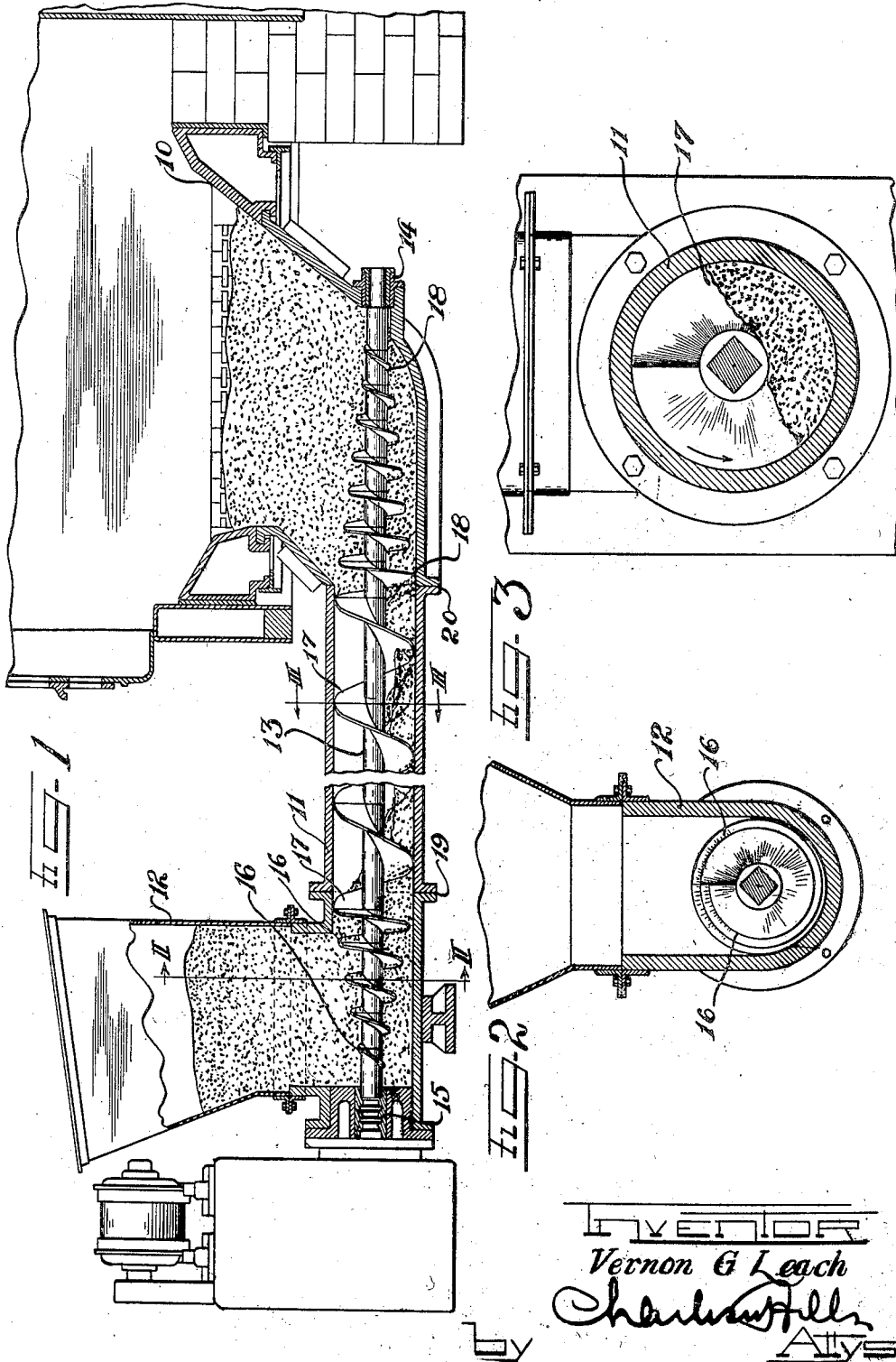
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MATERIAL FEEDER

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MATERIAL FEEDER

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The object of my invention is to improve the construction and reduce the cost of operation of screw or spiral conveyors for conveying coal and the like from a hopper and through a conduit, and for discharging and distributing the conveyed material in a receiver, such as a furnace.

More particularly, the invention relates to feeding devices for furnaces in which coal is fed from a hopper at one end into the underside of a bed of coals in a furnace at the other. With such an installation there is a superincumbent mass of material upon each end of the conveyor which produces a heavy frictional drag on the conveyor.

A further possible source of friction is in the conduit connecting the feed hopper and the furnace. If the diameter and pitch of that portion of the conveyor within the conduit is of the same diameter as the hopper part of the conveyor adjacent thereto, then the material carried by the conveyor will be rammed or packed in the conduit as the result of the retarding of movement in the conduit by frictional contact therewith.

It has been proposed to make spiral conveyors with greater pitch in the conduit section than in either the receiving or delivery sections. In such case, however, the receiving and delivery sections were of uniform diameter and pitch throughout.

When the receiving portion of the conveyor has a constant pitch and constant diameter, the conveyor fills at its outer end with material so that a solid closely packed rotary core is formed, the rotation of which, under the pressure of the superincumbent mass of coal, consumes a large amount of power. When, however, the diameter of the conveyor gradually increases the forward movement of the material into a part of steadily increasing volume both loosens the material and thereby lessens the friction and also allows the conveyor to take up more material.

Apart from the loosening effect produced by the steadily increasing volume of the conveyor the frictional drag on the conveyor is reduced by the reduction of its diameter which greatly lessens the area of the rotating mass within the receiving hopper.

At the discharge end the material has to be forced upwards against the weight of superincumbent material. Progressive reduction in the diameter of the conveyor at the discharge or delivery end has two great advantages, first reduction in frictional losses due to reduction of the area of the rotating mass within the discharge chamber and, second, the delivery instead of being confined to the far end of the conveyor takes place gradually throughout the entire length of that portion of the conveyor lying within the discharge chamber.

Other and further important objects of this invention will be apparent from the disclosures in the specification and the accompanying drawings.

This invention (in a preferred form) is illustrated in the drawings and hereinafter more fully described.

On the drawings:

Figure 1 shows a suggested application of my device in a coal burning installation with parts in elevation and parts in section.

Figure 2 is a fragmentary sectional view in elevation taken substantially along the line II—II of Figure 1.

Figure 3 is a fragmentary sectional view in elevation taken substantially along the line III—III of Figure 1.

As shown on the drawings:

Figure 1 shows a suggested application of my device to a stoker for feeding coal to the furnace of a boiler. The numeral 10 indicates a receiver or retort containing a bed of coal in a furnace to which coal is fed through a conduit 11 by means of a spiral conveyor from a hopper 12. That portion of the conduit connecting the hopper 12 and the receiver 10 that lies between the joints connected at 19 and 20 is known as a conduit for the purpose of this application. The bottom portions of both the hopper 12 and retort 10 conform in contour with the cylindrical bottom wall of the conduit 11 and are coincidental therewith to form a continuous bottom wall. The conveyor, in this instance comprises a shaft 13 parallel to said bottom wall and a plurality of spiral elements 16, 17 and 18 thereon. The shaft 13 is journaled at the

receiver end in a bearing 14 and at the hopper end in a marine bearing 15 to take the thrust of the conveyor shaft 13. The shaft 13 is driven at its front or hopper end by an electric motor or its equivalent.

It will be noted that the conveyor shaft 13 has a plurality of spiral elements 16 within the hopper. The elements 16 are of constant pitch but increase in area towards the rear or conduit end of the hopper as indicated in Figures 1 and 2. The arrangement shown gives, in effect, a coal pocket increasing in capacity as it moves forward in the hopper and reaching its maximum capacity just before it discharges into the conduit. Were the spiral elements of constant area the effect would be that of a pocket filled at the beginning of the path of travel and pushed through a packed mass of material, with attending serious friction losses. The spiral elements 16 discharge the material into the conduit 11 where it is advanced by a plurality of spiral elements 17.

It will be observed that the spiral elements 17 have a constant area and have a pitch steeper than that of the elements 16. Furthermore, the diameter of the spiral elements 17 is substantially the same as the inside diameter of the conduit 11.

Because of the change in pitch the material is swept away, as it were, from the point at which it is first engaged by the elements 17 and, as shown in Figure 1, the conduit is only partially filled and the material is not rammed as in conveyors heretofore used for a similar purpose. It follows that the friction losses in the arrangement shown are very low, and that the conveyor functions as a true conveyor, and not in a manner similar to that of a ram.

A plurality of spiral elements 18 on the shaft 13 discharge and distribute the material into the furnace 10. It will be noted that the spiral elements 18 have a pitch smaller than that of the elements 17, and that the pitch is constant, and that the elements progressively decrease in area towards the rear end of the conveyor.

When the conveyor is discharging into a receiver, against an accumulated mass of the material, as for instance, when discharging into the furnace of a boiler, the screw is capable of depositing the material in the receiver so that the top of the fuel bed will slope downwards towards the back of the furnace, or of any other desired contour.

It will be understood that it is not intended that the applicant limits himself in his construction to the proportions suggested in the drawings and that the application of the device which is shown in the drawings is but one of many possible applications.

I am aware that many changes may be made, and numerous details of construction may be varied through a wide range with-

out departing from the principles of this invention, and I therefore do not purpose limiting the patent granted hereon, otherwise than necessitated by the prior art.

I claim as my invention:

1. In an underfeed stoker, the combination with a coal hopper having a discharge neck, a retort, and a cylindrical conduit connecting the hopper and the retort, the conduit having an internal diameter substantially equal to that of the neck, of a screw conveyor extending through the conduit and into the hopper and the retort, the portions of the conveyor within the hopper and the retort having vanes with their diameter increasing toward the conduit, and that portion of the conveyor within the conduit having vanes with a pitch materially greater than the pitch of the vanes within the hopper and the retort.

2. In an underfeed stoker, the combination with a coal hopper having a discharge neck, a retort, and a cylindrical conduit connecting the hopper and the retort with the bottoms of the hopper, the conduit and the retort being substantially in horizontal alignment with each other and the conduit having an internal diameter substantially equal to that of the neck of the hopper, of a screw conveyor extending through the conduit and into the hopper and the retort, the portions of the conveyor within the hopper and the retort having vanes of constant pitch and with their diameter increasing towards the conduit, and that portion of the conveyor within the conduit having vanes with a pitch materially greater than the pitch of the vanes within the hopper and the retort.

In testimony whereof I have hereunto subscribed my name at Chicago, Cook County, Illinois.

VERNON G. LEACH.