Aug. 9, 1938.

M. DYKSTRA

2,125,898

CONVEYER APPARATUS

Filed Aug. 13, 1935

2 Sheets-Sheet 1

Fig. 1.

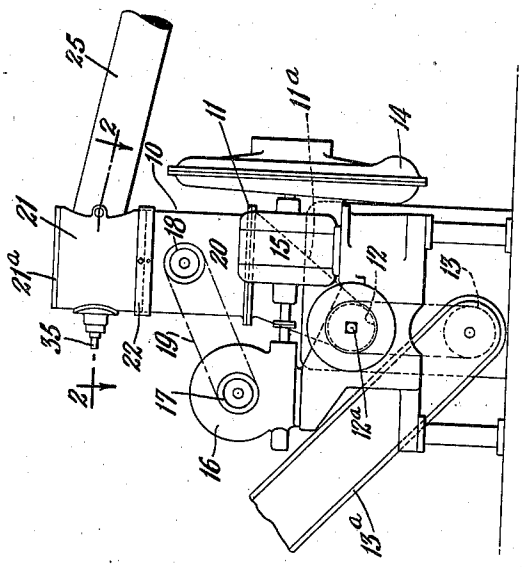
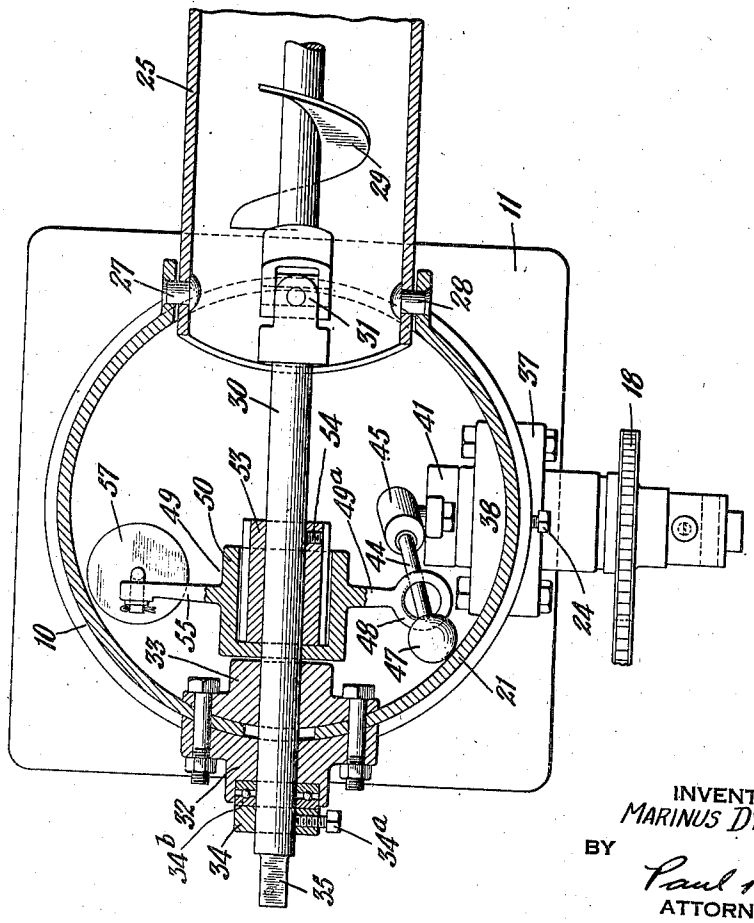


Fig. 2.



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2 Sheets-Sheet 2

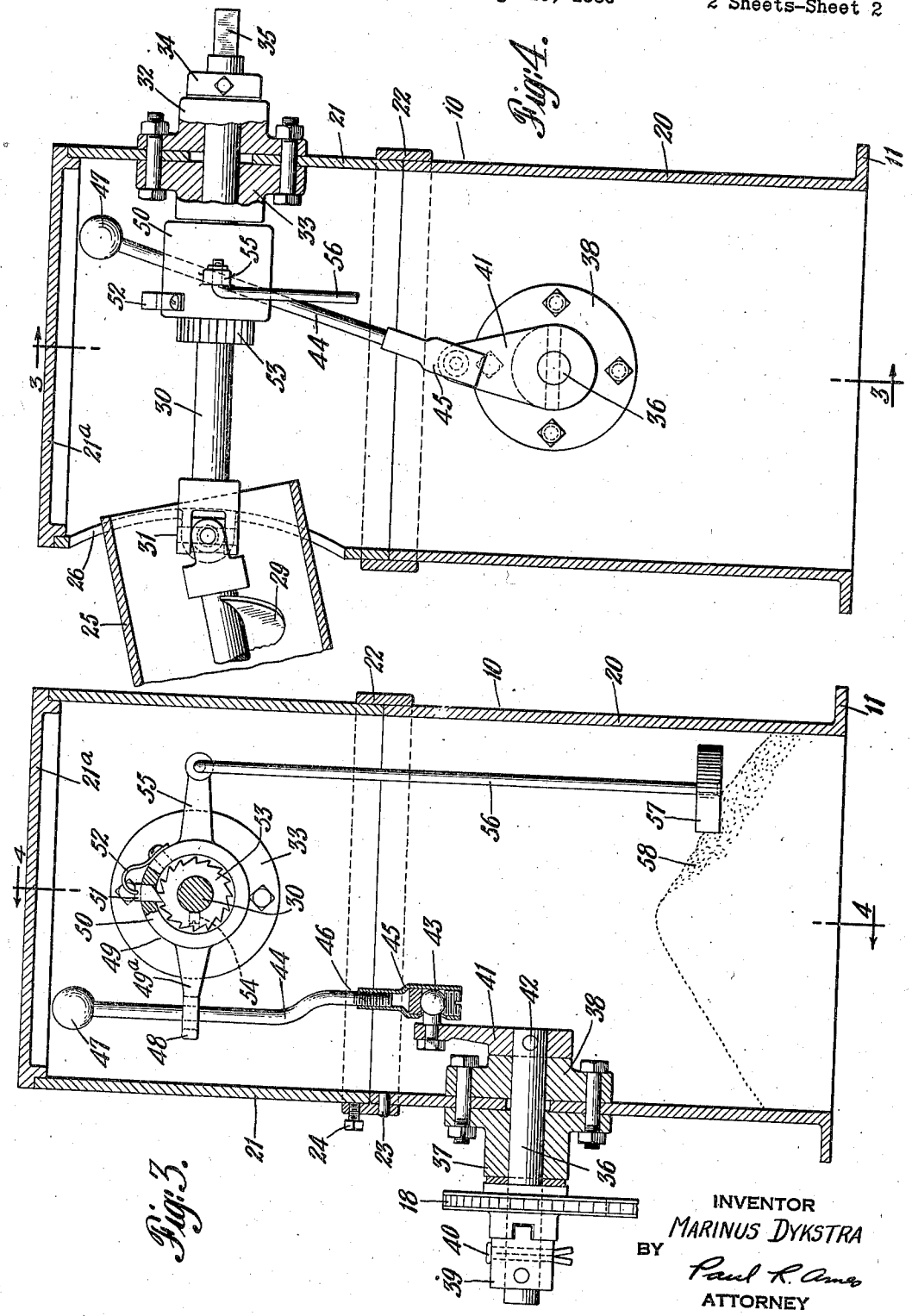


Fig. 4.

Fig. 3.

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UNITED STATES PATENT OFFICE

2,125,898

CONVEYER APPARATUS

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Application August 13, 1935, Serial No. 35,914

12 Claims. (Cl. 198—37)

This invention relates to conveyer apparatus and more particularly to apparatus for supplying solid materials, such as fuel, to a receiver or other receptacle, for example, in an apparatus for feeding coal to an automatic underfeed burner.

One object of my invention is to regulate the amount of material conveyed to the receptacle and to keep the height of such material in the receptacle constant.

A feature of my invention is to automatically supply solid material to a receiver as it is needed.

Another object of my invention is to provide apparatus for accomplishing these results which may be adapted to existing equipment and which may be adjustably mounted, therewith.

My invention finds special utility in connection with apparatus for feeding fuel to furnaces and the preferred embodiment will be described as it is applied to existing equipment in coal stokers, for example, such as that described in the Wightman Patent Re. 17,925 and the Hall, et al. Patent No. 2,077,882. There are various types of stokers now in use which take coal from a hopper of some sort and feed it into a furnace. These hoppers are ordinarily filled by hand, although mechanical conveyers have been used for this purpose. Such conveyers simply supply the coal in a steady stream, independent of the feed of the stoker. Due to the irregularity in the feed of coal to the burners, the variation in rate of feed because of the usual adjustment made in the feeding mechanism to accommodate variations in temperature, or for other reasons, such constant feed of fuel to the hopper is unsatisfactory and unless a very large hopper is used or some other means provided for accommodating excessive amount of fuel, overflowing of the hopper or insufficient fuel supply will result. In my improved apparatus these difficulties are overcome and a constant height of coal is maintained in the hopper, which may be relatively small as compared with the hoppers previously used. The advantages of a device which accomplishes this result in a simple manner are self-evident.

In the embodiment of my invention illustrated in the drawings:

Figure 1 is a perspective view showing my regulating feeding device associated with the other parts of a stoker unit.

Figure 2 is a top view of my regulating device, showing some of the parts in section on line 2—2 of Figure 1.

Figure 3 is a vertical sectional view on the line 3—3 of Figure 4, and

Figure 4 is a vertical sectional view on the line 4—4 of Figure 3.

My feeding and regulating mechanism 10, as shown in Figure 1, is mounted upon a receiver 11 in place of the usual coal hopper of a stoker such, for example, as those described in the above mentioned patents. In the illustration shown in Figure 1, the receiver 11 discharges by way of the inclined chute 11*a* into a chamber at one end of the conveying tube 12. A screw conveyer on the shaft 12*a* in this tube transmits this fuel to one or more burners in a furnace (not shown). Ashes from the furnace may be carried by a screw conveyer in the tube 13 to a point outside the furnace where the elevator conveyer 13*a* picks up said ashes and deposits them in any suitable bucket or other receptacle (not shown).

A forced draft of air may be supplied to the furnace through a suitable conduit by the blower 14 geared directly to motor 15. Power for the other units may be supplied by motor 15 through the reduction gearing 16. The screw conveyers and the elevator conveyer 13*a* may be continuously operated but are preferably intermittently driven from the reduction gearing in the manner described in the above mentioned application. My improved feeding mechanism may be driven independently but is preferably driven from the reduction gearing 16 by sprockets 17, 18 and chain 19 or some other suitable driving means.

My apparatus is adapted to convey the coal or fuel from a bin or other source to the receiver 11 and is made up of a shell 20 fixedly mounted on said receiver having a top portion 21 provided with a lid 21*a* which is rotatably mounted on the shell 20 within the collar 22. The collar 22 may be fastened to the lower shell 20 as by bolts or rivets 23, or other suitable means, and carries a set screw 24 to clamp the top portion in the desired position for any particular installation.

A coal conveying tube 25 is mounted in an opening 26 in one side of said top 21 and is pivotally mounted thereon by suitable means, such as the pins 27 and 28, so that it can be raised or lowered. In the device shown it may be raised or lowered approximately 35° above or below the horizontal. A suitable helicoid member 29 is rotatably mounted in said tube to move the coal and is driven by shaft 30 through a universal joint 31, which is centered with the pivot points 27 and 28 so that the tube and helicoid may be raised or lowered as a unit.

Shaft 30 is mounted on the opposite side of said shell 21 in bearing members 32 and 33 which are bolted to the side wall of the shell. This shaft

is retained in said bearing members by a collar 34 and set screw 34a, a thrust bearing being provided at its outer end as shown at 34b. This end of the shaft 30 projects out some distance and has a squared end 35 so that a crank may be fitted to it and turned by hand to fill or empty the conveying tube.

In normal operation the power to turn this shaft is supplied through the shaft 36 (Fig. 3) mounted in bearing members 37 and 38 which are bolted or otherwise fastened to the lower shell 20. Sprocket wheel 18 is carried on this shaft and is keyed to collar 39 outside the shell, which collar is, in turn, fixed to the shaft 36 by a sheer pin 40. This shear pin may, of course, be omitted and the sprocket wheel may be keyed directly to the shaft, but it is desirable as a safety device in the event that the conveyer mechanism becomes clogged or excessive pressure is applied to it.

The crank arm 41 is fixed to the inner end of shaft 36 as by pin 42 and at its outer end carries a pin having a ball 43 at the outer end thereof. A link rod 44, is adjustably connected to the crank arm by the screw threads 46, joining it to the socket 45, which cooperates with the ball 43 of the crank arm to form a ball and socket connection. A ball 47 is fixed to the uper end of said link rod 44 and a ring 48, of smaller diameter than the ball 47, at the end of a projection 49a of the rocker 49, surrounds said rod 44. The link rod 44 is preferably offset or bent as illustrated for a purpose to be described below. Ball 47 may also be screwed on to link 44 so that the effective length thereof may be adjusted.

Projection 49a is preferably integral with the hub portion 50 of the rocker 49 which is rotatably mounted on shaft 30 just inside the bearing member 33. Pawl 51, held down by spring 52, slides in a slot in said hub portion and engages the ratchet 53 which may be keyed or fastened by set screw 54 to the shaft 30. Opposite arm 49a and preferably also integral with the hub 50 is another arm 55, which is pivotally connected at its free end to the rod 56. A weight 57 is carried at the lower end of said rod and is adapted to strike the coal 58 as the level of the coal rises in the shell 20.

In mounting my device on the stoker mechanism illustrated, the stationary shell 20 is first bolted in place on the receiver 11. Shell 21 may then be placed in the collar 22 and rotated until the coal conveying tube 25 is towards the bin or coal supply. Rotation of the shell 21 is facilitated by the fact that the link 44 has an offset portion, above mentioned, which may be of any configuration to obtain the desired rotation. The adjustable length of the link 44 by means of screw threads 46 and the screw threads on ball 47 also aids in securing the desired amount of rotation.

The conveyer tube is next adjusted at the proper angle with the horizontal to supply coal and preferably sealed in place to prevent escape of coal dust or the like. A crank may then be applied to the head 35 on the shaft 30 to fill the tube 25 and receiver 11 with coal. The motor 15 is finally started and coal is conveyed to the burner by the conveyer in the tube 12. This operation may be continuous or intermittent. At the end of each downward stroke of the link 44 the weight 57 on the other side of the rocker arm pulls the rocker arm back into operative driving position following the upward stroke of link 44. When the coal in the shell 20 is below the lowest level of the weight 57, the rotation of the crank arm 41 will reciprocate the rocker 49 throughout its full stroke and the pawl 51 will actuate the ratchet 53 throughout its full stroke which may, for example, be the distance of 2 to 4 teeth. This actuation of the ratchet 53 will cause the fuel to be fed into the shell 20 from the bin, preferably at a rate slightly above the maximum rate of feed of fuel through the conveyer leading to the burner. The length of this stroke may be varied to any desired rate of feed by varying the length of the crank arm 41.

As the coal rises in the shell 20 the weight 57 will strike the coal near the end of its stroke and arrest the rocker arm 49, the ball 47 continuing its full reciprocation. On the next downward stroke, ball 47 on link 44 contacts the rocker arm for only a portion of the stroke, so that the rocker 49 will be rotated through only a portion of its normal rotation.

If the coal level in the receiver rises still higher gauge rod 56 prevents the rocker arm from being returned at all so that the pawl does not even pick up one tooth for the next stroke. In such a case the supply of coal to the receiver is automatically stopped until the coal level is again lowered by feeding more fuel to the furnace through the tube 12. As this occurs, the feeding of coal to the receiver is automatically started again. It will be a simple matter, of course, to adjust the stroke of crank arm 41 so that the conveyer working at its maximum speed may always be able to provide the hopper with a plentiful supply of coal.

It is apparent that my invention is not limited to use with coal stokers although it is especially useful in this connection. My apparatus may be adapted to handle any solid fuel or other materials where similar problems are encountered.

It is readily apparent that some sort of spring device may be used to return the rocker arm to its operative position instead of the weight 57. In such a case the weight might be replaced by a simple disc or cup.

This apparatus can be very quickly mounted on existing equipment and its installation requires very few directions and does not have to be made by a skilled person. By use of this device the necessity of shoveling coal into a stoker hopper is overcome and it is simply necessary to provide an adequate supply of coal in the bin.

Various well known mechanisms may be used to rotate the shaft 30 instead of the crank arm shown in the embodiment of my invention which is illustrated, as long as rotation of this shaft is effected in accordance with the amount of coal in the receiver 11.

The terms and expressions which I have employed are used as terms of description and not of limitation, and I have no intention, in the use of such terms and expressions, of excluding any equivalents of the features shown and described or portions thereof, but recognize that various modifications are possible within the scope of the invention claimed.

What I claim is:

1. Apparatus for conveying fuel to a burner comprising a conveyer adapted to convey fuel from a receiver to said burner, a second conveyer adapted to convey fuel to said receiver, said second conveyer being driven by a shaft, a ratchet fixed to said shaft, a rocker arm rotatably mounted on said shaft and carrying a pawl adapted to engage said ratchet, and means to rock said rocker arm in accordance with the height of fuel in said receiver, said second conveyer being adjustable with respect to said first conveyer about a vertical axis.

2. Apparatus for conveying fuel to a burner comprising a conveyer adapted to convey fuel from a receiver to said burner, a second conveyer adapted to convey fuel to said receiver, said second conveyer being driven by a shaft, a ratchet fixed to said shaft, a rocker arm rotatably mounted on said shaft and carrying a pawl adapted to engage said ratchet, and means to rock said rocker arm in accordance with the height of fuel in said receiver, said second conveyer being adjustable with respect to said first conveyer about a vertical axis and a horizontal axis.

3. In conveying apparatus, means for conveying solid material to a receptacle from which said solid material may be withdrawn, means including a mechanical link for operating said conveying means, and means actuated by said mechanical link for controlling the effect of said operating means on said conveying means to maintain the height of solid material substantially constant in said receptacle, said controlling means being operable to stop the influx of solid material when a predetermined height of said material is reached in the receptacle.

4. In apparatus for conveying solid fuel, a receptacle having an opening for discharging fuel and another opening for supplying fuel, means to convey fuel to said second opening, and mechanical means to regulate said conveying means in acccordance with the height of material in said receptacle, said conveying means being adjustable about a horizontal axis.

5. In combination with a device for supplying fuel to a burner, a receiver for holding fuel preparatory to being fed to the burner, means for conveying fuel to said receiver, means including a mechanical link for driving said conveying means, and gage means actuated by said mechanical link for automatically regulating said conveying means in accordance with the amount of fuel in said receiver, said last mentioned means rendering the conveying means temporarily inoperative when a predetermined height of fuel is reached in said receiver.

6. In combination with a device for supplying fuel to a burner, a receiver for holding fuel preparatory to being fed to the burner, means for conveying fuel to said receiver, and means for regulating said conveying means to vary the amount of fuel conveyed to said receiver in accordance with varying heights of material in the receiver, said conveying means being rotatable about a substantially vertical axis with respect to said receiver.

7. In combination with a device for supplying fuel to a burner, a receiver for holding fuel preparatory to being fed to the burner, means for conveying fuel to said receiver, and means for regulating said conveying means to vary the amount of fuel conveyed to said receiver in accordance with varying heights of material in the receiver, said conveying means being adjustable to supply fuel from different levels with respect to said receiver.

8. In combination with a device for supplying fuel to a burner, a receiver for holding fuel preparatory to being fed to the burner, means for conveying fuel to said receiver, and means for regulating said conveying means to vary the amount of fuel conveyed to said receiver in accordance with varying heights of material in the receiver, said conveying means being rotatable and tiltable with respect to said receiver.

9. Apparatus for conveying fuel to a burner comprising a conveyer adapted to convey fuel from a receiver to said burner, a second conveyer adapted to convey fuel to said receiver, means for driving said second conveyer including a ratchet and a pawl, and means including reciprocating gage means controlled by the height of fuel in said receiver to regulate the effective stroke of said pawl.

10. Apparatus for conveying fuel to a burner comprising a conveyer adapted to convey fuel from a receiver to said burner, a second conveyer adapted to convey fuel to said receiver and means controlled by the height of fuel in said receiver to regulate the rate of feed of said second conveyer, inversely to said height of fuel, said means including a ratchet fixed to the shaft of said second conveyer, a pawl engaging said ratchet and means to reciprocate said pawl in acccordance with the height of coal in said receiver.

11. Apparatus for conveying fuel to a burner comprising a conveyer adapted to convey fuel from a receiver to said burner, a second conveyer adapted to convey fuel to said receiver, said second conveyer being driven by a shaft, a ratchet fixed to said shaft, a rocker arm rotatably mounted on said shaft and carrying a pawl adapted to engage said ratchet, and means to rock said rocker arm in accordance with the height of fuel in said receiver.

12. In combination with a device for supplying solid fuel to a burner, a receiver, a conveyer for conveying fuel to said receiver, reciprocating means for operating said conveyer, and means reciprocated by said operating means into contact with the fuel in said receiver for regulating the effective reciprocation of said operating means in accordance with the height of fuel in said receiver.

MARINUS DYKSTRA.