Jan. 25, 1944. G. A. KOHOUT 2,340,190

CONVEYER

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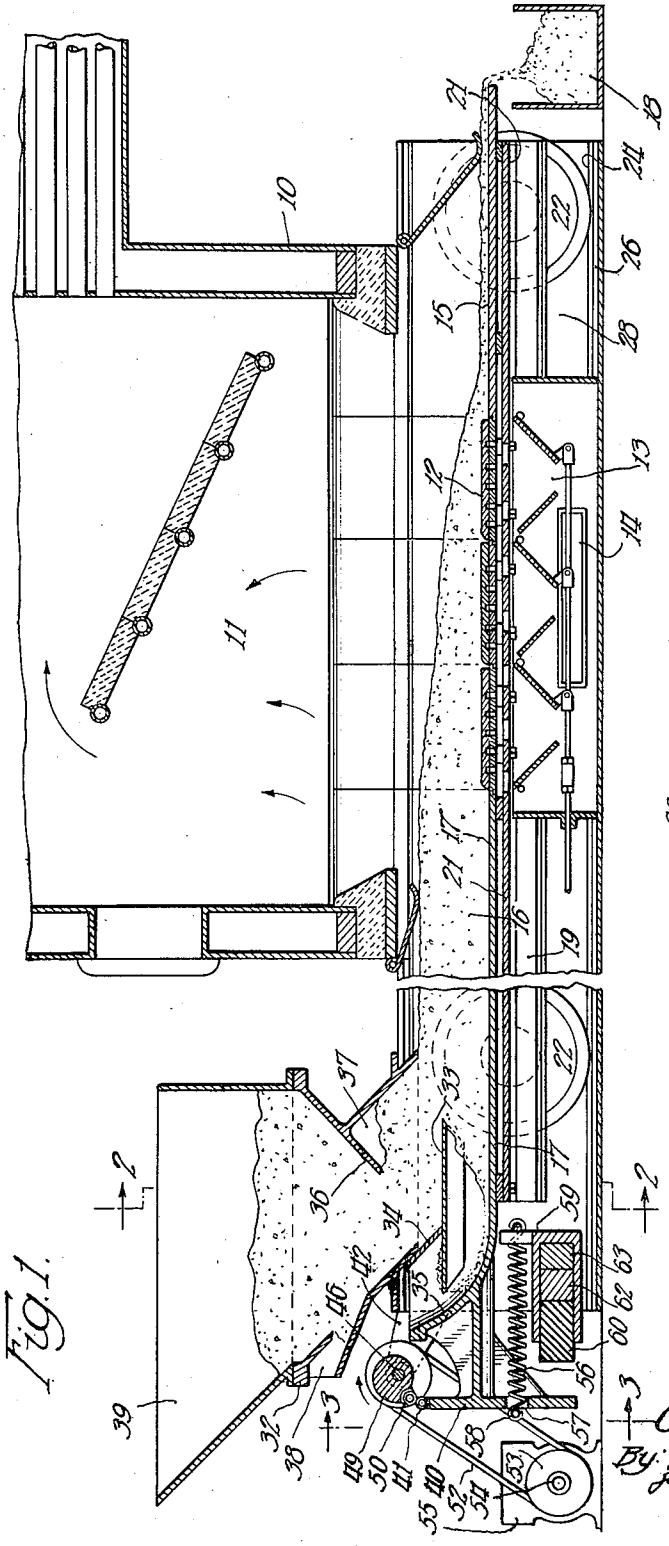


Fig. 1.

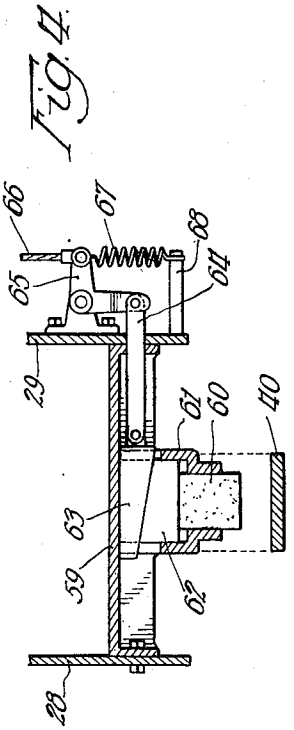


Fig. 4.

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Fig. 2

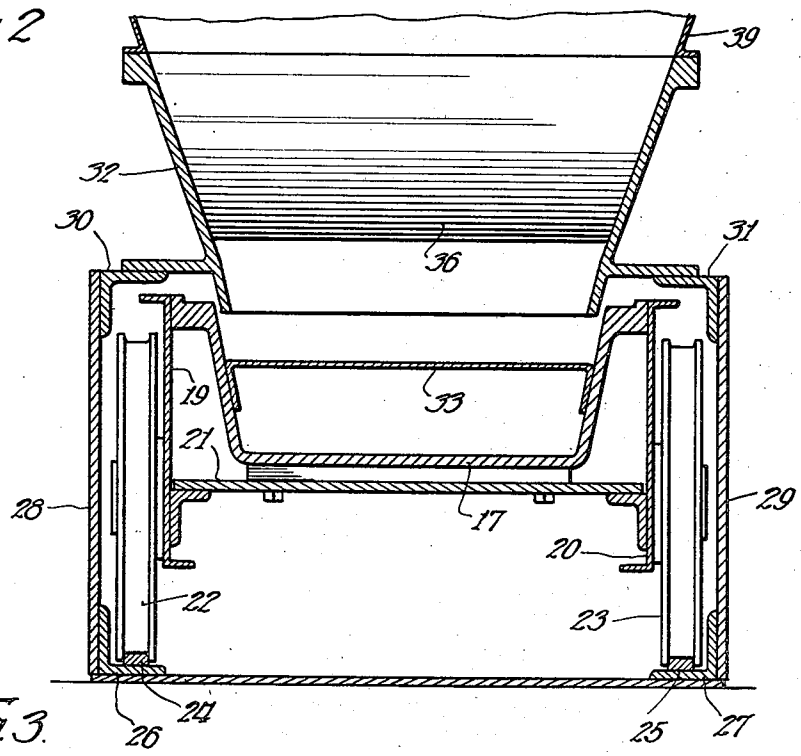
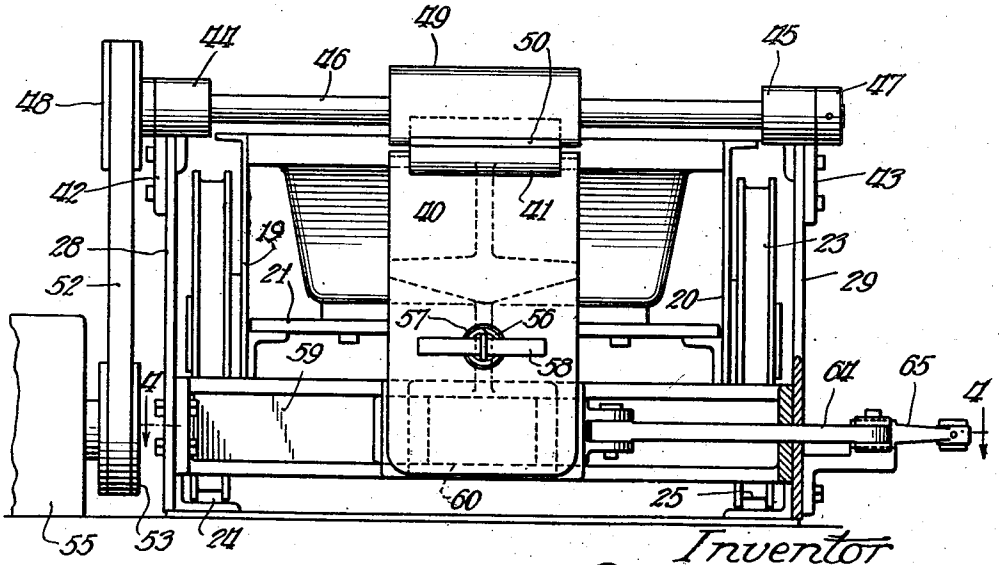


Fig. 3.



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Fig. 6.

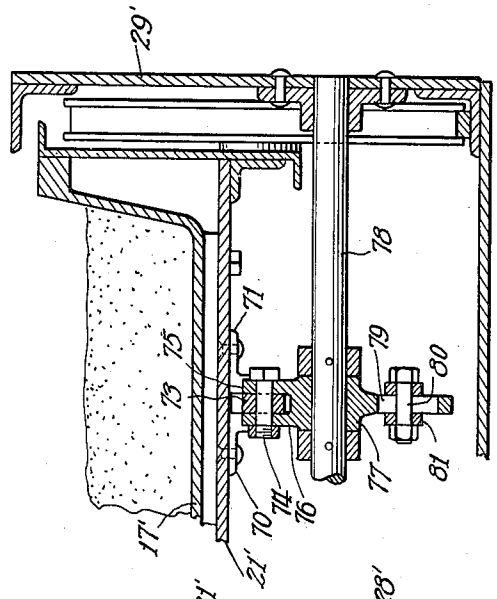
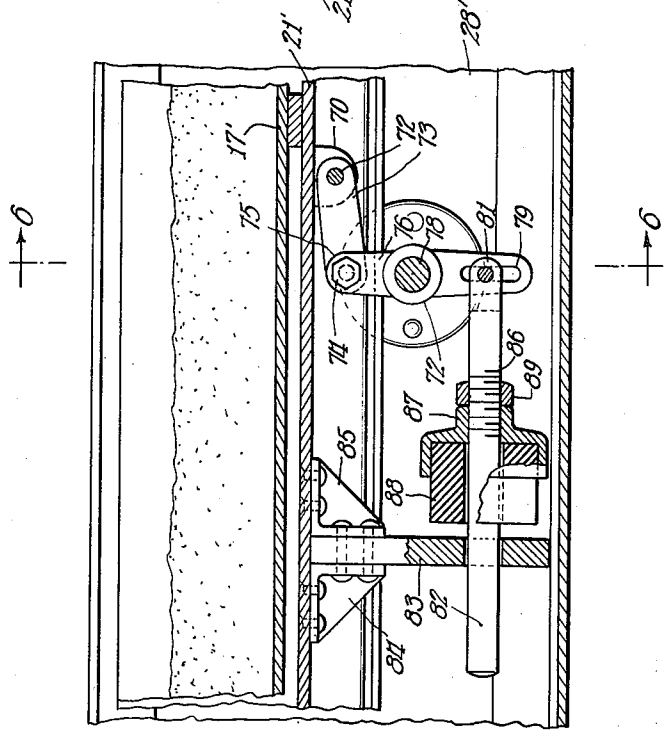


Fig. 5.



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UNITED STATES PATENT OFFICE

2,340,190

CONVEYER

George A. Kohout, Chicago, Ill.

Application May 14, 1942, Serial No. 442,886

3 Claims. (Cl. 198—56)

The present invention relates to conveyers and particularly to conveyers for conveying material such as coal, coke and the like to furnaces, although it is not limited thereto.

It is the principal purpose of this invention to provide a conveyer device of this character which can be used for conveying fuel of the character described from any suitable source, such as a bin, to and into a furnace, maintaining the advance of the fuel by intermittent movement thereof by causing the fuel carrier to advance at an accelerating rate for a short distance, and then suddenly stopping the carrier and returning it slowly to its original position.

The method of advancing the fuel just described amounts to taking advantage of the inertia of the material and gradually building up a momentum and then suddenly decelerating and stopping the carrier so as to allow the momentum in the body of the fuel to cause it to move farther along the carrier.

The invention is not limited to fuel feeding where the source is closely adjacent the furnace. In fact, it is shown and described in the following description with reference to a situation where the fuel bin may be a some little distance from the furnace itself and the fuel is fed into a hopper from the bin and caused to advance from the hopper for a substantial distance where it enters a furnace and is advanced through the furnace by the same movement that transfers the fuel from the hopper.

The present invention contemplates as a means of carrying out the objects thereof the provision of a carrier preferably in the form of an elongated trough which extends into the furnace beneath the combustion chamber thereof, the section in the furnace being composed of grates on which the fuel may burn. Another section of the carrier extends beneath a hopper which may be located adjacent to a fuel bin so that fuel can flow directly into the carrier from the hopper as it is needed. Preferably the carrier is mounted on wheels so that it will reciprocate readily, and power means is provided to give the carrier the proper motion to cause the advance of the fuel along the carrier from the hopper to the furnace and through the furnace. With this construction the fuel needs no attention except to see that it gets into the hopper, and the residue left after burning is delivered at the rear of the furnace where it can be disposed of. Obviously, if it is desired the direction of the fuel flow through the furnace may be reversed, the hopper then being placed at the rear of the furnace and the ash being delivered at the front of the furnace.

The features and advantages of the invention will appear more fully as the description proceeds, reference being had to the accompanying drawings wherein a preferred form of the invention is shown. It should be understood however that the drawings and description are illustrative only and are not to be taken as limiting the invention except insofar as it is limited by the claims.

In the drawings:

Fig. 1 is a longitudinal sectional view taken through the furnace and the fuel feeding mechanism;

Fig. 2 is a sectional view taken vertically through the hopper substantially on the line 2—2 of Fig. 1;

Fig. 3 is an end view taken substantially from the position 3—3 indicated in Fig. 1 but with the portion of the motor which drives the mechanism also included;

Fig. 4 is a plan sectional view taken on the line 4—4 of Fig. 3;

Fig. 5 is a fragmentary sectional view taken on substantially the same line as Fig. 1 but illustrating a modified form of control for stopping the advance movement of the carrier; and

Fig. 6 is a fragmentary sectional view taken on the line 6—6 of Fig. 5.

Referring now in detail to the drawings, the present invention is shown as embodied in fuel feeding mechanism for a boiler 10 having a combustion chamber 11 beneath which there is a grate portion 12 and a chamber 13 to which forced draft is supplied through an opening 14. The grates 12 are trough shaped in cross section and cooperating therewith are extensions 15 and 16 which are parts of a fuel carrier 17. The specific construction of the grates 12, the forced draft chamber and their relation to the furnace are described more fully in my co-pending application Serial No. 442,885, executed of even date herewith, for "Furnace grate." The description herein therefore will be confined to the novel features of construction whereby the carrier 17 is made to supply fuel to the grates and to move the fuel along the grates to the discharge extension 15 which discharges the ash residue from the burning fuel into an ash receptacle indicated at 18.

The carrier 17 is supported by two side bars 19 and 20 (see Fig. 2), which side bars are connected by a cross tie plate 21. Wheels 22 are affixed to the side bar 19, there being any desired

number of these wheels, and wheels 23 are affixed to the side bar 20. The wheels 22 and 23 run upon tracks 24 and 25, respectively, the tracks in turn being carried by angle irons 26 and 27. The angle irons 26 and 27 are fixed to two frame plates 28 and 29 and these frame plates in turn are provided with angle irons 30 and 31 at the top edges thereof. The angle irons 30 and 31 serve as means to support a hopper casting 32.

The carrier 17, as shown best in Fig. 2, is trough shaped in cross section. It has a plate 33 directly beneath the hopper casting 32 and the casting has a plate 34 which fits rather closely in the carrier 17 extending down to the top surface of the plate 33 so that when the carrier 17 moves to the left as shown in Fig. 1 the plate 34 prevents the fuel on top of the plate 33 from moving to the left. Of course, as the carrier 17 moves to the right the fuel on the plate 33 will be moved with it. However, the fuel in the carrier 17 is prevented by the plate 33 from backing up behind or to the left of the plate 34, and any fine material that works around the plate 34 will fall down into the curved end part 35 of the carrier 17 and be fed forward along with the rest of the fuel by the inertia feeding action that takes place. The carrier is shown as uncovered between the hopper 32 and the furnace but of course it may be covered by putting a plate over the angle irons 30 and 31 if that is desired. The hopper casting has a ledge 36 therein which restricts the outlet of the hopper substantially and which provides a space indicated at 37 in which the fuel which has already been delivered to the carrier has a chance to settle down and seek the level of the body of fuel advancing along the carrier. The hopper casting also is provided with an opening 38 by which an implement may be inserted to break up the packing that might result in the hopper due to wet coal or other cause. The hopper casting 32 is shown as provided with a sheet metal extension 39 to provide capacity for a substantial amount of fuel. This hopper may be located directly in or under a coal bin so as to be easily filled, in which case the carrier 17 will be long enough to reach from the coal bin to the furnace itself.

Means are provided whereby the carrier is given an accelerated motion toward the furnace and then suddenly stopped so as to cause the fuel therein to advance by reason of the momentum of the fuel. Of course, upon the rear travel of the carrier the entire fuel bed moves back with it, but the reverse travel is at a slow rate and there is effected a gradual but intermittent advance of the fuel.

The means for reciprocating the carrier 17 will now be described. It will be noted that the carrier has a rearward extension 40 which is an integral part thereof. This extension carries a roller 41 at its top edge and it is substantially narrower than the carrier itself (see Fig. 3). The plates 28 and 29 have brackets 42 and 43 thereon which extend rearwardly and upwardly and which carry bearings 44 and 45 for a shaft 46. The shaft 46 has a collar 47 keyed thereto at one end and a pulley 48 keyed thereto at the other end. A cam 49 is fixed on the shaft 46 in line with the extension 40, the cam being provided with a roller 50 at its high point, which roller is adapted to engage the roller 41. The pulley 48 is driven by a belt 52 which in turn is driven by a pulley 53 on the shaft 54 of a motor 55. The motor includes a speed reducing gear so that the rate at which the pulley 53 is driven is the proper speed for the desired reciprocation of the carrier 17. From an observation of Fig. 1 it will be seen that as the cam rotates it will move the carrier to the left as shown in Fig. 1 substantially to the position shown in Fig. 1, at which point the carrier will be released from the cam and permitted to move to the right.

The means for moving the carrier 17 to the right comprises a heavy spring 56 which passes through an opening 57 in the extension 40 and receives a pin 58. The other end of the spring 56 passes through a cross bar 59 that is fastened to the two side plates 28 and 29. The spring 56 is of course under tension and is strong enough to move the carrier 17 and its load to the right when the carrier is released by the cam 49.

Means are provided whereby to stop the advance of the carrier 17. Obviously the carrier will speed up from the time it starts due to the pull of the spring 56. In order to stop the carrier I provide a yielding block 60 which is adapted to engage the lower end of the member 40. The stop 60 preferably comprises a block of yielding material such as rubber. It is mounted in a housing 61 that is provided on the cross bar 59 and is backed up by a tapered block 62 located in the housing. In order to adjust the position of the stop 60 a wedge 63 extends into the housing 61 behind the block 62 and this wedge can be moved in or out by means of a link 64 and a bell crank 65. A chain or cable control member 66 is fastened to the bell crank. A spring 67 is also fastened to the bell crank and is fastened to a post 68 upon the side plate 29 so as to move the bell crank in a direction to cause it to push the wedge 63.

In the operation of the device, as the cam 49 is rotated it first moves the carrier 17 to the left at a relatively slow rate by engagement with the roller 41 on the extension 40. During this movement the spring 56 is of course being extended and is accumulating energy so that when the cam roller 50 passes out of engagement with the roller 41 the spring is ready to start moving the carrier to the right. This movement starts slowly as in the case of any spring action of this type but accelerates until the lower end of the extension 40 strikes the stop 60. This effects a sudden stop of the carrier 17 with the result that the fuel on the carrier, due to its momentum, slides on the carrier toward the furnace. The amount of the slide is not very great but it can be made any reasonable amount by varying the length of travel of the carrier and by varying the strength of the spring 56. Once the carrier is stopped the cam 49 upon its continued rotation will again engage the roller 41 and move the carrier back to its original position. As the fuel is advanced by the carrier it will of course continue to enter the carrier from the hopper 32.

Referring now to Figs. 5 and 6, these figures illustrate a modified form of device whereby the stopping of the advance movement of the carrier 17' is accomplished. The plate 21' has a pair of tapered brackets 70 and 71 fastened on the lower side thereof, these brackets being adapted to pivot a pin 72 which passes through a link 73. The other end of the link 73 is supported by a pin 74 that is held in the bifurcated upper end 75 of a lever 76. The lever 76 has a hub portion 77 which is pivoted upon a shaft 78. The

shaft 78 is fixed to the side frames 28' and 29' in any suitable fashion. The lower end of the lever 76 is provided with an elongated slot 79 that receives a pin 80. The pin 80 serves to connect the lever 76 to a bifurcated end portion 81 of a stop rod 82. The rod 82 extends from the link 76 through a depending bar 83 that is rigidly fixed by means of a pair of braces 84 and 85 to the plate 21'.

Intermediate the lever 76 and the bar 83 the rod 82 is threaded as indicated at 86 to receive a cushion holding cup 87. This cup is adapted to receive a resilient block 88 of rubber or similar material, the block itself being apertured for the passage of the rod 82. A lock nut 89 is utilized to lock the cup 87 in any desired adjusted position thus making it possible to vary the distance between the slotted end of the lever 76 and the block 88 to suit various conditions.

It will be observed that if the carrier 17' of which the plate 21' is a part, is moved to the right from the position shown in Fig. 5 this effects a movement of the lower end of the lever 76 in the opposite direction because the shaft 78 is fixed and any movement of the upper end of the lever 76 to the right will cause the lower end to move to the left. When the carrier 17' moves to the right sufficiently the stop 88 contacts the bar 83 and prevents any further advance of the carrier. In fact, this method of stopping the carrier results in a sudden stopping thereof which is of particular advantage in feeding fuel according to the method hereinbefore described. This stop mechanism may be used alternatively to the stop mechanism shown in Figs. 1 and 4 wherein the extension 40 of the carrier trough engages a resilient block 60 to stop the carrier.

The present device is preferably driven by means of a variable speed motor or drive mechanism so as to enable the operator to control the rate of fuel delivery by means of the number of reciprocations given to the carrier 17. The drive motor may in fact be intermittently operated by suitable timing mechanism. Such devices are already known in this art and are believed not to need any further description. The adjustable stop mechanisms shown in Figs. 4, 5 and 6 are additional control means whereby the length of stroke imparted to the carrier may also be varied to fit the conditions of a particular installation at any particular time.

Having thus described my invention, what I claim as new and desire to secure by Letters Patent is:

1. A fuel feeding device of the character described, comprising a reciprocating carrier, a hopper over the carrier, said carrier having a horizontal partition above the bottom thereof and beneath the hopper outlet and said hopper having means at the rear edge thereof cooperating with said horizontal partition to prevent passage of material being fed from the hopper into the carrier to the rear of the hopper, said partition terminating short of the advance edge of the hopper whereby material may be fed from the hopper onto the carrier.

2. A fuel feeding device of the character described, comprising a reciprocating carrier, a hopper over the carrier, said carrier having a horizontal partition above the bottom thereof and beneath the hopper outlet and said hopper having means at the rear edge thereof cooperating with said horizontal partition to prevent passage of material being fed from the hopper into the carrier to the rear of the hopper, said partition terminating short of the advance edge of the hopper whereby material may be fed from the hopper onto the carrier, said hopper having a barrier projecting downwardly and rearwardly from the front wall thereof above said partition whereby to define a throat in the hopper.

3. A fuel feeding device of the character described, comprising a reciprocating carrier, a hopper over the carrier, said carrier having a horizontal partition above the bottom thereof and beneath the hopper outlet and said hopper having means at the rear edge thereof cooperating with said horizontal partition to prevent passage of material being fed from the hopper into the carrier to the rear of the hopper, said partition terminating short of the advance edge of the hopper whereby material may be fed from the hopper onto the carrier, and means for reciprocating the carrier operable to advance the carrier at a gradually accelerating rate in one direction, means effecting a sudden deceleration of the carrier at the limit of its advance, and said drive means being operable to return the carrier to original starting position at a relatively slow rate.

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