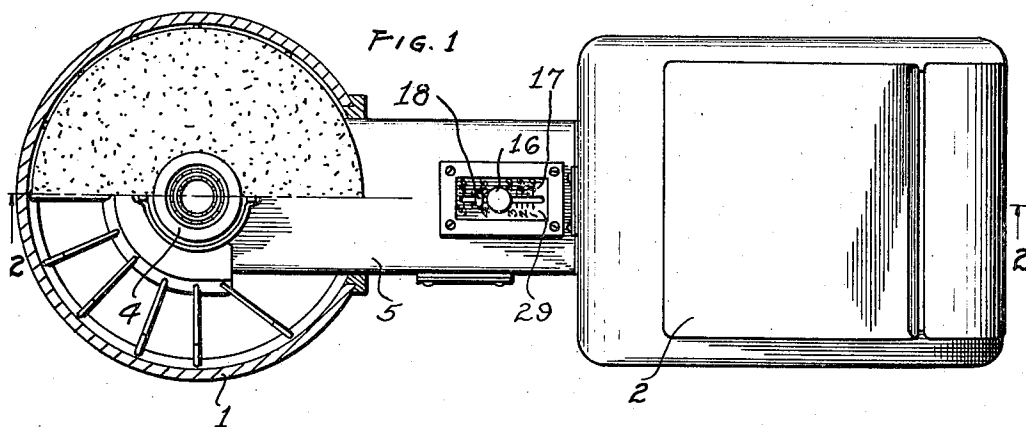
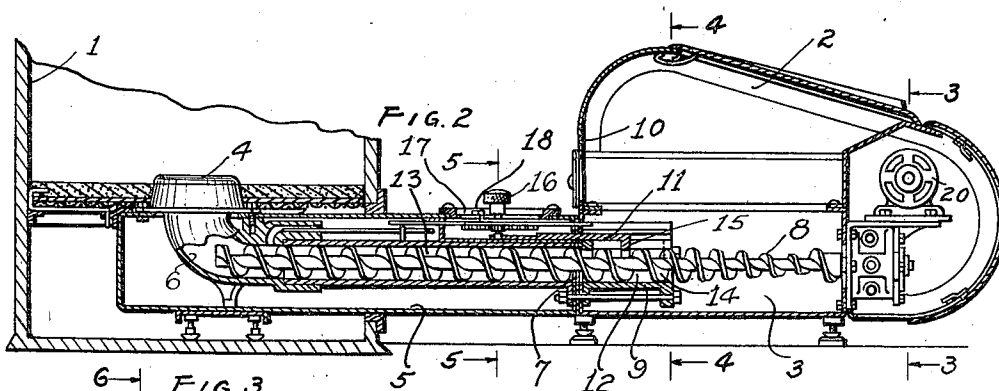
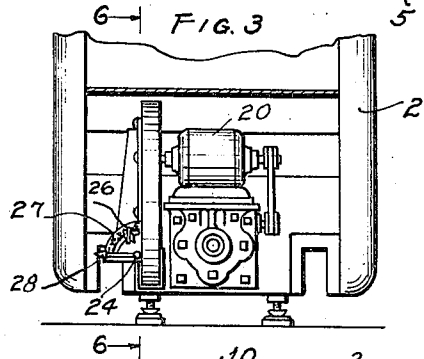
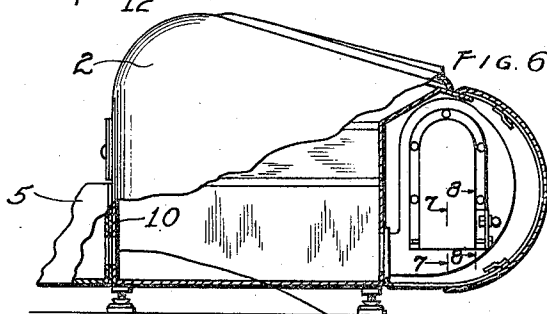
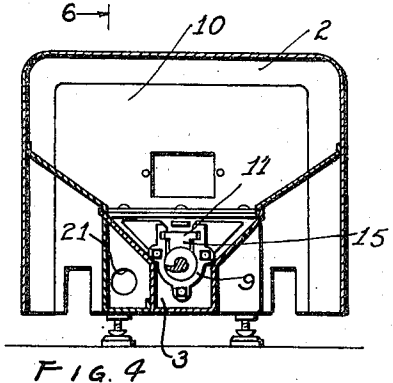
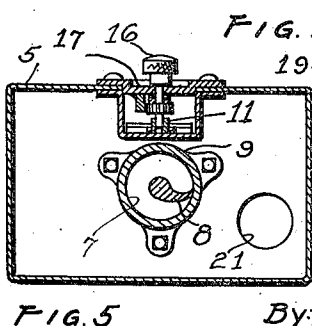
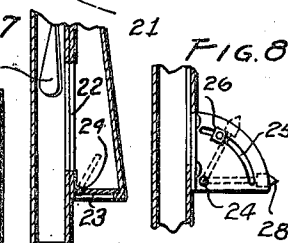
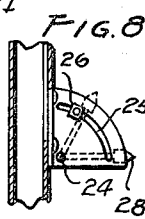


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STOKER PROVIDED WITH A METERING CONTROL
TO DETERMINE FUEL AND AIR FEED
Filed April 16, 1945

2,452,453



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STOKER PROVIDED WITH A METERING
CONTROL TO DETERMINE FUEL AND
AIR FEEDRoy F. Graham, University City, Mo., assignor to
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This invention relates to stokers generally, and more particularly to domestic or industrial stokers so constructed and connected to furnaces or other heat-producing devices, that solid fuel such as coal, is fed to such furnaces by such stokers.

My invention has as its principal object the construction of a stoker of the kind described, wherein means are provided for manually adjusting the rate of feed of coal from the hopper to the combustion hearth, so as to closely correlate the coal so fed, with the demand for heat existing from time to time.

An important object of this invention is to so construct the coal-feeding means that the latter travels at constant speed, and wherein adjustments may be made to make said means deliver said coal at different rates without altering or changing the speed of travel of said coal-feeding means.

Another object of this invention is to so construct a rotary flight conveyor in such a stoker, for feeding coal from a storage hopper to the combustion hearth, that the pitch of said conveyor varies at a predetermined portion of its length so as to be larger than at adjacent portions of the conveyor length to either side, to thereby provide an enlarged pocket or space between said pre-selected flights, whereby to correspondingly vary the coal-carrying capacity of the conveyor thereat.

A further object of my invention is to provide means for adjustably controlling and varying the quantity of coal admitted from the hopper into said enlarged pocket of the conveyor, at the need for such variation in coal feed arises during the operation of the furnace.

An added object of my invention is to provide, in cooperation with the adjustable coal-feed control of the kind described, means whereby the same may be manually operated or set from a point exteriorly of the stoker, so as to be done easily and conveniently in but a moment, said means being operable to move a pointer across a scale properly marked to visibly indicate the various rates of coal-feed, for the full range of movement of said feed control means.

A still further object of my invention is to control the admission of air passing to the combustion chamber, this adjustment being manual likewise, and there being an air-control scale closely adjacent said coal-feed scale and in the path of movement of said pointer so that the latter not only indicates the rate of coal feed at any setting of the feed control means, but simultaneously indicates the proper setting to which the air sup-

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ply should be set, as visibly indicated on said correlated air-setting scale, thus enabling the providing a proper setting of air admission for each setting of coal feed.

The invention has among its other objects the production of a stoker of the kind described, that will be relatively simple and economical in construction and operation, have a minimum number of parts, and which will be otherwise satisfactory and efficient for use wherever deemed applicable.

Many other objects and advantages of the construction herein shown and described will be obvious to those skilled in the art to which this invention appertains, as will be apparent from the disclosures herein given.

To this end, my invention consists in the novel construction, arrangement, and combination of parts herein shown and described, and uses mentioned, as will be more clearly pointed out in the following specification.

In the drawings, wherein like reference characters indicate like or corresponding parts throughout the views,

Figure 1 is a top plan view of the stoker, with its hearth end installed within a furnace, and with certain parts shown in cross-section in order to illustrate the invention more clearly;

Figure 2 is a vertical cross-section through the device, taken substantially along the line 2—2 of Fig. 1;

Figure 3 is a cross-sectional view from the rear of the stoker, taken substantially along the line 3—3 of Fig. 2;

Figure 4 is an other vertical cross sectional view taken substantially along the line 4—4 of Fig. 2;

Figure 5 is a vertical cross-sectional view, looking in the reverse direction, and taken substantially along the line 5—5 of Fig. 2;

Figure 6 is a fragmentary cross-sectional view taken substantially along the line 6—6 of Fig. 3;

Figure 7 is a fragmentary cross-sectional view taken substantially along the line 7—7 of Fig. 6; and

Figure 8 is a similar cross-sectional fragment, taken substantially along the line 8—8 of Fig. 6.

Referring more particularly to the drawings, wherein I have illustrated a preferred embodiment of my invention, there is shown a furnace 1 of any desired or suitable size, shape and construction, and in which the combustion of fuel takes place for the generating of the heat which is thereafter conducted to the various spaces or rooms in any preferred manner.

The stoker is provided with a magazine, con-

tainer or hopper 2 for holding coal or some other solid fuel of relatively small size so as to be efficiently fed through a spiral conveyor, said hopper being of a capacity to hold fuel sufficient to last for as long a period as is thought suitable, and from whence said fuel is fed mechanically into the furnace.

A trough 3 extends longitudinally within the hopper 2, the same being closed along its bottom and sides, but open across its top, somewhat as shown, and the supply of fuel may be placed within said hopper so as to extend upwardly therein to far above the top of said trough.

The stoker carries a combustion hearth or tuyère end 4 which is intended to be mounted within the confines of the furnace so that combustion may occur adjacent the top of said hearth, and the fuel is fed substantially automatically from the hopper to said hearth, where it commingles with air preferably forcibly directed to adjacent the top of said hearth, and thus supports combustion in a manner now to be described.

A casing 5 extends from said hopper to said hearth and is hollow so as to communicate therebetween, this casing having a tubular conduit 6 extending lengthwise therein, said conduit having its intake from the hopper through the inlet opening 7 provided thereat, said conduit being directed upwardly at its discharge end in the furnace, so as to feed said coal upwardly through said hearth thereat.

In order to actuate the coal forcibly through its path from the hopper to the hearth, I have arranged a conveyor means, as for example the screw conveyor 8 indicated, the same being formed as a helix of the series of flights spaced apart therealong, with a portion of the length of the spiral lying longitudinally within the trough and the balance of the screw extending forwardly therebeyond and passing through said inlet 7 and in the conduit to adjacent the hearth end. This screw is driven by any source of suitable power, such as by the motor 20.

A sleeve 9 is carried by the stoker, so as to project rearwardly into the trough from the forward wall 10 in which the opening 7 is provided, so as to form a horizontal extension or continuation of the conduit 6, except that it is to be noted that the top of said sleeve is open. A plate 11 acts somewhat as a valve or meter to adjustably close the open top of said sleeve to any proportion of the length of the latter, and will control the rate of coal that is fed by said conveyor, as will hereinafter be described.

This screw conveyor is not of constant pitch throughout its length, in the usual manner, but upon the contrary is of uneven pitch, this variation being in a predetermined manner. Between one pair of flights the pitch is at a maximum, to form the pocket 12, this pocket being within the confines of said sleeve 9, and said pocket will therefore be of a capacity to hold more of the coal than any other pocket of the conveyor.

The pockets 13 shown to the left of the pocket 12, or what is termed as forwardly of said pocket 12, may all be of uniform size, with constant pitch, while those pockets to the right of 12 may include a few of uniform size or pitch as indicated at 14, and thence taper off rearwardly by reducing the diameter of the conveyor somewhat as shown. As shown, there may be several pockets of the conveyor within the sleeve 9, but they are not of equal capacities.

The plate 11 is arranged to slide horizontally in either direction across the open top of the sleeve

as an adjustable closure therefor, and to insure true horizontal movement the sleeve may be provided with slots or guideways therein, into which the plate extends, as shown most clearly in Fig. 4.

A downwardly extending lip or flange 15 is formed at the rearward end of said plate 11, and the lower edge of said flange is rounded out or made arcuate so as to conform rather closely to the circular path generated by the conveyor flights within said sleeve 9. This plate is otherwise imperforate so that when the same is in any position of its longitudinal adjustment along the sleeve, the coal is admitted from above the plate into only that portion of the conveyor pockets that are thus exposed and uncovered by the plate at the time. Two such positions of plate adjustment are indicated, one in full line and the other in dotted line, the latter position being that of minimum feed of fuel.

As the plate is adjusted to the left, or forwardly, from the dotted line position (in Fig. 2), additional coal will drop into the conveyor pockets additionally exposed, from above the plate, the greatest feed occurring when the plate is at the extreme left.

Obviously, the plate thus forms a valve or meter whereby the rate of coal that is fed to the conveyor, at said sleeve, and in turn, from the conveyor to the hearth, is adjustably controlled or metered.

The plate 11 is preferably arranged for manually controlled adjustment, from an easily accessible point, as from a point adjacent the stoker exterior, as shown. To that purpose, the plate 11 travels through a guide opening through the wall 10, and at its forward end is fixed to a knob 16 which extends vertically through an elongated slot of a fixed top closure having a calibrated scale 17 therealong. This knob may project sufficiently far upwardly to make it easily grasped for adjustment, and its shank may have a pinion thereon for toothed engagement with a rack fixed along said top closure, so that as the knob is rotated, the same will move to the right or left, as the case may be, and carry the plate 11 in the same direction.

A pointer 18 may be fixed to the knob so as to be shifted across said scale 17 at each movement of said knob, and this scale may be made to indicate a series of selected rates of feed of fuel, as for example at "20" pounds of coal per unit of time, "30" pounds, etc., so that when the knob is adjusted so that the pointer indicates any scale marking, the amount of coal fed at such adjustment will be correlated thereto. It is obvious that when the pointer is intermediate two adjacent markings on the scale, the rate of coal feed at that point will correspond to that location of the pointer. In other words, although the knob may be set for the major pre-selected rates of fuel feed, yet a setting to other points will give intermediate feeds, so that the feed adjustment can be made just as fine and accurate as desired.

All such adjustment is made simply by controlling the coal fed into the conveyor from above the meter, without any necessity for changing the speed of drive of said conveyor; hence there is an economy in being able to use a constant speed motor, built to operate most efficiently at one speed and holding to that speed while in use.

Air is preferably forcibly fed to the tuyère of the installation, from a fan or blower 19, also preferably driven from the same motor 20 that drives the conveyor, the intake opening 22 to the blower being controlled by a damper 23 that is

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pivoted at one edge 24 to the blower housing. As the suction of the element 19 increases, the damper is lifted or opened there, and when said suction ceases, the damper will drop by gravity to its full-line closed position (indicated in Fig. 7). The air entrained by the fan is directed through the opening 21 through the casing 5, but finally passes upwardly through the tuyère end of the stoker, where it commingles with the ignited fuel forced upwardly through the hearth, to support combustion thereat.

A pointer 28 may be movable with the damper 23, and a damper-opening scale 27 may be arcuately arranged adjacent the path of movement of said pointer, and in order to limit the opening for the damper at any time, I have arranged an abutment or stop 26 manually movable in an arcuate slot 25 so as to be tightened or set at any point along the slot length. This slot is close to the scale 27, so that the setting of the stop may be made at substantially any point along the length of the scale 27. As soon as the damper pointer strikes said abutment, further opening of the damper is prevented while said abutment is kept at that point.

There may be as many stop settings indicated on the scale 27, as there are major fuel-rate settings for the scale 17, and in order to make the damper settings more easily readable they are correlated to the fuel settings, by providing the damper setting scale 29 on the plate that has the scale 17 thereon, both scales employing the common pointer 18, so that at any time that the knob has been adjusted to make a new rate of coal feed, the pointer 18 will simultaneously indicate on the scale 29, just what the proper damper setting should be to most efficiently burn fuel at the new rate, and then from said new damper setting as read from the scale 29, the abutment 26 may be immediately set to a point on the scale 27 to agree with the same point as indicated on the scale 29.

These settings for coal feed and air feed are made with utmost ease and certainty, simply from the scales, and without requiring any trial-and-error method of adjustment of either the fuel or air.

Having thus described my invention, it is obvious that various immaterial changes may be made in the same without departing from the spirit of my invention; hence I do not wish to be understood as limiting my self to the exact form, arrangement, construction and combination of parts herein shown and described, nor the uses mentioned, except as limited by the claims hereunto appended.

What I claim as new and desire to secure by Letters Patent is:

1. In a stoker furnace including a combustion hearth, a coal hopper, a conduit interconnecting said hearth and hopper, a conveyor operative at an unalterable single speed in said conduit for moving coal from said hopper through said conduit to said hearth, manually adjustable means for controlling air to said hearth for combustion,

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tion, adjustable means manually movable to be set for controlling the rate of feed of coal by said conveyor without varying the speed of movement of the latter, and scale means in the path of movement of said last-mentioned means for indicating thereon the proper settings of said air-control means for each such setting for coal feed.

2. In a stoker furnace, a combustion hearth, a coal hopper, a conduit communicating therebetween for passage of said coal, a fixed speed movable conveyor in said hopper and conduit for actuating the coal toward the hearth, means for controlling the air to said hearth for combustion with said coal and including a movable damper for controlling entry of air, manually set limit stops for opening movement of said damper, means for manually setting for controlling the load-carrying capacity of said conveyor without varying the fixed speed of the latter, and means along the path of movement of said last-mentioned means, to visibly indicate proper settings of said damper limit stops for each setting of the coal-load control means.

3. In a stoker furnace, a coal container, a combustion hearth, a conduit therebetween and having one terminal end extending for a substantial distance into said container to form its coal inlet portion within the container and spaced above the bottom of the latter, a rotary screw conveyor extending into the container and conduit and provided with flights to either side of said inwardly extended end of said inlet for carrying coal from said container to said hearth, the pitch of some adjacent flights in said container differing and being smaller adjacent said terminal end of said inlet portion than that of the other flights within said container, and a plate above said inlet coextensive in length with the distance between several adjacent flights and movable in said conveyor to shut off feed of coal to said conveyor from above said plate, and whereby only that space between the flights not shut off by said plate will be fed coal from above said plate.

ROY F. GRAHAM.

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