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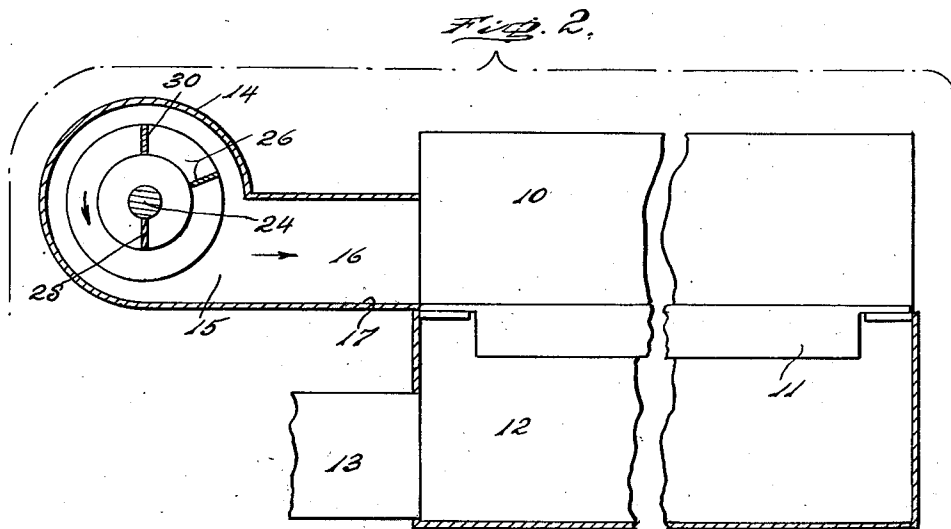
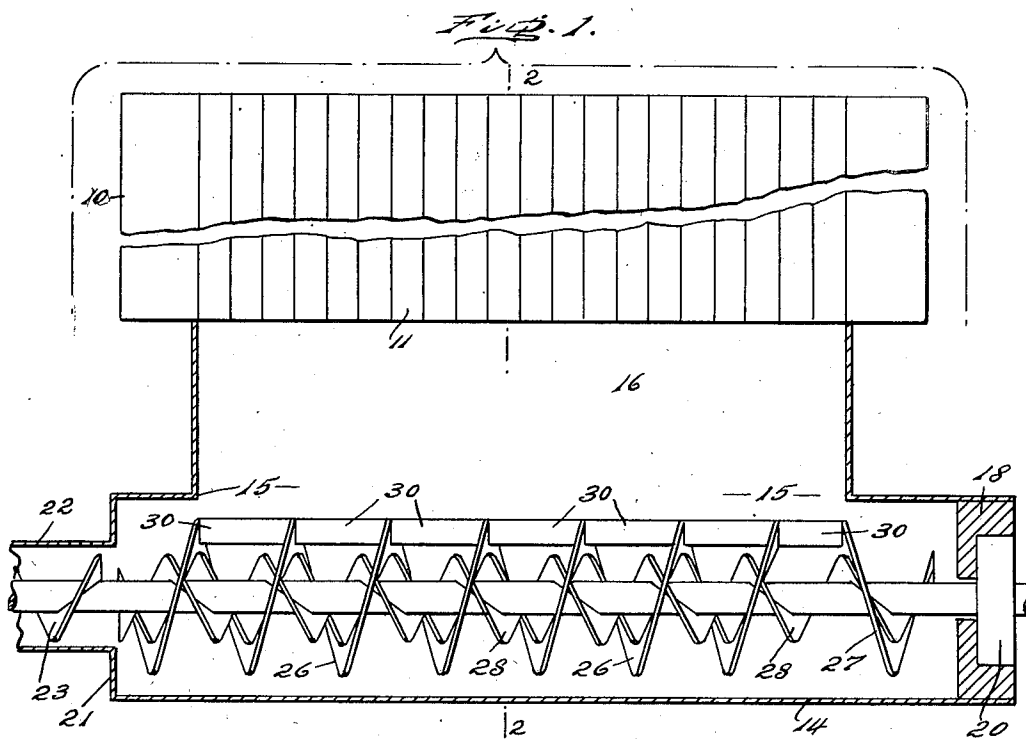
P. A. MULCEY ET AL

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CROSSFEED MECHANISM

Filed March 2, 1951

2 Sheets-Sheet 1



INVENTOR
Paul A. Mulcey
James W. Eckerd
BY Edward I. Small.
Robert M. Carr
ATTORNEY.

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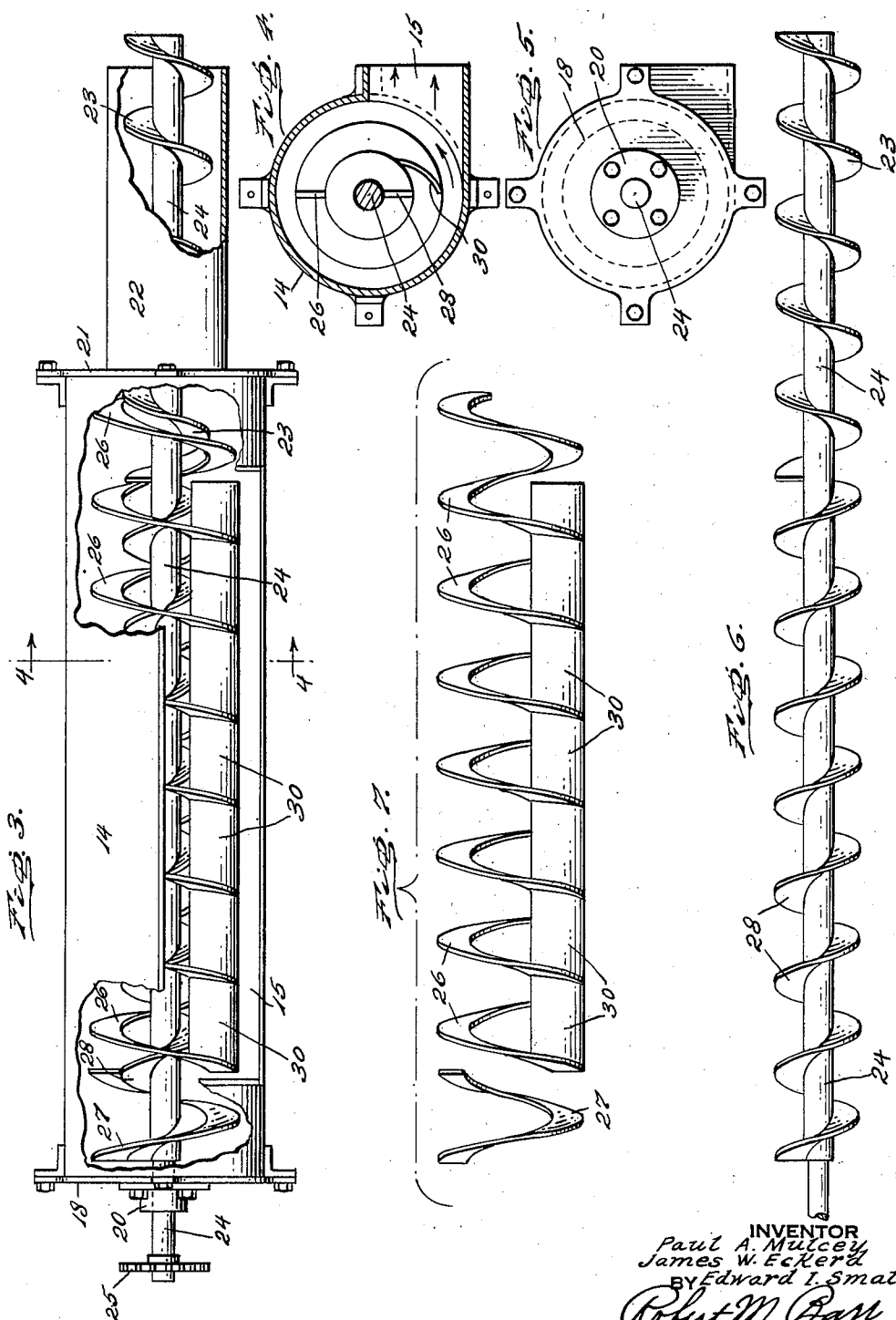
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INVENTOR
Paul A. Mulcey
James W. Eckerd
BY Edward I. Small.
Robert M. Carr
ATTORNEY.

UNITED STATES PATENT OFFICE

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CROSSFEED MECHANISM

Paul A. Mulcey, Dallas, James W. Eckerd, Shavertown, and Edward I. Small, Scranton, Pa., assignors to Anthracite Equipment Corporation, Wilkes-Barre, Pa., a corporation of Delaware

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The present invention relates generally to the feeding of granular solid material or sludge for flow over a surface, and more particularly to the feeding of coal by a crossfeed stoker.

In crossfeed mechanisms for delivering material to a horizontally disposed surface the problem, heretofore, has been to so deliver the material that it will flow uniformly and of even depth across such surface. This problem has been particularly troublesome where coal is stoker-fed to a retort having a rectangular grate, because a non-uniform or uneven fire bed results in spot combustion due to the induced draft breaking through thin areas of the bed. Thus, in some areas complete combustion may take place while in others there is incomplete combustion and a severe loss in efficient operation.

One of the objects of the present invention is to provide an efficient crossfeed mechanism for feeding granular solid material to a surface.

Another object of the invention is to provide a crossfeed mechanism for delivering material at a uniform rate to a surface.

Another object of the invention is to provide a crossfeed mechanism for delivering material evenly over a surface.

Another object of the invention is to provide a coal-distributing mechanism for a crossfeed stoker wherein the coal leaves the mechanism at a uniform rate and of even depth as delivered to a rectangular grate.

Another object of the invention is to provide a coal-feeding and distributing mechanism wherein a novel assembly of concentric screw flights operates upon coal to cause it to flow over a grate at a controlled rate.

Another object of the invention is to provide a coal-feeding and distributing mechanism wherein a novel assembly of concentric screw flights, having a common driving means, operates to feed coal lengthwise of a tube, a portion of the coal-feeding in one direction, another portion feeding in the opposite direction, and all the coal flowing away from the axis of the coal to discharge upon a grate at an even rate of advance.

Other objects will appear hereinafter.

In the accompanying drawings, Fig. 1 represents a plan in part section of a coal-feeding mechanism embodying one form of the present invention, shown in association with a crossfeed grate of a coal-burning retort; Fig. 2 represents a section on line 2—2 of Fig. 1; Fig. 3 represents a side elevation partly broken away of the coal-feeder and distributing tube; Fig. 4 represents a section on line 4—4 of Fig. 3; Fig. 5 represents an end elevation of the feeder and distributing tube; Fig. 6 represents a side elevation of the combined pick-up screw and excess return screw; Fig. 7 represents a side ele-

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vation of the auxiliary feeder screw with an excess return screw and attached distributing paddles.

Referring to the drawings, one form of the present invention is shown as operating in conjunction with a stoker-fired retort 10 having a rectangular grate 11 disposed over a wind box 12 supplied with air through a duct 13 from a fan blower (not shown). The retort and the use of coal is only by way of illustration, as the feeding mechanism of the invention includes a wide range of granular solid material or sludge, which can be delivered to any surface over which a uniform distribution of material is desired.

In the present instance the feeding mechanism of the invention comprises a tube 14 mounted at the receiving end of the grate 11 and having a side outlet 15 extending lengthwise of the tube 14 to discharge into a conduit 16 as a lateral continuation of the outlet 15. The floor 17 of the conduit 16 preferably lies substantially in the plane of the grate 11. Obviously the outlet 15 can be mounted to discharge directly upon a surface, but the present length showing of the conduit 16 is to provide a lateral space for it to pass under the water leg of a boiler.

The tube 14 is closed at one end by a removable plate 18 mounting an axially aligned bearing 20, and opens at the opposite end through an apertured plate 21 for communication with a coal supply pipe 22 which leads to a source of coal. The feed for the coal from this source, through the pipe 22, is by means of a pick-up screw comprising left hand flights 23 wound spirally about and attached to a driven shaft 24 which continues axially through the tube 14, where its end projects through the bearing 20 to mount a driven sprocket 25. It should be noted, however, that the flights 23 terminate adjacent the inlet to the tube 14 or preferably just within such inlet in order that the feed can be transferred to an auxiliary feeder screw of larger diameter left hand flights 26 also wound about the shaft 24 but internally radially spaced from the shaft 24 to provide an annular clearance for a purpose to be presently described. Attention is directed to the fact that the end flight 27 of this auxiliary screw adjacent the closed end of the tube 14 is a right hand convolution which acts to initially start a reverse or return feed of excess coal through the aforesaid annular clearance. This prevents packing and improper piling up of coal at the closed end of the tube 14.

In order to bring about an even or uniform distribution of the coal through the outlet 15, a third feed screw is provided having right hand flights 28 wound about and attached to the shaft 24, to pass along the annular clearance formed by the flights 26. Radially, these flights 28 are so dimensioned that those within one

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or more of the flights 26 provide contact points for spot welding whereby rotary motion of the shaft 24 is transmitted to the left hand feeder screw formed by the flights 26. Thus, rotation of the shaft 24 drives the flights 23 and 26 in the direction to feed coal into and along the tube 14 and the single flight 27 and the flights 28 causes a feed in the opposite direction. From the foregoing it will be seen that the tube 14 houses a pair of concentric screw flights having opposite directions of pitch, the inner flight being wound on the drive shaft and secured thereto, while the outer flight is secured to the inner flight. Furthermore, the invention is not to be limited to the specific right and left hand arrangement of the flights, because such depend upon the direction of turning of the shaft 24. The present showing is the preferred construction in accordance with the direction of rotation of the shaft 24 as indicated by the arrow.

As a means to further promote even distribution throughout the length of the tube 14, a plurality of vanes or paddles 30 are attached to the screw flights 26 so as to be contained within the outer diameter of such flights 26. As shown, each vane straddles the space between a pair of the flights 26 and is preferably, but not necessarily, of arcuate configuration with its convex face disposed in the direction of travel of the flights 26. In the preferred form these vanes 30 are in aligned relation parallel to the axis of the flights 26, but this is only by way of illustration, since the object is to pick-up coal between each pair of flights and deliver it effectively to the outlet 15 as a delivery supplementing the flow from the flights. The invention is not to be limited, however, to the number of such vanes, as it has been found that using a single vane in a particular place has given satisfactory results.

In the operation of the crossfeed mechanism, the coal or other granular solid material is delivered to the open end of the tube 14 by any suitable feed device, which, in this instance, is the pick-up screw in the pipe 22, where it is picked up by the flights 26 having the dual function of feeding the coal lengthwise of the tube 14 while advancing also laterally to discharge through the outlet side of outlet 15 onto the grate 11, or in this instance, into the conduit 16 leading to the grate. As the tube 14 fills with coal, the excess reaches the closed end of the tube 14, where the flight 27 reverses the coal flow and directs it into the path of the return feed flights 28, which convey this excess lengthwise within the flights 26 where it mingles with the incoming coal and leaves as a combined flow through the outlet 15. The relative proportioning of the feeding, return flights, and vanes is a precision one, whereby an even, uniform layer of coal emerges from the side of the tube 14 and is caused to travel at a controlled rate onto and across the grate of a coal-burning retort.

It will now be apparent that a complete unitary crossfeed mechanism for granular solid fuel has been devised wherein all parts of one moving unit are rigidly secured together and so function as to produce a result not heretofore attainable by a crossfeed mechanism. This result gives the following advantages: the rate of conveying is readily controlled; the pattern distribution can be controlled by design; a minimum amount of degradation is produced; the mechanism operates quietly; it can convey

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and distribute a varying range of material sizes, forms, and composition; it distributes material without size classification or segregation; power requirements are low; the construction is simple; requires no auxiliary mechanism for satisfactory operation; and is adaptable to variations in longitudinal dimension without disturbing distribution patterns.

Having thus described our invention, we claim:

1. A crossfeed mechanism for delivering material to an adjacent horizontally disposed rectangular grate, comprising a tube having a lengthwise disposed side outlet extending throughout substantially the length of said tube, and an inlet for material at one end, said outlet adapted to lead to said grate throughout substantially one side thereof, a shaft rotatably mounted in said tube parallel to said outlet, and two concentrically mounted feed screws operated by said shaft, said screws being parallel to said outlet and coextensive with respect thereto, one of said screws feeding a material delivered to said inlet in one direction lengthwise to discharge laterally through said outlet, and the other of said feed screws feeding excess material in the opposite direction to discharge laterally through said outlet, and one of said screws carrying a row of vanes in registering relation to said outlet to eject material to said outlet.

2. A crossfeed mechanism for delivering material to an adjacent horizontally disposed rectangular grate, comprising a closed end tube having an inlet at the opposite end and an outlet lengthwise of one side parallel to the axis of said tube, adapted to lead to said grate throughout substantially one side of said grate, a shaft rotatably mounted lengthwise within said tube, a screw having left hand flights coextensive with said outlet for feeding material away from said inlet and across said outlet and at least one right hand flight for returning material towards said inlet, a second screw having right hand flights coextensive with said outlet for returning material towards said inlet and across said outlet, said two screws being mounted on said shaft in overlapping relation, a plurality of radially disposed material-propelling vanes carried by one of said screws, said vanes being coextensive with said outlet, and means for transmitting rotary motion of said shaft to both screws, whereby said screws coact to deliver material to said outlet.

3. A crossfeed mechanism in accordance with claim 2 wherein the propelling vanes are mounted respectively between pairs of flights of one of said screws and laterally aligned with said outlet.

PAUL A. MULCEY.
JAMES W. ECKERD.
EDWARD I. SMALL.

References Cited in the file of this patent

UNITED STATES PATENTS

Number	Name	Date
1,525,506	Lauterbur	Feb. 10, 1925
2,142,701	Skelly	Jan. 3, 1939
2,208,757	Fitch	July 23, 1940
2,255,481	Crowley	Sept. 9, 1941
2,332,688	Baily	Oct. 26, 1943
2,390,680	Ausherman	Dec. 11, 1945