Oct. 28, 1941. H. N. BLISS ET AL 2,260,824

FEEDING APPARATUS

Filed June 26, 1939

Fig. 1.

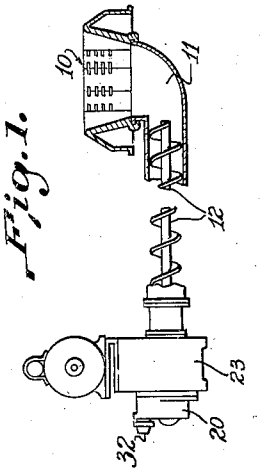


Fig. 2.

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FEEDING APPARATUS

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1 Claim. (Cl. 110—45)

This invention relates to feeding apparatus of the type wherein a feed screw, axially reciprocable in the feed conduit of a stoker mechanism, is adapted to advance with a straight ramming action for moving a quantity of fuel into the retort of the stoker, and, upon its return stroke, to rotate so as to unscrew itself from the body of fuel with which it is engaged. Such a feeding apparatus is illustrated in our Patent No. 2,200,831 issued May 14, 1940.

It is customary in a feeding apparatus of this general type to provide for adjustment of the feeding rate. The invention contemplates an arrangement which not only provides for adjustment of the feeding rate, but in addition, provides for adjustment of the amplitude of pulsation in the fuel bed, and accomplishes both adjustments through a common adjusting means.

Another object of the invention is to provide a feeding apparatus which, in addition to the characteristics above pointed out, is fairly simple and inexpensive in construction and yet durable and thoroughly dependable in operation.

Other objects, the advantages and uses of the invention will become more apparent after reading the following specification and claim, and after consideration of the drawing forming a part of the specification wherein:

Fig. 1 is a partially elevational and partially longitudinal sectional view through a feeding apparatus embodying the invention and a stoker retort with which such feeding apparatus is associated;

Fig. 2 is an axial sectional view of the feeding apparatus.

As an illustration of one form in which the invention may be embodied, we have shown in the drawing a feeding apparatus forming part of a stoker of the type illustrated in our Patent No. 2,200,831 above identified.

Means for reciprocating the screw 12 includes a push rod 13 having a shank portion 14 socketed in a socket 15 formed on the rear end of the screw 12, and secured thereto by means of a pin 16 extending through the walls of the socket and through the shank portion 14. On its other end the push rod 13 is formed with a reduced portion 17 on which is mounted a piston 18. The piston 18 is secured by means of a nut 19 threaded on the end 17. The piston 18 travels in a cylinder 20 which is attached as at 21 to the rear wall 22 of a housing 23 adapted to contain a supply of fluid for operating the piston 18. In the central region of the housing 23 is integrally formed a sleeve 24 in which the shaft 13 is journalled for oscillating and reciprocating movement.

Between the piston 18 and the rear wall 25 of the cap 20 is formed a chamber 26 into which operating fluid is injected under pressure by suitable pumping mechanism for moving the piston 18 forwardly so as to advance the screw. Between the piston 18 and the rear wall 22 of the housing is formed a chamber 27 into which operating fluid is adapted to be delivered from the same pumping mechanism, for moving the piston rearwardly and thereby retracting the screw.

The length of stroke of the piston is determined by the uncovering, upon the return stroke of the piston, of a port 28 in the wall of the cylinder 20.

The means for causing the screw to rotate during its return stroke, comprises a rider element 33 having a threaded driving engagement with a high pitched threaded region 34 of the push rod 13, and provided with clutch teeth 35 adapted, during the return stroke of the screw, to engage clutch teeth 36 on an annular abutment member 37, to be thereby restrained from either axial or rotative movement, and to consequently cause the push rod 13 to rotate as it continues its rearward stroke. Upon the forward stroke of the screw, the rider 33 will be carried against bearing buttons 57 on an annular abutment member 38 constituting an end thrust bearing against which the rider 33 may freely rotate so as to allow the screw to continue its advancing movement to the forward limit thereof without being required to rotate. Thus the screw upon its advancing stroke exerts a purely ramming action against the fuel in the conduit 11, moving all portions of the body of fuel within the conduit forwardly without developing the packing condition which is characteristic of rotary type feed screws. A quantity of the column of fuel at the forward end of the conduit 11 will be moved into the retort during this advancing stroke to add to the fuel bed.

Upon its return stroke, the screw will be forced to perform a rotating movement by means of which it unscrews itself from the column of fuel in the conduit 11, so as to reach a position from which upon its next advancing stroke it will carry the column forwardly to a new position.

One side of the sleeve 38 is provided with rack teeth 47 meshing with a pinion 48 which is rotatably mounted in a bore 49 formed in the sleeve 24. Upon an external end of the shaft

50 of the pinion 48 is secured an adjusting lever 51 which may be provided with conventional latching means (not shown) for cooperating with depressions 52 in the exterior of a side wall of the housing 23, so as to retain the sleeve 38 in any of several positions of adjustment determined by the spacing of the depressions 52. The lever 51 may also be provided with a pointer 53 adapted to cooperate with a scale 54 on the exterior of the housing wall, for indicating the position of adjustment of the sleeve 38a.

The adjustment of the sleeve 38 not only varies the spacing between the abutment members which determines the amplitude of lost motion, but also varies the feeding rate. The total amplitude of stroke will remain the same, but the effective feeding stroke, which is the difference between the total stroke and the lost motion portion of the return stroke, will vary inversely in accordance with the variation of the lost motion. Thus the invention in this form completely eliminates the valve mechanism for determining total stroke length, and provides in its place a common means for varying both the feeding rate and the amplitude of pulsation.

The sleeve 38 may be arranged to have sufficient range of adjustment so that it may be withdrawn to a position (shown in full lines) wherein the feed screw will have a purely reciprocating motion without rotation on the return stroke, or may be advanced to a position wherein the lost motion is reduced to practically zero and rotation starts immediately on the return stroke. On the other hand, the arrangement may if desired be such that in its fully advanced position, the sleeve 38 still allows some lost motion and consequently some pulsating action at maximum speed.

In the operation of the feeding mechanism, operating fluid is withdrawn from the housing 23 by the pumping mechanism hereinbefore referred to, and is continuously pumped, at a fixed rate, into the chambers 26 and 27 alternately, the shifting of delivery from one chamber to the other being controlled by a timer valve such as that shown in the aforesaid Patent No. 2,200,831 above referred to.

Under the pressure of the fluid thus delivered to the chambers 26 and 27, the piston 18 will be reciprocated in the cylinder 20. The piston will move forwardly from a starting point determined by the forward extremity of the port 28, and will advance to the forward limit of its stroke, which is fixed. During this advancing stroke, the screw will be moved forwardly without rotation. The rider 33 will, when the stroke is approximately half completed, contact the end thrust bearing 38 and, as the screw continues to advance, will rotate under the urge of the screw threaded region 34 of the push rod.

Upon the return stroke, the screw will move rearwardly without rotation during approximately half of its stroke, assuming the sleeve 38 to be in the position shown in dotted lines until the rider becomes clutched with the clutch element 37, whereupon during the remainder of the return stroke, the screw will be forced to rotate by the engagement between the rider and the threaded region 34 of the push rod. This will produce a "breathing action" in a retort to which the feeding mechanism is connected, tending to break up coke formations.

We claim:

In a stoker, in combination with a retort, a fuel feed conduit leading into said retort, and a feed screw reciprocable in said conduit for moving fuel into said retort; means for reciprocating said screw, said means including a casing, a push rod forming a continuation of the rear end of the screw, said rod being mounted in said casing for axial and rotative movement, a rider having a threaded connection with said push rod adapted to cause the rod to rotate when said rider is held against movement, and a pair of abutment members, spaced apart a distance considerably greater than the axial thickness of the rider, between which the rider is axially movable during a substantial portion of each reciprocation of the push rod and against which the rider is adapted to be arrested during the remainder of each reciprocation, one of said abutment members being adapted to restrain such rider against rotation so as to cause the push rod to rotate during a portion only of its return stroke, and the other of said abutment members comprising a sleeve encircling said shaft, said casing being formed with a bearing member in which said sleeve is axially slidable, means extending into said bearing member from the exterior of the casing and cooperating with said sleeve for adjusting the latter axially, said adjusting means comprising an oscillatable shaft provided with a pinion, and said sleeve being formed with rack teeth cooperating with said pinion.

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