Nov. 10, 1931. J. H. GLEASON 1,831,066

AUTOMATIC FUEL CHARGING DEVICE

Filed Sept. 24, 1928

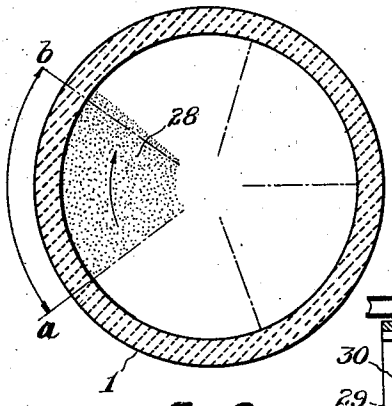


FIG. 3

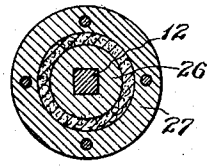


FIG. 2

FIG. 1.

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UNITED STATES PATENT OFFICE

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AUTOMATIC FUEL-CHARGING DEVICE

Application filed September 24, 1928. Serial No. 307,812.

My invention particularly relates to charging devices by which a circumferentially uniform fuel bed is maintained automatically in the generator, furnace or other fuel consuming chamber, by means of periodic fuel charges deposited therein by a distributor continuously rotated during the charging operation. The invention comprises improvements in the fuel-charging devices shown, described and claimed in my pending application for United States Letters Patent Serial No. 232,571. These improvements particularly relate to the means for rotating the fuel distributor, and to a relative arrangement and positioning of the several fuel-feeding and fuel-distributing devices whereby very slight head room is required for the charging device. By the method of distribution each charge preferably, although not necessarily, covers an area of the fuel-consuming chamber comprising a small fractional part of the complete circumference of the chamber. In such use of the device, each charge covers substantially such a fractional part of the complete generator circumference that a plurality of charges will extend substantially once around the generator. To be more exact, the charged areas are so created that a plurality of charges will slightly more than comprehend one complete circumference whereby for each series of complete charging operations there will be a slight overlapping area so as thereby to obviate any possible low spots between successive charges. This method of distribution is similar to that described and claimed in said pending application Serial No. 232,571.

The accompanying showing of the invention relates to a form of fuel-charging device, for use with a gas generator, such use being illustrative of the general use to which my improvements can be put.

The annexed drawings and the following description set forth in detail certain means illustrating my invention, the disclosed means, however, constituting but one of the various mechanical forms in which the principle of my invention may be embodied.

In said annexed drawings:

Figure 1 represents a vertical sectional view of my improved fuel-charging device, in combination with fragmentary portions of a standard water-gas generator, and feeding means therefor, the view showing in full lines the feeding position of a distributing element forming part of my improved fuel-charging device, and in dot-and-dash lines the non-charging or raised position of said distributing element;

Figure 2 is a fragmentary horizontal section, taken in the plane indicated by the line 2—2, Figure 1; and

Figure 3 is a diagrammatic view illustrating how the successive coal charges are deposited in the generator.

Referring to the annexed drawings in which the same parts are indicated by the same respective numbers in the several views, a standard water-gas generator 1 formed with a dome 2 is adapted to be charged with coal by my improved charging device through an opening 3. The charging device is supported upon eccentrically mounted wheels 4 so as to permit dropping the charger upon the wall of the charging opening 3. By any standard means fuel is fed automatically and periodically into a receiving hopper 5 from a spout 6, the hopper door being connected with a rod 7 actuated by suitable standard mechanism, usually a hydraulic cylinder. The receiving hopper 5 is flange-connected to a casing 8 within which is contained a distributor element 9 formed with a sector-shaped distributing surface 10 adapted to discharge fuel into the generator 1 over an area comprehended by an angle forming only a comparatively small part of the entire circumference of the generator. This charging area will be discussed and described hereinafter more fully. The distributor element 9 is substantially triangular in vertical section, as plainly seen in Figure 1, and is mounted upon a base member 11 which forms a valve to close off the top of the generator 1 by contact with the seat 15 formed upon the inner surface of the wall of the casing 8, during the non-charging periods, as plainly shown by dot-and-dash lines in Figure 1.

The distributing element 9 is vertically reciprocable through the medium of a hydraulic cylinder 14 adapted to reciprocate a rod 12 which is secured at its lower end in a vertically extended hub member 13 formed upon the base valve member 11.

Secured to a shaft 16 are the spirally arranged standard feeding means 17, this feeding means 17 being so actuated as to feed the coal by a step-by-step process during one charging operation through the medium of a rod 18 connected at one end by suitable transmission devices to the shaft 16 and eccentrically connected at the other end to a shaft 19 of reduction gearing 20 which in turn is driven by a motor 21. This motor 21 by suitable switch devices is adapted cooperatively with the actuation of the hydraulic cylinders governing the movements of the rods 7 and 12 to feed charges of coal in the manner plainly indicated in Figure 1 to the generator 1 at each gas down-run and at a time when the distributor element 9 is in its lowermost position, as is well known in the art. With the standard construction just described, I have combined means for rotating the distributor element 9, and hence the chute portion 10, a part of a rotation so as to cause the fuel to be distributed over an area of about one-fifth of the total circumference of the generator 1 for each charge of coal fed by the vanes of the feeding means 17. As plainly illustrated in Figure 3, wherein the arrow indicates the direction of rotation of the distributor element 9 and the shaded area 28 indicates that portion of the generator area covered by one charge, and the angle *a*—*b* indicates exactly one-fifth of the whole circumference, it will be seen that I actually cover slightly more than one-fifth of the generator area by each charge so that upon the repeated coverings of the same area of the generator, every fifth charge will slightly overlap, resulting in the elimination of any low or defective areas between the edges of successive charges.

The distributor element 9 is rotated as follows. A sprocket chain 22 operated from the shaft 16 of the feeding device 17 engages a sprocket wheel 23 secured to a shaft 29 mounted in housing 30 supported by the casing 8. Also secured to this shaft 29 is a bevel gear 24 engaging a second bevel gear 25 formed with an extended hub member 25′ mounted in a bracket 25^2 secured to the housing 30. The supporting rod 12 is preferably made square in section and is adapted to slidably engage a square opening in the hub member 25′ and is reciprocated by the cylinder 14 through similar upper and lower stuffing boxes, of the lower one of which a cross-section is shown in Figure 2, the same comprising an inner stuffing box member 26 having a square bore for the reception of the rod 12 and adapted to rotate in a stuffing box portion 27 formed with a round bore.

It will be plainly noted in Figure 1 that the feeding device 17 is closely adjacent the charging opening 3. It will also be noted that the means for rotating the supporting rod 12 and hence the distributor element 9 are located above the feeding device 17. This arrangement results in a construction requiring only slight head room, as distinguished from that shown in said pending application Serial No. 232,571, wherein the means for rotating the distributing valve are disposed intermediate the distributor device and the feeding device, thus requiring considerable head room.

The above described device operates as follows: By the timing of the hydraulic cylinder operating devices, the rod 12 and hence the distributing element 9 are lowered into the full line position shown in Figure 1. Then the feeding device 17 and the rotating devices for the rod 12 are operated, resulting in a charging of coal, such as shown in Figure 1, the arrangement being such that during the entire fuel-charging operation, the distributor 9 is rotated slightly more than one-fifth of a complete rotation. During five such operations the entire circumference of the generator 1 is covered including a slight overlapping at the beginning of the charged area so that the next series of five charges commence at a point somewhat advanced from the starting point of the preceding series. The result of the construction and operation is the uniform distribution of the fuel by a device requiring only slight headroom and the preventing of the building up of any low spots between any successive series of charges or between any charges which are dumped onto adjacent areas.

What I claim is:

1. Fuel-charging mechanism comprising a fuel-feeding device; means for supplying said device with fuel; a vertically-reciprocable distributor and means for automatically and periodically raising and lowering the same, means for periodically actuating said fuel-feeding device, said distributor being provided with a discharge chute and being arranged to receive fuel from said fuel-feeding device when the latter is periodically actuated, part of said distributor being a depending supporting rod, a housing through which said rod is reciprocated, a bracket secured to said housing, a bevel gear mounted upon said bracket and provided with an extended hub within which said rod is spline-connected, a sprocket wheel mounted on said housing, a sprocket chain engaging said sprocket wheel and driven from said fuel-feeding device, and a second bevel gear driven from said sprocket wheel engaging said first-mentioned bevel gear.

2. A distributor for fuel-charging devices

comprising a body member formed with a sector-shaped distributing surface, and a plane base member upon which said body member is mounted, said sector-shaped distributing surface extending down to and over the edge of said plane base member, the latter being formed with an upwardly-extended hub, and a supporting rod secured in said hub.

3. Distributor-rotating means for fuel-charging devices comprising a housing, upper and lower stuffing boxes mounted therein and each comprising an inner member formed with a square bore and an outer member formed with a round bore, a bracket secured to said housing and a sprocket wheel mounted on said housing, means for actuating said sprocket wheel, a bevel gear having an extended hub mounted in said bracket, a second bevel gear engaging said first-mentioned bevel gear and actuated from said sprocket wheel, and a supporting rod having a square section fitted within said square bores and spline-connected to and within said extended hub.

4. A distributor for fuel-charging devices comprising a body member formed with a sector-shaped distributing surface, and a plane imperforate base member unitary with said body member and upon which the latter is mounted, said sector-shaped distributing surface extending down to and over the edge of said plane base member, the latter being adapted to constitute a valve and being formed with a hub portion upwardly extended within said body member, and a supporting rod secured in said hub portion.

Signed by me this 13th day of September, 1928.

JAMES H. GLEASON.