

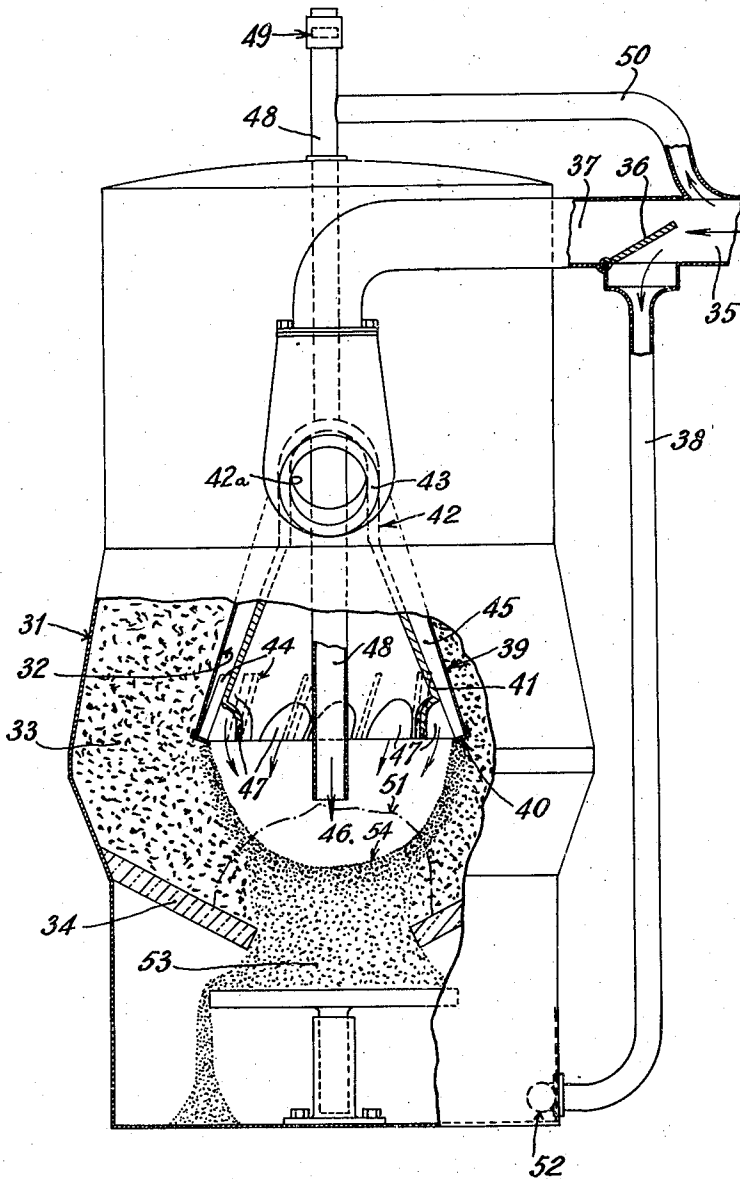
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PROCESS AND APPARATUS FOR BURNING SOLID FUEL

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PROCESS AND APPARATUS FOR BURNING
SOLID FUEL

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1

The present invention relates to a process for effectuating the combustion of combustible in pieces, in which the combustible is presented in a combustion zone, in the form of at least one crumbling-slope. According to this invention at least one jet of air is fed to sweep the surface of the slope in the same direction as that of its fall, said jet of air licking the said surface of the combustible without penetrating deeply into the mass of the latter, and auxiliary air is simultaneously brought underneath the combustion zone in such a way that said auxiliary air passes through part of the combustible mass in the reverse direction to that of its fall, for afterwards emerging from the surface of the slope.

The invention also relates to a combustion apparatus for combustible in pieces, for the working out of the above mentioned process. This apparatus comprises a recipient for the combustible, inside of which means are disposed for compelling the combustible to fall down in the form of at least one crumbling-slope and a device for the intake of air and for the exit of the combustion gases. According to the invention, the said air is directed in the form of at least one jet sweeping this crumbling-slope in the direction of its fall and reaching the exit without penetrating deeply into the mass in ignition, and further, this apparatus comprises an auxiliary air-intake supplying at its lower part a limited amount of air arriving underneath the combustion zone and passing through the combustible in that zone, afterwards emerging from the surface of the slope and reaching the exit.

The annexed drawing represents, by way of example, a view in elevation, partly sectional, of an embodiment of the apparatus to which the invention relates, illustrating at the same time, as an example, a way of working out the process.

The apparatus as shown comprises an airtight casing 31, inside of which is a double-walled conical bell 32. The combustible in pieces 33 rests on an inclined annular fireproof partition 34. The combustion air arrives through a pipe 35, provided with a flap-valve 36 controlling both the entrance of a main pipe 37 and that of an auxiliary pipe 38. When the flap-valve closes one of these pipes, the other is open at its maximum, and vice versa.

The bell 32 comprises an outer conical wall 39 presenting at its lower edge a ring 40 working as a support for the conical body 41 forming the inner wall of the bell 32. The body 41, which may be of cast-iron or of fire-proof material for example, extends at its upper part into a cylin-

2

drical pipe 42 whose opening 42a is connected to a pipe 43 for the exit of the combustion gases from the apparatus.

The bell 32 determines in the combustible mass 33 a space 46 which remains free of combustible and is limited by the crumbling-slope 54. In the region of its base, the conical body 41 is provided with a series of oblique outer fins 44 serving, on the one hand, to keep the body centered relating to wall 39 and, on the other hand, to start a whirling movement of the combustion air issuing from the annular space 45 enclosed between walls 39 and 41 and intended to lick the surface of the crumbling-slope 54.

The conical body 41 is provided at its lower part with pockets 47 projecting inwardly and opened at their lower part. Space 45 communicates at its upper part with the main pipe 37. The air delivered by pipe 37 thus escapes into space 46 through the lower opening of pockets 47. Each pocket is situated between two oblique ribs 44 and itself possesses a corresponding slant fin which cooperates with the whirling movement of the combustion air in space 46.

The apparatus as shown further includes an axial tube 48 the upper part of which projects above the apparatus and the lower part of which projects into the space 46. The upper end of tube 48 is fitted with a glass disk 49 through which pyrometric sights can be taken to determine the temperature of the combustible at the bottom of the space 46. Air is brought into tube 48 by a pipe 50 branched on to pipe 35 above the flap-valve 36 but the quantity of said air is very small and its influence on the combustion in space 46 is negligible; it is just devised for evacuating from tube 48 the smoke that might otherwise hinder the pyrometric sights.

The apparatus works as follows:

For kindling, the flap-valve 36 is set in such a position that it closes the main pipe 37; kindling material (paper, wood) is placed in the combustion zone at 51, as diagrammatically indicated by mixed lines, then combustible is poured down through an opening not shown in the drawing and situated in the upper part of the apparatus. The combustible (peat (turf), lignite or coal with a low calorific power, for example) forms pocket 46 in coming to rest on the kindling prepared at 51. This kindling is lighted through the door of the ashbox (not shown in the drawing), which is then shut. Air flows in through pipe 38 opening at 52 into the ashbox. When it is seen through the sighting-tube 48 that the mass is well ignited, the flap-valve 36 is lowered

sufficiently for the greater part of the air to pass through the main pipe 37 and through annular space 45 and to lick the surface of crumbling-slope 54 without penetrating deeply into the combustible mass. The regulation of the flap-valve varies according to the nature of the combustible. With peat, for example, the auxiliary pipe 38 should be almost completely closed. With coal of low calorific power, it is preferable to leave the flap-valve sufficiently raised for a perceptible air-delivery to pass through the auxiliary pipe 38, with the effect of keeping a certain volume in ignition in the region indicated at 53. The quantity of auxiliary air introduced by the auxiliary pipe 38 also varies according to the grain of the combustible, but is, however, always less than the quantity introduced through the main pipe 37.

The combustion air passing through pipe 35 may be brought into the apparatus either by suction or by compression.

What I claim is:

1. A process for effectuating the combustion of combustible in pieces, in which the combustible is presented in a combustion zone in the form of a substantially circular crater having a crumbling-slope, comprising supplying air for combustion, feeding a major portion of such air downwardly and tangentially so as to sweep the surface of said slope in the same direction as that of its fall, said major portion of air licking the said surface of the combustible without penetrating deeply into the mass of the latter, and simultaneously feeding a minor portion of said air into the combustible from underneath the combustion zone and passing said minor portion of air upwardly through part of the combustible mass in the reverse direction to that of its fall to afterwards emerge from the surface of the slope.

2. A process according to claim 1, in which the quantity of the minor portion of the air which passes through the combustible is equal at the most to a third of the total quantity of air introduced for combustion.

3. A process for effectuating the combustion of combustible in pieces, in which the combustible is presented in a combustion zone in the form of a substantially circular crater having a crumbling-slope, comprising supplying air for combustion, feeding a major portion of the air supplied for combustion downwardly and tangentially so as to sweep the surface of the sloping combustible in the same direction as that of its fall, said so fed major portion of air being uniformly distributed and licking the said surface of the combustible without penetrating deeply into the mass of the latter, and simultaneously introducing a minor portion of the supplied air into the combustible from beneath the combustion zone and passing said minor portion of the

air first laterally and then upwardly through part of the combustible mass in the reverse direction to that of its fall to thereafter emerge from the surface of the slope.

4. A combustion apparatus for effecting the combustion of combustible in pieces, comprising a receptacle for the combustible, a grate within said receptacle, bell-shaped, conical means positioned within said receptacle in space relationship to its walls and above and with the bell means inverted with its bell opening facing said grate and the bell opening lying and spaced from said grate so that the combustible on flowing downwardly within the receptacle over said bell shaped conical means will distribute itself below the bell opening in the form of a substantially circular crater with a crumbling-slope, means for admitting air into the interior of said receptacle and for conducting said air to the vicinity of said crater, means for directing the flow of incoming air so as to cause it to impinge tangentially against the walls of the crater and flow along the crumbling-slope in a downward direction without penetrating deeply into the combustible mass, auxiliary means for supplying air to a space in said receptacle beneath said grate, said air admitting means and auxiliary air supplying means being interconnected, and a damper for controlling flow of air through each so that the major portion of the air is supplied at the interior slope of said crater and the minor portion of said air is supplied beneath the grate, and means for leading off products of combustion from said receptacle.

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