Claims

1. A substantially metallic burner having a service temperature of not less than about 1200°C for a cracking furnace operating with walls at temperatures from 700°C to 1350°C comprising:

i) a substantially metallic flow passage defined by at least one surface having a downstream outlet (14) and at least one upstream inlet (1) for at least a gaseous oxidant;

ii) said substantially metallic flow passage having at least one descending baffle (16) depending from a region not more than 10% forward of the forward lip of said downstream outlet for said one or more gaseous oxidants, to the forward lip of said one or more outlets for said one or more gaseous oxidants, said descending baffle descending inside the upper metal section of the burner from 50 to 90% of the height of the front face (10) of said burner; and extending laterally across the inner surface of the burner from 100 to 75 % of the width of the face of said burner, said descending baffle being positioned so that there are substantially equal openings on each side of the descending baffle relative to the side walls (8) of the upper metal section and optionally said descending baffle having one or more circular channels there through to permit one or more fuel supply lines to pass there through; and

iii) optionally one or more arrays of heat convective surfaces (38) selected from baffles ribs, fins and protuberances to direct the flow of said at least a gaseous oxidant over said one or more arrays on the internal surface of said substantially metallic flow passage;

the burner comprising in cooperating arrangement:

i) a lower metal flow passage (21) for one or more gaseous oxidants having an open back end, closed side walls (22) and a closed bottom wall (23), a front wall (25) and a top wall (24) which does not extend the full length of the side walls to define an open upward facing vent (26) in the upper front end of the flow passage; and a metal front wall continuous with the bottom wall of the flow passage;

ii) an upper metal section having the same width as the metal flow passage comprising an upper front wall (29), two parallel side walls (27) and a rear wall (28) defining a chamber, an open bottom which co-operates with the open upward facing vent (26) in the flow passage and the upper front wall (29) and an open top said upper front wall (29) and back wall (28) having openings (50) therein at substantially the same height and lateral displacement to provide for one or more fuel supply lines (11) passing from the back to the front of said upper section;

iii) either:

a) one or more metal, or ceramic coated metal, top plates (33) cooperating with the open top of the upper metal section, said one or more top plates having a substantially planar surface and optionally having a curved leading edge and one or more substantially circular passageways there through (34), a back section having one or more polygon outlets (35) for said one or more gaseous oxidant there through; or

b) a continuation of the upper front wall extending to the back wall of the upper section said continuation having a leading edge optionally curved and optionally having one or more substantially circular passageways there through (34), and a substantially planar back section having one or more polygon outlets (35) for the oxidant there through, said back section optionally being coated with a ceramic; and

iv) one or more baffles (37) extending into said upper metal section.

2. The burner according to claim 1, having an arrays of heat convective surfaces that are ribs that define at least one continuous series of parallel channels (38) at least on the internal surface of the portions of the burner exposed to the cracking furnace.

3. The burner according to claim 2, wherein the channels have a height to width ratio from 0.1 to 2.

4. The burner according to claim 3, wherein a metallic fuel line (11) terminates proximate the external front surface for said flow passage from 25 to 75 % of the height of the front of the flow passage.

5. The burner according to claim 4, wherein said metallic flow passage has a thickness from 4 to 25 mm.

6. The burner according to claim 1, comprising a series of parallel longitudinal internal ribs (38) to direct the flow of said at least a gaseous oxidant over the forward facing surface of said descending baffle.

7. The burner according to claim 6, further comprising an ascending baffle (37) extending forward from the upper wall (24) of said lower metal flow passage into from 45 to 85% of the open area in the chamber of a upper metal section.

8. The burner according to claim 7, wherein said ascending baffle extending forward from the upper wall (24) of said lower metal flow passage is bent in its forward section up towards said one or more outlets to provide an upwards facing ascending baffle parallel to the inner front wall of upper section (29) and where required the upward extending section of said ascending baffle having one or more circular channels (36) there through to permit one or more fuel supply lines to pass there through.

9. The burner according to claim 8, wherein said ascending baffle extending forward from the upper wall (24) of said lower metal flow passage further comprises on the surface facing the inner front wall (29) of upper section a series of parallel longitudinal internal ribs (38) to direct the flow of said at least a gaseous oxidant over the internal surface of said substantially metallic flow passage.

10. The burner according to claim 9, wherein the channels have a height to width ratio from 0.1 to 2.

11. A substantially metallic burner having a service temperature of not less than about 1200°C for a cracking furnace operating with walls at temperatures from 700°C to 1350°C comprising:

i) a substantially metallic flow passage defined by at least one surface having a downstream outlet (14) and at least one upstream inlet (1) for at least a gaseous oxidant;

ii) said substantially metallic flow passage having at least one descending baffle (16) depending from a region not more than 10% forward of the forward lip of said one or more outlets for said one or more gaseous oxidants, to the forward lip of said one or more outlets for said one or more gaseous oxidants, said descending baffle descending inside the upper metal section of the burner from 50 to 90% of the height of the front face (10) of said burner; and extending laterally across the inner surface of the burner from 100 to 75 % of the width of the face of said burner, said descending baffle being positioned so that there are substantially equal openings on each side of the descending baffle relative to the side walls (8) of the upper metal section and optionally said descending baffle having one or more circular channels there through to permit one or more fuel supply lines to pass there through; and

iii) optionally one or more arrays of heat convective surfaces (38) selected from baffles ribs, fins and protuberances to direct the flow of said at least a gaseous oxidant over said one or more arrays on the internal surface of said substantially metallic flow passage;

wherein the burner has arrays of heat convective surfaces that are ribs that define at least one continuous series of parallel channels (38) at least on the internal surface of the portions of the burner exposed to the cracking furnace;

wherein the channels have a height to width ratio from 0.1 to 2;
wherein a metallic fuel line (11) terminates proximate the external front surface for said flow passage from 25 to 75 % of the height of the front of the flow passage;

wherein the metallic flow passage has a thickness from 4 to 25 mm; and

wherein the burner comprises in cooperating arrangement:

i) a lower metal flow passage (41) for one or more gaseous oxidants having an open back end, closed side walls (42) and a closed bottom wall (43), a front wall (45) and a top wall (44) which does not extend the full length of the side walls to define an open upward facing vent (46) in the upper front end of the flow passage; and a metal front wall continuous with the bottom wall of the flow passage;

ii) an upper metal section having the same width as the metal flow passage (46) comprising a front wall (49), two parallel side walls (47) and a rear wall (48) defining a chamber, an open bottom which co-operates with the open upward facing vent (46) in the flow passage and a front wall (49) and an open top said front wall (49) and back wall (48) having openings (50) therein at substantially the same height and lateral displacement to provide for one or more fuel supply lines passing from the back to the front of said upper section;

iii) either:

a) one or more metal, or ceramic coated metal, top plates (12) cooperating with the open top of the upper metal section, said one or more top plates having a substantially planar surface and optionally having a curved leading edge and one or more substantially circular passageways (59 there through, the back section having one or more polygon outlets (55) for said one or more gaseous oxidant there through; or

b) a continuation of the upper front wall extending to the back wall of the upper section said continuation having a leading edge optionally curved and optionally having one or more substantially circular passageways there through, and a substantially planar back section having one or more polygon outlets for the oxidant there through, said back section optionally being coated with a ceramic; and

iv) an ascending baffle (58) extending forward from the upper wall (44) of said lower metal flow passage into from 45 to 85% of the open area in the chamber of a upper metal section.

12. The burner according to claim 11, wherein said ascending baffle extending forward from the upper wall of said lower metal flow passage (44) is bent in its forward section up towards said one or more outlets to provide an upwards facing ascending baffle (58) parallel to the inner front wall of upper section (49) and where required the upward extending section of said ascending baffle having one or more circular channels (50) there through to permit one or more fuel supply lines to pass there through.

13. The burner according to claim 12, wherein said ascending baffle (58) extending forward from the upper wall (40) of said lower metal flow passage further comprises on the surface facing the inner front wall of upper section a series of parallel longitudinal internal ribs (38) to direct the flow of said at least a gaseous oxidant over the internal surface of said substantially metallic flow passage.

14. The burner according to claim 13, wherein the channels have a height to width ratio from 0.1 to 2.

15. The burner according to claim 7, wherein said one or more top plates (12) is present and is metal.

16. The burner according to claim 7, wherein said one or more top plates (12) is present and is metal coated with a ceramic.

17. The burner according to claim 11, wherein said one or more top plates (12) is present and is metal.

18. The burner according to claim 11, wherein said one or more top plates (12) is present and is metal coated with a ceramic.

19. The burner according to claim 7, wherein the upper front wall continues to the upper back wall and the back section is not coated with ceramic.

20. The burner according to claim 7, wherein the upper front wall (10) continues to the upper back wall and the back section is coated with ceramic.

21. The burner according to claim 11, wherein the upper front wall (10) continues to the upper back wall and the back section is not coated with ceramic.

22. The burner according to claim 11, wherein the upper front wall (10) continues to the upper back wall and the back section is coated with ceramic.