The invention relates to a flat-flame burner in which the special geometrical configuration of the burner components for introducing the fuel and the combustion air ensure proper mixing thereof and the required geometrical shape of the flames over a wide range of operating conditions.

4 Claims, 2 Drawing Figures
The present invention relates to a flat-flame burner utilizing liquid fuels and has more particularly for its object to provide a structure for such a burner enabling the same to utilize heavy fuels.

In certain steelmaking applications such as for annealing certain substances in heating furnaces, it is often the practice to use the so-called radiant arch technique, which is based on the utilization of "wall flame" burners in which the flame develops along a divergent tunnel, in a plane perpendicular to the axis thereof, so as to lick the wall of the furnace formed by an arch or a wall. Thus the heat transmitted by the flame to the furnace wall by convection is restored by this wall by radiation and is transmitted to the items to be annealed in the furnace.

Prior art "wall flame" burners can operate only on gas or domestic fuel, and it would obviously be most useful for users to have burners capable likewise of operating on fuel-oil and especially heavy fuel-oil.

It is an object of the present invention to provide a structure for a liquid fuel burner of the above-mentioned kind capable of utilizing heavy liquid fuels.

Generally speaking, operation of the aforesaid kind of burner with a flat-flame requires a special geometrical configuration of the fuel and combustion-air-admitting components. Such configuration must ensure not only proper mixing of the fuel and the oxidant but also the required geometrical shape of the flame over a wide range of operating conditions.

In the particular case of liquid fuel burners, the above requirements are particularly stringent since the geometry of fuel injection into the divergent burner tunnel must be continuously ensured. Hence protracted fouling (due to coking for instance) of the burner tip must be avoided at all costs since this could modify the angle of fuel injection into the tunnel and thereby cause a change in the geometrical shape of the flame.

Further, the position of the injector must be so chosen as to ensure absolute cleanliness of the burner tunnel in operation.

A flat-flame burner according to this invention for heavy liquid fuels, comprising a cylindrical body coaxially surrounding a fuel and primary air feeding stick terminating in an injector, a divergent tunnel downstream of the injector, said body being further provided with a secondary air inlet opening in the annular compartment bounded by said body and said stick, and further means being provided for rotating said secondary air before it is re
3,809,525

3, 809, 525

leased through an annular slit surrounding the injector, characterized in that said injector includes a needle-valve along which the liquid fuel runs and at the end of which it is transformed into droplets, said needle-valve being surrounded by a diffuser formed with helicoid primary-air-feeding passages that atomizes said droplets, the air/fuel suspension being thereafter directed towards an orifice provided in a disc which has formed therein a convergent nozzle terminating in a flared portion which blends the convergent nozzle portion with the disc face, which face lies in a plane perpendicular to the burner axis or very slightly inclined thereto.

2. A burner according to claim 1, characterized in that said orifice in said disc forming the burner tip is a very short profiled hole which is flared at either end.

3. A burner according to either preceding claim, characterized in that said disc is made of a refractory material which is a poor heat conductor.

4. A burner according to claim 1, characterized in that said injector is disposed in the burner tunnel so that the external envelope of the jet of atomized liquid fuel lies close to the tangent to the divergent and flared portion of the tunnel, the jet forming an aperture angle of close on 40°.

* * * * *