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AUTHORS: Potapenko, A. Ye., Kostenko, P. P.

TITLE: Effect of an electric field on a flame

PERIODICAL: Inzhenerno-fizicheskiy zhurnal, v. 5, no. 10, 1962, 73 - 76

TEXT: It is sought to improve the break-off characteristics of a burner by applying a constant electric field. The experiments were made with a "Pyrex"-glass nozzle burner with a nozzle of 9.8 mm. Inside the burner, at a distance of 26 mm from its orifice a central electrode was used and outside it a ring electrode of 32 mm diameter; the distance between the latter and the orifice being varied during the experiments. A mixture of air and ethyl alcohol was burned at 100°C. At d-c voltages between 10 and 35 kv and with different polarities of the two electrodes, the air supply was increased until the flame broke off. When the ring electrode was placed directly at the orifice ( $h=0$ ) and a negative field (in relation to the central electrode) was applied, the air supply had to be considerably increased to break off the flame at a given fuel consumption. A positive polarity of the central electrode impaired the break-off characteristics.

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Effect of an electric field...

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The results when the ring electrode was placed at a distance of  $h = 16$  mm from the orifice of the burner were quite different. With either type of polarity the velocity at which the flame broke off increased with the voltage applied. It could be proved by Michelson's schlieren method that the inner flame cone and the normal propagation rate of the flame do not change when an electric field is applied. The effects observed are explained by different directions of the flow of charged gas particles. Inferior mixing with air and an increased velocity gradient on the burner wall ought consequently to impair the break-off characteristics, too. Further studies into the effect of an electric field on the break-off characteristics were made with a brass burner of 27 mm diameter, enclosed in a low-pressure chamber. There are 3 figures.

SUBMITTED: April 12, 1962

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