ward and forward until a clear inverted image of the arc was obtained, thus permitting sketches and even photographs of the arc to be made. A few of the sketches made are shown in diagram form. Fig. 1, *a* and *b*, represents what will be called a normal arc, that is, one where the movable electrode is the negative pole. The flame apparently flowed from the electrode to the slag, depressing the slag and flaring out to all sides, as in the case of diagram *a*, Fig. 1, or to one side in the case of *b*, Fig. 1. An arc length of about 3 inches ((7.6 cm.) could easily be maintained. Under these circumstances the arc was silent.

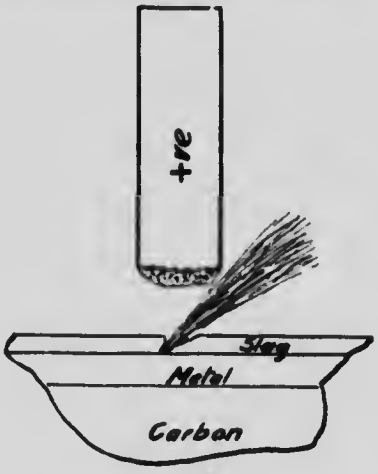

FIG. 2.

Fig. 2 represents what occurs as soon as the polarity of the furnace is changed. A very unstable arc appeared. This arc started below the surface of the slag, the flame moving away from the slag surface and projecting particles of slag into the air with considerable force. The length of this arc could barely be maintained at a greater length than 1 inch (2.54 cm.). The noise of the arc was loud and spluttering.

It had been noticed that if, with a normal arc such as *a* and *b*, Fig. 1, large currents were allowed to flow, the arc became noisy and had a tendency to quench itself, even at comparatively short lengths. What actually happened is seen in Fig. 3. Two distinct