Compared to other steel-making methods, the electric furnace has definite advantages. First, the electric arc is a source of "pure" heat, by which heating and melting of the charge is accomplished without contaminating the melt by combustion products of a gaseous or liquid fuel.

Further, the rate of heat application is very rapid, yet can be closely controlled. The heat of the bath is easily adjustable, up or down, by adjusting the electrical input to the electrodes.

The conventional electric furnace, however, has one serious drawback. During the refining period, the bath of molten steel is comparatively quiet and circulation of the melt within the furnace is limited. Now it is common knowledge to melters of high-quality steels in electric-arc furnaces that an inert molten metal bath during the refining period is undesirable. Alloying elements tend to stratify and temperature distribution is not uniform. Accurate sampling of the melt is thus practically impossible.

Various manual or mechanical methods are used in conventional furnaces to obtain some degree of mixing or stirring of the metal and slag. Occasional hand-stirring of the melt is difficult and cumbersome and the effects only temporary.

The *induction stirrer* has proved to be a practical and efficient method of setting up a continuous turbulence in the molten bath. This ingenious device was invented, and developed by the Allmänna Svenska Elektriska AB, (ASEA), which is the largest electrical works in Sweden. In simplest terms, the stirrer can be described as a segment of the stator of a gigantic induction motor which is mounted on the outside of the furnace bottom. It sets up a moving magnetic field which penetrates the non-magnetic steel furnace bottom as well as the refractory bottom lining. This magnetic field sets up mechanical forces which agitate and stir the entire bath.

The result is a saving in time per melt, since the reaction between steel and slag is hastened. De-slagging is much more thorough since the slag can actually be swept toward the slag door by stirring action alone. In addition, the alloying elements which are added to the steel are much more rapidly and thoroughly distributed throughout the melt, and the temperature of the bath is more uniform. All of this adds up to better chemical control which means better and more uniform steel.

The first installation of this type of stirrer was at the Surahammar steel works in Sweden in 1939. The second was at the Hagfors Works in 1947. The first Surahammar stirrer confirmed the principle, but had operating difficulties which required its being removed from service. In 1948, a second stirrer was installed at Surahammar and is still operating successfully. Several additional stirrers have since been ordered for other European steel plants and some are already in operation.

During the latter part of 1950, an agreement to manufacture the stirrers in this country was made between Aros Electric, Incorporated, of New York and Elliott Company. Aros Electric, Incorporated, is a wholly-owned subsidiary of ASEA and the induction stirrer is being marketed through this organization. The first Aros stirrer to be installed on an electric furnace in the United States (and the largest installed anywhere), went into service in the fall of 1952 at the melt shop of Timken Roller Bearing Company, Canton, Ohio.