This invention relates to electric furnaces for the smelting of metals which have grooves filled with molten metal and terminating at the upper end in a hearth space.

This invention has for its object the influencing of the magnetic pressures which occur together with the stream lines and are directed perpendicularly to the same, wherein from results that in the grooves and specially in the groove-mouths, and further in the hearth space, electro-dynamic eddy formations occur, which act upon a mixing through of the bath, so that hotter bath portions are mixed with colder ones. The foregoing expressions “magnetic pressures”, “stream lines”, and “electro-dynamic eddy formations”, are explained as follows; to wit: Magnetic pressure results when an electric current flows in a conductor, a magnetic field is formed around the conductor and this field produces a magnetic pressure in known manner in the direction of its expansion. If the current flows in a rigid or solid conductor, this pressure can not be ascertained, as it is comparatively small. If, however, the current is supplied to a liquid conductor, for example to a tube filled with liquid metal, and is passed through the tube for the purpose of heating the metal, compressions will be noticed which are caused by this magnetic pressure. The direction of this magnetic pressure is perpendicular to the direction of the current. With reference to the expression “stream lines”, it is to be noted that when current flows in a conductor, the cross section of the conductor can be imagined as subdivided and the current coming onto such a small cross section may be called “stream line”. This is similar to the lines of force in magnetic fields. Regarding the expressions “electro-dynamic eddy formations”, it is to be noted that if a liquid electric conductor is of cylindrical shape, all the magnetic pressure builds up around the central axis of the conductor so that the pressure will become so great that it can overcome the hydrostatic counter pressure. If the conductor has diverging boundary surfaces, magnetic pressure components are produced which extend obliquely to the central axis of the conductor and in this case “eddy formations” occur in the conductor. Such eddy formations are magnetic eddies which are generally termed “electro-dynamic eddies”. Eddy formations and electro-dynamic eddy formations are the same, the latter expressions indicating the origin of the eddy formations.

It is however desired to produce the eddy formation and the mixing through of the bath portions now stronger and then feebler, as in the phases of smelting or of keeping of warm bath.

According to the observation on which the invention is based, the eddy formation and thereby the bath movement can be considerably influenced, if a web bridging the grooves and constructed of electricity conducting substances, is inserted in the grooves from the hearth space. This web offers to the stream lines a more easy way, due to the high electric conducting resistance which the hot metal possesses, so that thereby the course of the stream lines is altered and influenced and the eddy formation can thereby be altered. This variation of the course of stream lines is obtained according to whether the web is sunk more or less deeply into the hearth space, and it is therefore more advisable to make the web adapted to be lifted and lowered and also adapted to be shifted in lateral directions.

In order to facilitate the deflecting of the stream lines upon the web and to eventually alter the direction of the stream lines on their course from the groove into the hearth, stud-like projections engaging with the groove mouth may be arranged on the web. These studs may be constructed as tubular bodies.

It is specially practical, if the projections on the bridging web are arranged on the side of the web turned away from the groove mouths. In this case the metal flows from the groove can be drawn higher up into the colder zones of the bath.

Three embodiments of the invention are illustrated by way of example in the accompanying drawing in which:

Fig. 1 shows a bridging web with stud-like projections engaging in the grooves.

Fig. 2 shows the bridging web with tubular projections.