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RAIL HEATING METHOD
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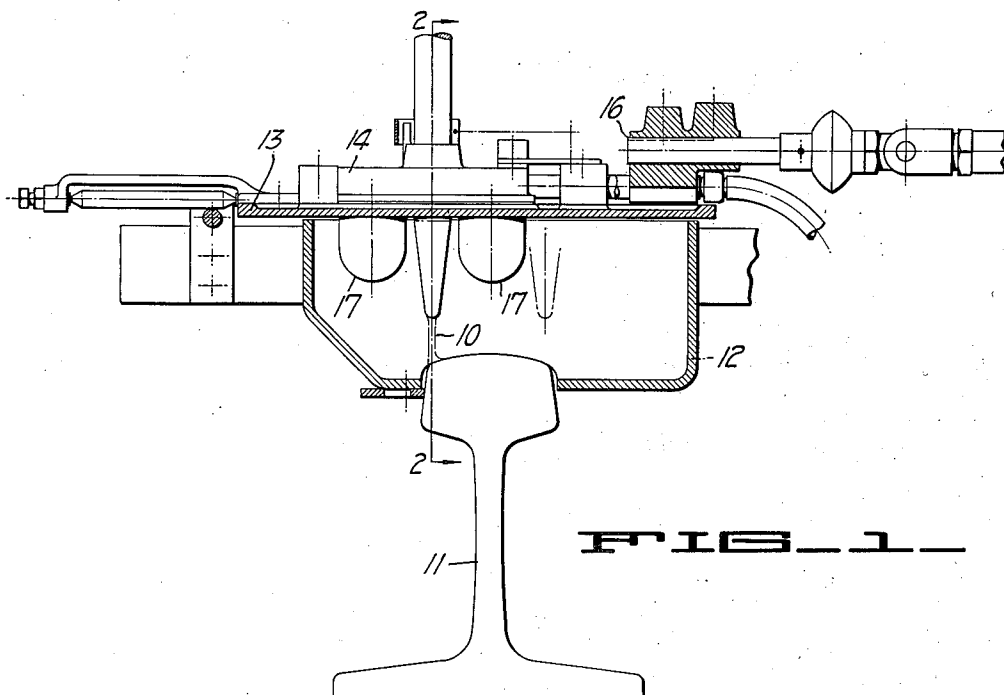


FIG. 1

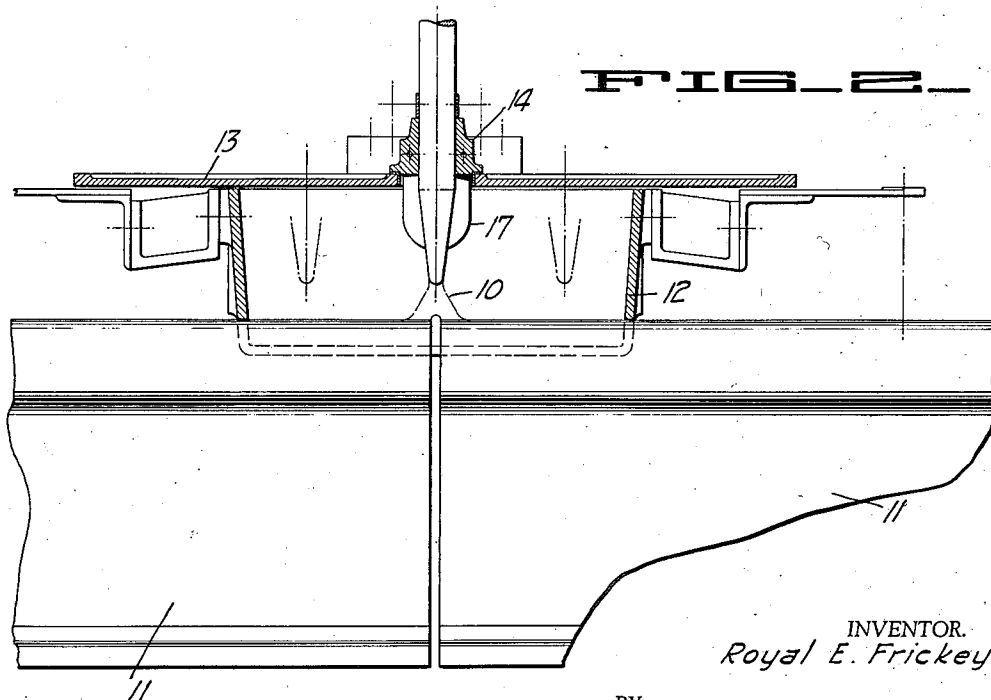


FIG. 2

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RAIL HEATING METHOD

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4 Claims. (Cl. 219—15)

This invention relates generally to the heating of railroad rails in rail treatment processes, where the heated area is subsequently chilled to effect hardening.

5 In co-pending application Serial No. 660,544, filed March 13, 1933, there is disclosed a novel rail treatment process for the hardening of rail-
road rails, in which a limited area of the upper
10 surface of the rail is heated to an elevated tem-
perature by traversing an electric arc over the
same, after which the heated area is chilled to
effect hardening. Because of the relatively high
temperature of an electric arc, and the localized
15 heating caused by the same, there is a tendency
for the arc to burn the surface of the rail over
which it is traversing. There is also a tendency
for the electric arc to be unstable and erratic in
its operation. Burning of the upper surface of
20 the rail is obviously undesirable, particularly since
it may mar or pit the upper surface of the rail
to a detrimental degree, and since scale or like
evidence of burning must be cleaned away before
contacting the heated area with a chilling me-
25 dium. Lack of stability and erratic operation of
the arc are likewise undesirable, because of the
operating difficulties which are involved in the
event the arc is extinguished, and because lack
of stability is generally accompanied by ineffi-
cient transfer of heat.

30 It is an object of the present invention to provide an improved method of heating rails by an electric arc, which will minimize burning of the surface of the rail and which will cause the arc to be stabilized and uniform in its operation.

35 Further objects of the invention will appear from the following description in which the preferred embodiment of the invention has been set forth in detail in conjunction with the accompanying drawing.

40 Fig. 1 is a transverse cross-sectional view illustrating apparatus such as can be used in carrying out my method.

Fig. 2 is a cross-sectional detail taken along the line 2—2 of Fig. 1.

45 In the drawing there is disclosed a portion of the rail heating apparatus utilized in the process disclosed and claimed in said co-pending application Serial No. 660,544 and likewise disclosed in application Serial No. 666,528, filed April 17,
50 1933. Briefly, this apparatus consists of an electric arc 10, arranged to operate upon the upper surface of a railroad rail 11. To afford a suitable enclosure for the arc, I have shown a box 12 having an open bottom and adapted to rest
55 upon the rail. The top of this box is enclosed by

a movable cover 13, which serves to carry the electrode holder 14. Arm 16 serves to connect the holder and the cover to suitable actuating mechanism, whereby the electrode is rapidly traversed over the area being heated, in directions
5 both laterally and longitudinally of the rail. Such traversing movement can be conveniently accomplished by rapidly reciprocating the electrode laterally of the rail, while at the same time effecting reciprocation longitudinally of the rail.
10 With such traversing movement, the arc established between the lower end of the electrode and the upper surface of the rail traces intersecting zigzag paths, so that the heat from the arc is distributed over all points of the area being
15 heated. To minimize concentration of heat and to enable a greater power input to the arc, magnetic means 17 is shown for spreading the arc fan shaped. As shown in Fig. 2, the upper surfaces of rail ends at a rail joint are being heated
20 preparatory to a hardening operation.

In applying the present invention, I apply over the area to be heated a material containing an ionizing medium, prior to the striking of the arc. Thereafter, during the heating operation this
25 material influences operation of the arc, to minimize burning of the upper surface of the rail and to cause stable arc operation. While the material can be applied to the upper surface of the rail in the form of a paste, it is more conveniently applied in the form of a granular powder which can be sprinkled upon the rail before the
30 arc is struck.

A material which has given good results is as follows:

	Percent
Potassium ferro-cyanide.....	45
Sodium chloride.....	30
Sodium carbonate.....	7
Calcium carbonate.....	9
Charcoal.....	9

(Percentages are by weight.)

The above material is a homogeneous mixture in the form of a granular powder. A thin layer of this composition can be sprinkled over the area
45 to be heated, and after striking the arc it will not be immediately blown out of the enclosure.

The principal ionizing medium of the above material is potassium ferro-cyanide, which has a marked effect upon stabilizing the arc, and which
50 also minimizes burning of the upper surface of the rail. In fact, I have utilized this ingredient of itself, with considerable success. The remainder of the ingredients, however, are deemed de- 55

sirable in order to minimize evolution of poisonous gases, and in order to facilitate maintenance of a reducing atmosphere. A reducing atmosphere tends to minimize burning of the rail metal and to avoid carbon impoverishment of the layer of metal being heated.

I claim:

1. In a method of heating railroad rails preparatory to hardening by chilling, spreading a material over a limited area of the upper surface of the rail to be heated, the material consisting of a mixture of potassium ferro-cyanide, sodium chloride, sodium carbonate, calcium carbonate and charcoal, the potassium ferro-cyanide being the major constituent, and then traversing an electric arc over said area.

2. In a method of heating railroad rails preparatory to hardening by chilling, the step of traversing an electric arc over the surface to be heated in the presence of an alkali metal cyanide,

to cause the arc to be stabilized and to prevent injury to the surface of the rail.

3. In a method of heating railroad rails preparatory to hardening by chilling, spreading a material over a limited area of the upper surface of the rail to be heated, the material containing an alkali metal cyanide, and then traversing an electric arc over said area, the alkali metal cyanide serving to cause the arc to be stabilized without imparting hardening agents to the rail metal.

4. In a method of heating railroad rails preparatory to hardening by chilling, sprinkling a granulated powder over a limited area of the upper surface of the rail to be heated, the powder containing an alkali metal cyanide, and then traversing an electric arc over said area, the alkali metal cyanide serving to cause the arc to be stabilized without imparting hardening agents to the rail metal.

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