H. GOLDSCHMIDT.

METHOD OF UNITING RAILS AND THE LIKE.

APPLICATION FILED NOV. 9, 1912.

1,090,296. Patented Mar. 17, 1914.

Fig. 1

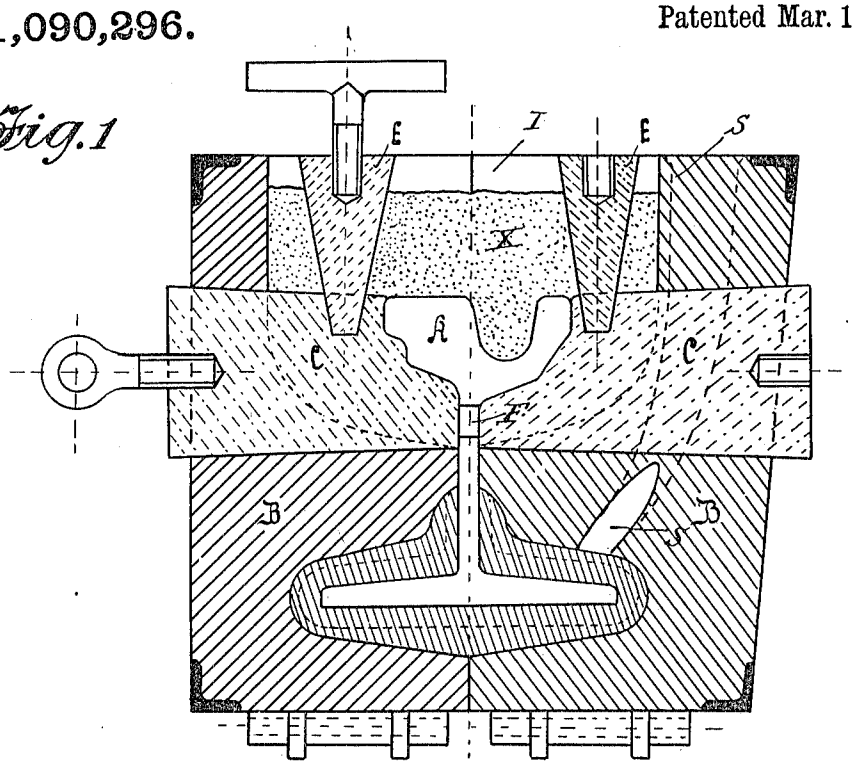
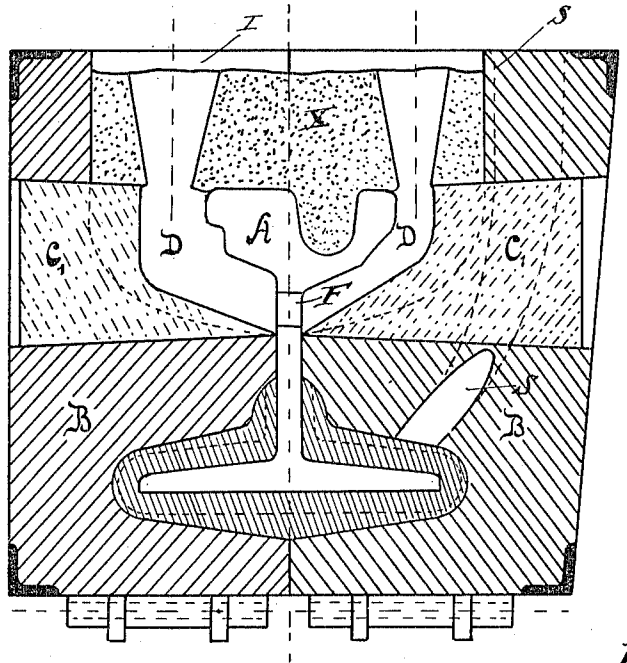


Fig. 2



Witnesses;
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UNITED STATES PATENT OFFICE.

HANS GOLDSCHMIDT, OF ESSEN-ON-THE-RUHR, GERMANY.

METHOD OF UNITING RAILS AND THE LIKE.

1,090,296. Specification of Letters Patent. Patented Mar. 17, 1914.

Application filed November 9, 1912. Serial No. 730,358.

To all whom it may concern:

Be it known that I, HANS GOLDSCHMIDT, doctor of chemical science, a subject of the King of Prussia, German Emperor, and a resident of Essen-on-the-Ruhr, in the Province of the Rhine, German Empire, have invented new and useful Improvements in Methods of Uniting Rails and the like, of which the following is a specification.

In order to unite rails and the like, and more especially steel rails which are fixed in position or relatively immovable, by an alumino-thermic or similar welding process, the molten iron resulting from the reaction has hitherto been mostly poured into a mold surrounding the ends of a rail for example, in such a manner that the foot and the greater part of the web were fused together with the aluminothermic iron to form a united and continuous piece. In this process, in which the slag was used for heating the rail heads to welding temperature, a metallic union of the rail heads could only be obtained by jumping or forcing the rail ends together, but such a jumping operation could not be performed when the rails were laid in paved surfaces. Even when such a quantity of aluminothermic mixture was used that the iron resulting from the reaction reached the rail heads, it was not possible to obtain a complete or sound union of the rail heads, because, although the highly superheated aluminothermic iron easily fused with the comparatively thin foot and web of the rails, it did not unite with the rail heads which are of comparatively large cross sectional area.

Now according to the present improvements it is possible to obtain a sound and complete union of the rail heads, and this is accomplished by fusing to the sides of the rail heads, which latter have been highly heated by the slag produced in the process of joining the foot and web, one or two strengthening pieces which act as fish plates or the like.

The new or improved method can be carried out in different ways and it is possible, for example, to carry out the welding of the foot and web in the manner indicated, then to quickly knock off the hot slag and finally to surround the rails while still hot with a second mold, having spaces for the strengthening pieces which are to be fused on the rail head, after which, highly heated liquid iron is poured into this second mold.

Another method of carrying out the present invention consists in providing the slag itself with spaces for the reception of the two strengthening pieces for the head and apparatus for this purpose is illustrated by the accompanying drawings in which:—

Figure 1 is a transverse sectional elevation of a mold for uniting the foot of the rail and a part of the web, while Fig. 2 is a similar view of the mold adapted for use when fusing or welding the strengthening pieces on each side of the rail head.

In Fig. 1 A is the section of the rail ends to be united, B B are the two halves of the mold and C C are two mold parts passing horizontally through the upper part of the mold B and extending to the rail head on each side. These parts C are in the nature of cores as they are for the purpose of forming spaces in the slag casting as will presently appear. If the superheated liquid material be poured into the mold B, the aluminothermic iron fuses the ends of the rail feet and the whole or a part of the webs together and the slag heats the heads of the rail ends and the mold parts C C. To effect the latter operation, the upper part of a mold above the parts C C and the rail head is provided with a space I to receive a molten heating agent X, which is preferably the slag resulting from the aluminothermic reaction by means of which the molten iron is produced. The aluminothermic iron is first poured in the sprue opening S to fill the lower part of the mold to effect the joint between the lower portions of the rails, after which the residual molten slag is poured into the space I. When the slag has set or solidified, the mold parts C C are withdrawn from the mold B and replaced by shorter mold parts C_1 C_1 Fig. 2, in such a manner that two spaces D D on the sides of the rail are formed. Two tapered or funnel shaped plugs or cores E E Fig. 1 produce when withdrawn two holes in the slag above the rail head as shown in Fig. 2 which holes may serve as ingate and riser respectively for the aluminothermic iron during pouring or for any other highly heated iron used for the production of the second casting. In order to enable the iron that flows into the mold to fill both spaces D D at the same time, a communication between these spaces may be formed by means of a hole or slot F in the web preferably immediately below the rail head. It is, however, possible to cause

the iron to flow over the rail head and over the solidified slag to the other side of the rail head, by leaving an overflow-conduit above the solidified slag for the aluminothermic iron flowing over the rail head from one side to the other thereof, as indicated in Fig. 2. Of course it is possible to fill each hollow space D D by separate pours, but the best result will, as aforesaid, be obtained when the two sides of the strengthening piece are cast at the same time from one crucible only.

By carrying the invention into practice as hereinbefore described an exceptionally strong and durable union of the rails is obtained.

As a basis for the thermic mixture employed in carrying out the method as hereinbefore described, aluminum and any other similarly acting metals or alloys may be used, such as, for example calcium-silicon, calcium-aluminum or the like.

What I claim is:

1. A method of uniting rails and the like which consists in first welding together the lower parts of the rail sections and then welding or fusing a separate strengthening piece alongside of the upper parts or heads of the sections.

2. A method of uniting rails and the like which consists in first welding together the lower parts of the rail sections, by surrounding them with molten iron and then welding or fusing a separate strengthening piece alongside of the upper parts or heads of the sections.

3. A method of uniting rails and the like which consists in first welding together the lower parts of the rail sections, by surrounding them with molten iron resulting from an aluminothermic process and then welding or fusing a separate strengthening piece alongside of the upper parts or heads of the sections.

4. A method of uniting rails and the like which consists in first welding together the lower parts of the rail sections, by surrounding them with molten iron resulting from an aluminothermic process, heating the upper parts of the sections by the slag produced simultaneously with the iron and then welding or fusing a strengthening piece alongside of the upper parts or heads of the sections.

5. A method of uniting rails and the like which consists in first welding together the lower parts of the rail sections, by surrounding them with molten iron resulting from an aluminothermic process, heating the upper parts of the sections by the slag produced simultaneously with the iron, in which slag apertures or spaces for producing or receiving the strengthening pieces are formed.

6. A method of uniting rails and the like which consists in first welding together the lower parts of the rail sections, by surrounding them with molten iron resulting from an aluminothermic process, heating the upper parts of the sections by the slag produced simultaneously with the iron, in which slag apertures or spaces for producing or receiving the strengthening pieces are formed by means of insertible and removable cores.

7. A method of uniting rails and the like which consists in first welding together the lower parts of the rail sections, by surrounding them with molten iron resulting from an aluminothermic process, heating the upper parts of the sections by the slag produced simultaneously with the iron, in which slag the spaces for receiving the strengthening pieces are formed by first inserting a core into the mold fitting against the rail section and then replacing this core by a shorter one.

In witness whereof I have hereunto set my hand in the presence of two witnesses.

HANS GOLDSCHMIDT. [L. S.]

In the presence of—

HELEN NUFER,

ALBERT NUFER.