No. 890,337. PATENTED JUNE 9, 1908.

W. H. CONNELL.

MANUFACTURE OF COMPOUND INGOTS.

APPLICATION FILED SEPT. 27, 1907.

FIG. 3.

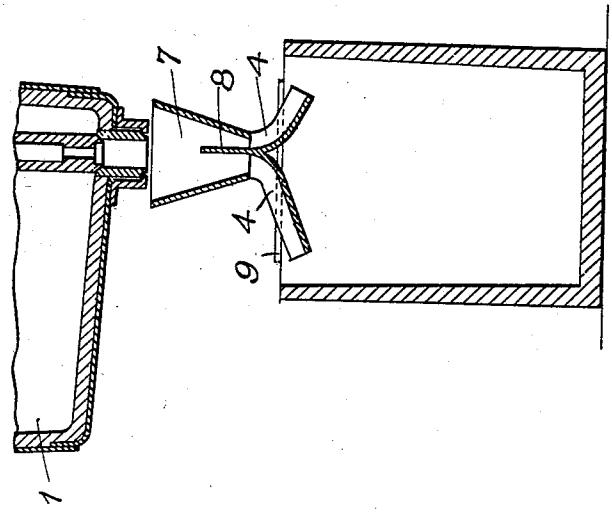

FIG. 1.

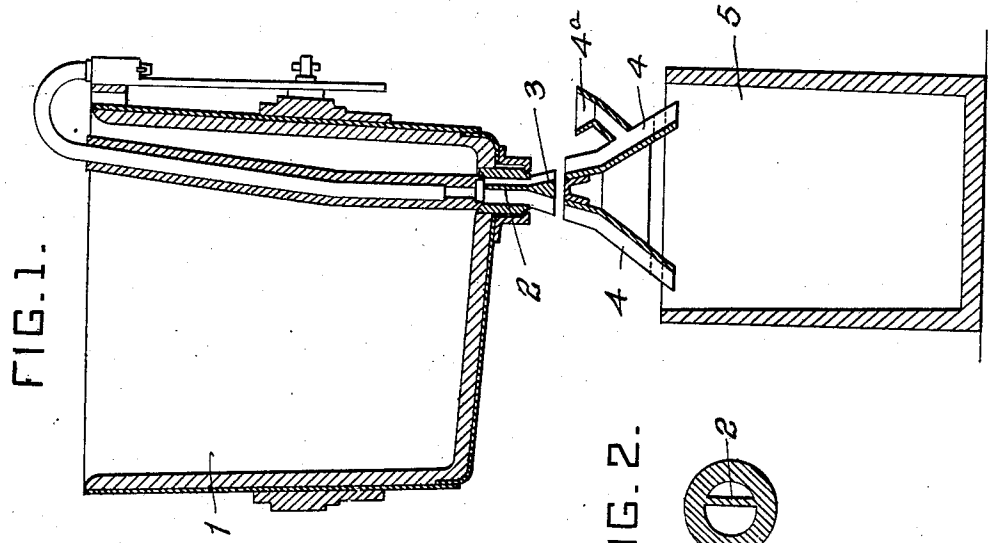

FIG. 2.

WITNESSES:

J. Herbert Bradley.

Charles Barnes.

William H. Connell INVENTOR

by Christy and Christy. Atty's.

THE NORRIS PETERS CO., WASHINGTON, D. C.

UNITED STATES PATENT OFFICE.

WILLIAM H. CONNELL, OF PITTSBURG, PENNSYLVANIA.

MANUFACTURE OF COMPOUND INGOTS.

No. 890,337. Specification of Letters Patent. Patented June 9, 1908.

Application filed September 27, 1907. Serial No. 394,873.

To all whom it may concern:

Be it known that I, WILLIAM H. CONNELL, residing at Pittsburg, in the county of Allegheny and State of Pennsylvania, a citizen of the United States, have invented or discovered certain new and useful Improvements in the Manufacture of Compound Ingots, of which improvements the following is a specification.

In an application Serial No. 390,797, filed August 30th, 1907 I have described and claimed an improved method of forming compound ingots, said method consisting generally stated in simultaneously introducing metals varying in one or more characteristics into the mold in distinct streams side by side. The invention described herein has for its object the changing of the character of one or more of such streams as by the addition of some suitable material or materials thereto, as it flows to the mold.

The invention is hereinafter more fully described and claimed.

In the accompanying drawing forming a part of this specification Figure 1 is a sectional elevation of a form of apparatus adapted to the practice of my invention Fig. 2 is a detail view of the pouring spout of the ladle shown in Fig. 1 and Fig. 3 is a view similar to Fig. 1 illustrating a modified form of apparatus.

In the manufacture of rails it is desirable that the head or tread which is subject to the greatest wear and strain should be made hard and tough, which can be obtained only by alloying the Bessemer or other metal now generally used. The alloys such as nickel, vanadium, chromium, etc., generally used for this purpose are expensive and if the whole rail be made from the same metal, as is necessary under the present practice, the cost of manufacture is greatly increased. If however the portion of the ingot from which the head of the rail is to be formed can be alloyed or treated a very considerable saving in the cost of manufacture will be effected.

In the practice of my invention, the metal *e. g.* Bessemer metal which is to form the largest ingredient is introduced into the mold in two or more distinct streams as stated in the application referred, and into that one of the streams designed to form the portion of the ingot to be rolled into the head of the rail, is introduced the alloying material. This alloying material may consist of compound of carbon nickel and vanadium in any suitable proportions, or other alloying materials may be used.

In the preferred practice of my invention, the metal for forming the larger part of the ingot is run into a ladle 1 and in its passage from the ladle to the mold, the metal is divided into two or more streams suitably proportioned, as regards relative volume. This division of the metal into two or more streams can be effected in many ways, as for example by forming a diaphragm 2 across the outlet opening from the ladle. In order to further divert these streams the diaphragm is provided with a wedge shaped extension 3. It is preferred that the streams of metal should enter the mold as widely separated as possible and to that end oppositely arranged chutes or spouts 4 are placed on the mold 5 as shown in Fig. 1. In addition to effecting a wide separation of the streams of metal, these spouts or chutes form a convenient means for adding the alloying material to one of the streams. The alloying may be added in a solid form or in a molten condition, preferably the latter, as insuring a more uniform mixture of the alloy with the other metal. A branch spout or chute 4^a may be attached to one of the spouts 4 to direct the alloying material into the main stream flowing below the branch spout or chute. As shown in Fig. 3, a funnel 7 having a dividing diaphragm 8 may be formed integral with the directing spouts or chutes 4, and such dividing and directing structure provided with lateral wings 9, when it may be supported on the ingot mold.

It is a characteristic of my improvement that a homogeneous body of metal is divided into two or more streams of metal having any desired relative volumes, an alloy added to one or more of said streams, and the streams simultaneously teemed into the mold as distinct streams and in such manner that the metals of the two streams will commingle in approximately equal proportions in, and adjacent to a certain plane, but that the percentage will change on opposite sides of such plane, as stated in the application. By suitably proportioning the volumes of the two streams of homogeneous metal, an ingot can be produced having such a stratification or arrangement of metals that in the completed rail the head will consist wholly or nearly so of the hard tough alloy, and that there will be a gradual reduction of the alloying metal in the web of the rail. By reason of the

thorough commingling of the metals in the interior of the ingot there will not be any sharp plane of cleavage or a zone where the change from one metal to another is sudden and distinct.

I claim herein as my invention:

1. As an improvement in the art of making compound ingots, the method herein described which consists in dividing a body of homogeneous metal into a plurality of streams, changing the character of one or more of said streams and simultaneously introducing said streams into a mold side by side, but distinct.

2. As an improvement in the art of making compound ingots, the method herein described which consists in dividing a body of homogeneous metal into a plurality of streams adding an alloy to one or more of said streams and simultaneously introducing said streams into a mold side by side but distinct.

3. As an improvement in the art of making compound ingots, the method herein described which consists in dividing a stream of metal as it flows from a reservoir into a plurality of streams, changing the character of the metal in one or more of the streams and introducing said streams simultaneously into a mold side by side but distinct.

In testimony whereof, I have hereunto set my hand.

WILLIAM H. CONNELL.

Witnesses:

CHARLES BARNETT,

FRANCIS J. TOMASSON.