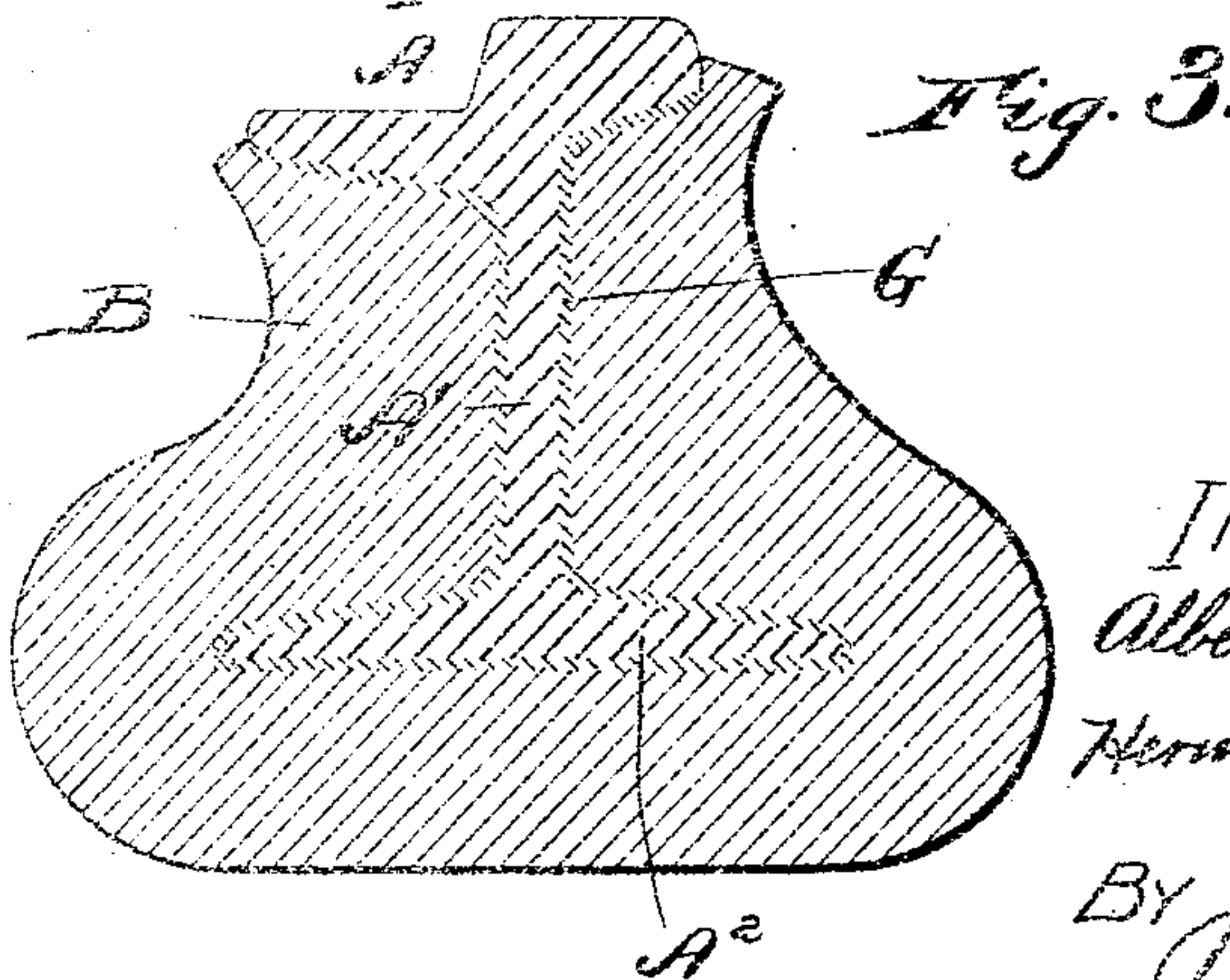
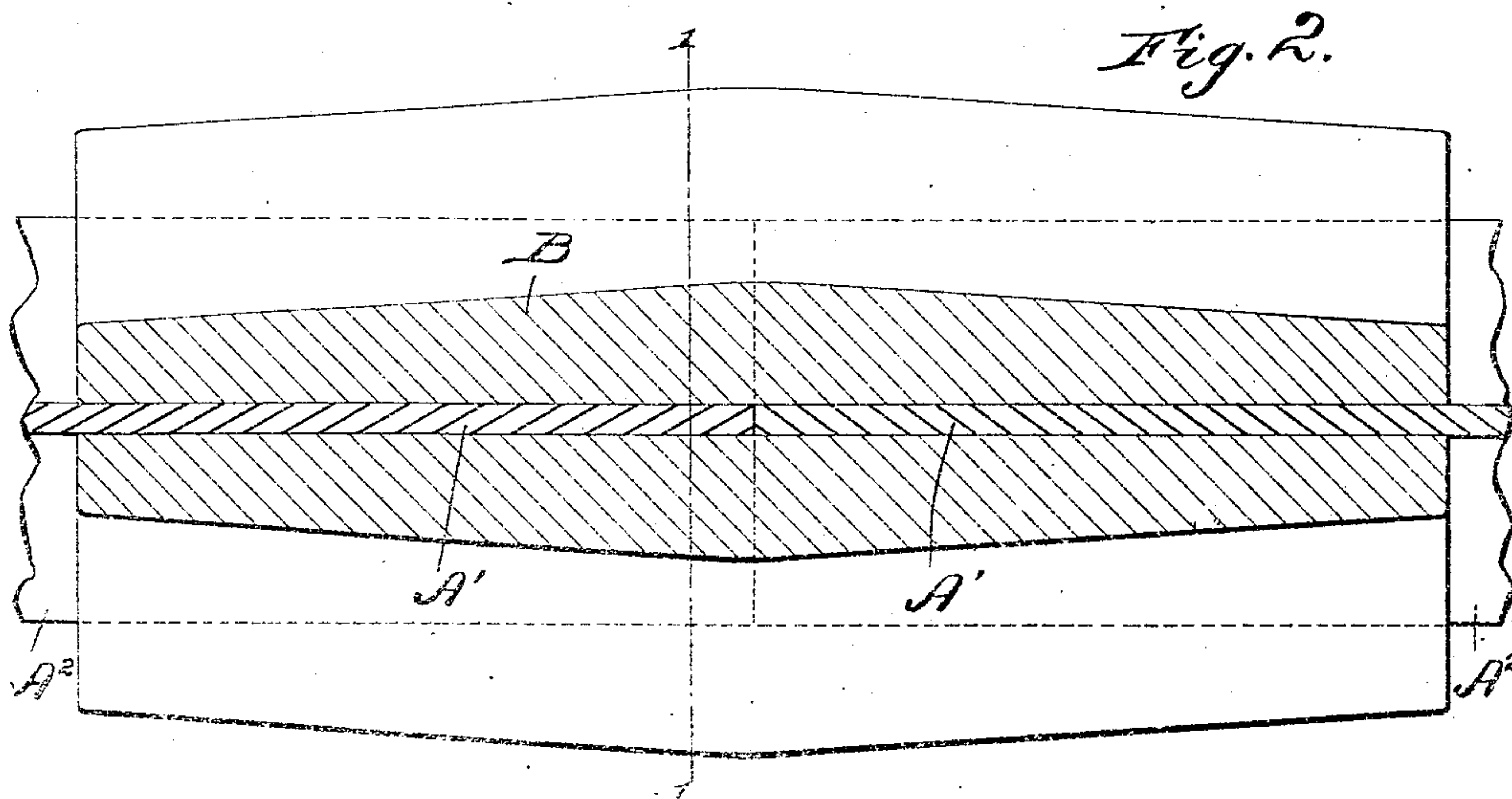
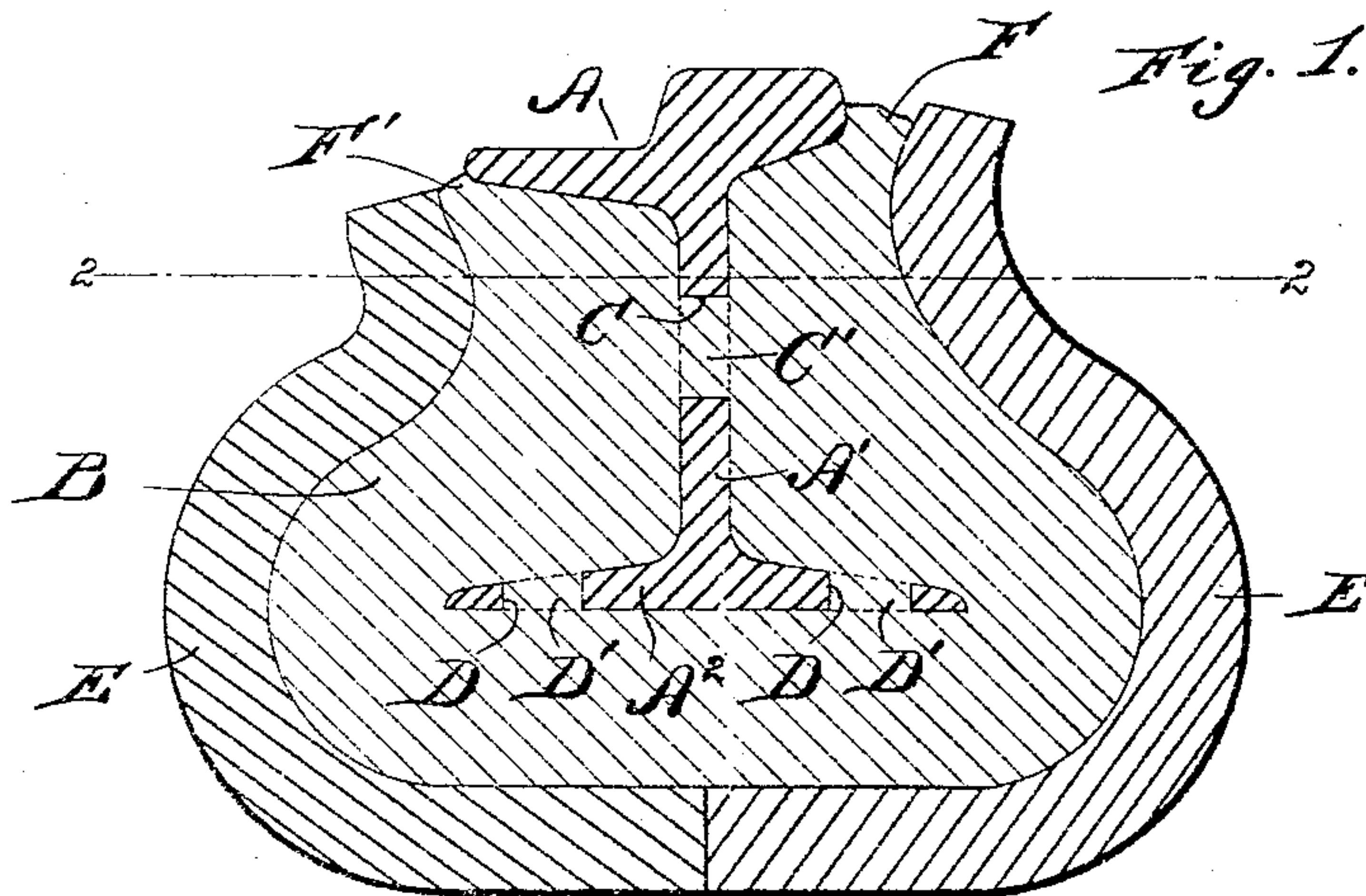


(No Model.)

A. HOFFMANN & H. W. FALK.
RAIL JOINT AND METHOD OF FORMING SAME.

No. 545,040.

Patented Aug. 20, 1895.



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RAIL-JOINT AND METHOD OF FORMING SAME.

SPECIFICATION forming part of Letters Patent No. 545,040, dated August 20, 1895.

Application filed March 12, 1895. Serial No. 542,183. (No model.)

To all whom it may concern:

Be it known that we, ALBERT HOFFMANN and HERMAN W. FALK, citizens of the United States, residing at Milwaukee, county of Milwaukee, State of Wisconsin, have invented a certain new and useful Improvement in Rail-Joints and Methods of Forming the Same; and we declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it pertains to make and use the same, reference being had to the accompanying drawings, which form a part of this specification.

Our invention relates to new and useful improvements in rail-joints and methods of forming the same; and our said invention consists in the matters hereinafter described, and pointed out in the appended claims.

In the accompanying drawings, illustrating our invention, Figure 1 is a transverse vertical sectional view of a rail-joint constructed in accordance with our invention, said section being taken on line 1 1 of Fig. 2. Fig. 2 is a horizontal longitudinal sectional view of the same, taken on line 2 2 of Fig. 1. Fig. 3 is a transverse sectional view illustrating a somewhat different form of our improved joint.

The object of our invention is to provide a suitable rail-joint by means of which the rail ends may be securely united together, so as to effectually prevent any vertical, lateral, or longitudinal movement of the rail ends after they have been joined and at the same time to unite the body of metal which surrounds the rail ends securely to the surfaces of said rail ends by the fusion of the metal.

The various features of our improvement will be hereinafter described in detail.

Referring by letter to the drawings, A A designate a pair of rail ends, A' A' the webs, and A² A² the base-flanges of said rail ends.

B designates a body of metal which is cast around and beneath said rail ends and united directly to the surfaces thereof by fusion. In some instances we find it desirable to flow the metal not only around the outside of the rail ends, but through the apertures C C in the webs thereof which are usually provided for the reception of bolts. In some instances we further provide apertures D D in the base-flanges of the rail ends through which the metal is also caused to flow, as in Fig. 1.

Our improved joint may be formed upon rail ends which are devoid of the apertures or perforations in their webs or base-flanges, and the metal body B firmly united or fused to the surfaces of said rail ends.

E E designate two halves or parts of a mold employed in the formation of our improved joint.

In forming our improved rail-joint we may proceed in various ways to cast the metal body B around said rail ends and unite the same thereto.

In practice we find that in order to obtain perfect union between the rail ends and the cast-metal body B it is necessary to raise the temperature of the mold and the rail ends to a comparatively high degree previous to casting the metal body around the latter, and this elevation of temperature may be accomplished in various ways. For instance, we may, preparatory to casting the joint, heat the molds to a high temperature, then by clamping the heated molds upon the rail ends to be joined heat will be imparted to the rail ends which are inclosed within the mold, so that when the molten metal is poured into the mold said metal will not be chilled by contact with the surfaces of the mold and the rail ends, but will be enabled to flux or fuse directly to the surfaces of said rail ends.

In order to prevent the molten metal from adhering to the surfaces of the mold, said mold is preferably coated upon its inner surfaces with a material such as graphite or a mixture of graphite and oil to which the molten metal cannot fuse.

In some cases where the temperature of the mold and the rail ends has not been raised to a sufficiently high degree the fusion of the cast metal to the rail ends may readily be obtained by continued pouring of the metal into the mold upon one side of the joint and permitting said metal to overflow from the opposite side of the mold, the metal, of course, in passing through the mold, flowing around the rail ends and in direct contact with the surfaces thereof, so as to raise the temperature of the rail ends to the high degree necessary to obtain fusion of the cast metal thereto.

In order to facilitate the pouring of the metal through the mold, as described, the

mold may be constructed in the manner indicated in Fig. 1 of the drawings, in which the pour-hole or sprue F is made somewhat higher than the overflow F' upon the opposite side of the mold. This construction enables the molten metal to be poured into and through the mold, so as to cause said metal to flow through the mold in contact with the surfaces of the rail ends until said rail ends have been heated to a sufficiently high temperature to obtain the desired fusion of the cast metal to the surfaces of said rail ends.

We find that in practice the heating of the mold in the manner before described, prior to its application to the rail ends, is ordinarily sufficient to impart the necessary degree of heat to the rail ends, so that it is not necessary to permit any appreciable amount of molten metal to overflow from the mold, in order to obtain the desired fusion. On the other hand, where the mold is applied to the rail ends without being heated, the desired temperature may be obtained by the described method of pouring the metal through the mold in contact with the rail ends.

As a further and separate improvement, and in order to obtain the desired fusion of the cast metal to the surfaces of the rail ends without the necessity of raising the temperature of the rail ends to a very high degree, we may employ a suitable flux, which is applied to the surfaces of the rail ends. For this purpose we may apply any suitable or desired flux to the rail ends—such, for instance, as a thin sheet or layer G of fusible metal—as indicated in Fig. 3, which metal, upon the introduction of the molten metal into the mold, will readily fuse and form a flux, by means of which the cast-metal body and the rail ends will be effectually fused together.

We prefer, in practice, to form the metal body B in substantially the manner indicated in Fig. 2, its central part being made heavier or thicker than the ends, thereby affording a heavier body of metal and greater strength at the point where the rail ends abut against each other.

By the construction indicated in Fig. 1, in which the metal is flowed through apertures or perforations in the rail ends, the parts of the metal body upon opposite sides of the webs or base flanges of the rail ends are very firmly and securely united together.

In forming our improved rail-joint the rail ends to be joined are first cleaned or brightened, so as to remove any oxide or any foreign matter which might adhere to the surfaces of the rail ends, when, by the application of the heated molds previous to the operation of casting the metal body around the rail ends, any moisture will be expelled from the interior of the mold and from the surfaces of the rail ends, so that when the molten metal is poured into the mold the mold and the surfaces of the rail ends will be in condi-

tion to facilitate the fusion of the cast-metal body to the surfaces of said rail ends.

Of course any desired means may be employed for heating the mold and the rail ends either before or after the mold has been adjusted in position.

By our improved form of joint the rail ends are held together so as to be effectually prevented from springing or moving laterally or vertically, while by the fusion of the cast-metal body to the abutting rail ends said ends are held together and all tendency of the rails to pull apart when contraction of the rails takes place will be effectually counteracted. Furthermore, by the fusion of the cast-metal body to the surfaces of the rail ends, the rails are electrically "bonded," thereby dispensing with the necessity of separately bonding the rails when our improvement is applied to the tracks of electric railways.

By our improvement, the rails being held in positive and unyielding contact with each other at their abutting ends so that longitudinal movement of the rails is impossible, the track is made not only very firm and unyielding, but is at the same time rendered exceedingly smooth and even, and the liability of the rails to wear away at the joint in the track is effectually obviated.

By reason of the heating of the mold and the rail ends previous to filling the mold with the molten metal the chilling effect of the mold and the rail ends when the molten metal is brought into contact therewith is obviated, and the resultant casting, which serves to unite the the abutting rail ends, is rendered tough and strong by reason of the softness of the cast-iron, instead of being brittle, as would be the case if the casting were made in a chill or without previously heating the mold and the rail ends.

In joining the ends of rails of an old track in which the rails are already in position we may produce satisfactory joints between said rail ends where the rail ends have pulled apart by inserting between said rail ends a thin section or shim, so as to fill the space between the rail ends when the body of metal being cast around the rail ends in the manner before described will firmly unite said rail ends and said shim together and will thus produce a very even and smooth track for the car-wheels.

By our improvement the joint between the ends of the rails is made very much stronger than the ordinary form of fish-plate joint, and the track is rendered more firm and unyielding at the points where the rail ends come together than at any other locality along the track.

Having thus described our invention, what we claim as new, and desire to secure by Letters Patent of the United States, is—

1. An improved method of forming rail joints, consisting in cleaning the rail ends to be joined, forming or adjusting a mold upon said rail ends and over the joint so as to sur-

round the webs and base flanges thereof, heating said mold and said rail ends, and pouring molten metal into said mold (around and beneath the base flanges of both rails) and uniting said metal directly to the surfaces of said rail ends by fusion.

2. An improved method of forming rail joints, consisting in cleaning the rail ends to be joined, forming or adjusting a mold upon said rail ends, pouring molten metal into and through said mold, and finally permitting the metal to stand in the filled mold.

3. An improved method of forming rail joints, consisting in cleaning the rail ends to be joined, forming or adjusting a mold upon the rail ends over the joint, heating said mold and said rail ends, pouring molten metal into and through said mold and in contact with the surfaces of the web and upper and lower faces of the base flanges of both of said rail ends, and finally permitting the metal in filled mold to stand.

4. The method of joining the ends of rails, consisting in first preparing the ends of the rails for fusion, second arranging the ends of the rails in close proximity and in alignment,

third placing a suitable mold around and over the sides and bases of the rail ends and across the joint, fourth introducing a stream of molten metal into the upper part of the mold at one side and causing it to pass down around the base flanges and up over the opposite side, substantially as described, and finally allowing the mold to become filled and the metal to stand, substantially as and for the purpose described.

5. An improved method of forming rail joints, consisting in preparing the ends of aligned rails for fusion, forming or adjusting a mold upon said rail ends and over the joint, heating said mold and said rail ends, pouring molten metal into said mold and uniting said metal to the surfaces of the webs and upper and lower faces of the base flanges of said rail ends by fusion.

In testimony whereof we sign this specification in the presence of two witnesses.

ALBERT HOFFMANN.
HERMAN W. FALK.

Witnesses:

JOHN E. WILES,
T. G. STOTT, Jr.