Oct. 5, 1937. J. F. CAMPBELL ET AL 2,095,055

ARTICLE OF MANUFACTURE AND METHOD OF MAKING SAME

Filed June 10, 1935

Fig. 1.

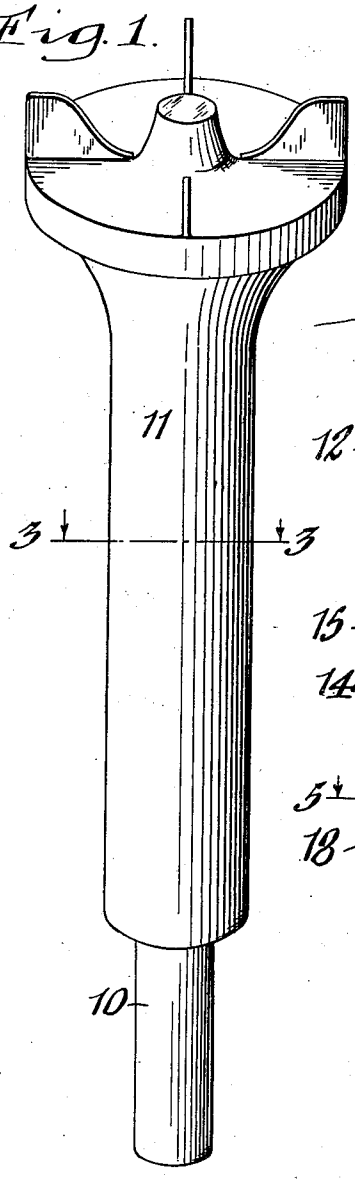


Fig. 2.

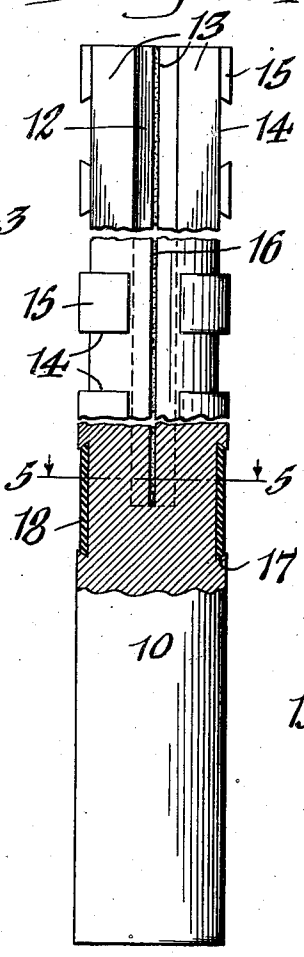


Fig. 3.

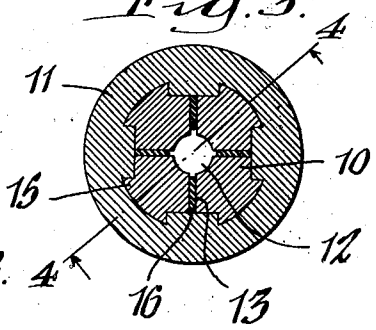


Fig. 4.

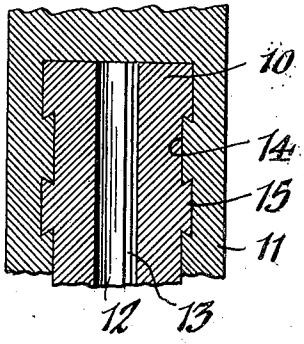
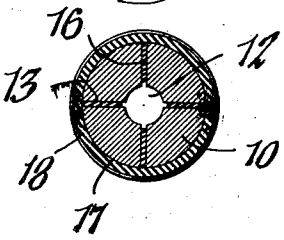


Fig. 5.



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ARTICLE OF MANUFACTURE AND METHOD OF MAKING SAME

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Application June 10, 1935, Serial No. 25,706

2 Claims. (Cl. 22—201)

This invention relates generally to certain new and useful improvements in the art of casting or metal founding but more particularly to composite articles cast from silicon iron and to the method of making the same.

It has for its chief object to provide a composite article cast from metals having a different heat expansion and contraction or shrinkage together with a method of casting the same without danger of fracturing the casting.

Other features of the invention reside in the method employed and in the construction and arrangement of parts hereinafter described and particularly pointed out in the appended claims.

In the accompanying drawing:—

Figure 1 is a perspective view of a composite article cast in accordance with our invention. Figure 2 is an enlarged fragmentary sectional elevation of the core member or structure used in practising the invention. Figure 3 is an enlarged cross section taken on line 3—3, Figure 1. Figure 4 is a fragmentary longitudinal section taken substantially in the plane of line 4—4, Figure 3. Figure 5 is a cross section taken on line 5—5, Figure 2.

Similar characters of reference indicate corresponding parts throughout the several views.

Our invention is particularly adaptable for making composite articles cast from metals having a different heat expansion and contraction or shrinkage and more specifically wherein silicon iron constitutes one of the metals from which the article is made, such for example, as various equipment used in chemical and like plants and wherein silicon iron is employed because of its strength, durability and resistance to attack by acids.

In carrying out our invention, we first provide a core member or shaft 10 of cold rolled steel or like metal and then cast about this shaft a sleeve or envelope 11 of silicon iron or like metal. This sleeve or envelope is cast in any shape desired, that shown in the drawing, particularly Figure 1, depicting an impeller or rotor member with journal extension of acid pumping equipment. That end portion of the core or shaft over which the silicon iron sleeve is cast is preferably bored to provide an axial opening 12, and intersecting this opening are a plurality of radially-disposed, longitudinally-extending saw-cuts or slits 13 providing resulting sectors which permit contraction of the core or shaft in response to any peripheral pressure to which they may be subject, as the contraction of the silicon iron sleeve about the core-shaft.

Disposed on the periphery of the slitted portion of the core-shaft 10 are annular undercut grooves 14 forming alternately arranged, substantially sector-shaped anchoring tongues or projections 15. This tongue and groove structure serves to effectually anchor and interlock the sleeve 11 to the core-shaft and afford a firm bond between the respective parts of the composite article to prevent their relative axial and lateral displacement.

To prevent the molten silicon iron flowing into the slits 13, we provide each of such slits with a filler 16 of a compressible, heat-resistant packing, such as asbestos or the like. This packing, while serving this sealing purpose, also permits the contraction of the core-shaft 10 in response to the corresponding contraction or shrinkage of the silicon iron when cooling.

Adjacent its lower or slitted portion and approximately short of the journal-end of the silicon iron sleeve 11, the shaft 10 preferably has an annular groove 17 in which is fitted a heat-resistant packing 18 which acts as an insulator between the respective parts and affords in effect to produce the same degree of contraction as do the slits 13 and thereby effectually prevent fracturing of the sleeve at its inner end during cooling.

When ready to cast a given composite article, the core-shaft 10, after being constructed in the manner above set forth, is placed in the mold, which may be of any suitable and well known construction, and the silicon iron is poured therein about the core-shaft to shape, say, the pump impeller depicted in Figure 1. The molten metal flows into and around the grooves and tongues 14 and 15, respectively, to firmly anchor the sleeve 11 to the core, and the latter at first absorbs heat from the molten metal and expands. The sleeve, upon cooling, contracts or shrinks and the resulting pressure is transmitted to the slitted core-shaft which is free to contract accordingly and thereby prevent fracturing of the silicon iron casting.

We claim as our invention:—

1. The method of applying a cast envelope of silicon iron integrally to a core member which consists in providing the core member with radially-disposed, longitudinally-extending slits to render the same expansible and contractible, and then casting the envelope around the core with the latter first undergoing expansion from the heat absorbed by the envelope and then undergoing contraction as the envelope cools and contracts about the core member.

2. An article of manufacture, comprising a metallic core member constituting a portion of the finished article, a shell of silicon iron cast about a portion of said core member to form therewith the composite article, and means formed in the core member to render it contractible in response to the shrinkage of the cast shell and including slits and compressible heat-resisting packing arranged in the slits to resist the flow of the molten silicon metal inwardly of the surface of the core member.

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