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METHOD OF LINING BEARINGS

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Fig. 1.

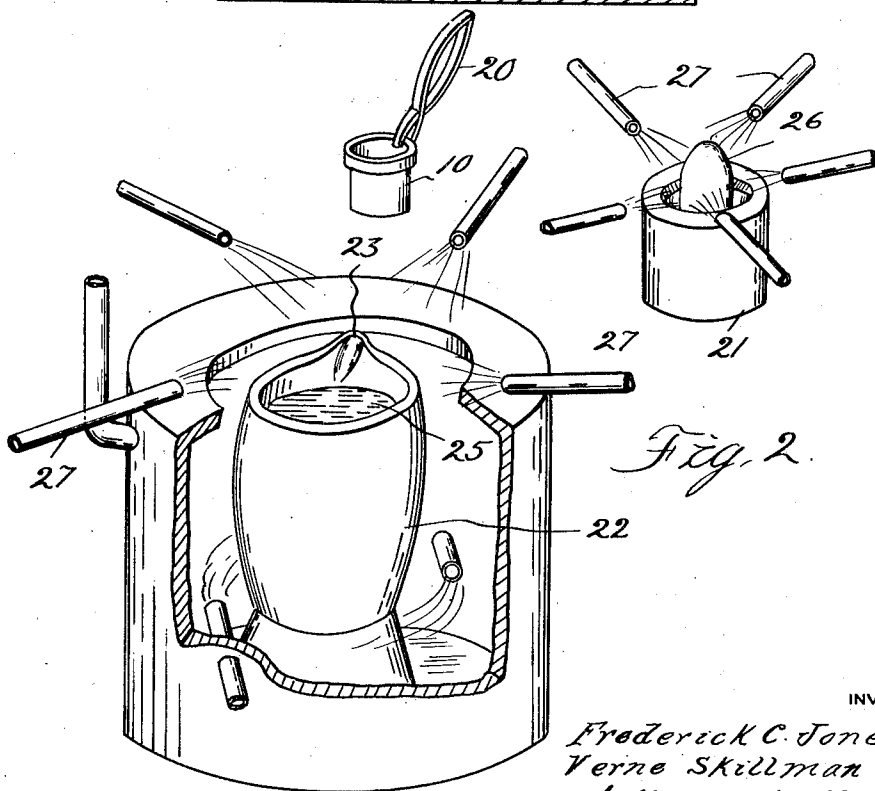
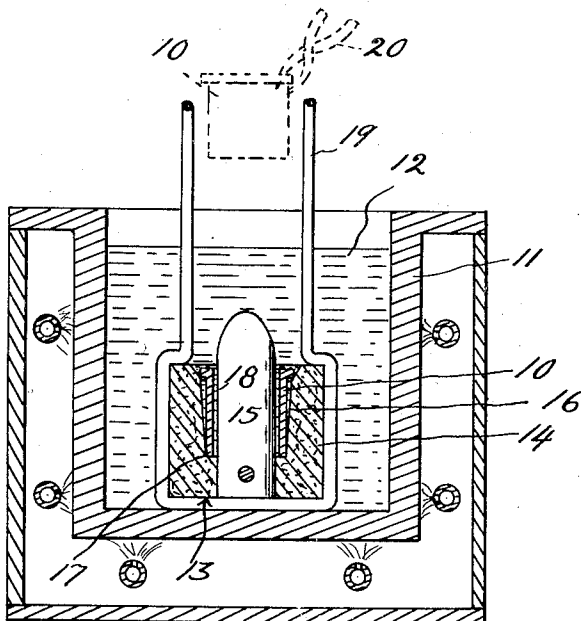


Fig. 2.

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METHOD OF LINING BEARINGS

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This invention relates to the method of lining bearings and more particularly to a method of lining steel back bearings with a non-ferrous alloy having a high copper base.

5 The present invention contemplates lining steel back bearings by casting, the lining being attached to the shell either to the inner or outer surface thereof or to both as found desirable or expedient. By the use of back-
10 ings or shells of steel, in place of the customary bronze, a more durable bearing is produced because by reason of the greater modulus of elasticity of the steel the shell is subject to only a fraction of the distortion to
15 which the bronze shell is subject.

The method forming the subject matter of the present invention and the advantages incident thereto will be made more apparent as this description proceeds, reference being
20 had to the accompanying drawings wherein:

Figure 1 is a semi-diagrammatic vertical sectional view through a crucible and a mold by means of which one form of the present invention will be made more apparent; and

25 Figure 2 is a semi-diagrammatic fragmentary perspective view of apparatus by means of which the present method may be carried into execution in a slightly different manner.

By reference to Figure 1 the first form of
30 my invention will be described. The problem involved is that of lining the shell or bearing back 10 with a suitable bearing metal, it being understood that the shell or back 10 is formed of steel because of the advantageous properties of steel over bronze
35 as mentioned hereinbefore.

It is proposed to line the shell 10 with a nonferrous alloy having a high copper base. An alloy for example of copper and lead in
40 the approximate proportions of 75% copper and 25% lead has been found to be satisfactory and to give good results.

The first step in the process is that of cleaning and fluxing the shell 10 and both
45 the cleaning and fluxing may be accomplished with any preferred means and in any desired manner. The shell may however, be efficiently fluxed by painting or otherwise coating the same with a solution of borax.

50 In Figure 1 there is illustrated a crucible

11 containing the bearing metal 12 in a molten state. Submerged well within the molten metal 12 is a mold 13 which consists of an outer mold member 14 and a core 15. The mold is made of carbon
55 or some other material capable of withstanding the intense heat. The outer mold member 14 is provided with a recess 16, herein illustrated as circular in cross section to correspond to the exterior configuration
60 of the shell 10. The recess 16 preferably tapers inwardly toward the bottom thereof and in this way the circumference of the recess 16 at the bottom 17 thereof may be employed for centering the shell with respect
65 to the mold. However it is obvious that any other centering means may be employed.

The outer diameter of the core 15 is less than the inner diameter of the shell to provide an annular space 18 therebetween. The
70 mold 13 is provided with a lifting frame 19 by means of which the same may be placed in and removed from the crucible 11.

After the shell 10 has been cleaned and fluxed it is dipped, as for instance by means
75 of tongs 20 into the mass of molten bearing metal at the top of the crucible above the mold 13. This acts to produce or cause a preliminary conditioning of the surface of the shell by causing a film of the bearing
80 metal to adhere thereto and to partially raise the temperature of the shell to a point nearer that of the molten bearing metal. This preliminary treatment of the shell prepares the surface thereof to receive the lining which is
85 subsequently to be cast thereon and to this extent functions the same as the tinning operation employed for preparing bearing shells for a lining of Babbitt material or the like.

After this preliminary treatment of the
90 shell or bearing back 10 it is placed in the mold without exposing the same to the air which would cause an oxidation of the metal adhering to the surface thereof. This is accomplished by placing the shell 10 within
95 the mold without removing the same from the molten metal 12.

When the shell 10 is placed within the mold as illustrated in full lines in Figure 1,
100 a coating or lining of metal adheres to the

inner surface thereof, this lining being substantially equal in thickness to the annular space 18 provided between the core 15 and the inner surface of the shell. The shell 10 is permitted to remain within the mold until the temperature of the shell has been raised to that of the molten bearing metal. This condition is generally indicated when the metal ceases 'bubbling' or 'kicking'.

While in the described method some of the bearing metal adheres to the outer surface of the shell, this may be subsequently removed in the finishing operation.

Obviously with the present method the lining may also be cast on the outside only of the shell or may be cast both on the inside and outside of the shell. In the first instance the core 15 will be sufficiently enlarged to fit the interior of the shell snugly to thus prevent the bearing metal from coming in contact with and adhering to the inner surface of the shell and under these conditions the size of the recess 16 will be such as to provide an annular space between the outer surface of the shell and the wall of the recess so that a coating of the bearing metal may adhere to the outer surface of the shell. In cases where it is desirable to cast a lining of a non-ferrous alloy on both surfaces of the shell annular spaces will be provided both between the core 15 and the inner surface of the shell and between the wall of the recess 16 and the outer surface of the shell.

By reference to Figure 2 a slightly modified form of the present invention will be described. In this form the mold is not submerged in the molten bearing metal but the bearing metal is poured into the mold after the shell or bearing back has been placed therein. The shell is given its preliminary treatment or is conditioned in the molten bearing metal and is then placed in the mold whereupon the bearing metal is poured into the mold in such a manner as to cause the same to adhere to the desired surfaces thereof. All of the these operations are carried on in the presence of burners which will exclude the air from contact with the shell and thus prevent oxidation, these burners also maintaining the mold at the temperature of the molten metal.

In Figure 2 it will be noted that the mold 21 is illustrated as arranged in proximity to a crucible 22 which is preferably provided with a pouring lip 23 whereby the crucible may be lifted and the metal poured into the mold 21 after the shell has been placed therein. The shell 10, after being cleaned and fluxed as previously described, will be first dipped into the molten metal 25 in crucible 22 to preliminarily condition or treat the surface thereof after which the shell is quickly removed and placed over the core 26 and within the mold 21. Thereafter the molten metal 25 from the crucible is introduced into the

mold and according to the structure of the mold is brought into contact with either the inner or outer surface or both surfaces of the shell as desired. Instead of pouring the molten metal from the crucible 22 it may obviously be transferred therefrom to the mold by a ladle. The reference character 27 indicates a plurality of burners located around the mold and crucible so that the steps of the process may be carried on in the presence of the flame from these burners whereby the shell 10 is kept from contact with the air.

In accordance with this invention the shells which are lined either on their inner or outer surfaces with the herein described alloy may thereafter have their other surface coated with a layer of Babbitt material which may be applied thereto in any preferred manner as for instance by means of centrifugal depositing. Under such conditions the resulting product would be a bearing having a copper alloy lining on one surface thereof and a Babbitt lining on the other surface thereof.

Obviously the invention is capable of modification within certain limits and to this end reservation is made to make such changes and modifications as may come within the purview of the accompanying claims.

What we claim as our invention is:

1. In the method of lining steel bearing shells, those steps which consist in treating the surface of the shell with a molten metal and casting a coating of lining metal on the surface of the shell while maintaining the shell substantially free from contact with the air.

2. In the method of lining steel back bearings by casting, those steps which consist in preliminarily conditioning the surface of the bearing back by submerging the same in the molten lining metal and then applying a coating of lining metal by casting to that surface of the bearing back to be lined without removing the same from the molten bath.

3. In the method of lining bearing shells, those steps which consist in cleaning and fluxing the shell, conditioning the surface thereof by submerging the shell in the molten lining metal and placing the shell in a mold submerged in the molten lining metal.

4. The method of casting linings of a non-ferrous alloy on steel back bearings which consists in cleaning and fluxing the bearing back, conditioning the surface thereof by submerging the same in the molten bearing metal and casting the lining thereon while the bearing back is arranged in a mold submerged in the molten bearing metal.

5. In the method of lining bearing shells, those steps which consist in providing a molten mass of lining metal consisting of copper and lead in substantially the proportions of 75% copper and 25% lead, conditioning the surface of the shell by submerging the same in the molten metal and then casting

the lining on the shell while maintaining the shell substantially free from contact with the air.

6. In the method of lining bearing shells, those steps which consist in providing a molten mass of lining metal consisting of a non-ferrous alloy having a high copper base, conditioning the surface of the shell by submerging the same in the molten metal and then casting the lining on the shell while maintaining the shell substantially free from contact with the air.

In testimony whereof we affix our signatures.

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