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W. S. GRAU ET AL

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SOFT CORE FOR HARD MATERIALS AND METHOD OF APPLYING SAME

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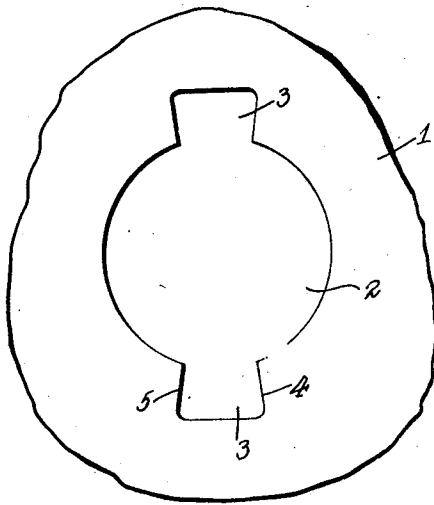


Fig. 1.

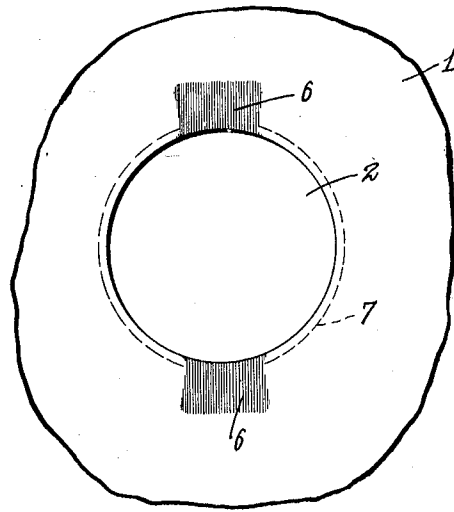


Fig. 2.

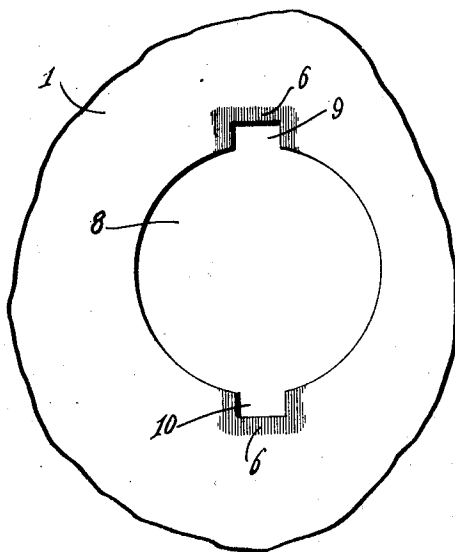


Fig. 3.

Inventors

William S. Grau
James C. Bishop

By Lyon & Lyon

Attorneys

UNITED STATES PATENT OFFICE.

WILLIAM S. GRAU, OF INGLEWOOD, AND JAMES O. BISHOP, OF TORRANCE, CALIFORNIA,
ASSIGNORS TO THE NATIONAL SUPPLY COMPANY OF DELAWARE, OF NEW YORK,
N. Y., A CORPORATION OF DELAWARE.

SOFT CORE FOR HARD MATERIALS AND METHOD OF APPLYING SAME.

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This invention relates to soft cores for hard materials and methods of applying the same, and is more particularly related to a hard steel products such as a product composed of manganese steel in which there is provided an insert of mild or soft steel through which a keyway is formed.

In the fabrication of sliding clutches, such, for example, as are employed in connection with oil well drilling, pumping and the like equipment, the clutches are subjected to severe shocks through the keyways. Manganese steel is very dense, hard and tough, and is also very difficult to machine, and the methods pursued heretofore for forming the keyways in the clutch bores have not been entirely satisfactory. Two different methods have heretofore been employed, which are substantially as follows: In accordance with the first method, the manganese steel product was first formed and then a soft steel insert was cast into position around the periphery of the bore through the manganese steel product, and this soft or mild steel insert was then readily machinable. The desired keyway could be cut in this soft steel insert in accurate alignment with the center line of the bore of the produce. This method, however, is disadvantageous due to the fact that the cast steel insert gradually works loose, due to the racking and pounding action which said sliding clutches are subjected to in service. In order to overcome the difficulty of the cast steel inserts gradually working loose, a second method was devised, by means of which the keyways formed through the hub of the sliding clutch sprockets were cast to the exact size during the casting of the manganese sliding clutch sprockets, by the use of cold rolled steel slugs, which were fastened to the core. This method eliminated the objection which caused the abandonment of the cast steel insert method, but proved unsatisfactory due to the difficulty encountered in casting these keyways in absolute alignment with one another and with the axis of the bore of the hub of the sprocket or the outside diameters of the clutches, and this difficulty has proven practically impossible to overcome when employing this method. Besides this difficulty when machining clutches or sprockets with keyways cast to size in accordance with this second method, all alignment of the various other parts of the clutch sprockets or hubs had to be taken from the cast keyways. Consequently, other important points of the articles were thrown badly out of alignment.

An object of this invention is to produce a method of fabricating hard steel, and particularly manganese products, so as to enable the forming of keyways in the products in substantially accurate alignment with the longitudinal axes of the bores through the products, and to overcome the difficulty of employing a cast insert liner which will become loose when the product is put into use.

Another object of this invention is to produce a method of fabricating hard steel products, including the casting or forging of the rough steel product to substantially the form desired, with an enlarged key recess formed therein, welding mild steel or softer metal in the enlarged key recess or way, and cutting a keyway in the softer metal in accurate alignment with the center line of the casting.

Another object of this invention is to provide a method of fabricating hard steel clutch sprockets or the like, including making a rough steel casting having an enlarged key recess or way formed therein, filling the enlarged recess by welding a softer metal therein, turning the casting so formed to the desired interior diameter, and then cutting the keyway or keyways in the softer metal welded inserts in alignment with the longitudinal center of the turned casting.

Another object of this invention is to provide a manganese steel product having an oversized way formed in the inner periphery which extends longitudinally substantially in alignment with the axis of the product, and in which way is positioned or formed a welded steel insert of relatively soft or mild steel in which a keyway is formed in accurate alignment with the axis of the product.

Other objects and advantages of this invention it is believed will be apparent from

the following detailed description of a preferred embodiment thereof, as illustrated in the accompanying drawings.

In the drawings:

5 Figure 1 is a fragmental elevation of a manganese steel casting illustrating the same as formed with an enlarged keyway extending outward from the axial bore of the casting.

10 Figure 2 is a similar fragmental view of the manganese steel casting, illustrating the way illustrated in Fig. 1 as filled with a mild or soft steel by welding.

Figure 3 is a similar elevation, illustrating the finished manganese steel product, showing the center or axial bore of the product as turned down to the desired diameter and illustrating parallel keyways formed in accurate alignment with the longitudinal-
20 ly extending axis of the manganese steel product.

This invention is particularly applicable to the fabrication of manganese steel products having keyways formed therein, but it
25 is not intended that the application of this invention should be limited to the fabrication of manganese steel products but the same may be equally well adapted to the formation of keyways through other relatively hard steels, such, for example, as
30 chrome vanadium steels and the like. This invention is also not essentially limited to the formation of keyways which extend longitudinally of a casting, but is adaptable to the formation in hard steel products of
35 any other form of way or slot, the alignment of which is necessary with some other point or part of the particular steel casting.

Referring to the drawings, 1 illustrates a
40 fragment of a hub, which may be the hub of a clutch collar, sprocket or the hub of any similar product which is formed or adapted to be formed of relatively hard and tough steel, such, for example, as manganese
45 steel. The hub 1 is formed of hardened steel, such as manganese, either by casting or by forging, and is formed with an axial bore 2 which extends through the product, the diameter of which bore is less than the desired or required diameter of the finished
50 product. Formed during the casting of the hub 1 are parallel ways or recesses 3 which are formed in substantial alignment with the axis of the bore 2. The recesses or keys
55 3 are preferably formed with tapered walls 4 and 5.

The casting formed as above described is then prepared for turning the interior bore 2 to the required or predetermined diameter
60 by filling the keyways 3 with a relatively soft or mild steel by welding a soft or mild steel into the recesses or ways 3 to substantially fill the same, as illustrated at 6 in Fig. 2. The inner bore 2 is then turned to
65 the required or predetermined diameter, as

illustrated by the dotted line 7 in Fig. 2, to provide the finished bore, as illustrated at 8 in Fig. 3. Keyways 9 and 10 are then cut or milled by any desired or preferred process or method in the soft or mild steel insert 6 formed in the oversized ways 3. The keyways 9 and 10 being formed in mild or soft steel may be formed in accurate alignment with the axis of the bore 8 and in accurate alignment with one another.

The method of forming keyways in hubs, as heretofore set forth, is particularly adapted both for use in connection with the fabrication of manganese steel sliding clutch collars or sprockets.

Having fully described our invention, it is to be understood that we do not wish to be limited to the details herein set forth, but our invention is of the scope of the appended claims.

We claim:—

1. A method of fabricating hard steel clutch sprockets, including making a rough steel casting having an oversized key recess formed therein, filling the enlarged recess
90 by welding a softer metal therein, turning the casting so formed to the desired interior diameter, and cutting the desired keyway in the soft metal in alignment with the longitudinal axis of the casting.

2. A method of fabricating hard steel key-fitted products, including making a rough steel product to substantially the form desired with an oversized key recess formed therein, welding mild steel in the key recess,
100 and cutting a keyway in the mild steel.

3. A method of fabricating manganese steel products having keyways, including casting the product to the form desired with an enlarged longitudinally extending recess
105 extending from the bore of the product, welding a relatively soft metal in the recess to substantially fill the same, and cutting a keyway in the softer metal in alignment with the longitudinal axis of the casting.

4. A method of fabricating manganese steel products, including forming the product to substantially the form desired with an oversized recess extending longitudinally through the axial bore of the product, welding mild steel in the oversized recess, and
115 cutting a keyway in the mild steel.

5. A method of fabricating manganese steel sprockets, including forming the sprocket of manganese steel to substantially the form and shape desired with an oversized recess formed in the axial bore through the sprocket, welding the mild steel into the oversized recess, and cutting a keyway in the mild steel.

6. A method of fabricating manganese steel sprockets, including casting a rough manganese sprocket with an oversized longitudinally extending recess formed there-
125 through in substantial alignment with the

axial bore of the sprocket, welding mild steel into the recess to substantially fill the same, turning the sprocket on the inner bore to a predetermined diameter, and cutting
5 a keyway through the mild steel in alignment with the axis of the longitudinally extending bore of the casting.

7. A method of fabricating hard steel clutch sprockets, including making a rough
10 steel casting having a pair of oversized key recesses formed therein in substantial alignment, filling the enlarged recesses with a mild steel, turning the casting so formed to a predetermined interior diameter, and cutting
15 parallel keyways in the mild steel in alignment with the longitudinal axis of the turned casting.

8. A method of fabricating hard steel key-fitted products, including making a
20 rough steel product to substantially the form desired with a pair of substantially parallel oversized ways, welding mild steel in the oversized ways, and cutting keyways in the mild steel.

25 9. An article of the class described, comprising a hard steel casting having an oversized keyway formed therein in substantial alignment with the longitudinal axis of the casting, a welded steel insert in the
30 recess, and a keyway formed in the insert in accurate alignment with the longitudinal axis of the casting.

10. In a manganese steel sprocket, the combination of a hub having an oversized longitudinally extending way formed there-
35 in, a welded mild steel insert in the way, and a keyway formed in the insert in accurate alignment with the axis of the hub.

11. A manganese steel sprocket having an oversized way formed in the inner periphery and extending longitudinally substantially in alignment with the axis of the hub,
40 a welded steel insert in the way, and a keyway formed in the mild steel insert in accurate alignment with the axis of the hub.
45

12. A relatively hard steel hub having an oversized way formed in the inner periphery, a welded steel insert in the way, and a keyway formed in the mild steel insert.

13. A manganese steel hub having a pair
50 of substantially parallel oversized ways formed in the inner periphery, welded steel inserts in the ways, and keyways formed in the mild steel inserts.

14. A manganese steel hub having a pair
55 of oversized ways formed in the inner periphery, welded steel inserts in the ways, and keyways formed in the welded steel inserts in substantial alignment with the longitudinal axis of the hub.
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Signed at Torrance, California, this 18th day of April, 1927.

WILLIAM S. GRAU.
JAMES O. BISHOP.