D. FITZPATRICK.

PROCESS OF CASTING WORM GEAR WHEELS.

APPLICATION FILED NOV. 1, 1917. RENEWED AUG. 14, 1920.

1,358,190. Patented Nov. 9, 1920.

Fig. 1.

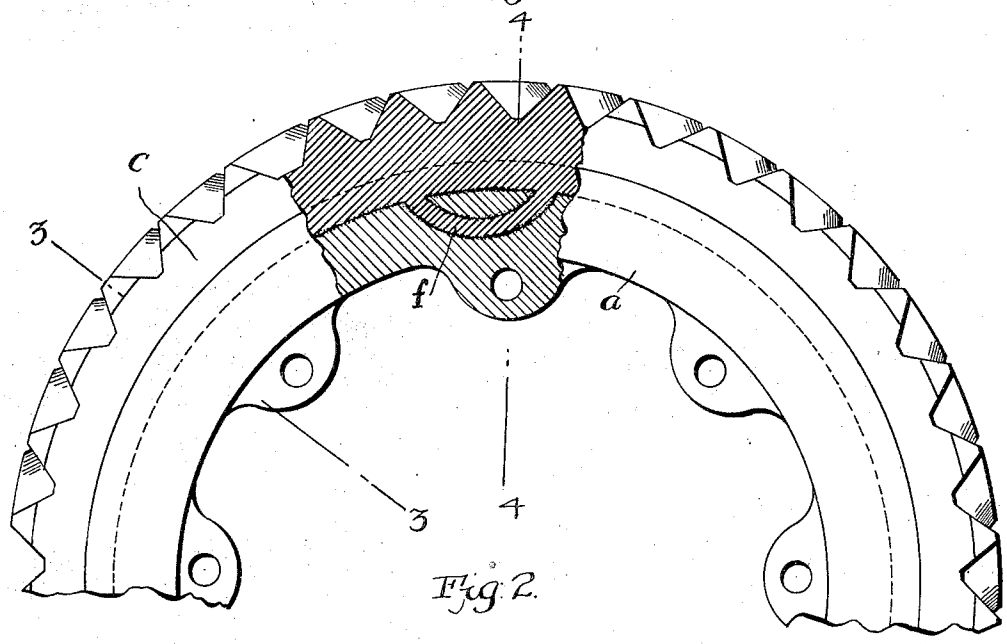


Fig. 2.

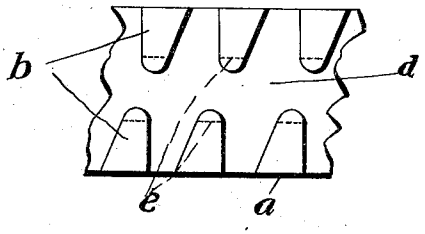


Fig. 3.

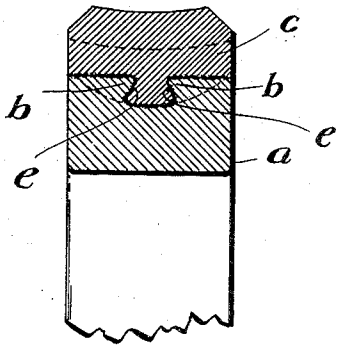
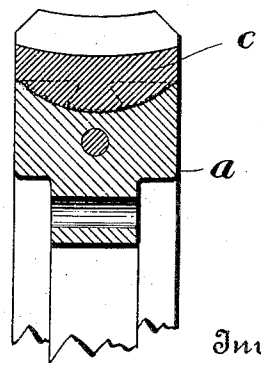


Fig. 4.



Inventor

David Fitzpatrick

Attorneys

Messrs Austin.

UNITED STATES PATENT OFFICE.

DAVID FITZPATRICK, OF CLEVELAND, OHIO, ASSIGNOR TO THE CLEVELAND WORM AND GEAR COMPANY, OF CLEVELAND, OHIO, A CORPORATION OF OHIO.

PROCESS OF CASTING WORM-GEAR WHEELS.

1,358,190. Specification of Letters Patent. Patented Nov. 9, 1920.

Application filed November 1, 1917, Serial No. 199,750. Renewed August 14, 1920. Serial No. 403,512.

To all whom it may concern:

Be it known that I, DAVID FITZPATRICK, a subject of the King of Great Britain, and resident of Cleveland, county of Cuyahoga, and State of Ohio, have invented certain new and useful Improvements in Processes of Casting Worm-Gear Wheels, of which the following is a specification.

This invention relates to improvements in gears used with a steel worm to form a worm gear set and relates particularly to an improvement in the method of constructing worm gears in which a relatively weak metal, such as bronze, is mounted on an iron center.

Heretofore, it has been customary to cast the iron centers with means for interlocking with a weaker metal such as bronze which, in a molten condition, is poured around the periphery of the iron center or core and flows into the recesses which are provided therein. The recesses have been either in the form of grooves or spaces between projecting lugs.

The object of this invention is to make a stronger joint between the two metals composing the wheel and to prevent one metal leaving the other under any circumstances, such as creeping or breaking apart.

Various other objects and advantages of the invention will be in part obvious from an inspection of the accompanying drawings and in part will be more fully set forth in the following particular description of one form of mechanism embodying my invention, and the invention also consists in certain new and novel features of construction and combination of parts hereinafter set forth and claimed.

In the accompanying drawings;

Figure 1 is a side view of a worm gear embodying my invention that is broken away in part to show more clearly the construction thereof;

Fig. 2 represents a plan view of the rim of the worm gear center or core;

Fig. 3 is a sectional view on the line 3—3 of Fig. 1;

Fig. 4 is a sectional view on the line 4—4 of Fig. 1.

The iron center *a* may be of cast iron, malleable iron, steel or a suitable alloy. The rim or periphery of the center is provided with stubs *b* extending part way across its face. A ring of relatively weak anti-friction material such as bronze or a similar alloy *c* provides the outer portion of the wheel and has the gear teeth formed therein. The stubs *b* register with the teeth and are spaced apart to form an annular groove *d* that is filled with the anti-friction material and prevents lateral movement of the ring. The inner ends of the stubs are also undercut as at *e* to form interlocks with the bronze. Small passages may also be provided in the rim of the core which become filled with the anti-friction material during casting and form locking loops *f*, but such locking loops are not essential and may be added as an additional precaution.

The outer ring of bronze or similar anti-friction metal is welded or brazed onto the iron center or core at the time it is cast so as to form practically a unitary structure, and the process by which this is accomplished is as follows: The rim of the cast iron core is first thoroughly cleansed and it is then washed with a weak solution of muriatic or similar acid. Promptly thereafter the rim is coated with molten tin or a suitable alloy of tin such as tin and lead. This coating may be comparatively thin such for example as would be formed by dipping the rim into a bath of the coating material and then allowing it to drain. The coating hardens immediately after being applied to the core.

Thereafter and just before casting, the core itself is heated to a temperature that will cause the coating to soften without melting or draining. Preferably the core is heated as hot as may be without causing the coating to run, that is to a temperature just below the melting point. A temperature of approximately 300° F. is usually satisfactory, although it may vary with the character of the coating employed. As soon as the core has been heated to the desired point the bronze is poured around the periphery of the core to form a solid ring thereon. Any vapor or impurities come out through the usual risers that may be provided for this purpose. After the bronze has set, the wheel is taken out and allowed to cool gradually to normal atmospheric temperature. Subsequently the teeth are cut in the bronze in the well known manner.

By means of this process a gear wheel is produced having a bearing face of a comparatively weak anti-friction material such

as bronze, which will be shrunk onto the cast iron center and at the same time will be brazed or welded thereto. The two metals will not separate under any circumstances and will be so completely brazed or fused together as to form for all practical purposes a single homogenous article. Even under the most severe conditions of actual use, the ring cannot creep or work loose and the joint will be one of the strongest points in the wheel.

While I have shown and described and have pointed out in the annexed claim, certain novel features of my invention, it will be understood that various omissions, substitutions and changes in the form and details of the device illustrated and in its operation may be made by those skilled in the art without departing from the spirit of the invention.

Having thus described my invention, I claim:

The process of forming a gear having a center core of cast iron and a surrounding ring of bronze which consists in coating the core with a substance containing tin, permitting the coating to harden, heating the coated center to a temperature of approximately 300° F. to soften the substance and casing the bronze on said softened substance to braze the parts together.

Signed at Cleveland, in the county of Cuyahoga, and State of Ohio this 18th day of October, 1917.

DAVID FITZPATRICK.