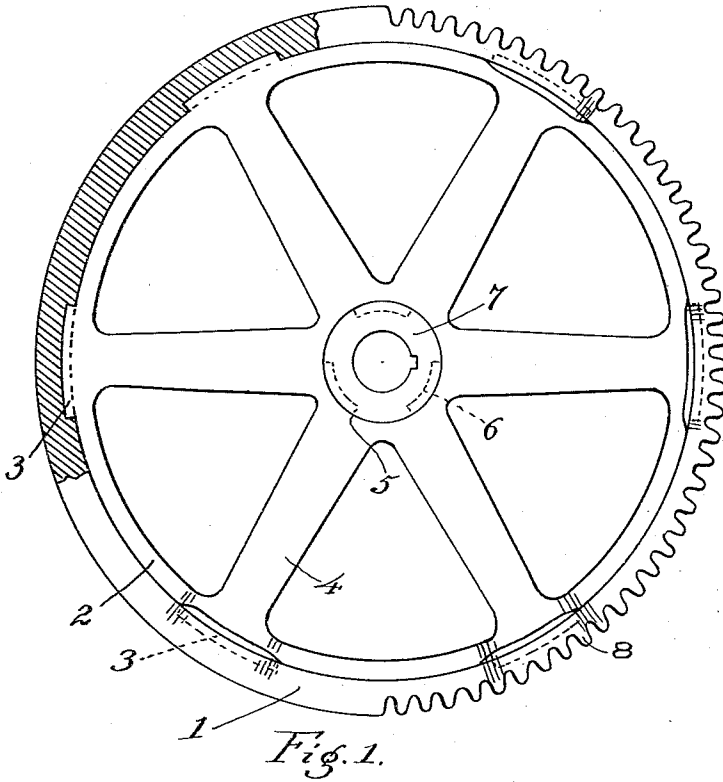
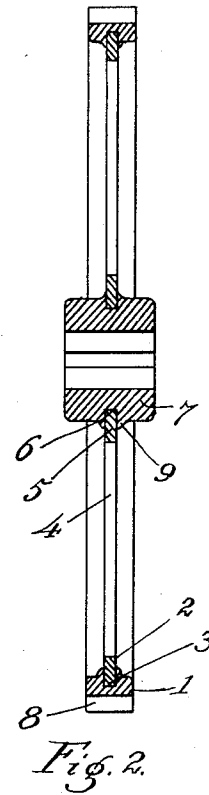
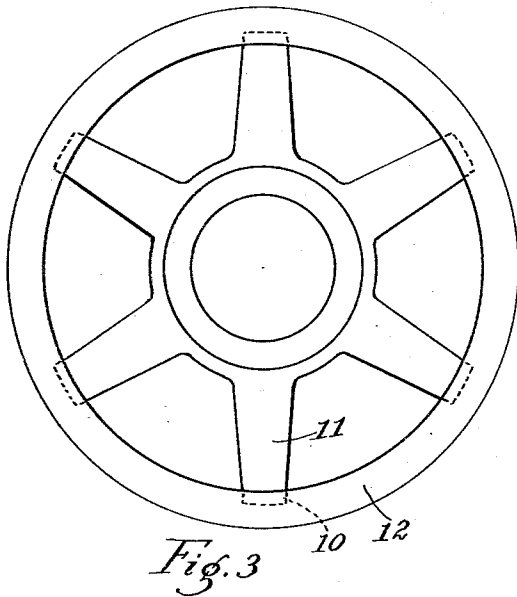
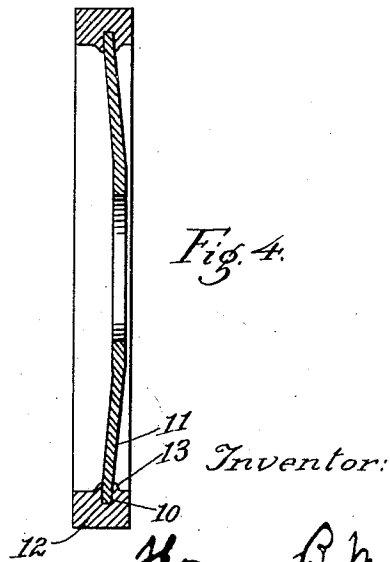


T. B. MORRIS.
 PROCESS OF FORMING GEARS AND THE LIKE.
 APPLICATION FILED APR. 29, 1919.

1,407,704.

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PROCESS OF FORMING GEARS AND THE LIKE

1,407,704.

Specification of Letters Patent. Patented Feb. 28, 1922.

Application filed April 29, 1919. Serial No. 293,547.

To all whom it may concern:

Be it known that I, THOMAS B. MORRIS, a citizen of the United States, and a resident of the city of Cincinnati, in the county of Hamilton and State of Ohio, have invented certain new and useful Improvements in Processes of Forming Gears and the like, of which the following is a full, clear, and exact description, reference being had to the drawings accompanying this specification.

My invention relates to the forming of gears, car wheels, pulleys and the like, wherein more particularly the inner portion and outer portion are formed up, cast or forged, separately and are then united. In the past it has been believed to be necessary where two such parts are united, either to drive the inner portion into the outer or rim portion, with a very tight fit, or else to form up the two parts so that a pile will be formed which can be made the basis of a weld.

I have found that the mere act of compression of a heated and partially plastic rim over spokes of a spider, or over a series of tenons formed on the exterior surface of an interior ring, will result in a permanent and valuable gear, wheel or pulley structure. I do not weld the parts nor do I form a driving fit between them, since with the proper conformation of parts, I am enabled to assemble my product without resorting to either of these means.

In order to form a pile for welding, it has been necessary in the past to form the exterior or interior member with a groove or its equivalent, so that after the compression of the outer member there will be a space left between the joint of the two parts which will permit of the weld being formed.

On the contrary to this principle, the parts are formed in my invention so that no space is left after the compression but on the contrary the metal forced aside by the compression joint will be machined off, in finishing up the work.

The manner in which my process is carried out to attain the object set out above, will be hereinafter more specifically pointed out and the novelty therein duly claimed.

In the drawings,

Figure 1 is a side elevation broken away in part showing an assembled gear wheel made according to my invention.

Figure 2 is a central cross section thereof.

Figure 3 is a plan view of a wheel made according to my invention.

Figure 4 is a central cross section thereof. The difference between the structures shown in Figures 1 and 2, and in Figures 3 and 4 is that, in the first two figures the device is made up of a rim forced over an inner rim with tenons thereon, and in the second two figures the rim is forced on the ends of spokes made up with a hub in the form of a spider. The fact that one of the devices shown is a gear and the other a wheel is of no significance.

As shown in Figures 1 and 2, the outer body 1 is made up separately, as a forging, with a smooth inner surface. The inner member is made up with a circular rim 2 of a size to fit within the outer rim 1, and a series of tenons 3 are formed preferably on the same cross section as the inner rim itself. If desired the rim may be a spider cast or forged of spokes 4, which are united at the inner ends by a ring 5. This ring 5 will then have tenons 6 similar to the outer tenons and the hub 7 of the device will be forged separately. Where the inner member is a casting the hub will ordinarily be cast with the inner member.

With this structure, the outer rim, be it for a gear with teeth formed therein, as shown at 8, or smooth or flanged for a wheel or pulley, may be of high grade metal, as may be the hub 7. The spider may be of cheaper material.

To unite the parts, they are placed in a frame with the hub and outer rim heated to a plastic or semi-plastic state and pressure applied circumferentially which will force the tenons into the body of the metal. Such metal as is forced out of place, as indicated at 9 (Figure 2), may be machined off, in making a neat job.

If the inner member is not made up with an outer rim, the ends of the spokes are forced into the rim, of the wheel or gear, as the case may be, there being no necessity of any tenons. Here again the forced-out metal (Figure 4) should be machined off to make a neat piece of work.

It should be noted that the ends of the spokes or tenons are formed with an outer edge conforming to the inner circumference of the outer rim. This insures a firmly united metallic joint without air holes which probably be the result should the ends of the tenons or spokes be flat and be pressed

into a curved surface. The rim is put on hot and semi-plastic with the spider cold and the rim is allowed to cool. In welding processes where shrinking on of the rim is practiced the parts are welded before the rim has cooled so that the reheating destroys the unity of the metallic joint.

I have found that a gear, wheel or pulley or the like, made up in this manner will be to all intents and purposes the same as a unitary piece, and am thus enabled to gain all of those advantages resulting from being able to form up the rim of a wheel separately from the spider or inner rim. These advantages are obvious and require no special mention.

Having thus described my invention what I claim as new and desire to secure by Letters Patent is:—

1. The process of uniting rims with inner members of a metallic body, which consists in forming the inner members with their rim contacting portions to fit flush with the inner periphery of the rim and then compressing the rim over said inner members whereby no air pockets and no lateral spaces are permitted between the inner members and the rim.

2. That process of forming a gear or the like, which consists in separately forming

the outer rim thereof, and the inner member thereof, said inner member having separated extending elements for forcing into the inner circumference of said rim and then compressing said rim over the inner member, said extending elements being formed with their ends curved to correspond with the inner circumference of the rim.

3. That process of forming a gear or the like, which consists in separately forming the outer rim thereof, and the inner member thereof, said inner member having separated extending elements for forcing into the inner circumference of said rim and then compressing said rim over the inner member, said extending elements being formed with their ends curved to correspond with the inner circumference of the rim, and with their sides substantially flush with the main body of the inner member.

4. That process of uniting rims with inner members of a metallic body which consists in heating the rim, and compressing it over such inner member, the latter being cold, with said inner member having edges adapted to sink into the rim, and then permitting the parts to cool, forming thereby a metallic joint between them.

THOMAS B. MORRIS.