Nov. 29, 1927. 1,650,780

W. E. WILLIAMS

WHEEL DISK AND METHOD OF MANUFACTURE

Filed Aug. 1, 1922

Fig. 1.

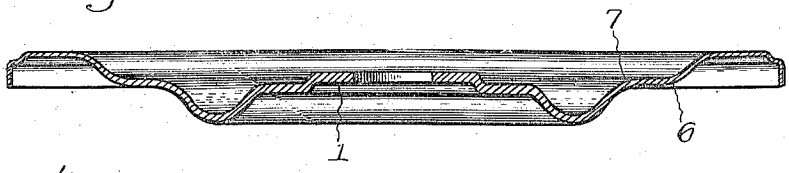


Fig. 2.

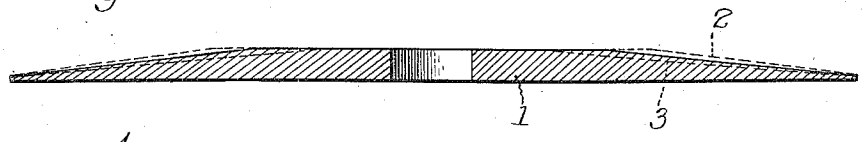


Fig. 3.

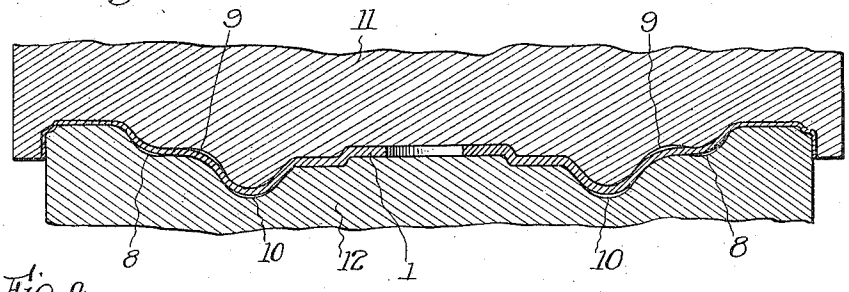


Fig. 4.

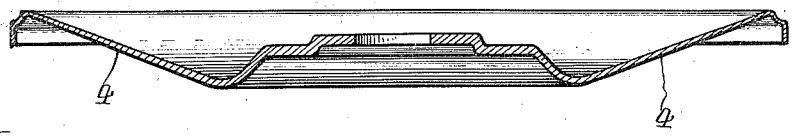


Fig. 5.

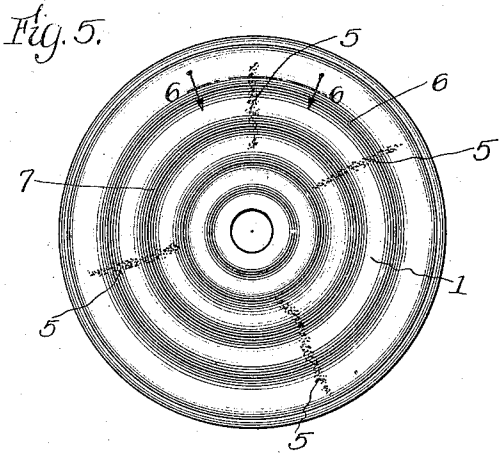
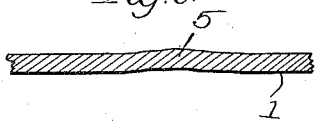


Fig. 6.



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UNITED STATES PATENT OFFICE.

WILLIAM ERASTUS WILLIAMS, OF WILMETTE, ILLINOIS, ASSIGNOR, BY MESNE ASSIGNMENTS, TO STEEL WHEEL CORPORATION, OF LANSING, MICHIGAN, A CORPORATION OF MICHIGAN.

WHEEL DISK AND METHOD OF MANUFACTURE.

Application filed August 1, 1922. Serial No. 579,018.

My invention relates to a method of making true symmetrical disks, for disk wheels for automobiles, and the object of the invention is to provide means for forming with dies tapered disks into true symmetrical shapes using disks that vary in thicknesses. Reference will be had to the accompanying drawing in which

Figure 1 is a transverse section of a finished disk.

Figure 2 is a section through a finished blank, ready for pressing, but on a distorted scale to better show variations in thicknesses.

Figure 3 is a diametrical section through the dies, in position at the completion of the pressing operation.

Figure 4 shows an old style disk in section.

Figure 5 is a plan view of an old style disk, showing the defects in the pressing due to the variations in the thickness of the disk blank.

Figure 6 is a section on line 6—6 of Figure 5.

In the manufacture of steel disk wheels for automobiles, the most desirable form is to have a metal disk which is thicker around the hub zone and thinner around the margin, and circular disks of this type are difficult to produce in exact sizes either by rolling or by other means, without serious extra cost.

In rolling a tapered disk the metal will draw unevenly down the taper and thus commercial disks, (and by commercial I mean disks that a rolling mill will be able to produce in quantity production, with the same average care and tolerances as with other rolling mill products), will so vary in thickness as to make a smooth pressing in dies almost impossible on a quantity production basis, in the forms generally heretofore used for tapered disk wheels.

In Figure 2, 1 indicates in full lines, the exact form of disk desired and the dotted lines 2, 3 indicate the variations that actually occur in commercially rolled disks.

When commercially produced tapered blanks are pressed into such form as that indicated in Fig. 4, that is into a form having broad smooth areas, small buckling irregularities, indicated at 5, Fig. 6, cannot readily be avoided. Practically, steel dies cannot exactly fit both faces of blanks varying in thickness as indicated by the dotted lines 2, 3, of Fig. 2, and when it is sought to produce from such blanks forms analogous to that of Fig. 4. many of the disks produced will have buckled areas such as shown at 5, Fig. 6. These, practically, must be hammered out or ground out, or such disks must be discarded and lost, for even a slight deformity of this kind shows in the finished wheel.

By making the disk in the form shown in Figure 1, the reverse swells 6 and 7 allow the dies to be made to accommodate the commercial variations in the thicknesses of the disks and obtain smooth uniform surfaces without the buckles 5 before mentioned.

As shown, this disk has annular salient portions or ridges each integrally continuous with a similar reversed ridge or re-entrant region, so that each face of the disk has concentric annular waves or corrugations. The dies 11, 12, Fig. 3, which so form the blanks, are not made with concave and convex areas exactly corresponding to a perfect disk made from a perfect blank, but each die has its re-entrant annular areas formed with a clearance or excess depth, as is shown at 8, 10 of one die and at 9 of the other. If the commercial blank having slight irregularities, as suggested in Fig. 2, be placed in such dies, the salient portions of each die will force the metal into the corresponding re-entrant portions of its companion, and under die action the metal of such irregular blank will be properly distributed, any excess entering the clearance spaces. The disks produced will have smooth surfaces free from buckled areas. The clearances may be very slight, and the disks produced will approach very closely the form of the theoretical disk of Fig. 1, no matter whether the blank had in any region a slight excess or a small deficiency of metal.

What I claim is:

1. A disk body for vehicle wheels having an outwardly tapering radial cross section and presenting between the hub and rim areas a concentric series of concave and convex zones, adjacent zones merging gradually into each other on an ogee curve and decreasing in depth radially outward, the curves flattening as the thickness of the disk decreases.

2. The method of forming wheel disks

from commercial, circular metal blanks of outwardly tapered radial section, which consists in pressing the blanks between annularly corrugated co-acting dies each having the depth of its re-entrant areas greater than the projection of the co-acting salient areas of its companion, forming clearance spaces coincident with the salient annuli on each face of the blank to be formed.

3. The method of forming wheel disks radial sections of which are outwardly tapered, which consists in pressing a plate of such cross section between co-acting dies each having annular ridges to enter corresponding depressions of its companion, the corresponding salient and re-entrant areas only having slight clearance spaces, whereby portions of a slightly irregular blank may be drawn over the salient portions while not gripped at these points and the metal be properly distributed without buckling.

4. The method of forming wheel disks from circular plates, which consists in shaping the plates between dies each having salient and re-entrant portions adapted to co-act with reverse portions of the other, there being clearance space at the bottom of each re-entrant area to permit the flow into said clearance spaces of excess metal from adjacent portions of said disks.

Signed at Chicago in the county of Cook and State of Illinois, this 13th day of July, 1922.

WILLIAM ERASTUS WILLIAMS.