Feb. 5, 1952 D. W. VOORHEES 2,584,309

PRESSED METAL VEHICLE WHEEL

Original Filed Dec. 11, 1947 2 SHEETS—SHEET 1

Fig. 1

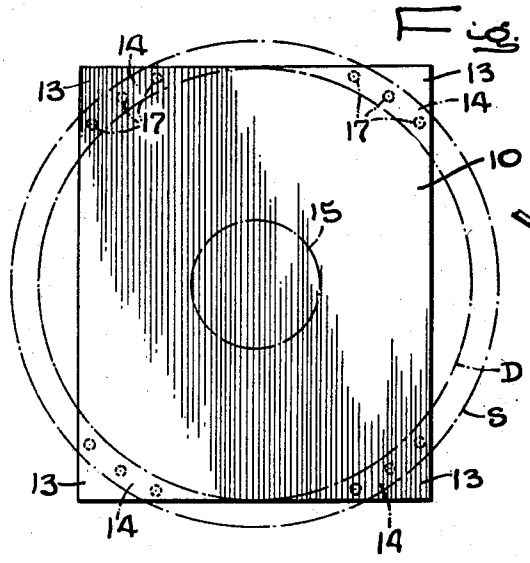


Fig. 2

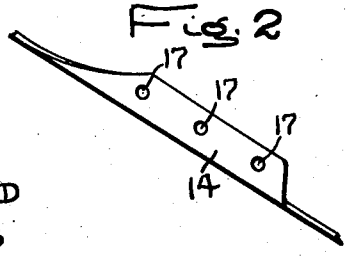
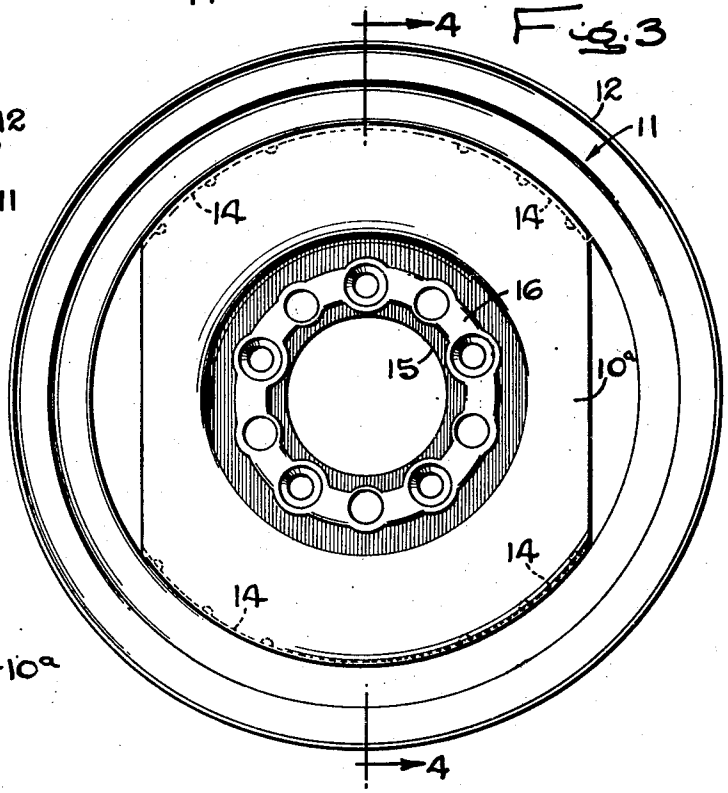


Fig. 3



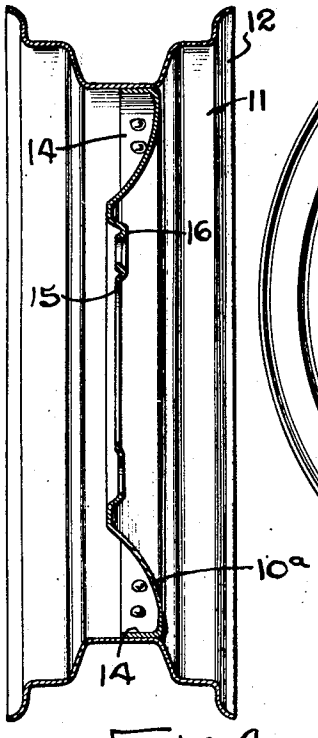


Fig. 4

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PRESSED METAL VEHICLE WHEEL

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Fig. 5

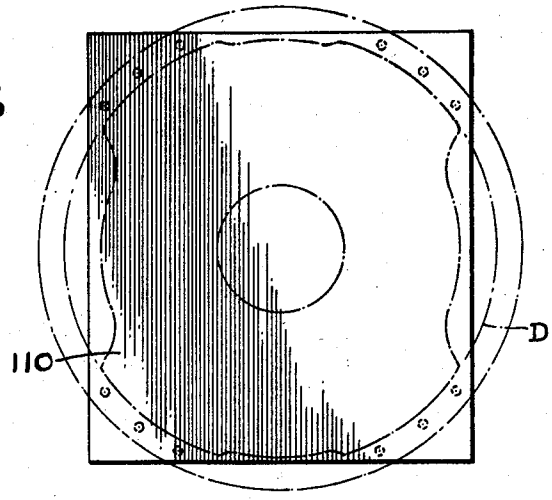
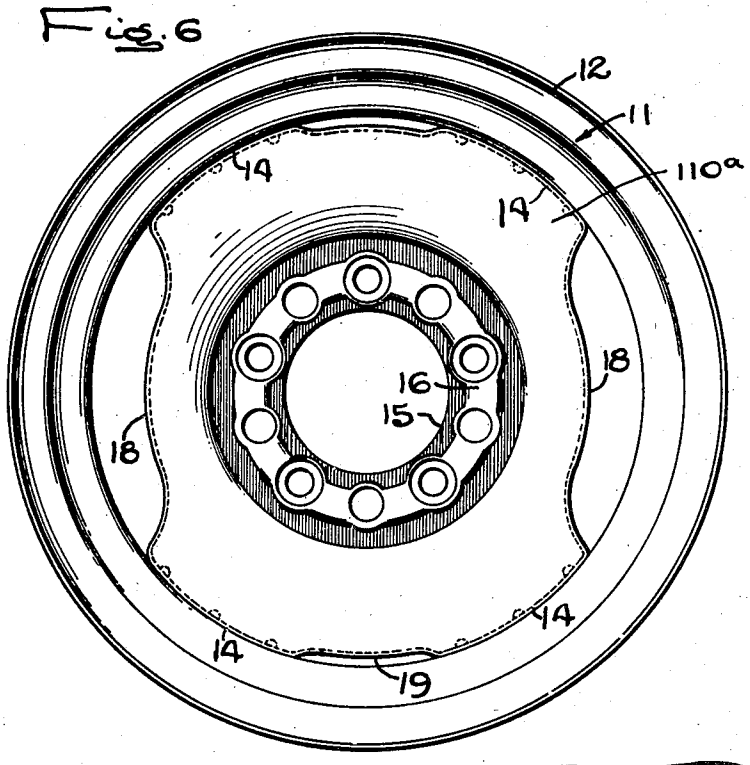


Fig. 6



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2,584,309

PRESSED METAL VEHICLE WHEEL

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Original application December 11, 1947, Serial No. 790,957. Divided and this application December 7, 1948, Serial No. 63,885

3 Claims. (Cl. 301—63)

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The invention relates to metal vehicle wheels, and more particularly to wheels of the type produced from blanks of sheet metal by operations such as pressing, stamping and rolling.

This application is a division of my copending application Serial No. 790,957, filed December 11, 1947, now abandoned.

The general object of the invention is to provide an improved pressed metal vehicle wheel of sturdy construction and attractive appearance which can be produced with a minimum waste of material.

Another object is to provide a pressed metal wheel utilizing a body or "disk" which can be fashioned from a metal sheet of minimum size and which will afford supporting contact between the body and the wheel rim throughout a large percentage of the rim's interior.

Many years ago, it was proposed in the now expired patent to Main No. 1,533,438 to form a wheel body from a square blank whose sides were no greater than the internal diameter of the rim to which it was applied. The corners were trimmed and flanged for attachment to the rim. This accomplished a considerable saving in metal as compared to using square blanks, as had theretofore been the practice, which were large enough to encompass a complete disk with continuous border flange for attachment to the rim.

In the period since the Main patent, square blanks of the diminished size he proposed have been widely used. But the extent to which his system of metal saving could be carried was rigidly limited. It was limited by the amount that the percentage of contact area between wheel body and rim could be safely reduced. By such "percentage" is meant the percentage of the total internal circumference of the rim which is contacted by the arcuate corner attaching flanges on the blank. This is sometimes referred to as the "percentage of support." It is clear that, for any given size of rim, as the square blank is reduced in size, the length of the arcuate attaching flanges afforded at each corner of the blank becomes less and less. Such flange length shrinks with diminution in blank size until it finally reaches zero, or, in other words, until the square is so small that its corners no longer reach the rim.

The present invention departs from the trend of using square blanks as outlined above. By the present invention it is possible, with the different shape of blank here disclosed, to get a much greater percentage of support and consequently more rigid construction, with the same overall area for the blank. Or, to put it another way, the present invention requires a much smaller overall area for the blank, as compared to a square, for the same percentage of support.

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Specific dimensional examples are given later herein.

Further objects and advantages of the invention will become apparent as the following description proceeds, taken in connection with the accompanying drawings, in which:

Figure 1 is a plan view of a rectangular blank employed in providing a wheel pursuant to the present invention.

Fig. 2 is an enlarged detail plan view of one of the four corner attaching flanges fashioned on the blank of Fig. 1.

Fig. 3 is a face view of the completed wheel, the scale being somewhat larger than in Fig. 1.

Fig. 4 is a vertical sectional view taken substantially along the line 4—4 in Fig. 3.

Fig. 5 is a view similar to Fig. 1, showing somewhat modified proportions for the blank and indicating a slightly different form for the finished wheel body made from it.

Fig. 6 is a face view of the completed wheel having a wheel body fashioned from the blank of Fig. 5.

Although a particular embodiment of the invention has been illustrated and described in some detail, there is no intention to thereby limit the invention to the specific detail and procedure set forth. On the contrary, the intention is to cover all alternative constructions and procedures falling within the spirit and scope of the invention as expressed in the appended claims.

In practicing the present invention, the wheel body is fashioned from a rectangular blank. The lengths of the long and short sides of the rectangle, in relation to the internal rim diameter desired for the wheel, are of special importance. The long side of the rectangle is substantially equal to or longer than such diameter. The short side of the rectangle is, on the other hand, substantially less than such diameter.

Such a rectangular blank 10 of steel or other suitable sheet metal is shown in Fig. 1, being intended for use in producing the wheel body 10a for the finished wheel 11 of Figs. 3 and 4. As appears in the latter figure, the wheel body 10a is circumscribed by an annular rim 12. The rim may be formed in any suitable well known manner as, for example, by rolling a flat sheet in a desired contour and welding the ends together to complete the annulus. The cross sectional contour of the rim 12 illustrated is simply one well known form which is in use today. In Fig. 1 the broken line circle D indicates the internal diameter of the rim 12.

In shaping the rectangular blank 10 to form the wheel body 10a, the corner areas 13 beyond the perimeter of a shearing line circle S, indicated in broken lines, are trimmed off, leaving

portions 14 to constitute attaching flanges. Such flanges are bent at right angles to the plane of the wheel body. Moreover, the wheel body is drawn into the general dish shape indicated in Fig. 4, a center opening 15 formed for reception of a hub (not shown) and a flange 16 surrounding the opening 15 suitably apertured and embossed or coined to facilitate bolting of the wheel to a mounting flange (not shown) on the hub. The detail of the formation on the flange 16 constitutes no part of the present invention, simply one of the variety of well known available forms being shown. All of these operations may, for example, be carried out in a hydraulic press with suitable blanking and forming dies.

The formed wheel body 10*a* is permanently attached to the rim 12 in some suitable manner, as, for example, by riveting or spot welding. In this instance, three rivet holes 17 are indicated for each of the attaching flanges 14.

Let us assume that the rim 12 has an inside diameter of, for example, 13½ inches. In such case, the blank 10 may be dimensioned 13½ inches by 11 inches. That means, of course, that its long dimension is just equal to the internal diameter of the rim while its shorter dimension is substantially less than such diameter. The blank 10 has, in such case, an overall area of 148.5 square inches. Also, in such case, the attaching flanges 14 will contact 59% of the internal circumference of the rim, that is, give 59% support. In contrast, a square blank of substantially that same overall area would be 12 inches by 12 inches (overall area of 144 square inches). But the corner flanges of such a 12 inch by 12 inch square blank could give only 39% support in a 13½ inch rim. By way of still further contrast, if the square blank is to give as much as 55% support in the assumed size of rim, the dimensions of the blank have to be increased to 13¼ inches by 13¼ inches, resulting in an overall area of 175.5 square inches for such blank. Using a rectangular blank of only 148.5 square inches, as against a square blank of 175.5 square inches, for the same percentage of support thus obviously yields a large and important savings in material. Spread over the usual quantities of production for such wheels, it represents a savings of many tons of metal.

In the wheel of Fig. 3 it will be noted that the side edges of the body 10 (which appear as vertical sides in that figure) are unflanged. The square blank of 175.5 square inches mentioned above would it is true, have sufficient metal, that it could have border flanges, if desired along its comparable edges which are spaced from the rim. Sometimes such border flanges are desirable for purposes of appearance, neatness of finish, and strength. Even widening the rectangular blank to permit such flanges still, however, leaves a large margin of advantage over the square blank.

Thus, as indicated in Fig. 5, a rectangular blank 110 may be employed in fashioning the wheel body 110*a* of Fig. 6 in lieu of the blank 10 for the wheel body 10*a* previously described. The long dimension of the blank 110 is still equal to the internal diameter D of the rim 12 but the shorter dimension of the rectangle has been somewhat increased. If we assume, as before, that the internal diameter of the rim is 13½ inches, the long dimension of the rectangle may also be 13½ inches and the short dimension 12

inches. Fig. 5 is drawn in such proportions. That means the blank 110 will have an overall area of 162 square inches, still substantially less than 175.5 square inches for the square blank and yet there is a completely flanged edge on the resultant wheel body 110*a*. In this case the flanges will contact approximately seventy per cent of the internal circumference of the rim and thus give a seventy per cent support. The wheel body may be dished, centrally apertured and provided with a suitably embossed and apertured mounting flange 16, as previously noted.

In the case of the wheel body 110*a*, the pairs of mounting flanges 14 at opposite ends of the blank are spread apart a little further than in Fig. 1, giving a slightly more symmetrical location for them. Edge or border flanges 18 and 19 extend along the portions of the body intermediate the mounting flanges 14.

From the foregoing it will be perceived that a most important and substantial economy in manufacture of wheels of the general class described has been accomplished as compared to the practices which have been in vogue over a long period of years.

I claim as my invention:

1. A metal vehicle wheel having, in combination, an annular rim and a one-piece sheet metal body fitted therein, said body being of a length substantially equal to the inside diameter of said rim and of a width between the limits of 80% and 90% of the length, and four integral corner flanges formed on the ends of said body, said flanges being arcuate in contour and arranged in pairs spaced apart to fit snugly within said rim.

2. A metal vehicle wheel having, in combination, an annular rim, a one-piece body fixed to said rim, the length of said body being substantially equal to the inside diameter of the rim and the width being approximately 80% of the length, and four arcuate flanges formed at the ends of said body snugly received in and rigidly attached to said rim, said flanges extending around and contacting the rim through approximately 59% of its internal circumference.

3. A metal vehicle wheel having, in combination, an annular rim, an elongated one-piece body fixed in said rim, said body having arcuate ends and free side edges, the maximum length of said body being substantially equal to the inside diameter of said rim and the width being not less than 80% nor more than 89% of the length, a pair of arcuate flanges formed at each end of said body for engagement with the internal surface of said rim, said flanges extending around not less than 59% nor more than 70% of the internal circumference of said rim.

DANIEL W. VOORHEES.

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