Apr. 3, 1923. 1,450,618

J. G. SWAIN

PRESSED STEEL WHEEL AND METHOD OF MAKING SAME

Filed Nov. 20, 1919 2 sheets-sheet 1

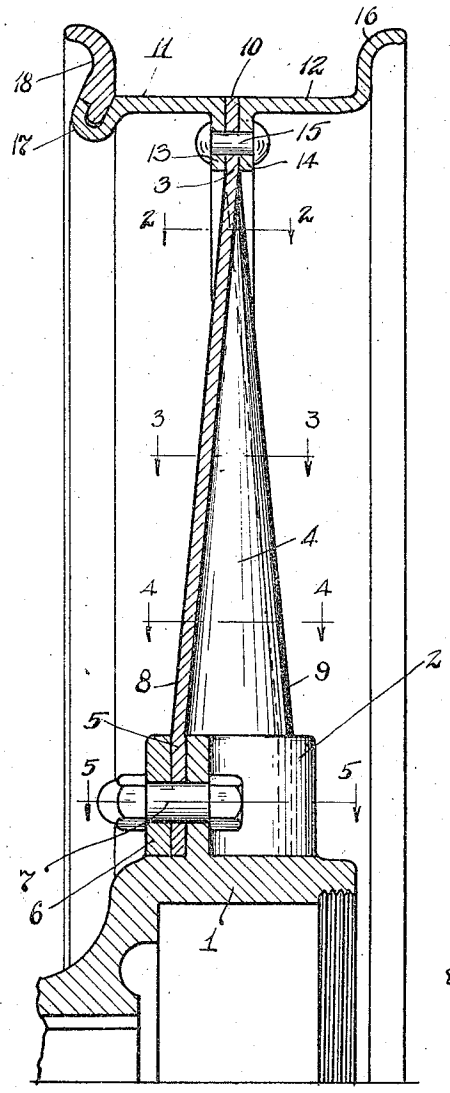


FIG. 1

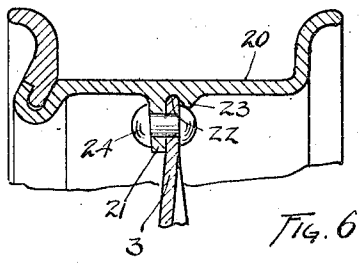


FIG. 6

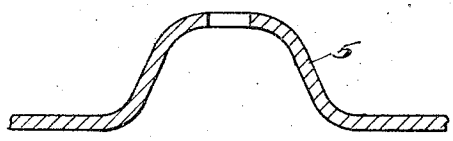


FIG. 5

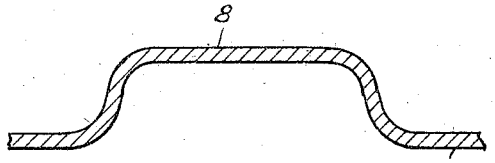


FIG. 4

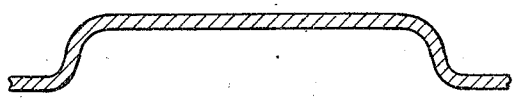


FIG. 3

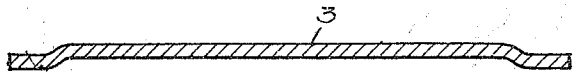


FIG. 2

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Apr. 3, 1923. 1,450,618

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PRESSED STEEL WHEEL AND METHOD OF MAKING SAME

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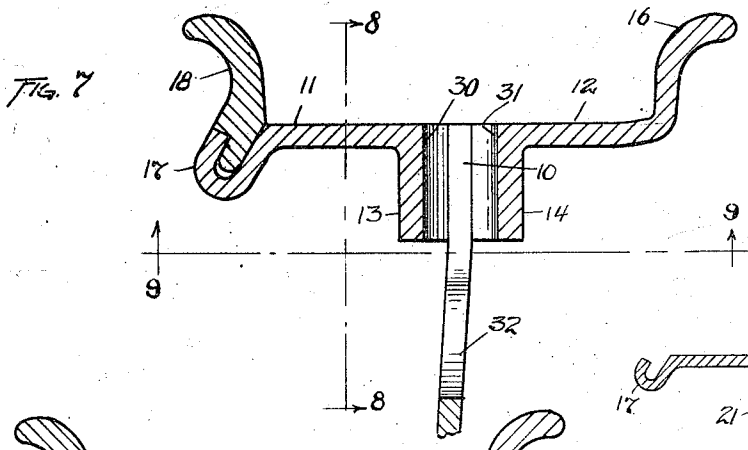


FIG. 7

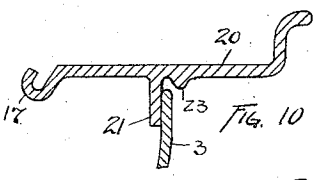


FIG. 10

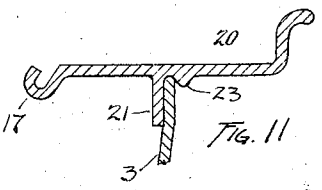


FIG. 11

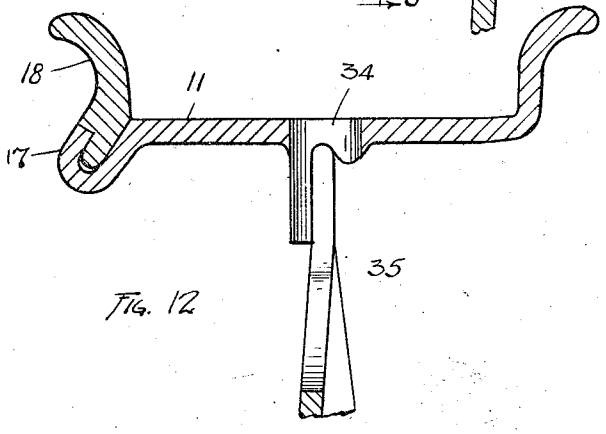


FIG. 12

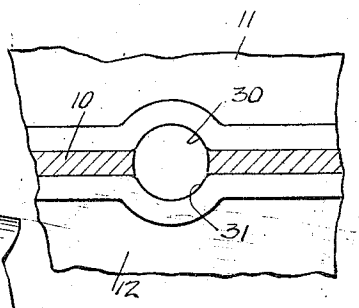


FIG. 9

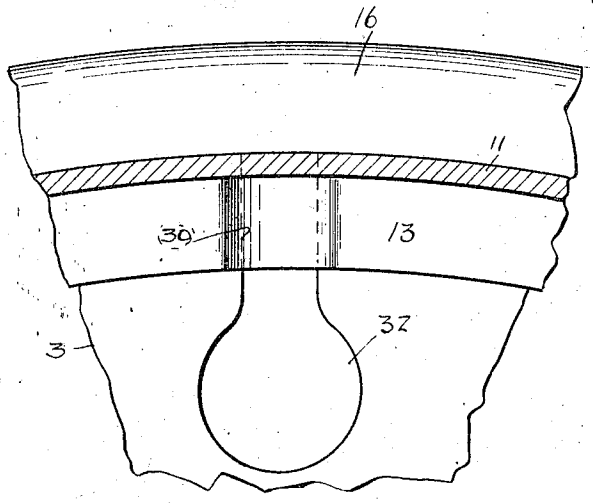


FIG. 8

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Patented Apr. 3, 1923. 1,450,618

UNITED STATES PATENT OFFICE.

JOSEPH G. SWAIN, OF AKRON, OHIO.

PRESSED-STEEL WHEEL AND METHOD OF MAKING SAME.

Application filed November 20, 1919. Serial No. 339,400.

To all whom it may concern:

Be it known that I, JOSEPH G. SWAIN, a citizen of the United States, and a resident of Akron, county of Summit, and State of Ohio, have invented a new and useful Improvement in Pressed-Steel Wheels and Method of Making Same, of which the following is a specification, the principle of the invention being herein explained and the best mode in which I have contemplated applying that principle, so as to distinguish it from other inventions.

The present invention, relating, as indicated, to pressed steel wheels and method of making same, is particularly directed to an improved type of wheel, or, as is commonly called, a disk wheel, together with an improved method of making the disk portion of such wheel. The particular advantages of my improved wheel are its great strength in proportion to the amount of material used and the simplicity of construction and of assembly. To the accomplishment of the foregoing and related ends, said invention, then, consists of the means hereinafter fully described and particularly pointed out in the claims.

The annexed drawing and the following description set forth in detail certain mechanism embodying the invention, such disclosed means constituting, however, but one of various mechanical forms in which the principle of the invention may be used.

In said annexed drawing:—

Fig. 1 is a transverse section showing my improved wheel; Figs. 2, 3, 4 and 5 are transverse sections on the lines 2—2, 3—3, 4—4 and 5—5, respectively; Fig. 6 is a partial transverse section showing a modification of the wheel structure; Fig. 7 is a transverse view of the wheel shown in Fig. 1, formed to receive a valve stem in the rim; Fig. 8 is a section on the line 8—8 in Fig. 7; Fig. 9 is a section on the line 9—9 in Fig. 7; Figs. 10 and 11 are transverse sections illustrating the method of application of the rim shown in Fig. 6 to the disk; and Fig. 12 is a transverse section of the rim and wheel shown in Fig. 6 at the point of reception of the valve stem.

In Fig. 1 I have shown a metal hub member 1, which is provided with a radially extending corrugated flange or support 2. This flange may conveniently be formed integral with the hub member itself and all surfaces of the flange are radial with respect to the axis of the hub. The disk portion of the wheel consists of a circular plate or disk 3 which is provided with a series of corrugations 4, each corrugation increasing in depth and decreasing in width as it extends from the outer portion of the disk to the inner portion. The extreme inner portion 5 of the disk 3 is formed with its surfaces radial with the axis of the disk, and with the corrugations therein of the same size and conformation as the corrugations in the flange 2 on the hub, thus adapting the inner portion of the disk to be abutted snugly against the corrugated flange 2, where it is retained by means of a second corrugated flange 6, which is removably fastened to both the disk and the flange 2 by means of bolts 7.

It is not broadly new to use a corrugated disk in a metal wheel, but in the present construction the corrugations serve the double purpose of providing great strength in the disk against lateral strains and of providing a driving engagement between the disk and the hub, and thus removing the driving strain from the bolts, which are used to hold these members in engagement. In my construction the driving engagement is through the contacting corrugated surfaces of the disk and the flange on the hub, and the only strain on the bolts 7 is that of holding this surface in such engagement, which is of course comparatively slight when compared with the full force of the driving strain if it were exerted on the bolts alone. The corrugations in the disk 3 are so formed that the crest 8 and the bottoms 9 of the corrugations stand at approximately the same angle to the central plane of the disk and hub, and thus resist strains in the same way as do the spokes of the woven wire wheel. The form of these corrugations is shown in Figs. 2 to 5, inclusive, in which the deepening form of the corrugations as they extend toward the center is clearly shown.

The disk member may conveniently be formed either by pressing or rolling an angular sheet of metal into the form which is shown, and to secure a uniform cross-sectional thickness in the disk I employ an initial blank which is thicker at its inner periphery than it is at its outer. Such a blank when worked to form the progressively deepening corrugations from the outer end to the inner end will have a progressive thinning of the metal from the outer to the inner rim during these working

operations, and by proper proportioning it is possible to conclude with a corrugated disk of uniform cross-section, although it is not of course essential to my construction.

The outer periphery of the disk 3 is radial to the central plane of the disk and hub, and this portion 10 serves to support the tire-receiving members 11 an 12. These two tire-receiving members are formed with inwardly extending radial flanges 13 and 14, respectively, which engage against the opposite sides of the portion 10 of the disk, and are permanently secured thereto by a series of rivets 15. The member 12 is provided with a tire-engaging flange 16 which is integral therewith, while the member 11 is formed with a depressed and circumferentially extending groove 17, in which is received a second tire-engaging flange 18, which is removable from the groove for the mounting and dismounting of the tire.

In the form of rim shown in Fig. 6, the tire-receiving member 20 is formed in one piece and is provided with a substantially central downwardly extending flange 21, and with a recess 22 formed on one side of this flange 21, between it and a second shorter flange or projection 23. This form of rim may be very securely and snugly mounted on the disk 3 by being initially formed with the projection 23 of the proper size to slip over the disk 3, thus bringing the periphery of the disk between the flanges 21 and 23. The entire rim 20 is then shrunk into a close engagement with the disk 3 as indicated in Fig. 6. By any suitable means this operation may conveniently be carried out on machines such as West tire-setting machines which are commonly used to size and shrink rims. After the rim is so shrunk on to the disk it is secured in that position by a series of rivets 24 or other suitable means (not shown). In Figs. 10 and 11 I have shown this method of mounting the rim upon the disk, the rim first being formed of a size to permit the projection 23 to slide past the outer edge of the disk 3. Upon the shrinking of the rim, as indicated in Fig. 11, the disk is engaged between the flange 21 and the flange 23 and is securely held therein.

It is of course necessary to provide for the valve stem of the pneumatic inner tube of the tire and such means are provided for the wheel shown in Fig. 1 in the manner indicated in Figs. 7, 8 and 9. In these figures, it is shown that the rim members 11 and 12 are provided with semi-circular registering openings 30 and 31, which together form a circular opening for receiving the valve, as indicated in Fig. 9. The flanges 13 and 14 on the rim members 11 and 12, respectively, are similarly formed to provide semi-cylindrical openings, while the disk 3 is cut away to form a recess 32 which is considerably larger than the valve stem and permits of convenient access and manipulation thereof. In Fig. 12 I have shown a single recess 34 which is formed directly through the single rim member 20, the disk 3 being cut away, as in preceding construction, to provide a recess 35.

The advantages of my improved wheel are its simplicity of construction, its great supporting strength, which is secured by the corrugating of the disk portion to bring the metal into a series of planes, some of which lie on each side of the central plane of the wheel, as well as the convenient method of manufacture.

Other modes of applying the principle of my invention may be employed instead of the one explained, change being made as regards the structure herein disclosed, provided the means stated by any of the following claims or the equivalent of such stated means be employed.

I therefore particularly point out and distinctively claim as my invention:—

1. In a wheel, the combination of a hub member, a continuous tire-receiving rim member provided with two continuous parallel and adjacent intergral flanges on its inner surface, one of said flanges being deeper than its companion flange, and a disk mounted on said hub and held in engagement with the inner surface of said deeper flange by the clamping action of said flange of lesser depth.

2. In a wheel, the combination of a hub member, a continuous tire-receiving rim member provided with two continuous parallel and adjacent integral flanges on its inner surface, one of said flanges being deeper than its companion flange and provided with a plurality of rivet-holes at spaced intervals throughout its annular extent, a disc mounted on said hub and held in engagement with the inner surface of said deeper flange by the clamping action of said flange of lesser depth against its circumferential portion, the adjacent circumferential portion of said disc being provided with rivet-holes at spaced intervals adapted to register with said rivet-holes in said deeper flange, and rivets secured in said registering rivet-holes to supplement the holding action of said clamping flange.

3. In a method of making disk wheels, the steps which consist in forming a metal rim member with inwardly projecting flanges, slipping a disk past one of said flanges into position between the two, and then forcibly compressing said rim into engagement with said disk.

Signed by me, this 17th day of November, 1919.

JOSEPH G. SWAIN.