Feb. 14, 1933. H. A. GREENWALD 1,897,375

WHEEL

Filed May 12, 1931 2 Sheets-Sheet 1

Fig. 1.

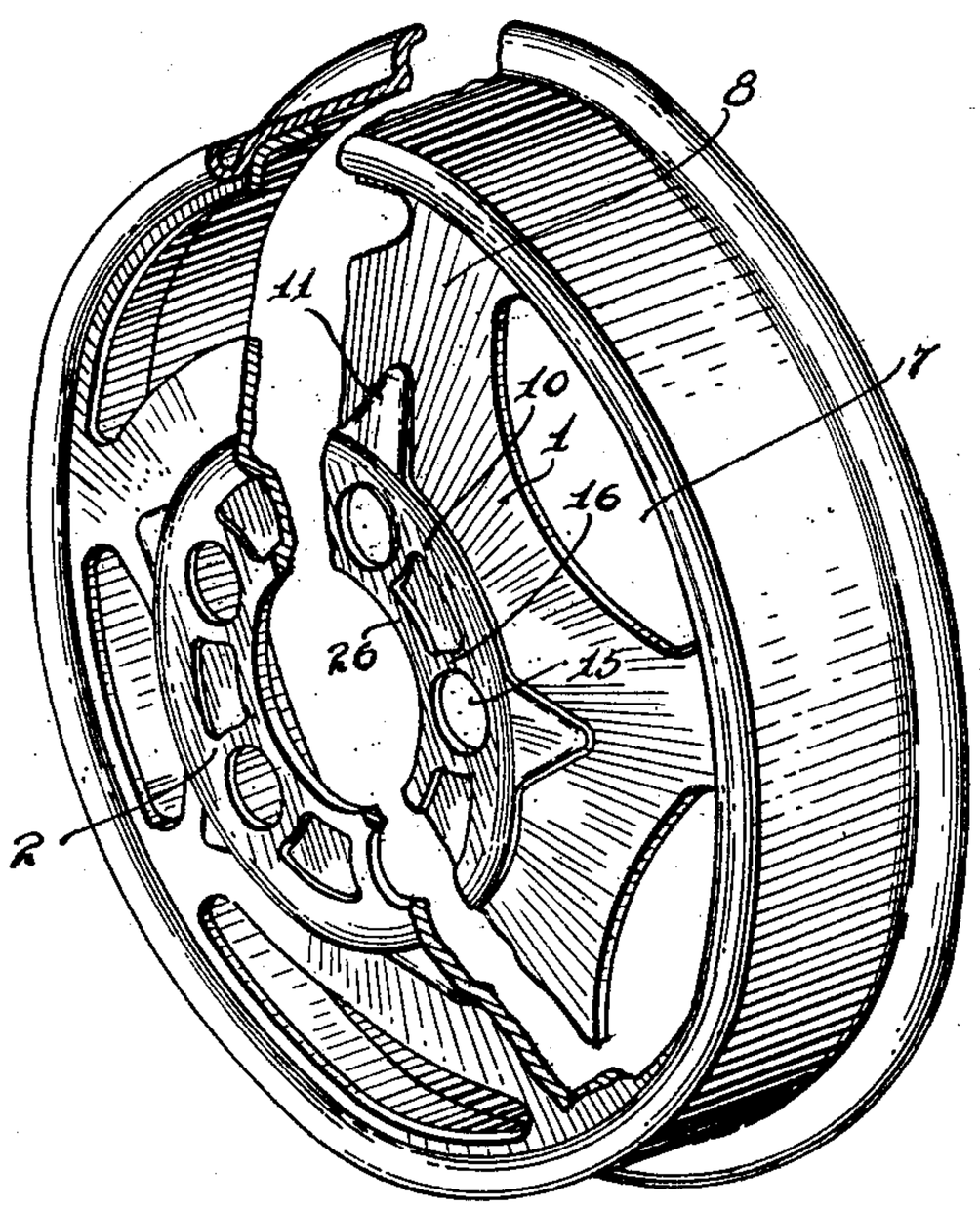


Fig. 2.

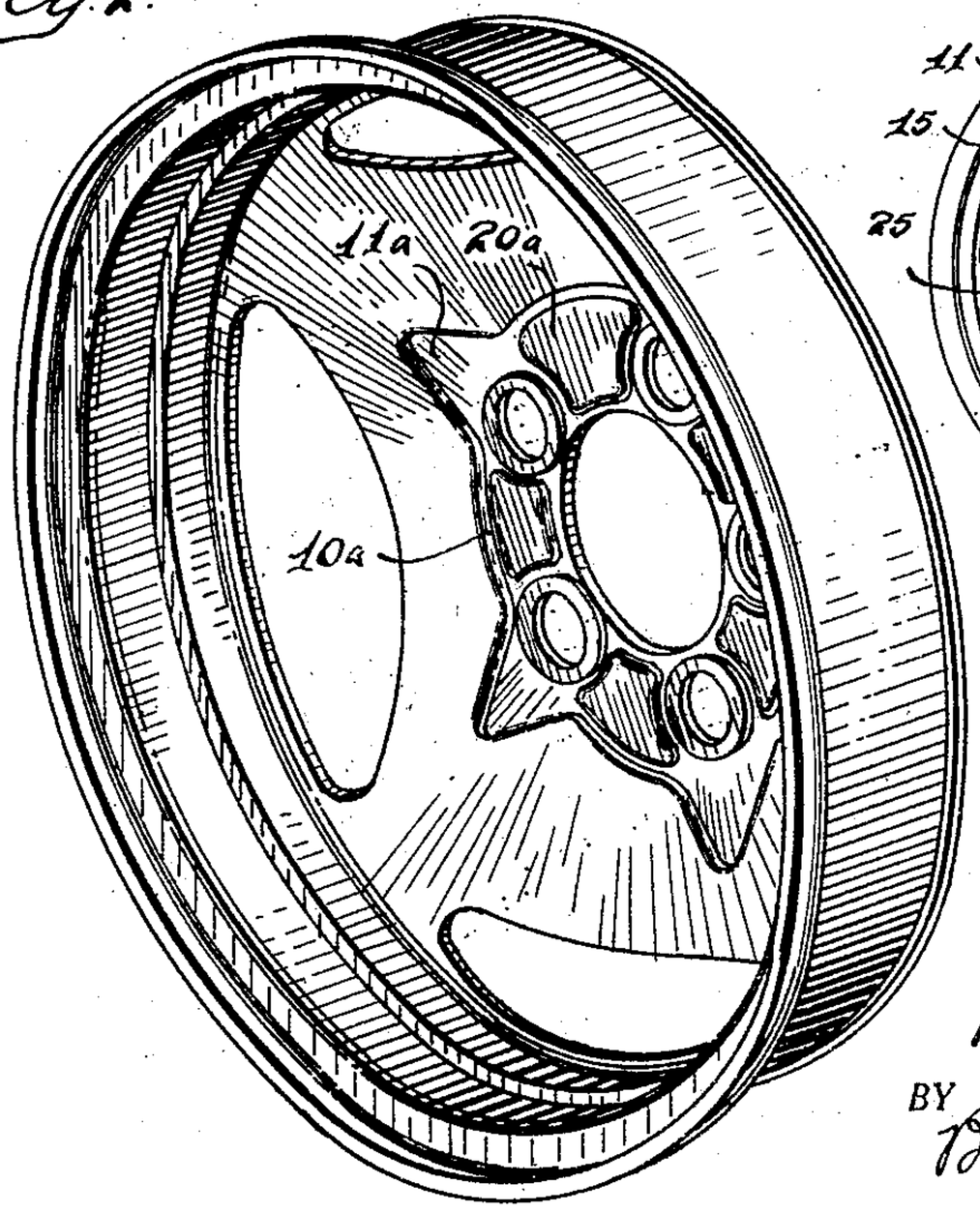
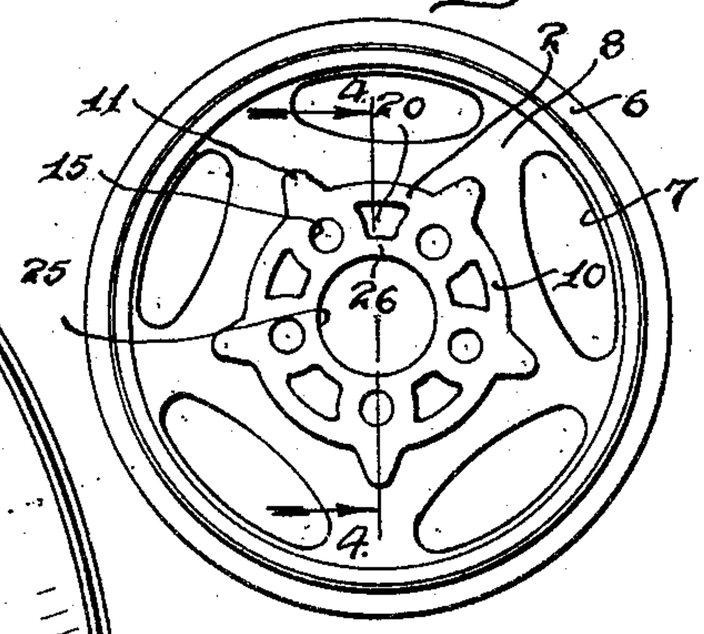


Fig 3.



INVENTOR.

HAROLD A. GREENWALD.

BY Barnes and Kisselle

ATTORNEYS.

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Fig. 4.

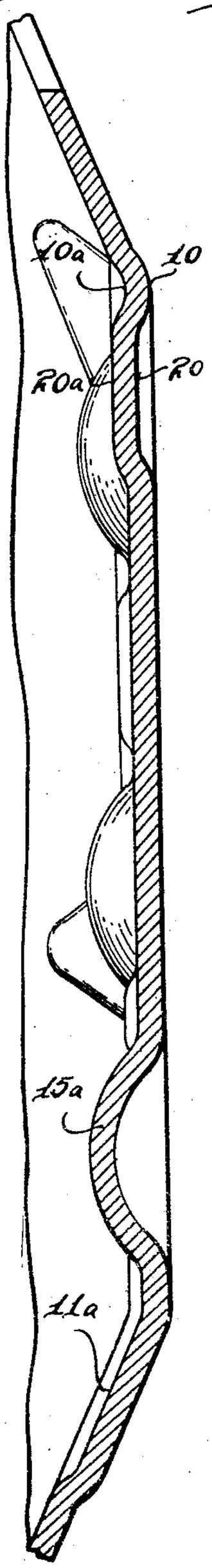


Fig. 5.

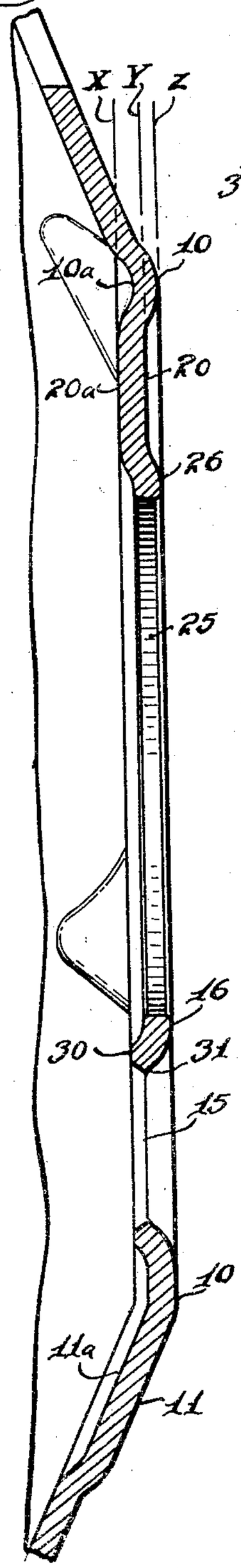
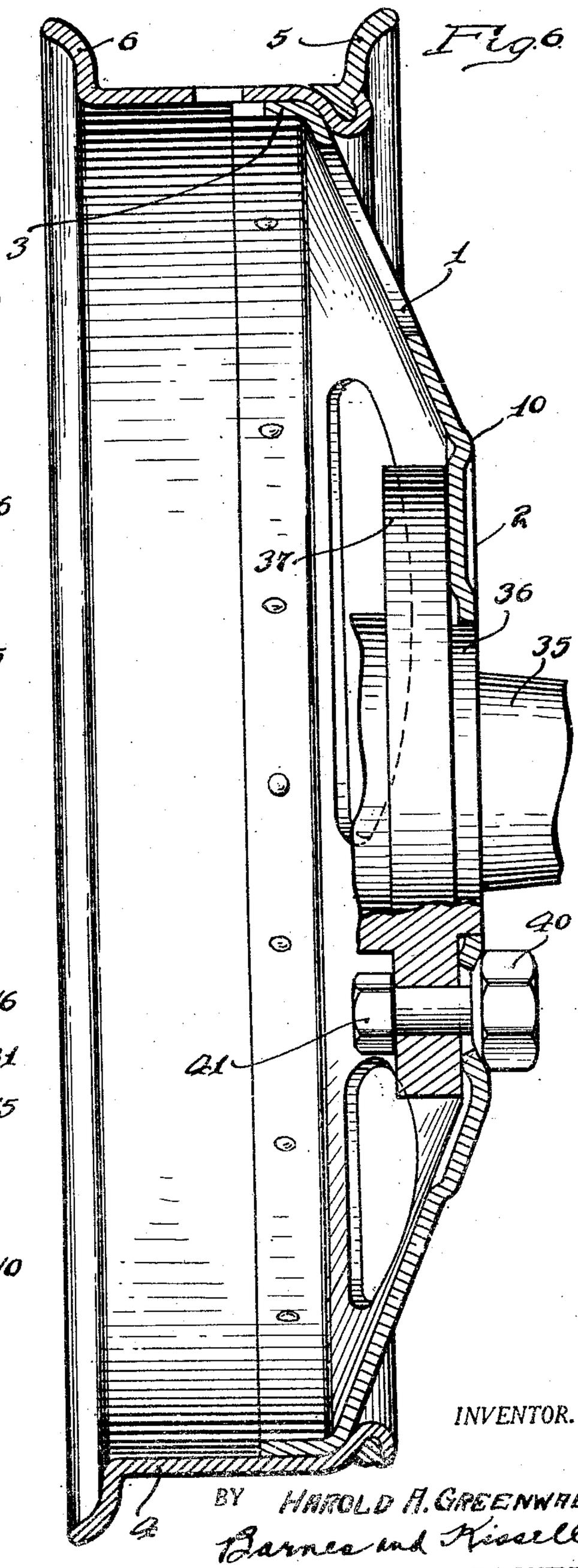


Fig. 6.



INVENTOR.

BY HAROLD A. GREENWALD.

Barnes and Kisselle

ATTORNEYS.

Patented Feb. 14, 1933

1,897,375

UNITED STATES PATENT OFFICE

HAROLD A. GREENWALD, OF RIVER ROUGE, MICHIGAN, ASSIGNOR TO WHITEHEAD & KALES COMPANY, OF RIVER ROUGE, MICHIGAN, A CORPORATION OF MICHIGAN

WHEEL

Application filed May 12, 1931. Serial No. 536,802.

This invention has to do with a wheel and is concerned particularly with a wheel of disk type which may be made from sheet metal stock. The principal object of the invention is the provision of a wheel advantageously made from blank stock of a given thickness and in which the inner zone or hub portion of the wheel is given increased strength without utilizing stock which is thicker at the hub or inner zone than it is at the outer zone. Heretofore disk wheels have been made from stock having a thickness which would suffice for the inner zone and in which the stock thickness in the outer zone of the wheel was reduced as by means of a rolling process. In accordance with the present invention the stock thickness of the outer zone of the wheel is that of the thickness of the original blank, while at the same time the metal at the inner zone is so worked and shaped as to effectively meet the strains and stresses placed thereon. Other objects and advantages will appear from the detailed description.

In the drawings:

In Fig. 1 is a perspective view of a wheel constructed in accordance with the invention showing the wheel partially cut through to illustrate structural features.

Fig. 2 is a perspective view showing the opposite side of the vehicle.

Fig. 3 is a small elevational view of the wheel.

Fig. 4 is an enlarged sectional view taken through a wheel blank illustrating its form in the process of wheel manufacture taken substantially as on line 4—4 of Fig. 3.

Fig. 5 is a sectional view similar to Fig. 4 showing the disk after it has been machined.

Fig. 6 is a sectional view taken through a completed wheel showing the same attached to a hub.

As shown in Fig. 1 the wheel is of disk formation wherein the disk has an outer zone 1 and an inner or hub zone 2. The outer zone may be disposed at an angle to the inner zone as shown in Fig. 6, and the peripheral edge may be turned as at 3 for receiving a rim or felly 4 which in the present instance is shown in the form of a rim for receiving a pneumatic tire having a removable ring flange 5 and a permanent flange 6.

The disk wheel may be made from a blank of sheet stock from which the disk may be cut. By the use of suitable dies or the like the disk may be treated so that the outer zone is angularly disposed as desired with regard to the hub and the flange or peripheral edge 3 provided. The outer zone thus has a frusto-conical shape. The outer zone of the wheel may be cut through to provide apertures 7 which define spoke-like members 8. This serves to lighten the wheel and the apertures may be arranged so that the spokes 8 are of taper formation so as to have greater strength near their base than in their outer regions in close proximity to the rim. However the strengthening of the hub described below may be accomplished and employed with a disk wheel which is not apertured to form spoke-like members.

The hub is strengthened by shaping the metal in such manner as to afford an effective increase of thickness in the stock at the hub of the wheel without in reality utilizing thicker metal. In carrying out the strengthening of the hub the stock may be shaped by suitable dies or the like. By reference to Fig. 1 it will be noted that the outer periphery of the inner zone is defined by a circular like raised portion or bead like member 10. This bead or raised portion 10, as shown in Figs. 4 and 5, may be located substantially at the juncture of the inner and outer zones.

At spaced points along the bead 10 the same merges into raised portions or projections 11, which as shown in Figs. 1 and 3 are in alignment with the spokes 8. This is the preferred location of the projections 11 when a spoked disk wheel is employed. The bead 10 and the projections 11 are provided by depressing the metal on the opposite side of the disk thus effecting a recess 10*a* and a recess 11*a*. As shown herein the raised portions are on the outside of the frusto-conical formation with the depressions on the inside although this arrangement may be reversed. The depressions thus formed are shown in Fig. 2. The projections 11 are preferred for strengthening purposes although the hub portions may

be strengthened without use of these projections and the invention is intended to cover a wheel without such projections. The hub is provided with a series of circumferentially arranged apertures 15 for attachment purposes. Surrounding each aperture is a raised portion 16, the outer surface of which is preferably in the same plane as the outer surface of the raised portion 10, and as shown in Fig. 5. The raised portion 10 constitutes a part of the circular raised portion around each aperture. Situated alternately between the apertures are depressed areas 20 which on the inner face of the wheel appear as raised portions or pads 20*a*.

In the making of the wheel the blank may be subjected to die operation to shape it into the form shown in Fig. 4. It is within the invention to have one operation for shaping the outer zone in its angular shape, punching the apertures 7 and forming the rim 3, with a separate operation on the blank for forming bead 10, depressions 20 and raised parts 16. However, the punch and die operations may be combined or separated as may be decided upon. As shown in Fig. 4 the central part of the blank remains intact but it is situated so that its outer surface lies substantially in the same plane as the outer surface of bead 10. The metal located at the bolt aperture 15 remains intact and is depressed as illustrated at 15*a*. The blank may now be acted upon to cut out the central portion thus forming a central aperture 25 for fitting over an axle hub. The central aperture is bounded by a raised or bead like portion 26. This raised or bead like portion 26 constitutes the inner boundary of the depressions 20 and constitutes the inner parts of the circular raises 16 around the bolt apertures 15. The metal 15*a* is now removed and the hub aperture 25 and bolt apertures 15 may be machined. In this regard the metal surrounding the aperture 15 may be machined as at 30 to bring this surface 30 into alignment with the surfaces or pads 20*a*; also the aperture may be machined to provide for the reception of an attaching nut or cap screw of taper formation for centering purposes thus presenting a tapered surface 31. However the aperture 15 may, if desired, be bounded by metal the surfaces of which are parallel with the axial center of the wheel.

This wheel may be attached to a hub in the usual manner as illustrated in Fig. 6 wherein a hub of a vehicle is illustrated at 35 having a part 36 over which the aperture 25 fits, and a part 37. When the wheel is placed over the hub the surfaces or pads 20*a* lie flush up against the hub part 37; also the surfaces 30 around the apertures 15 lie flush against the member 37, and a securing nut 40 may be screwed onto a holding bolt 41. It is understood that there is a securing bolt and nut for each aperture.

For the purpose of more clearly bringing out the inventive idea let it be assumed that the blank from which the wheel is made had an initial thickness of one-quarter inch. This is shown by the projected lines on Fig. 5 wherein the distance between X and Y is that of the thickness of the blank or one-quarter inch. Line Z has been projected and lines X and Z represent, respectively, the inner plane and the outer plane of the inner zone of the wheel. Accordingly, while the stock thickness is but a quarter of an inch, the distance from X to Y, the effective thickness of the inner zone has been increased with an overall thickness from X to Z which may be, for example, three-eighths of an inch. It will be noted that the overall thickness of the metal immediately surrounding the bolts 15 has been increased to a distance equal to that between X and Z. The dimensions of a quater inch and three-eighths inch have been employed only as one example and it is to be understood that these dimensions may vary in the construction of wheels for different uses or for light and heavy work. There is shown in Fig. 6 a single wheel mounted upon a hub. In some commercial automotive vehicles designed for rather heavy work dual wheels are used, and in this event two of the disk wheels constructed in accordance with my invention may be placed back to back after the manner well understood by those versed in the art.

Accordingly, the present invention provides a wheel which can be made from blank stock by simple stamping and machine operations, yet the outer zone is lightened as by means of the apertures provided therefor and the inner zone is strengthened by an effective thickness in the inner zone without an actual increase of stock thickness in the inner zone. Thus all metal thinning or metal thickening steps in the manufacture of this wheel has been eliminated to the end that manufacturing costs are reduced. In the wheel shown there are five spokes and five apertures for attachment with as many projections 11 extending into the outer zone. It will be understood that this is subject to variation, as more apertures for attachment may be provided and more spokes may be provided or the spokes may be entirely eliminated. Projections 11 form an effective tie and reinforcing rib between the inner and outer zones as well as serving for strengthening of the disk wheel at the juncture between inner and outer zones.

I claim:

A disk wheel comprising a disk having an inner zone and an outer zone, the inner zone being substantially perpendicular to the axis, and the outer zone being of frusto-conical shape, the outer zone having apertures defining spokes, the metal of the disk being pressed out to form a bead of circumferential form

at the juncture of the inner and outer zones, pressed out portions providing raised elements merging with the bead and on the bead side of the disk, said raised elements projecting radially outwardly from the bead into the outer zone, said raised elements each being substantially centered on a spoke and projecting only into the base of the spoke, the inner zone having a plurality of bolt-receiving apertures disposed in spaced annular form and the inner zone having a central aperture for disposition over a hub, the metal of the disk being fashioned to provide a bead like portion around each bolt aperture and around said central aperture, the last mentioned beads, the bead at the juncture of the zones, and the said raised elements being all on the same side of the disk, the metal of the disk between the bolt apertures being pressed to form raised pads projecting from the disk on the side opposite that having the beads and said raised elements leaving depressions on the opposite side thereof, said pads being adapted to abut flush against a hub flange.

In testimony whereof I affix my signature.

HAROLD A. GREENWALD.