May 14, 1929. H. W. DOVER 1,713,035

HANDWHEEL

Filed Nov. 15, 1927

Fig. 1.

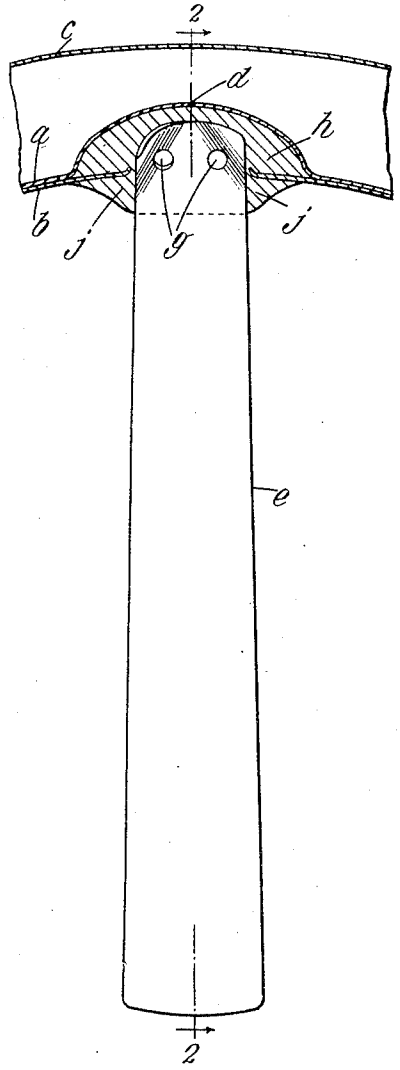
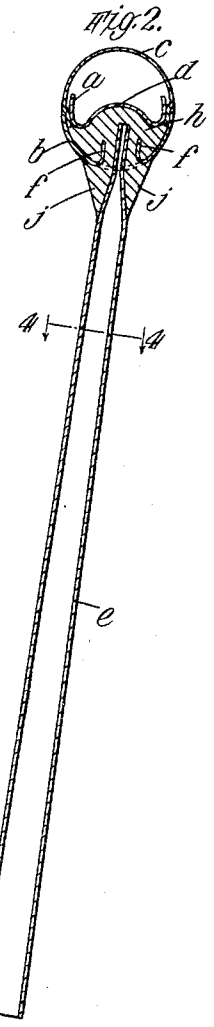


Fig. 2.



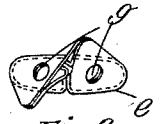


Fig. 3.

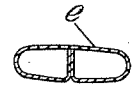


Fig. 4.

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UNITED STATES PATENT OFFICE.

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HANDWHEEL.

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In the specification of my prior British Letters Patent No. 162,544 is described and claimed a hand wheel whereof the rim-portion is built up of annular inner and outer peripheral portions, of which the inner peripheral portion is constituted by two parts each of concavo-convex cross-section arranged one within the other with their free edges spaced slightly from one another, and of which the outer peripheral portion is of concavo-convex cross-section and shouldered or off-set inwardly at its marginal portions, so that said offset marginal portions may fit between the free edges of the two parts of the inner peripheral portion of the rim and the outer surfaces of said inner and outer peripheral portions may be substantially continuous. In that specification it is also stated that the two constituent parts of the inner peripheral portion, having been arranged the one within the other, are then pierced to receive the outer ends of the arms of the wheel, said outer ends are fitted in position and their junctions with the inner peripheral portion are then brazed, welded or similarly treated so as to unite the parts.

In the specification of my prior British Letters Patent No. 162,499 is described and claimed an arm for a hand wheel formed from sheet metal bent from a blank to the desired cross-section of arm required, the lateral marginal portions of the blank being inturned at what is to be, preferably, the underside of the arm, so as to form a diaphragm across, or strengthening rib within, the arm, and in this last-mentioned specification it is stated that the arm of that invention may be employed in connection with a rim-portion built up in accordance with the first mentioned specification.

The object of the present invention is to strengthen the fixing of such and other arms to a rim-portion such, for instance, as one according to the first mentioned specification, for which purpose the inner part of the inner peripheral portion of the rim-portion is formed with pockets or recesses corresponding in number and angular position with the arms of the wheel and with their concavities presented towards the centre of the wheel, the outer part of the inner peripheral portion of the rim-portion is slit circumferentially of said portion and its margins are folded inwardly of said portion to present apertures for the introduction thereinto of the outer ends of the arms of the wheel, and, after said ends have been so introduced, molten metal is cast in the space surrounding said ends, thus embedding them and securing them firmly to the rim-portion.

If the arms of the wheel are to be of cast metal the securing of their ends to the rim-portion may be effected by casting the arms, including the metal in the pockets or recesses, in situ or the outer ends of previously cast arms may be secured in the pockets or recesses as just described.

If the arms of the wheel are to be in accordance with the second mentioned specification there is no necessity to shoulder their ends as before, but on the contrary, the tubular structure of the arms may be squeezed in at said ends in order to prevent molten metal from flowing thereinto and the more irregular the deformation of said structure, the more firmly will said ends be embedded in, and secured by, the cast metal, whilst the absence of any thin cut edges presented in the circumferential direction precludes the possibility of any cutting action or undue wear as result of e. g. the strain due to a sudden turning of the wheel.

Any suitable metal such as aluminium, brass, type-metal or like alloy may be employed for embedding the ends of previously formed arms.

One form of the present invention is illustrated by the accompanying drawings, wherein Figure 1 is a partly sectional plan of a short length of the rim-portion of a motor car steering wheel with an arm secured thereto; Figure 2 is a section on the line 2—2, Figure 1; Figure 3 is an end view of the arm alone, as seen from the outer end; and Figure 4 is a cross-section of the arm on the line 4—4, Figure 2.

As shown the rim-portion of the hand wheel is built up of annular inner and outer peripheral portions, of which the inner peripheral portion is constituted by two parts *a* and *b* arranged the one *a* within the other *b* with their free edges spaced slightly from one another, and of which the outer peripheral portion *c* is of concavo-convex cross-section and shouldered or off-set inwardly at its marginal portions, so that said off-set marginal portions may fit between the free edges of the two parts *a* and *b* and the outer surfaces of the portions *b* and *c* may be substantially continuous. The part *a* is

formed with pockets or recesses such as *d* corresponding in number and angular position with the arms such as *e* of the wheel, whilst the part *b* is slit circumferentially of said part and its margins are folded inwardly of said part as at *f* to present apertures for the introduction thereinto of the outer ends of the arms *e*.

Each arm *e* is formed in accordance with my prior British Letters Patent No. 162,499, the tubular structure being squeezed in at its outer end in order to prevent molten metal from flowing there into and twisted out of its normal plane, as shown especially in Figure 3, the more firmly to embed said end in, and secure it by, the cast metal, as hereinafter set forth, whilst if the flattened end of the arm be drilled as at *g* this will assist the molten metal to flow from one side to the other and also provide a more secure grip to prevent the arm from working loose.

After the outer end of an arm *e* has been introduced into the aperture between the inwardly folded margins *f*, molten metal, such as aluminium, brass, typemetal or like alloy, is cast as at *h* into the space surrounding said end, thus embedding it and securing it firmly to the rim-portion. The cast metal may be employed also to round off the corners externally of the rim-portion and arm *e*, as at *j*, so as to make a neat joint.

I claim:—

1. A hand wheel whereof the rim-portion is built up of annular inner and outer peripheral portions, of which the inner peripheral portion is constituted by two parts each of concavo-convex cross-section arranged one within the other with their free edges spaced slightly from one another, and of which the outer peripheral portion is of concavo-convex cross-section and shouldered or off-set inwardly at its marginal portions, so that said off-set marginal portions may fit between the free edges of the two parts of the inner peripheral portion of the rim and the outer surfaces of said inner and outer peripheral portions may be substantially continuous, the inner part of said inner peripheral portion being formed with pockets or recesses with their concavities presented towards the centre of the wheel and the outer part of said inner peripheral portion being slit circumferentially of said portion and having its margins off-set to present apertures for the introduction thereinto of the outer ends of the arms of the wheel, while, after said ends have been so introduced, molten metal is cast in the space surrounding said ends, thus embedding them and securing them firmly to the rim-portion.

2. A hand wheel whereof the rim-portion is built up of annular inner and outer peripheral portions, of which the inner peripheral portion is constituted by two parts each of concavo-convex cross-section arranged one within the other with their free edges spaced slightly from one another, and of which the outer peripheral portion is of concavo-convex cross-section and shouldered or off-set inwardly at its marginal portions, so that said off-set marginal portions may fit between the free edges of the two parts of the inner peripheral portion of the rim and the outer surfaces of said inner and outer peripheral portions may be substantially continuous, the inner part of said inner peripheral portion being formed with pockets or recesses with their concavities presented towards the centre of the wheel and the outer part of said inner peripheral portion being slit circumferentially of said portion and having its margins off-set to present apertures for the introduction thereinto of the outer ends of the arms of the wheel, said arms, including the metal in the pockets or recesses, being cast in situ.

3. A hand wheel as claimed in claim 1, whereof the arms are each bent from a sheet metal blank, the marginal portions of said blank being inturned and forming a diaphragm within the arm, and the tubular structure of each of the arms at its outer end being squeezed in and twisted out of its normal plane.

4. A hand wheel whereof the rim-portion is built up of annular inner and outer peripheral portions, of which the inner peripheral portion is constituted by two parts each of concavo-convex cross-section arranged one within the other with their free edges spaced slightly from one another, and of which the outer peripheral portion is of concavo-convex cross-section and shouldered or off-set inwardly at its marginal portions, so that said off-set marginal portions may fit between the free edges of the two parts of the inner peripheral portion of the rim and the outer surfaces of said inner and outer peripheral portions may be substantially continuous, the inner part of said inner peripheral portion being of sharper curvature than the outer part so that while said parts are tangential at the centre of their transverse curvature their free edges are spaced slightly from one another, and being formed with pockets or recesses with their concavities presented towards the centre of the wheel and the outer part of said inner peripheral portion being slit circumferentially of said portion and having its margins off-set to present apertures for the introduction thereinto of the outer ends of the arms of the wheel, while, after said ends have been so introduced, molten metal is cast in the space surrounding said ends, thus embedding them and securing them firmly to the rim-portion.

5. A hand wheel as claimed in claim 1, whereof the arms are each bent from a sheet metal blank, the marginal portions of said

blank being inturned at the underside of said arm and forming a diaphragm within said arm.

6. A hand wheel as claimed in claim 1, whereof each arm is of substantially flattened oval cross-section with its underside V-shaped and is bent from a sheet metal blank, the marginal portions of said blank being sharply inturned at said underside so as to lie contiguous with one another and forming a diaphragm lying substantially along the minor axis of the cross-section of said arm.

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