H. W. DOVER.

HAND WHEEL.

APPLICATION FILED SEPT. 30, 1920.

1,411,239.

Patented Mar. 28, 1922.

4 SHEETS—SHEET 1.

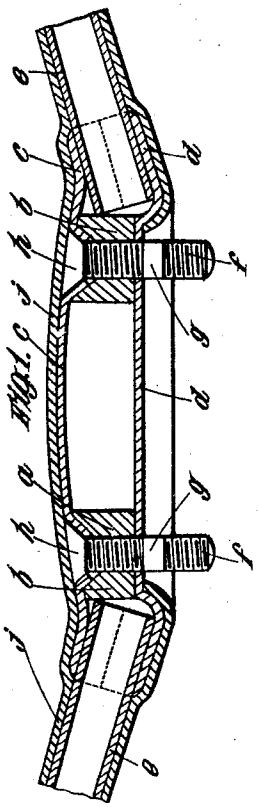


Fig. 1.

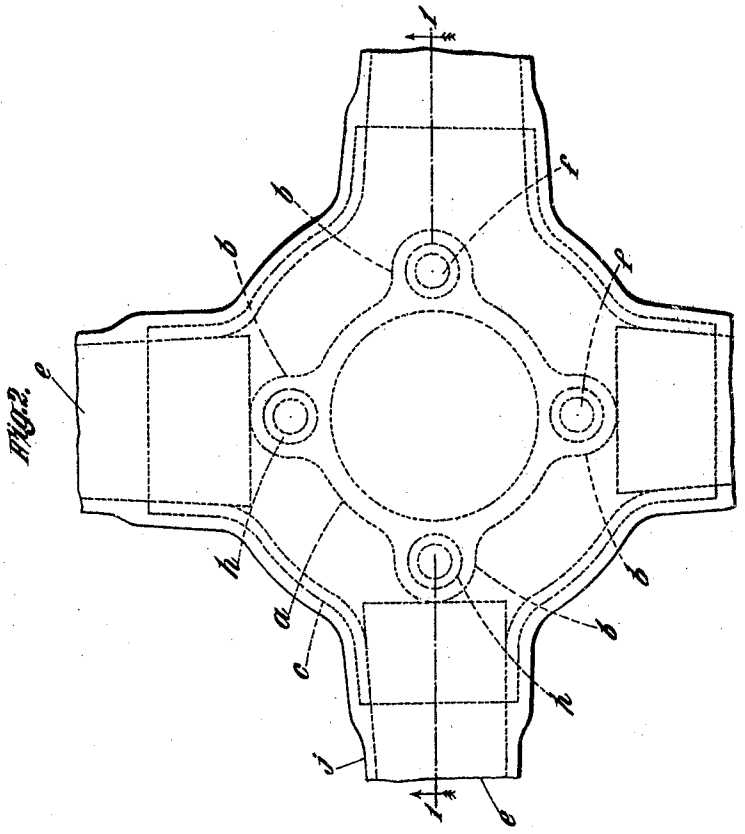


Fig. 2.

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4 SHEETS—SHEET 2.

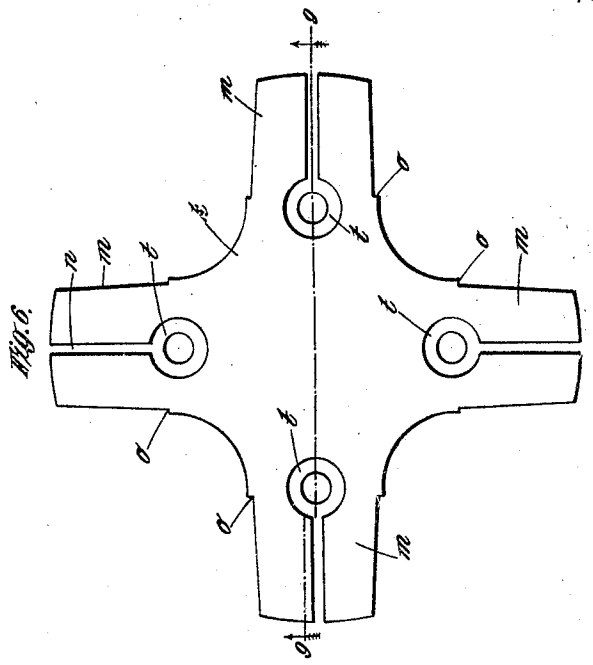


Fig. 2.

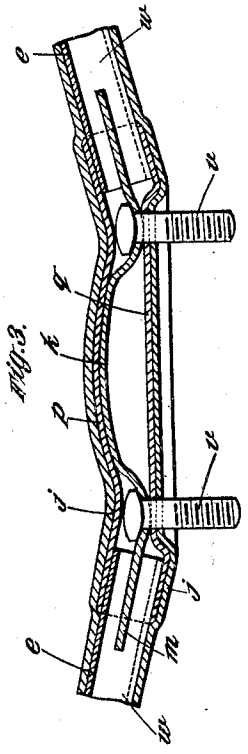


Fig. 3.

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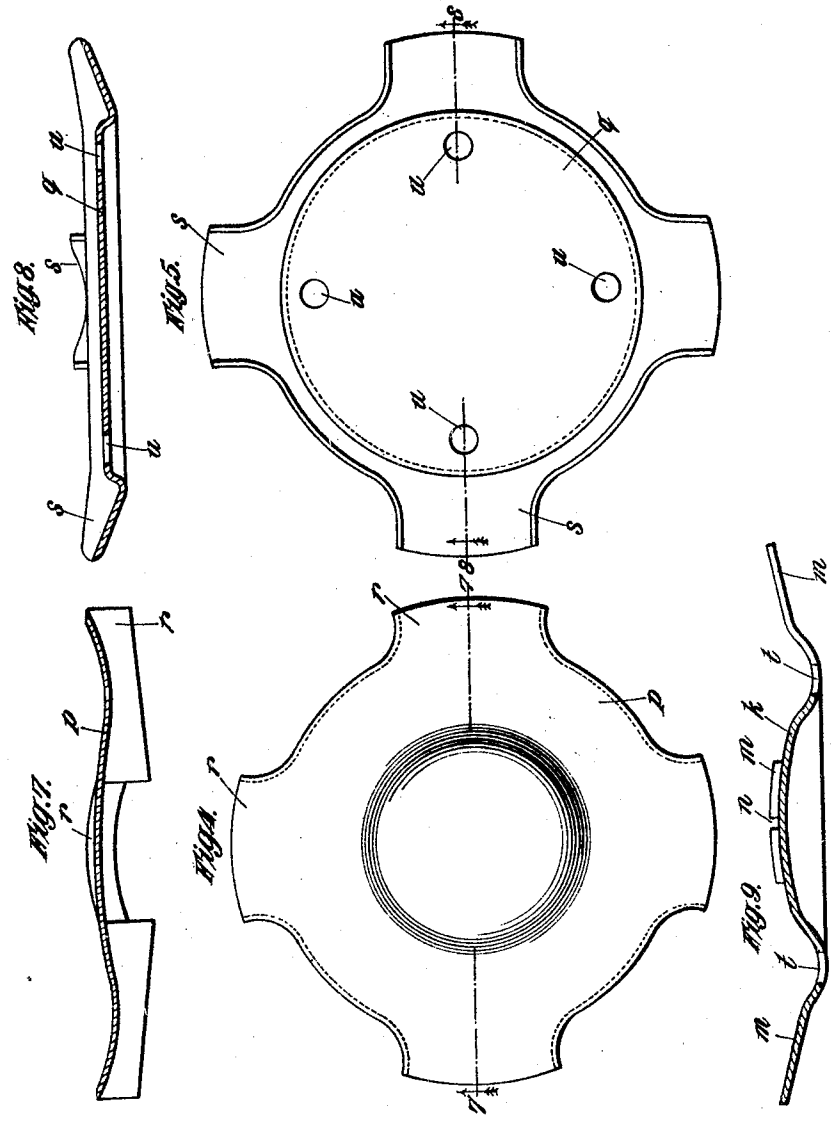
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4 SHEETS—SHEET 4.

Fig. 10.

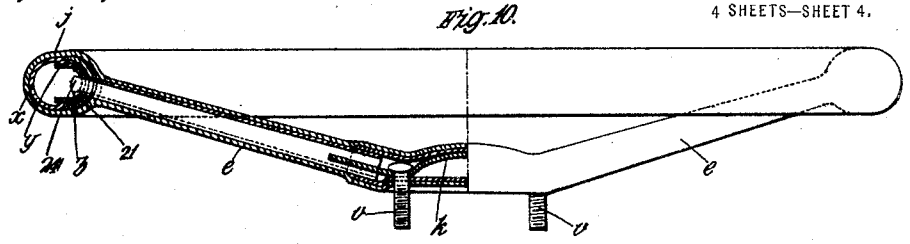
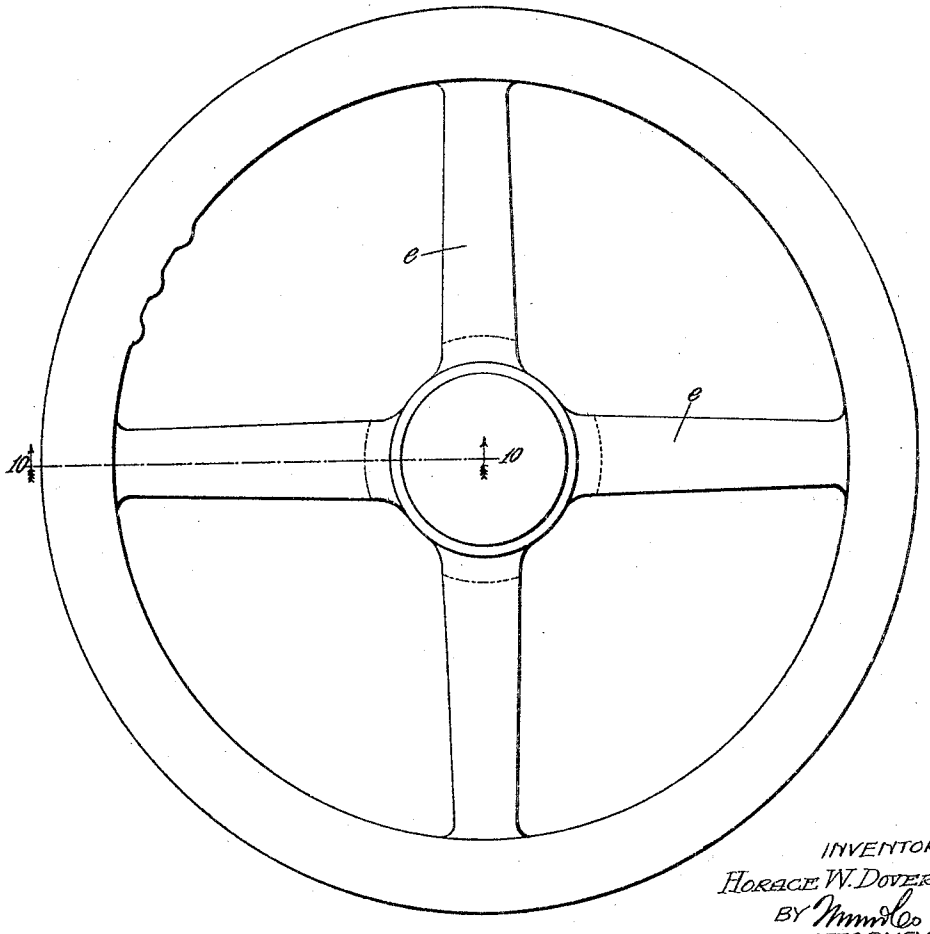


Fig. 11.



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UNITED STATES PATENT OFFICE.

HORACE WALTER DOVER, OF NORTHAMPTON, ENGLAND.

HAND WHEEL.

1,411,239. Specification of Letters Patent. Patented Mar. 28, 1922.

Application filed September 30, 1920. Serial No. 413,852.

To all whom it may concern:

Be it known that I, HORACE WALTER DOVER, a British subject, of Holywood, St. James, Northampton, England, have invented certain new and useful Improvements in or Relating to Hand Wheels, of which the following is a specification.

This invention relates to hand wheels such for instance as are employed for steering motor vehicles, for operating stop cocks, controlling aircraft, motor boats, gun mechanism, and for other purposes, and has for its object to obviate or reduce the use of cast parts and to cheapen the cost of construction

According to this invention the nave of such a hand wheel is formed from a distance piece or distance pieces, two stamped metal plates and means for securing said plates the one above and the other below said distance piece or distance pieces, said plates being so stamped that when the parts are assembled, sockets are provided adapted to receive the inner ends of the arms or spokes of the wheel.

The arms may be solid or tubular and produced by casting, stamping, drawing or other method, but preferably each arm is formed in accordance with the invention set forth in the specification accompanying my application for Letters Patent Serial Number 413,851 by bending a sheet metal 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.

In the accompanying drawings Figure 1 is a sectional elevation on the line 1—1, Figure 2 of the nave of a hand wheel according to one form of this invention and Figure 2 is a plan thereof. Figure 3 is a similar view to Figure 1 showing another form of the invention. Figures 4, 5 and 6 are plan views of details, Figure 7 is a cross-section on the line 7—7 Figure 4. Figure 8 is a cross-section on the line 8—8 Figure 5, Figure 9 is a cross-section on the line 9—9, Figure 6, Figure 10 is a sectional side view of a wheel on a smaller scale and Figure 11 is a plan thereof, those parts of Figure 10 which are to the right of the center line being shown in elevation and those parts to the left of said line being shown in section on the line 10—10, Figure 11.

As shown in Figures 1 and 2 the nave is formed from an annular distance piece *a* having a plurality of outwardly extending apertured lugs *b* . . . and having its upper surface curved convexly as shewn in Figure 1, two circular stamped metal plates *c* and *d* each extending completely across the annular distance piece *a* and beyond the periphery thereof, and means for securing said plates *c* and *d* the one *c* above the other, *d*, below the annular distance piece *a*. The central portion of the upper plate *c* is domed to conform with the convexity of the upper surface of the distance piece *a*, and the central portion of the lower plate *d* is flat, whilst the circumferential marginal portions of said plates *c* and *d* are crimped or corrugated correspondingly so that when the parts are assembled sockets are provided adapted to receive and fit closely around the inner ends of the arms or spokes *e* . . . of the wheel and those parts of said circumferential marginal portions of the plates intermediate said sockets are bent towards one another so that their edges meet or overlap. The two plates *c* and *d* are formed with apertures to correspond with those in the lugs *b* . . . of the annular distance piece *a* and each of the apertures in said lugs *b* . . . is threaded throughout its length and countersunk at its upper end. The parts are held together by bolts *f* . . . each threaded at its opposite ends leaving a plain portion *g* to constitute a shoulder. After the plates *c* and *d* have been placed in position the one, *c*, above and the other, *d*, below the annular distance piece *a* with their apertures registering with those in the lugs *b* . . . the bolts *f* . . . are screwed into the threaded apertures in the lugs *b* . . . until their shoulders abut against the central portion of the under plate *d* and (preferably after the arms *e* . . . have been placed in position in the sockets) the head of each bolt is riveted over as at *h* so as to press the margin of the aperture in the upper plate *c* into the countersunk hole in the distance piece *a*, the rivet head *h* being made flush with the upper surface of said plate *c*.

The plates *c* and *d* are preferably stamped so that when the inner ends of the arms *e* . . . are placed in the sockets said arms *e* . . . are upwardly inclined as shown in Figure 1 and the median plane of the rim-portion (not shewn) is higher than that of the nave-portion.

After the arms *e* . . . have been placed in position, if they have not been so placed before the heads of the bolts *f* . . . have been riveted over, pressure may be applied to the two plates *c* and *d* so as to press the socket portions closely around the inner ends of the arms *e* . . . and the parts may be rendered more secure by brazing, welding or the like at the junctions.

The arms *e* . . . shown are tubular but preferably each arm is of flattened oval cross-section and the lateral marginal portions of the blank from which the arm is bent up are inturned so as to lie contiguous with one another and constitute a diaphragm or strengthening rib lying substantially along the minor axis of the cross-section. The inner end of each arm *e* may be shaped to conform with the configuration at the bottom of the socket in the nave portion or it may be cut off straight across as indicated in Figure 2 and at its outer end (not shown) it may be machined away at each side so as to form shoulders the central remaining part being passed first through a suitably apertured washer, then through a corresponding aperture in one of the channelled members, from two of which, and a stiffening hand, the rim-portion of the wheel may be built up in accordance with my prior British Letters Patent No. 2623, 1906, and then through another suitably apertured washer disposed within said channelled member, after which the upper portion of the arm, which constitutes a tongue, is bent away from the lower portion so as to lie flat against the last mentioned washer. The end of the arm and the washer may then be brazed, welded or otherwise united together and to the channelled member. The remainder of the rim-portion is then built up in accordance with the above mentioned British Letters Patent No. 2623, 1906, and the whole with the exception of the underface of the central portion of the lower plate *d* and those parts of the bolts *f* . . . which project therefrom may be encased in a casing *j* of celluloid exonite, or similar material, or of a non-inflammable material capable of being moulded in a similar manner, applied according to any of the well-known methods of manufacture (e. g. moulding).

If desired the rim-portion and the arms may be wrapped spirally with a tape of linen or other fabric after which the covering compound or material may be applied as above mentioned.

In some cases cast or stamped solid or drawn tubular arms may be employed for the wheel, but the use of arms bent up as above set forth is preferable.

If it is desired that a hub may be formed in one with the wheel the two stamped plates *c* and *d* may be centrally apertured to correspond with the annular distance piece *a* and to give passage to a hub (not shown) provided with a flange adapted to contact with the flat annular remainder of the under plate *d*, said flange being apertured to correspond with said plates *c*, *d* and distance piece *a* so that said plates *c*, *d*, distance piece *a* and flanged hub may be secured together by headed bolts passed therethrough from beneath, the upper ends of said bolts being riveted over as above set forth.

After the plates and bolts are assembled (and preferably after the arms have been placed in the sockets) the contiguous parts of the heads of the bolts and the central portion of the upper plate *c* are welded, brazed or otherwise united.

In the form of the invention shown in Figures 3 to 11 the nave is formed from a stamped metal distance piece *k* having a plurality of radially extending tongues *m* . . . each slotted as at *n* and shouldered as at *o*, and having its upper surface curved convexly as shown in Figure 9, two stamped metal plates *p* and *q* adapted to receive between them the distance piece *k* and means for securing said plates *p* and *q* the one, *p*, above, and the other, *q*, below the distance piece *k*. The central portion of the upper plate *p* is domed and the central portion of the lower plate *q* is flat, whilst the circumferential marginal portions of said plates *p* and *q* are crimped or corrugated correspondingly so that when the parts are assembled sockets are provided by the radial extensions *r* . . . and *s* . . . of the plates *p* and *q* respectively, said sockets being adapted to receive and fit closely around the inner ends of the arms or spokes *e* . . . of the wheel and those parts of the circumferential marginal portions of the plates intermediate said sockets are bent towards one another so that their edges overlap. The distance piece *k* and the lower plate *q* are correspondingly apertured as at *t* . . . and *u* . . . respectively to give passage to the shanks of bolts *v* . . . (Figure 3) and the distance piece *k* is cupped adjacent the apertures *t* . . . to accommodate the heads of said bolts which are held down in said cups by the upper plate *p* as shown in Figure 3.

The distance piece *k* and the plates *p* and *q* are preferably stamped so that when the inner ends of the arms *e* . . . are placed in the sockets said arms *e* . . . are upwardly inclined, as shown in Figures 3 and 10, and the median plane of the rim-portion is higher than that of the nave portion.

Each arm *e* is formed according to the invention set forth in the specification accompanying my application for Letters Patent Serial Number 413,851 and is of substantially flattened oval cross-section, whilst the lateral marginal portions *w* of the blank from which the arm *e* is bent up are sharply inturned so as to lie contiguous

with one another and constitute a diaphragm or strengthening rib lying substantially along the minor axis of the cross-section.

When the parts are assembled the tongues *m* . . . are fitted into the hollow arms *e* . . . the slots *n* . . . accommodating the portions *w*, and the inner ends of the arms abutting against the shoulders *o* . . . so as to position and steady said arms. After the arms *e* . . . have been placed in position and the parts assembled pressure may be applied to the two plates *p* and *q* so as to press the socket portions closely around the inner ends of the arms *e* . . . and the parts may be rendered more secure by brazing welding or the like at the junctions.

Preferably the rim-portion of the wheel is built up, in accordance with the invention set forth in the specification accompanying my application for Letters Patent Serial Number 413,853 of an annular outer peripheral portion *x* of concavo-convex cross-section and an annular inner peripheral portion constituted by two parts *y* and *z*, each of concavo-convex cross-section, arranged the one, *y*, within the other, *z*.

The outer end of each arm *e* is machined away at each side so as to form shoulders the central remaining part being passed through the parts *y* and *z* and bent over as at 24 and secured as set forth in the specification accompanying my application for Letters Patent Serial Number 413,851 aforesaid.

The whole, with the exception of the projecting portions of the bolts *v* . . . may be encased in a casing *j* of celluloid, exonite, or similar material, or of a non-inflammable material capable of being moulded in a similar manner, applied according to any of the well-known methods of manufacture (e. g. moulding).

Having now particularly described and ascertained the nature of my said invention and in what manner the same is to be performed, I declare that what I claim is:—

1. A hand wheel whereof the nave is formed from a distance piece, two undivided stamped metal plates and means for securing said plates the one above and the other below said distance piece, said plates being so stamped that when the parts are assembled sockets are provided adapted to receive within them the inner ends of the arms or spokes of the wheel, whilst those parts of the circumferential marginal portions of the plates intermediate of said sockets are pressed towards one another and constitute parts of the periphery of the nave parallel with the axis thereof.

2. A hand wheel whereof the nave is formed from distance pieces, two undivided stamped metal plates and means for securing said plates the one above and the other below said distance pieces, said plates being so stamped that when the parts are assembled sockets are provided adapted to receive within them the inner ends of the arms or spokes of the wheel, whilst those parts of the circumferential marginal portions of the plates intermediate of said sockets are pressed towards one another and constitute parts of the periphery of the nave parallel with the axis thereof.

3. A hand wheel, as claimed in claim 1, wherein those parts of the circumferential marginal portions of the plates intermediate of the sockets are pressed the one over the other, substantially as set forth.

4. A hand wheel, as claimed in claim 1, wherein the distance piece is constituted by a stamped plate domed centrally substantially as set forth.

5. A hand wheel as claimed in claim 3 wherein the distance piece is constituted by a stamped plate domed centrally, substantially as set forth.

6. A hand wheel, as claimed in claim 4, wherein the distance piece is formed with shouldered radial tongues, substantially as set forth.

7. A hand wheel, as claimed in claim 6, wherein the tongues of the distance piece are slotted to accommodate the inturned marginal portions of the blanks from which the arms or spokes of the wheels are bent.

HORACE WALTER DOVER.