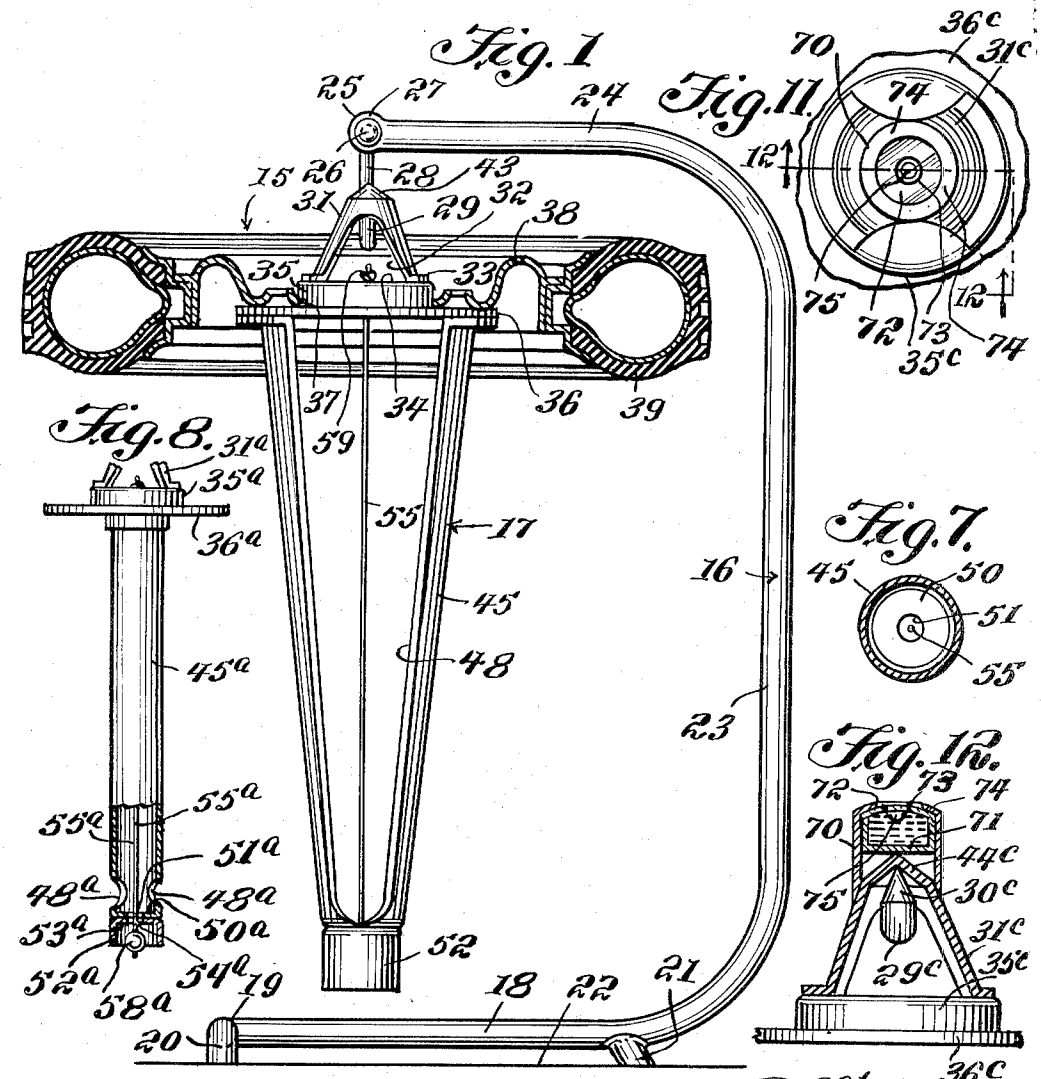
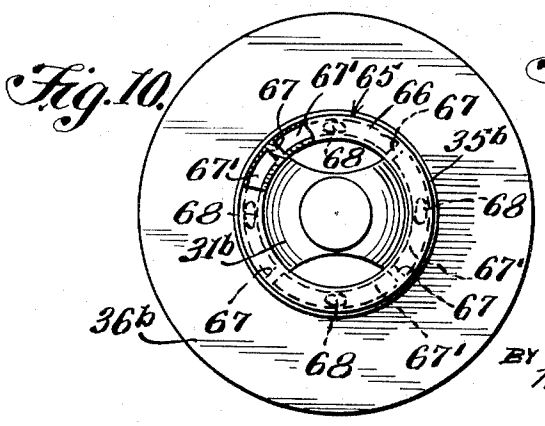
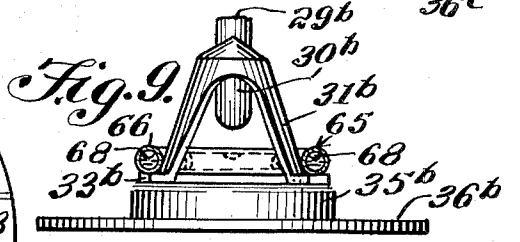
Oct. 11, 1955 O. J. LUCHT 2,720,110

STATIC BALANCING DEVICES

Filed Sept. 11, 1953 2 Sheets-Sheet 1







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STATIC BALANCING DEVICES

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Fig. 2.

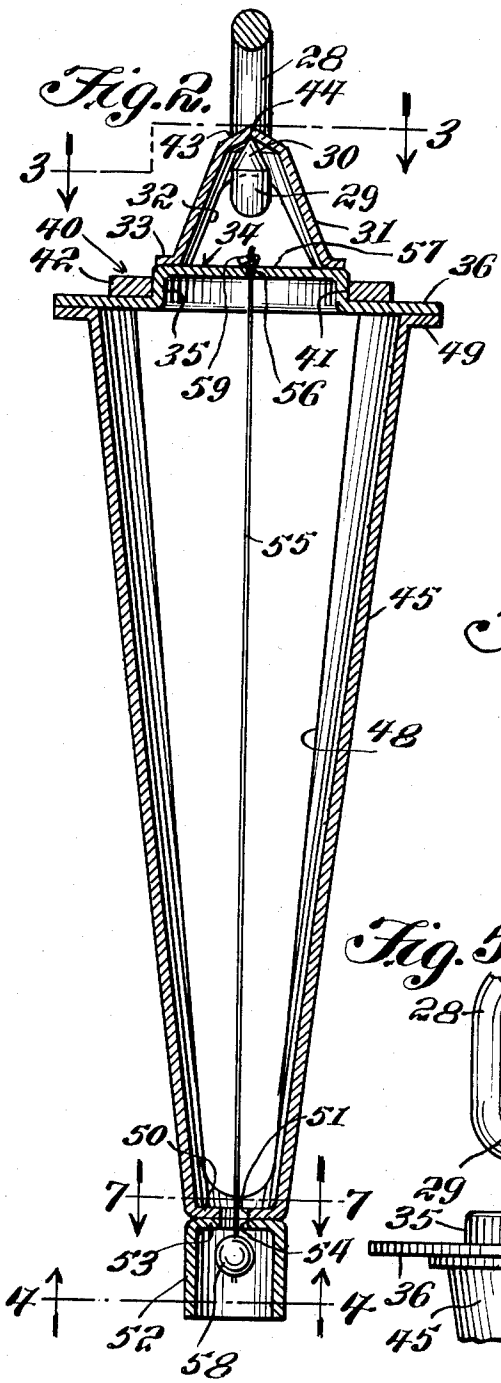


Fig. 3.

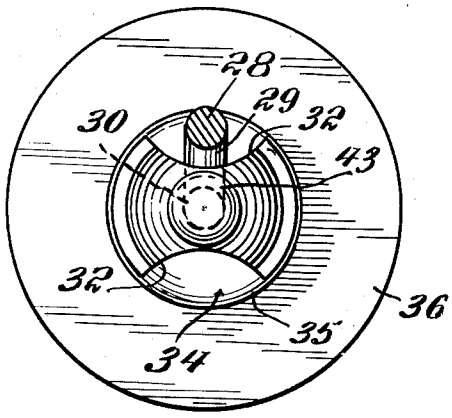


Fig. 4.

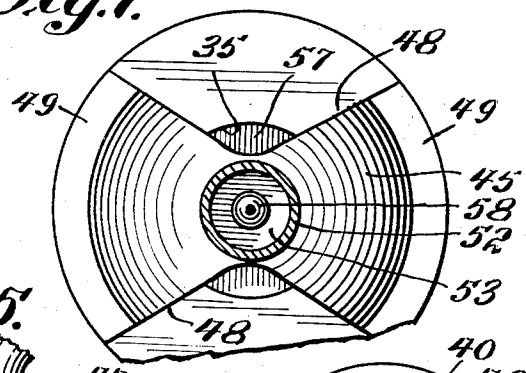


Fig. 5.

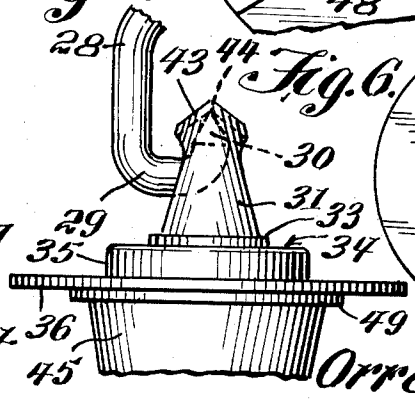
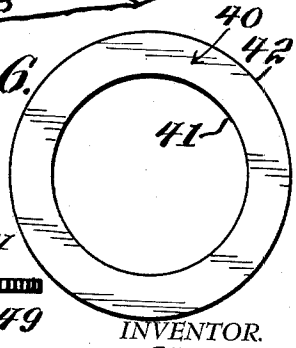


Fig. 6.



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STATIC BALANCING DEVICES

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Application September 11, 1953, Serial No. 379,511

8 Claims. (Cl. 73—66)

This invention relates to improvements in static balancing devices for rotors, and more particularly, but not exclusively, to devices for statically balancing vehicle wheels and tires.

The primary object of the invention is to provide devices of the character indicated above which are of greatly simplified construction and involve a minimum number of parts, so that the devices can be made in serviceable and rugged forms at such relatively low cost that the devices can be marketed for general use by average automobile owners.

Another important object of the invention is to provide devices of the character indicated above which are unusually easy to use and operate by unskilled persons, and which afford good accuracy in balancing automotive wheels and tires.

Other important objects and advantageous features of the invention will be apparent from the following description and the accompanying drawings, wherein, for illustration purposes only, specific forms of the invention are set forth in detail.

In the drawings:

Figure 1 is a side elevation of one form of the invention, a wheel and tire in place thereon being shown in section;

Figure 2 is an enlarged central vertical section taken through the housing of the said form, and showing thereon an adapter washer or ring;

Figure 3 is a horizontal section taken on the line 3—3 of Figure 2;

Figure 4 is a horizontal section taken on the line 4—4 of Figure 2;

Figure 5 is a fragmentary side elevation taken at right angles to Figure 1;

Figure 6 is a plan view of an adapter washer or ring;

Figure 7 is a horizontal section taken on the line 7—7 of Figure 2;

Figure 8 is a side elevation, partly broken away, of a modified form of housing;

Figure 9 is a fragmentary side elevation of another modified form involving a ring type bubble level;

Figure 10 is a top plan view of Figure 9;

Figure 11 is a top plan view of a further modified form involving a centered type of bubble level; and

Figure 12 is a fragmentary transverse vertical section taken on the line 12—12 of Figure 11.

Referring in detail to the drawings, wherein like numerals designate like parts throughout the several views, and first to Figures 1 through 6, the form of the invention therein shown is generally designated 15 and comprises a stand generally designated 16, and a balancer housing 17.

The stand 16 is preferably C-shaped and formed of rigid tubing or of bar stock, and involves a base arm 18 terminating at one end in a junction 19 with a ground engaging cross arm 20, and having near its other end a ground engaging cross bar 21, by means of which the stand is supported on the ground or floor 22. The said other end of the base arm 18 merges into the lower end of a

standard 23, whose upper end merges into a horizontal support arm 24 having a free end 25. Through the free end 25 extends a transverse horizontal pivot 26 which traverses an eye 27 on the upper end of the shank 28 of a depending lateral hook 29, which itself terminates in an upright conical point 30.

The balancing housing 17 of Figures 1 to 6 includes a hollow conical head 31 which is cut away at two diametrically opposite sides, as indicated at 32, 32 to provide for entrance of the hook 29 and point 30 into the head 31. The flanged lower end 33 of the head 31 is secured, in suitable manner concentrically onto the top of an inverted flat cylindrical pan-shape 34 having an annular side wall 35 with a relatively wide annular vehicle wheel supporting flange 36 fixed around the lower end of the annular side wall 35. The outside diameter of the annular side wall 35 is only slightly less than the inside diameter of the center opening 37 which exists in a smaller size automotive wheel 38 of conventional type, comprising a pneumatic tire 39, with the wheel 38 resting upon the annular flange 36, whereby such a wheel is centered in the housing 17 for a balancing operation.

Where wheels having larger central openings 37 are to be balanced, washers or rings 40 are provided to rest upon the wheel supporting flange 36 around the side wall 35, as shown in Figure 2, and have center openings 41 fitting the side wall 35, and peripheral edges 42 which fit the larger wheel openings 37.

The conical head 31 has a conical upper end 43 terminating in an internal apex 44 in which the conical hook point 30 supportably engages, and by reason of which the housing 17 including the head 31 can rotate on the axis of the point 30 and swing freely in all directions relative to the point 30 in response to the force of gravity, so that the housing 17 can of itself assume a perpendicular relation determined by the force of gravity.

The housing 17 further comprises a tubular depending extension 45 which tapers downwardly from its upper end 46 to its lower end 47, and has diametrically opposed sight openings 48, 48 tapering downwardly from the upper end 46 to a point close to the lower end 47, as particularly well shown in Figure 2. A lateral annular flange 49 on the upper end of the extension 45 is secured by suitable means concentrically to the underside of the wheel supporting flange 36.

The lower end 47 of the extension 45 is closed by a horizontal end wall 50 which has a central hole 51 therein, and a protective inverted cup 52 is concentrically secured to the underside of the end wall 50 and depends therefrom. The bottom 53 of the cup 52 has a central hole 54 registered with and of the same size as the hole 51.

The levelling or balance indicating means of the form of the invention shown in Figures 1 to 5 is of the plumb type, and involves a plumb line or cord 55 trained downwardly through a central hole 56 provided in the bottom or top 57 of the pan-shape 34 and depending freely through the holes 51 and 54 at the lower end of the extension 45 where a weighted plumb bob or ball 58 is secured to the lower end of the cord 55 and is free to swing laterally within the protective cup 52 from a plumb or perpendicular position centered with respect to the holes 51 and 54. The cord 55 can be knotted at its upper end, as indicated by the numeral 59, above the pan-shape bottom 57 to retain the cord in place.

In the foregoing form of the invention, balancing a wheel in place and centered on the wheel supporting flange 36 involves observing the positions of the cord 55 and plumb ball 58 relative to the edges of the holes 51 and 54, and correcting for any deviations from a central position of the cord 55 by applying balancing weights or by application of other means to the wheel, as the wheel is rotated by hand through 360°, in a well known manner.

The form of the invention shown in Figures 7 and 8 of the drawings, which also employs a plumb line and bob, the tubular housing extension **45***a* is cylindrical instead of tapered, and its side wall is imperforate except for a pair of diametrically opposed sight holes **48***a*, **48***a* provided therein at a level immediately above the extension end wall **50***a* and the protective cup bottom **53***a* containing the holes **51***a* and **54***a* through which the plumb line cord **55***a* depends. In this form observations of centering and of deviations of the plumb line cord **55***a* from center are observed in performing wheel balancing operations.

In the form of the invention shown in Figures 9 and 10, an extension, such as the extension **45** or the extension **45***a* of the above described forms of the invention, is omitted and dispensed with, but the same head and wheel supporting structure are retained, and a different type of levelling or balancing means is employed. In the form of Figures 9 and 10 a circular or ring-type bubble level **65** is employed, and consists of a tubular ring **66** which surrounds and is secured to the flanged lower end **33***b* of the conical head **31***b*, the interior of the tubular ring **66** being compartmented, as indicated at **67**, to provide a plurality of circumferentially spaced spirit level chambers **67'**, the positions of whose bubbles **68** indicate a balanced or unbalanced condition of a wheel supported on the wheel supporting flange **36***b*.

Figures 11 and 12 show a still further form of the invention which retains the head and wheel supporting structure of the above described forms of the invention, but employs a different bubble levelling and centering means. In Figures 11 and 12, a cylindrical casing **70** is mounted concentrically upon the conical top **44***c* of the head **31***c* and surrounds and encloses a cylindrical container **71** having an upwardly curved, transparent top **72** provided with a center mark **73**. A flange **74** on the upper end of the casing **70** confines the container in place in the casing **70** and on the upper end **44***c* of the head **31***c*. The container **71** is filled with spirits which provides a bubble **75** which in a perpendicular or level position of the wheel supporting flange **36***c*, coincides with the center mark **73**. Unbalanced conditions of a wheel supported on the flange **36***c* are indicated by displacements of the bubble **75** from coincidence with the center mark **73**.

What is claimed is:

1. In a balancer for a wheel having a central circular opening, a housing comprising a hollow conical head, a flange on said housing adapted and arranged to support a horizontally disposed wheel thereon, said hollow head being cut away on diametrically opposite sides to define hook-receiving openings; a substantially C-shaped stand having a base arm, ground-engaging cross arms secured at their centers to said base arm at each end thereof, a standard attached to said base arm at its lower end thereof, said standard being secured at its upper end to one end of a horizontally disposed support arm, a horizontally disposed pivot secured to said support arm at its other end, a hook having an eye at its upper end, said hook being pivotally supported on said pivot through said eye and being formed at its lower end with an upright conical point, said point being adapted to be received through one of said hook-receiving openings and in said conical head for support thereof; and gravity operated level indicating means having at least one effective component thereof mounted on said head.

2. A balancer according to claim 1, wherein said gravity operated level indicating means comprises a ring bubble level involving a circular tube surrounding and mounted on said head, said circular tube having circumferentially arranged spirit level compartments, each enclosing spirits providing a bubble.

3. A balancer according to claim 1, wherein said gravity operated level indicating means comprises a cylindrical container mounted concentrically on the upper end of said head, a body of spirits within said casing and containing a bubble, a transparent convex cover closing the upper end of said casing and having a centered marker thereon.

4. In a balancer for a wheel having a central circular opening, a housing comprising a hollow head having a top having a central conical recess therein, a stand having an arm terminating in an erect point extending into said head and supportably engaging in said conical recess whereby the head is free to be rotated relative to the stand and free to swing in all lateral directions relative to the stand in response to the force of gravity, said head further comprising a centered annular wall with which the central opening of a wheel is adapted to be conformably engaged, a wheel supporting flange on said head surrounding said annular wall, and gravity operated level indicating means having at least one effective component thereof mounted on said head, said level indicating means comprising a depending plumb line cord having an upper end secured to a central part of said head and a lower end having a plumb bob thereon, said housing further comprising a tubular extension fixed to and depending from said head around said plub line cord, said extension having a lower end wall provided with a central hole larger in diameter than said cord and through which the cord depends whereby a balanced condition of a wheel on the wheel supporting flange is indicated by a centered position of the cord in said hole and an unbalanced condition of the wheel is indicated by an eccentric position of the cord in said hole.

5. In a balancer for a wheel having a central circular opening, a housing comprising a hollow head having a top having a central conical recess therein, a stand having an arm terminating in an erect point extending into said head and supportably engaging in said conical recess whereby the head is free to be rotated relative to the stand and free to swing in all lateral directions relative to the stand in response to the force of gravity, said head further comprising a centered annular wall with which the central opening of a wheel is adapted to be conformably engaged, a wheel supporting flange on said head surrounding said annular wall, and gravity operated level indicating means having at least one effective component thereof mounted on said head, said level indicating means comprising a depending plumb line cord having an upper end secured to a central part of said head and a lower end having a plumb bob thereon, said housing further comprising a tubular extension fixed to and depending from said head around said plumb line cord, said extension having a lower end wall provided with a central hole larger in diameter than said cord and through which the cord depends whereby a balanced condition of a wheel on the wheel supporting flange is indicated by a centered position of the cord in said hole and an unbalanced condition of the wheel is indicated by an eccentric position of the cord in said hole, a protective cup on the lower end of said extension and spacedly surrounding the plumb bob.

6. In a balancer for a wheel having a central circular opening, a housing comprising a hollow head having a top having a central conical recess therein, a stand having an arm terminating in an erect point extending into said head and supportably engaging in said conical recess whereby the head is free to be rotated relative to the stand and free to swing in all lateral directions relative to the stand in response to the force of gravity, said head further comprising a centered annular wall with which the central opening of a wheel is adapted to be conformably engaged, a wheel supporting flange on said head surrounding said annular wall, and gravity operated level indicating means having at least one effective component thereof mounted on said head, said level indicating means comprising a depending plumb line cord having an upper end secured to a central part of said head and a lower end having a plumb bob thereon, said housing further comprising a tubular extension fixed to and depending from

said head around said plumb line cord, said extension having a lower end wall provided with a central hole larger in diameter than said cord and through which the cord depends whereby a balanced condition of a wheel on the wheel supporting flange is indicated by a centered position of the cord in said hole and an unbalanced condition of the wheel is indicated by an eccentric position of the cord in said hole, said tubular extension having a side wall provided above said lower end wall with diametrically opposed sight openings providing visual access to said hole and the part of the cord depending through the hole.

7. In a balancer for a wheel having a central circular opening, a housing comprising a hollow head having a top having a central conical recess therein, a stand having an arm terminating in an erect point extending into said head and supportably engaging in said conical recess whereby the head is free to be rotated relative to the stand and free to swing in all lateral directions relative to the stand in response to the force of gravity, said head further comprising a centered annular wall with which the central opening of a wheel is adapted to be conformably engaged, a wheel supporting flange on said head surrounding said annular wall, and gravity operated level indicating means having at least one effective component thereof mounted on said head, said level indicating means comprising a depending plumb line cord having an upper end secured to a central part of said head and a lower end having a plumb bob thereon, said housing further comprising a tubular extension fixed to and depending from said head around said plumb line cord, said extension having a lower end wall provided with a central hole larger in diameter than said cord and through which the cord depends whereby a balanced condition of a wheel on the wheel supporting flange is indicated by a centered position of the cord in said hole and an unbalanced condition of the wheel is indicated by an eccentric position of the cord in said hole, said tubular extension having a side wall provided above said lower end wall with diametrically opposed sight openings providing visual access to said hole and the part of the cord depending through the hole, said sight openings extending to the upper end of said extension.

8. In a balancer for a wheel having a central circular opening, a housing comprising a hollow head having a top having a central conical recess therein, a stand having an arm terminating in an erect point extending into said head and supportably engaging in said conical recess whereby the head is free to be rotated relative to the stand and free to swing in all lateral directions relative to the stand in response to the force of gravity, said head further comprising a centered annular wall with which the central opening of a wheel is adapted to be conformably engaged, a wheel supporting flange on said head surrounding said annular wall, and gravity operated level indicating means having at least one effective component thereof mounted on said head, said level indicating means comprising a depending plumb line cord having an upper end secured to a central part of said head and a lower end having a plumb bob thereon, said housing further comprising a tubular extension fixed to and depending from said head around said plumb line cord, said extension having a lower end wall provided with a central hole larger in diameter than said cord and through which the cord depends whereby a balanced condition of a wheel on the wheel supporting flange is indicated by a centered position of the cord in said hole and an unbalanced condition of the wheel is indicated by an eccentric position of the cord in said hole, said tubular extension having a side wall provided above said lower end wall with diametrically opposed sight openings providing visual access to said hole and the part of the cord depending through the hole, said sight openings consisting of relatively small apertures in the region of the lower end wall, the side wall of the extension being otherwise imperforate.

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