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COMPLETE SPECIFICATION.

Improvements in or relating to Front Wheel Forks for Cycles.

I, BURNARD SCOTT WADE, a British Subject, of Sunshine House, Bolshaw Road, Cheadle, Cheshire, do hereby declare the invention, for which I pray that a patent may be granted to me, and the method by which it is to be performed, to be particularly described in and by the following statement:

This invention relates to front wheel forks for motor and other cycles, of the type in which the wheel spindle is carried by a spring-controlled arm pivoted upon the legs or main member of the fork for movement about an axis parallel to that of the wheel. The term "spring", as used above and hereinafter, should be understood to include a stressed elastic body or bodies of a non-metallic nature, as well as a fluid in compression.

A motor-cycle front wheel fork forming one example of the type referred to is the subject of Letters Patent No. 693,646 and comprises in combination a main fork member whose upper portion is adapted to be connected to the steering head of the cycle frame, a sub-fork member, and a pair of telescopic shock absorbers arranged parallel with each other and pivotally connected at their ends to the main and sub-fork members, the lower portion of the main fork member being curved or inclined rearwardly so that its lower end can be behind the front road wheel of the cycle, and the sub-fork member being pivotally attached at one end to the lower end of the main fork member and adapted at or near its front end to carry the front road wheel of the cycle, so that, with articulation of the sub-fork member, the length of the road wheel base of the cycle remains substantially constant.

When a hub brake is associated with a cycle wheel mounted in a fork of the type aforesaid the present practice is to anchor the back-plate and/or other non-rotary parts of the brake to the spring-controlled arm.

With such an arrangement, however, application of the brake to check rotation of the wheel necessarily interferes to same extent with the spring action of the arm. As will readily be understood, if the wheel be completely locked whilst remaining in effective contact with the ground, pivotal movement of the spring-controlled arm is theoretically impossible, and whilst this extreme condition may seldom arise in practice, the rider of a cycle with the sprung-arm type of front fork will find that a marked stiffening-up of the springing will almost always accompany any hard application of the front wheel brake.

The drawbacks of such hampered spring action are, of course, particularly important when the cycle is traversing a rough surface; for example, in the case of a motor-cycle which is being driven at high speed down a steep and rutted track. Although, under such conditions, the front brake is far more effective than the rear brake for checking the machine, it cannot when anchored in the known manner, be heavily applied with safety, since the resultant stiffened fork action may make the machine difficult or impossible to hold.

The object of the present invention is completely to eliminate, in a cycle front fork of the type referred to, any interference with the spring-controlled movement of the wheel when the latter is braked.

According to this invention, a cycle front fork of the type aforesaid is characterised by substantially parallel-motion links connecting a leg or main member of the fork to the torque-resisting structure of a hub brake which is mounted concentrically with the wheel spindle for rotation in a plane accurately parallel to the latter.

Conveniently one of these links is represented by the spindle-carrying arm previously mentioned.

In the accompanying drawings:—

Fig. 1 is a side elevation of a motor-cycle front-wheel fork and brake arranged in accordance with the present invention; and

Figs. 2 and 3 are fragmentary sections on the lines 2—2 and 3—3, respectively, of Fig. 1.

In the example illustrated, the legs 5 of a motor-cycle front fork 6 terminate at opposite sides of, and behind, the wheel 7 their extremities having pivoted thereto at 28 a pair of forwardly-extending, rigidly-connected radial arms 8 with the wheel spindle 9 carried at the free ends thereof.

The weight of the adjacent part of the machine is supported by a pair of compression springs, each interposed between one of the arms 8 and a suitable abutment on the adjacent fork leg 5. Preferably each such spring is associated with a known form of vibration-damper unit 10, which may comprise an oil-containing cylinder and a coacting piston-and-rod assembly respectively pivoted to the fork leg 5 at 11 and to the radial arm 8 at 12, the spring aforesaid being compressed between collars on the cylinder and piston rod.

The wheel hub 13 is provided with the usual concentric drum 14 adapted to co-operate with internal brake-shoes 15 carried by a back-plate 16 and adapted to be forced against the drums periphery by a cam 17 or other means also mounted upon the back-plate.

Assuming for convenience that the wheel 7 and brake-drum 14 are not rotating, it will be appreciated that, if the brake back-plate 16 be anchored to the adjacent pivoted arm 8 as is the normal practice, any upward movement of the wheel spindle 9 against the action of the compression springs aforesaid must be attended by an angular movement of the brake shoes 15 with reference to the drum 14; that is to say, it will be frictionally resisted to an extent dependent upon the degree of brake application.

According to the present invention, the brake back-plate 16 is mounted for free rotation upon the wheel spindle 9, and a suitable point thereon above the level of such spindle is linked to the adjacent fork leg 5, the link 18 having substantially the same effective length as the spring-controlled arm 8 below it and opposite ends thereof being equally spaced from the arm pivot 11 and wheel spindle 9 respectively.

The back-plate anchorage link 18 and adjacent radial arm 8 thus form opposite sides of a parallelogram, or of a figure approximating thereto, with the result hat, in the conditions above set forth, there is no relative angular movement of the brake shoes 15 and drum 14 however far the arm 8 may swing about its pivot 28, and hence the application of the brake involves no frictional resistance to the spring-controlled movement of such arm.

Obviously, if desired, the anchorage link 18 may be arranged between a point on the back-plate 16 below the wheel spindle 9 and a downward extension of the adjacent fork-leg 5 beyond the pivot 28 of the arm 8, or the latter may co-operate with parallel anchorage links (such as 18) arranged both above and below it.

Since it is important to avoid any tilting of the continuously oscillating back-plate 16 due to out-of-balance forces imposed thereon by the brake shoes 15 and their actuating means 17 (particularly when of a mechanical nature), such plate is formed or provided with a hub portion 19 of adequate length and diameter, and its lateral rigidity may be further increased by reinforcing ribs radiating from this hub portion, which may be cast or forged integrally with the back-plate 16 (or the central part thereof) or alternatively may have the back-plate pressed on to it as shown and retained by peening over one end of the hub portion.

The latter is preferably fitted with an oil-impregnated bush 20 embracing a part of the wheel spindle 9 which is enlarged by a hardened steel sleeve 21 engaged between a collar 22 on the spindle 9 and a washer 23 retained by a nut 24.

Bushes similar to 20 may be provided at the pivots 12, 28 of the radial arms 8, or alternatively there may be employed at any or each of these points a known form of bush incorporating rubber in shear.

As regards the brake anchorage links 18, it is preferred to provide opposite extremities thereof with hardened steel bushes 25, which engage respectively with hardened steel pins 26 fixed to the fork legs 5 and back-plate 16, rubber oil-seals 27 being fitted at the ends of each bush 25 to retain the lubricant and to resist ingress of dirt and water.

Whilst the invention has been specifically described with reference to a fork with forwardly-directed radial arms 8, it is of course equally applicable to (say) a front fork with trailing arms, and it is immaterial whether the common pivotal axis of the twin arms passes outside the wheel or through it.

I am aware that, as regards the brakes of a motor vehicle having a resilient suspension system which includes a longitudinal oscillating arm, it has already been proposed, in the Specification of Letters Patent No. 678,786, to pivotally connect opposite ends of a rod to the brake-shoe supporting disc and to a fixed part of the vehicle chassis, so that these two pivotal points, the point of suspension of the oscillating arm, and a wheel spindle at the free end of such arm are respectively disposed at the corners of a deformable parallelogram.

What I claim is:—

1. A cycle front fork of the type referred to, characterised by substantially parallel-motion links connecting a leg or main member of the fork to the torque-resisting structure of a hub brake which is mounted concentrically with the wheel spindle for rotation in a plane accurately perpendicular to the latter.

2. A cycle front fork according to Claim 1, further characterised in that one of the links aforesaid is represented by the spindle-carrying arm.

3. A cycle front fork according to Claim 1 or Claim 2, further characterised in that the (or each) link anchoring the torque-resisting structure of the brake is connected to the back-plate or shoe-carrying member of the latter.

4. A cycle front fork according to any one of the preceding claims, further characterised in that the ends of the (or each) anchorage link are provided with hardened steel bushes engaging hardened steel pins which are fixed respectively to the brake structure and to the leg or main member of the fork.

5. A cycle front fork provided with a brake structure anchored substantially as described with reference to, and as shown in, the accompanying drawings.

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PROVISIONAL SPECIFICATION.

Improvements in or relating to Front Wheel Forks for Cycles.

I, BURNARD SCOTT WADE, a British Subject, of Sunshine House, Bolshaw Road, Cheadle, Cheshire, do hereby declare this invention to be described in the following statement:

This invention relates to front wheel forks for the motor and other cycles, with particular reference to that type of wheel-mounting in which the axle is carried by a spring-controlled arm pivoted upon the fork, for movement about an axis parallel to that of the wheel. The term "spring", as used above and hereinafter, should be understood to include a stressed elastic body or bodies of a non-metallic nature, as well as a fluid in compression.

When a hub brake is associated with a cycle wheel mounted as in a fork of the type aforesaid, the present practice is to anchor the back-plate and/or other non-rotary parts of the brake to the spring-controlled arm.

With such an arrangement, however, application of the brake to check rotation of the wheel necessarily interferes to some extent with the spring action of the arm. As will readily be understood, if the wheel be completely locked whilst remaining in effective contact with the ground, pivotal movement of the spring-controlled arm is theoretically impossible, and whilst this extreme condition may seldom arise in practice, the rider of a cycle with the sprung-arm type of front fork will find that hard braking is almost always accompanied by a marked stiffening-up of the suspension system.

The drawbacks of such hampered spring action are, of course, particularly important when the vehicle is traversing a rough surface; for example, in the case of the front wheel of a motor-cycle which is being driven at high speed down a steep and rutted track. Although, under such conditions, the front brake is far more effective than the rear brake for checking the machine, it cannot, when anchored in the known manner, be heavily applied with safety, since the resultant stiffened fork action may make the machine difficult or impossible to hold.

The object of the present invention is completely to eliminate, in a sprung wheel-mounting of the type referred to, any interference with the spring-controlled movement of the wheel when the latter is braked.

According to this invention, the torque-resisting structure of a hub brake associated with a wheel sprung as aforesaid is mounted concentrically with the wheel axle, for rotation in a plane accurately perpendicular to the latter, and is connected to the fork, frame or chassis of the vehicle by means of parallel-motion links, one of which may be represented by the wheel-carrying arm itself.

In one example, the invention is applied to a motor-cycle front fork whose legs terminate at opposite sides of, and behind, the wheel and have pivoted at their extremities a pair of forwardly-extending, rigidly-connected radial arms with the wheel spindle carried at the free ends thereof.

The weight of the adjacent part of the machine is supported by a pair of compression springs, each interposed between one of the arms aforesaid and a suitable abutment on the adjacent fork leg. Preferably each spring is associated with a hydraulic vibration-damper, which may comprise an oil-containing cylinder and a coacting piston-and-rod assembly respectively pivoted to the fork leg and radial arm, the spring aforesaid

being compressed between collars on the cylinder and piston rod.

The wheel hub is provided with the usual concentric drum adapted to co-operate with internal brake-shoes carried by a back-plate and adapted to be forced against the drums periphery by cam or other means also mounted upon the back-plate.

Assuming for convenience that the wheel and brake-drum are not rotating, it will be appreciated that, if the brake back-plate be anchored to the adjacent pivoted arm as is the normal practice, any upward movement of the wheel spindle against the action of the compression springs must be attended by an angular movement of the brake shoes with reference to the drum; that is to say, it will be frictionally resisted to an extent dependent upon the degree of brake application.

According to the present invention, the brake back-plate is mounted for free rotation upon the wheel spindle, and a suitable point thereon above the level of such spindle is linked to the adjacent fork leg, the link having the same effective length as the spring-controlled arm below it and opposite ends thereof being equally spaced from the arm pivot and wheel spindle respectively.

The back-plate anchorage link and adjacent radial arm thus form opposite sides of a parallelogram, with the result that, in the conditions above set forth, there is no relative angular movement of the brake shoes and drum however far the arm may swing about its pivot, and hence the application of the brake involves no frictional resistance to the spring-controlled movement of such arm.

Obviously, if desired, the anchorage link may be arranged between a point in the back-plate below the wheel spindle and a downward extension of the adjacent fork-leg beyond the pivot of the arm, or the latter may co-operate with parallel anchorage links both above and below it.

Since it is important to avoid any tilting of the back-plate due to out-of-balance forces imposed thereon by the brake shoes and their actuating means (particularly when of a mechanical nature), such plate is formed or provided with a hub portion of adequate axial length and its lateral rigidity may be further increased by reinforcing ribs radiating from such hub, which is preferably fitted with an oil-impregnated bush.

Similar bushes may be provided at the ends of the (or each) anchorage link, and also at the pivots of the radial arms, or alternatively there may be employed at any or each of these points a known form of bush incorporating rubber in shear.

Whilst the invention has been specifically described with reference to a form of sprung cycle fork with forwardly-directed radial arms, it is of course equally applicable to (say) a rear fork with trailing arms, and it is immaterial whether the common pivotal axis of the twin arms passes outside the wheel or through it.

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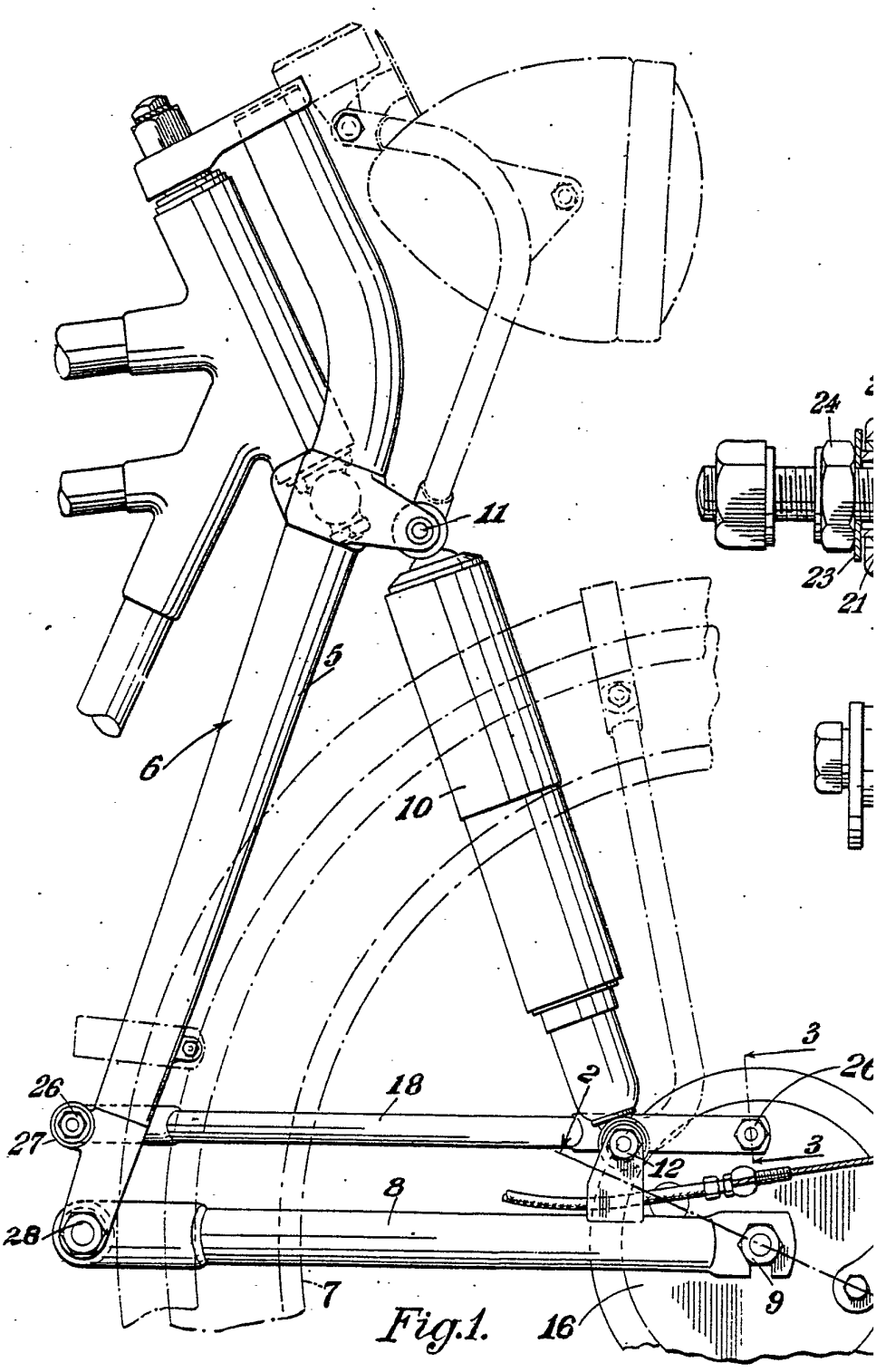

Fig.1.

750,590 COMPLETE SPECIFICATION
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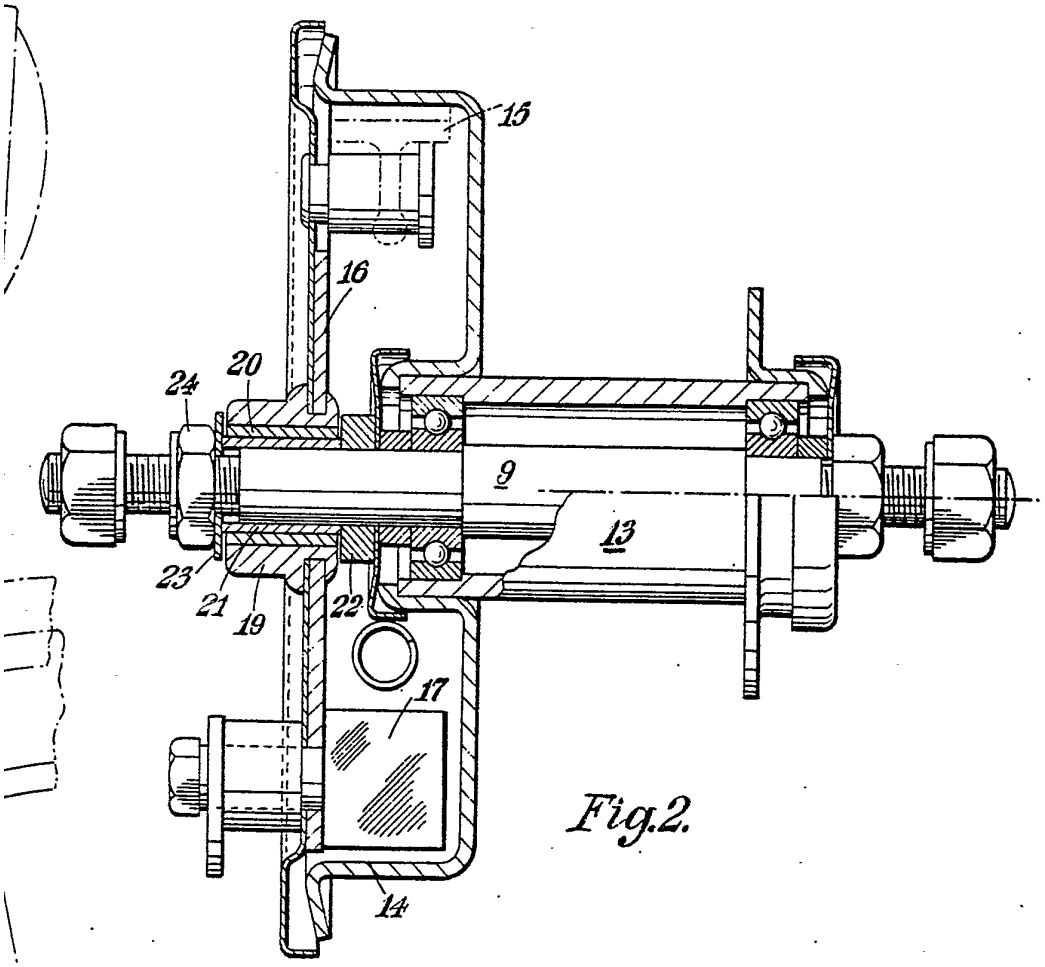
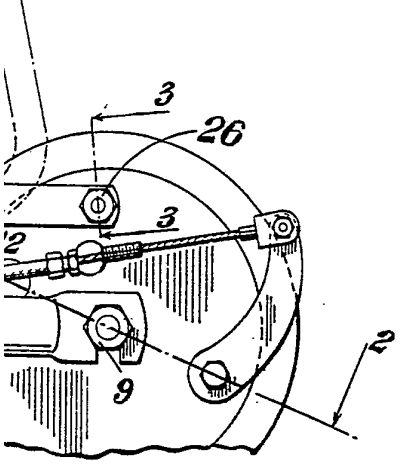


Fig.2.



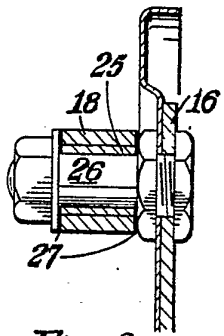


Fig.3.

750,590 COMPLETE SPECIFICATION
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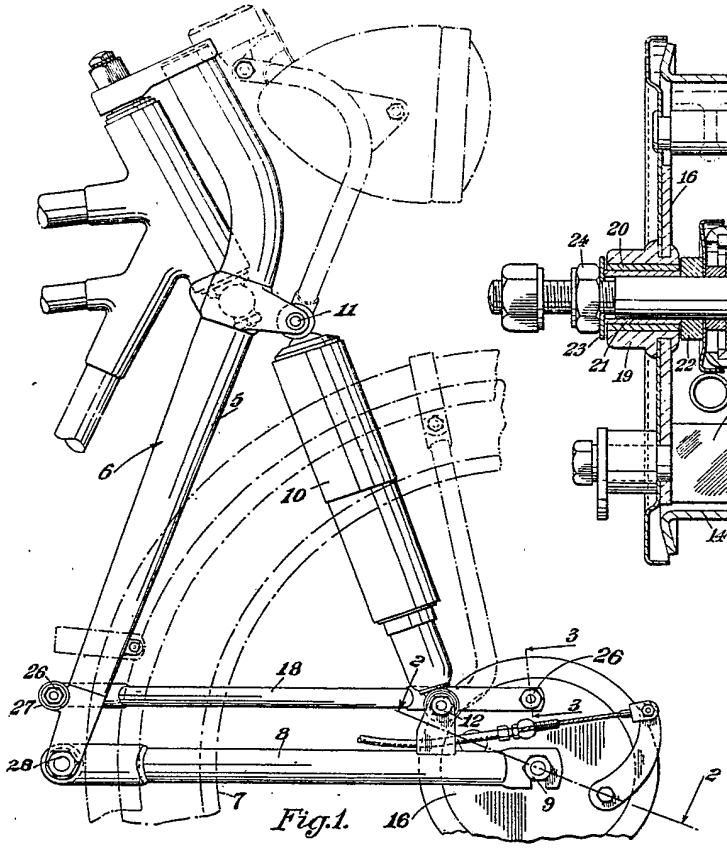

Fig.1.

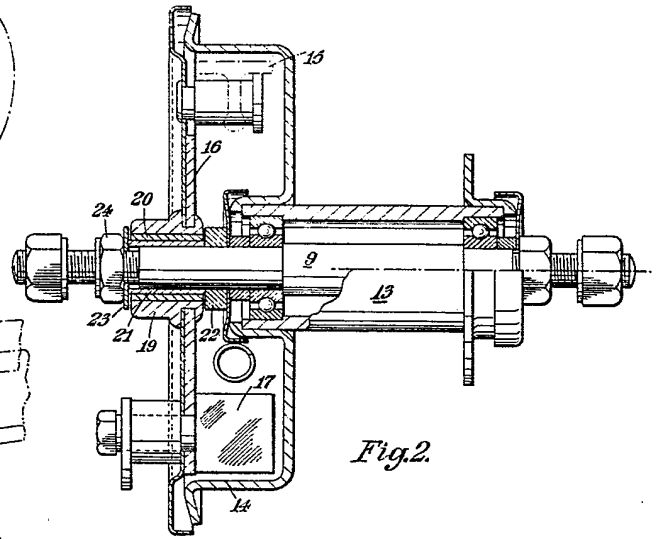

Fig.2.

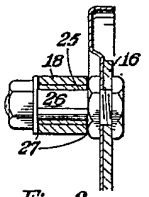

Fig.3.