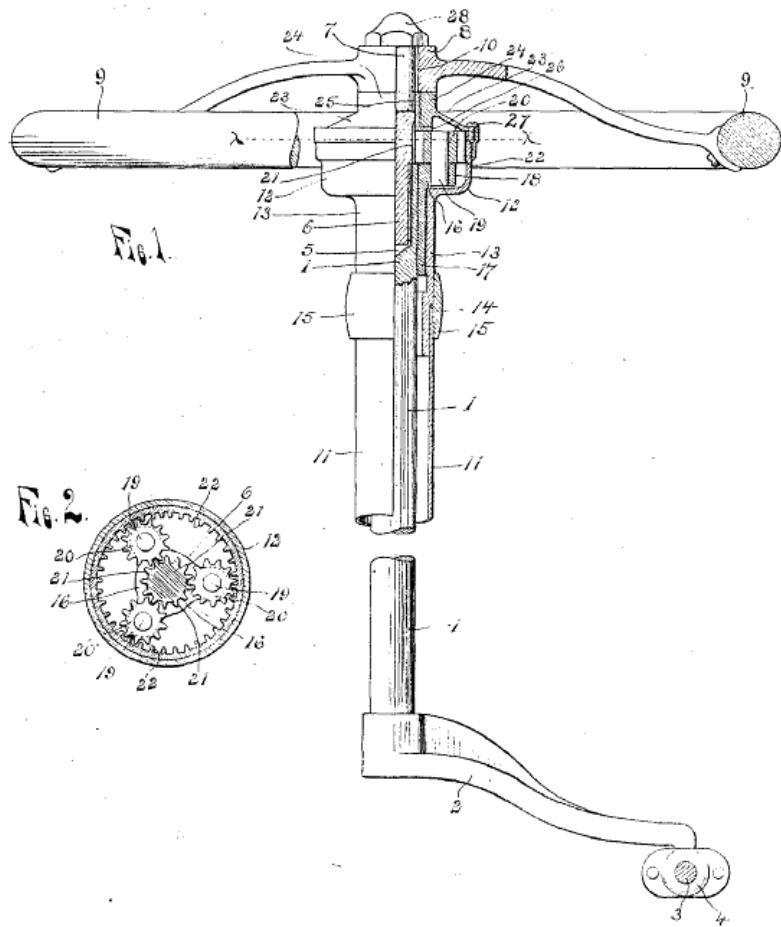


No. 847,405.

PATENTED MAR. 19, 1907.

H. FORD.
STEERING MECHANISM.
APPLICATION FILED JUNE 21, 1905.



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HENRY FORD, OF DETROIT, MICHIGAN.

STEERING MECHANISM.

No. 847,405.

Specification of Letters Patent.

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To all whom it may concern:

Be it known that I, HENRY FORD, a citizen of the United States of America, residing at Detroit, in the county of Wayne and State of Michigan, have invented certain new and useful Improvements in Steering Mechanism, of which the following is a specification, reference being had therein to the accompanying drawings.

This invention relates to improvements in steering mechanism for self-propelled vehicles, such as automobiles and similar conveyances; and its object is to provide means whereby but a small amount of power is required to hold or turn the hand-wheel and to so construct and arrange said means as to permit the inclosing of the same in a tight casing which is located in a very accessible position and which may be quickly taken apart for cleaning or repair without the necessity of detaching the steering-post or other parts or connections.

To this end the invention consists in loosely mounting the steering-wheel upon the upper end of the steering-shaft and interposing between it and said shaft suitable gearing for transmitting a slow motion to the shaft from the wheel, a suitable tight casing being provided upon the upper end of the steering-post for the gearing; and the invention further consists in the particular construction and arrangement of the casing and parts and in providing certain other new and useful features, all as hereinafter more fully described, reference being had to the accompanying drawings, in which—

Figure 1 is a side elevation, partly in section, of a device embodying the invention; and Fig. 2, a section of the same on the line *xx*.

As shown in the drawings, 1 is a solid shaft forming the steering-shaft, and upon the lower end of said shaft is secured an arm 2, to the outer end of which a connecting-rod 3 is attached at one end by a suitable ball-and-socket joint 4, the opposite end of said rod being connected in any of the usual and well-known ways to the ordinary steering-knuckles. In the upper end of said steering-shaft is formed a socket 5 to receive the reduced lower end 6 of the stub-shaft 7, and on the upper end of said stub-shaft is secured the hub 8 of the steering-wheel 9 by a key 10.

A tube secured in any suitable manner (not shown) at its lower end to the floor of the vehicle-body forms the stationary steering-

post 11, and secured to the upper end of said post is a circular casing 12, formed with a tubular portion 13 of the same diameter as the post, which is reduced at its lower end to fit into the post and to form a shoulder 14 to engage the end thereof, a ring 15 being secured over the joint to strengthen the same. Keyed or otherwise secured upon the upper end of the steering-shaft is a bearing member 16, the tubular or hub portion 17 of which fits loosely within the tubular portion 13 of the casing to turn freely with the shaft therein, and at the upper end of said member are formed outwardly-extending arms provided with openings forming bearings 18 to receive the shafts 19, upon which are secured the pinions 20, three in number and spaced at equal distances apart around the stub-shaft 7, which is formed with gear-teeth 21 to engage said pinions.

The casing 12 is formed with internal gear-teeth 22 to engage the pinions at their outer sides and is externally screw-threaded at its upper edge to engage an internally-screw-threaded cap 23, which is formed with a bearing 24 for the stub-shaft to engage said shaft above its gear-teeth and below the lower end of the hub of the hand-wheel, which rests thereon. A bushing 25 is provided for the bearing 24, and a flange 26 on said bushing extends outward from the lower end between the inner end of the bearing and the upper sides of the pinions, so as to hold said pinions down upon their bearings 18. A screw 27 extends downward through the cap into the edge of the casing to prevent said cap from unscrewing, and a finishing-nut 28 is provided on the upper end of the stub-shaft 7 to assist in securing the hand-wheel thereon and to form a finish.

When the hand-wheel is turned, said wheel being secured to the stub-shaft, motion is transmitted by the gear-teeth 21 to the pinions 20, and as said pinions are in engagement with the internal gear-teeth on the stationary casing said pinions will be forced to travel around within said casing and, being mounted on the bearing member 16, which is secured to the steering-shaft, will cause said shaft to be revolved, but at a much slower speed or lesser distance than the hand-wheel, owing to difference between the diameter of the internal gear and that of the intermediate gears or pinions. Much less power is therefore required to hold or to

turn the hand-wheel than would be required if said wheel was secured directly to the steering-shaft.

The casing being tight excludes all dust and may be filled with lubricant to prevent wear and friction of the gears and at the same time lubricate all of the steering-shaft bearings, thus preventing all lost motion due to wear and giving a free-turning wheel. Said casing also forms a neat finish or hub in the axis of the hand-wheel, where it is protected and out of the way.

Having thus fully described my invention, what I claim is—

1. The combination with a tubular steering-post formed with an enlargement at its upper end and a steering-shaft within said post, of a hand-wheel mounted upon the upper end of said enlargement and free to turn thereon, and means within said enlargement interposed between said wheel and the upper end of said shaft for transmitting from the wheel to the shaft a different rate of speed than that of the wheel.

2. The combination with a tubular steering-post and a steering-shaft within said post, of a hand-wheel on the upper end of said post, a stub-shaft in said wheel having a telescopic connection with the shaft, and gearing connecting said wheel and the upper end of the shaft.

3. The combination with a tubular steering-post and a steering-shaft within said post, of a casing on the upper end of said post, a steering-wheel supported by the casing and free to turn thereon, gears carried by the wheel and the casing, and pinions on the shaft engaging said gears to transmit motion from said wheel to the upper end of the steering-shaft.

4. The combination with a steering-shaft, of a stub-shaft in axial alinement with said shaft and having a telescopic engagement therewith, a hand-wheel secured to the stub-shaft, a gear on the stub-shaft, a stationary internal gear surrounding said gear, and an intermediate gear carried by the steering-shaft interposed between the gear on the stub-shaft and the internal gear.

5. The combination with a stationary steering-post and a steering-shaft within said post, of a casing secured to the upper end of the steering-post and provided with a bearing, a stub-shaft supported in said bearing in axial alinement with the steering-shaft and free to turn therein, a laterally-extending flange on the steering-shaft a hand-wheel fast on the outer end of said stub-shaft, and gearing within the casing for transmitting motion from said stub-shaft to the steering-shaft.

6. The combination of a steering-shaft having a socket in its upper end and a laterally-extending flange, a stub-shaft engaging

said socket at one end and free to turn therein, a hand-wheel secured to the upper end of the stub-shaft, a gear on the stub-shaft, and gears in engagement with said gear to transmit motion therefrom to the steering-shaft.

7. The combination with a stationary post and a steering-shaft within said post, of a casing secured to the upper end of said post and provided with internal gear-teeth, a stub-shaft supported in axial alinement with the steering-shaft and having a telescopic engagement therewith, a gear on said stub-shaft within the casing, a hand-wheel on the outer end of said stub-shaft, a bearing member secured to the upper end of the steering-shaft, and intermediate gears mounted on said bearing member and engaging the gear on the stub-shaft and the internal gear-teeth on the casing.

8. The combination with a stationary tubular post, of a steering-shaft within said post provided with a socket in its upper end, a stub-shaft in axial alinement therewith engaging said socket and free to turn therein, a gear on said stub-shaft adjacent to the end of the steering-shaft, a hand-wheel secured to the upper end of the stub-shaft, a casing secured to the upper end of the post and provided with internal gear-teeth, a bearing member secured to the upper end of the steering-shaft and provided with shafts forming bearings, gears having openings engaging said bearings and in mesh with the gear on the stub-shaft and the internal gear-teeth on the casing, and a cover detachably secured to the casing and provided with a bearing for the stub-shaft.

9. The combination with a stationary tubular post, of a steering-shaft within said post provided with a socket in its upper end, a circular casing secured to the upper end of the post and provided with an internal gear, a bearing member formed with a sleeve portion secured to the upper end of the steering-shaft, a laterally-extending flange on said member provided with pins forming vertical bearings, gears on said pins in mesh with the internal gear on the casing, a stub-shaft in axial alinement with the shaft having a reduced lower end engaging the socket in the steering-shaft, a gear on said stub-shaft adjacent to the end of the steering-shaft, a hand-wheel secured to the upper end of the stub-shaft and a cap screwed upon the casing and provided with a bearing engaging the stub-shaft between the gear thereon and the hub of the hand-wheel.

In testimony whereof I affix my signature in presence of two witnesses.

HENRY FORD.

Witnesses:

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