PATENT SPECIFICATION

326,206

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PROVISIONAL SPECIFICATION.

Improvements in and relating to Transmission, Steering and Suspension Mechanism for Automobiles.

I, ARTHUR GEORGE GRICE, of "Cuthlie", Richmond Road, Caversham, Reading, Berkshire, a British subject, do hereby declare the nature of this invention to be as follows:—

This invention relates to automobiles and refers more particularly though not exclusively to small automobiles (hereinafter referred to as "trucks") intended for the transport of luggage or goods at railway stations, factories, vans, etc.

The main object of the invention is to provide improved layouts of the transmission, steering and suspension mechanism in such vehicles.

The invention consists in an automobile embodying a driving motor, toothed or friction change speed mechanism and a steering head carrying two steering and driving wheels disposed adjacent each other and preferably mounted upon a subframe which is pivoted to and sprung in relation to a chassis.

The invention also consists in an automobile as set forth above wherein the steering driving wheels are driven by a shaft passing between them radially in co-operation with a differential gear.

The invention also consists in an automobile as set forth above wherein steering and reverse movement are effected by rotating the steering head associated with the driving wheels preferably by means of a steering wheel, chain and sprockets.

The invention also consists in an automobile as set forth above wherein the shaft connecting the gear box to the driving wheels is provided with a brake whereby the vehicle may be brought to rest and securely maintained in that condition and whereby in the event of a differential gearing being provided the said functions may be performed without impairing steering or reversal freedom.

The invention also consists in an automobile as set forth above wherein the gear change mechanism comprises a pair of constant mesh pinions one on a lay shaft and the other rotationally rigid with a gear wheel meshing with a gear wheel on the propeller shaft, the two rotationally rigid wheels being loosely mounted upon a driving shaft connected to the engine or motor, and one or more gear wheels splined on said driving shaft and adapted to be brought into mesh selectively with co-operating gear wheels on the lay shaft.

In carrying the invention into effect in one convenient form by way of example as applied to a truck for use on railway stations for the transport of luggage or goods, I provide a platform on a chassis, supported at its rear by two wheels disposed near the sides of the truck. The front of the truck is pivoted to a subframe supported on a pair of wheels disposed close to each other. The wheels are carried in a steering head embodied in the sub-frame and are capable of free rotary movement about an approximately vertical axis in order to enable steering of the truck and its reversal to be effected.

The sub-frame may be universally pivoted at its front or rear end to the truck chassis but in either event I provide vertical guides and also a spring or springs for the other end in order that the longitudinal axis of the sub-frame may be constrained to motion in a vertical plane. In order to permit of limited rocking movement of the sub-frame about the said longitudinal axis I provide springs between the sides of the sub-frame and the chassis.

To the chassis is attached an internal combustion engine and a change speed gear mechanism attached to the sub-frame is driven thereby through a universally jointed shaft. Conveniently the engine is an opposed twin engine with or without an engine shaft clutch coupled to or embodying a driving shaft carrying two splined pinions for selectively engaging appropriate pinions fast on a lay shaft. The lay shaft carries a pinion in constant mesh with a pinion which is rotationally free upon the said driving shaft and which is rigid with a bevel pinion engaging a further bevel wheel attached to a propeller shaft passing longitudinally through the steering head tube. Brake mechanism operating on the propeller shaft is provided.

The driving shaft carrying the splined gear wheels is disposed in a substantially horizontal plane and intersects the axis

of the steering head at right angles. The steering head at its lower end carries the bearings of the two driving steering wheels, which as mentioned above are disposed close to each other and the drive is conveyed to these wheels by bevel gearing, the two wheels either being mutually rigid on a common spindle or driven through differential mechanism as desired.

Steering is performed, by rotating the steering head tube which contains the propeller shaft. Conveniently this may be effected by attaching a steering wheel to a substantially vertical spindle carried in bearings on the truck platform, this steering wheel spindle being geared to the steering head tube by a chain passing over suitable sprockets mounted on the two members. In order to reverse the direction of motion it is merely necessary to move the steering head tube through 180° and it will be observed that when a differential gear is provided this angular movement may be effected even while the vehicle brake is applied.

Obviously however if preferred reverse drive may be effected by the provision of a reversing pinion in the gear box.

According to the above example the engine and speed change gearing are mounted one forward and one to the rear of the propeller shaft and these parts may thus be covered readily by a suitable bonnet if desired. A construction on similar lines but embodying three or four seats may readily be applied for public hire service as taximeters, particularly in view of the extremely large lock possible.

Friction change speed mechanism may be employed if desired.

Dated this 27th day of November, 1928.

MARKS & CLERK.

COMPLETE SPECIFICATION.

Improvements in and relating to Transmission, Steering and Suspension Mechanism for Automobiles.

I, ARTHUR GEORGE GRICE, of "Cuthlie", Richmond Road, Caversham, Reading, Berkshire, a British subject, do hereby declare the nature of this invention and in what manner the same is to be performed, to be particularly described and ascertained in and by the following statement:—

This invention relates to automobiles and refers more particularly though not exclusively to small automobiles (hereinafter referred to as "trucks") intended for the transport of luggage or goods at railway stations, factories, vans, etc.

The main object of the invention is to provide improved layouts of the transmission, steering and suspension mechanism in such vehicles.

The invention consists in an automobile embodying a driving motor, toothed or friction change speed mechanism and a steering head carrying two steering and driving wheels disposed adjacent each other and all mounted upon a subframe which is pivoted to and sprung in relation to a chassis.

The invention also consists in an automobile as set forth above wherein the steering driving wheels are driven by a shaft passing between them radially in co-operation with a differential gear.

The invention also consists in an automobile as set forth above embodying friction driving and braking mechanism, the arrangement being such that as the drive is disconnected the brake is automatically applied and vice versa.

The invention also consists in an automobile as set forth above wherein epicyclic gear is provided in conjunction with bevel gearing.

The invention also consists in an automobile as set forth above wherein the gear change mechanism comprises a pair of constant mesh pinions one on a lay shaft and the other rotationally rigid with a gear wheel meshing with a gear wheel on the propeller shaft, the two rotationally rigid wheels being loosely mounted upon a driving shaft connected to the engine or motor, and one or more gear wheels splined on said driving shaft and adapted to be brought into mesh selectively with co-operating gear wheels on the lay shaft.

The invention also consists in automobiles as set forth above and constructed and operating substantially as hereinafter described with reference to the accompanying drawings.

Referring to the accompanying diagrammatic drawings:—

Figures 1, 2 and 3 illustrate three views in front elevation, side elevation and plan respectively of one convenient construction in accordance with the present invention.

Figures 4 and 5 illustrate fragmental views in vertical section of a modified construction.

Figures 6 and 7 illustrate fragmental views in vertical section of a further modified construction embodying friction gearing.

In carrying the invention into effect in

one convenient form illustrated in Figures 1 to 3 by way of example as applied to a truck for use on railway stations for the transport of luggage or goods, I provide a platform on a chassis *a*, supported at its rear by two wheels *b* disposed near the sides of the truck. The front of the truck is pivoted to a sub-frame *c* supported on a pair of wheels *d*, *d* disposed close to each other. The wheels are carried in a steering head *e* embodied in the sub-frame and are capable of free rotary movement about an approximately vertical axis in order to enable steering of the truck and its reversal to be effected.

The sub-frame is pivoted at its front and rear end to the truck chassis by sprung U-bolts *f* which cause it to rest on four rubber blocks *g*.

To the chassis is attached an internal combustion engine *h* and a change speed gear mechanism *j* attached to the sub-frame is driven thereby through a universal joint *k*. Conveniently the engine is an opposed twin engine.

In carrying the invention into effect according to the modification illustrated in Figures 4 and 5, I connect the engine shaft to the sun wheel *u* of an epicyclic gear, the planet carrier of which is rigidly connected to a shaft *v* bearing at its centre on splines a sliding dog *t*. This shaft *v* carries loosely two bevel wheels *w* and *x* which are both in mesh with the common bevel wheel *m* mounted rigidly upon the propeller shaft *n*.

An external brake band *y* serves to arrest the rotation of the epicyclic annulus *z* when it is required to transmit drive from the engine to the shaft *v*. The sliding dog *t* enables the shaft *v* to be connected rotationally with either of the bevel wheels *w* or *x* as desired for forward or reverse drive.

The band *y* is actuated by a shaft 2 which may be rotated through a small angle by a pedal (not shown). This shaft 2 also embodies means for contracting a brake band 3 upon a brake drum 4 also rigid upon the shaft *v*, the arrangement being such that when the pedal is depressed against the pressure of a spring the brake band *y* is contracted upon the epicyclic annulus *z*, the brake band 3 being at the same time released from the brake drum 4 and vice versa.

Any convenient means such as a fork 5 mounted upon a rocked shaft 6 may be provided for effecting the necessary longitudinal movements of the sliding dog *t*.

The propeller shaft *n* is housed within a steering head tube 7 to the upper end of which a pinion *s* is rigidly attached. This pinion meshes with an intermediate pinion *r* which in turn meshes with a pinion *q* carried at the lower end of a steering column *p*.

The propeller shaft carries at its lower end a driving bevel 8 meshing with a crown wheel 9 rigidly fixed upon the short live axle 10 carrying the road wheels *d*, it being noted that in this example differential gearing is despensed with.

According to a further example illustrated in Figures 6 and 7, I connect the engine shaft to a driving shaft 11 which is squared throughout the bulk of its length. This squared shaft carries upon it a friction wheel 12 which may be moved longitudinally thereof by means of a fork member 13 carried upon a spindle 14. One end of the shaft 11 is carried in a swivellable bearing embodied in a membear 15 which is urged upwards in its bearings by a spring 16 so as to hold the friction wheel 12 out of engagement with the driven disc 17 mounted upon the propeller shaft *n*. The member 15 embodies a collar 18 which is engaged by a forked bell crank lever 19 carried upon a shaft 20, which latter also carries a bell crank lever 21 which is coupled by a link 22 to a lever 23 rigid with a brake operating cam 24.

When the parts described above occupy the positions in which they are illustrated in Figures 6 and 7, that is with the friction wheel 12 out of contact with the disc 17, then the brake blocks 25 are urged together so as to come in contact with the top and bottom surfaces of the disc 17 by means of springs 26, thus holding the disc 17 stationary. In this position the truck or trolley cannot be moved and can quite safely be left on an incline.

A further lever 27 is provided on the shaft 20, however, which is capable of being operated by a tension spring 28 from a brake lever 29 pivoted at 30. When this brake lever is depressed the shaft 20 is rotated so as to depress the collar 18 against the force of the spring 16 and rock the shaft 11 so as to engage the friction wheel 12 with the disc 17, at the same time the lever 21 effecting disengagement of the brake blocks 25.

I prefer to provide beneath the disc 17 two rollers 31 in order to take up the thrust imposed by the frictional force exerted between the friction wheel 12 and disc 17.

It will be appreciated that with the above example an infinite variety of forward speeds or reverse speeds can be obtained by manipulating the fork 13 and pedal 29.

The propeller shaft *n* may be connected through gearing directly to a common shaft carrying the wheels *d* or may be coupled to two separate shafts operated

through differential gearing. Rotation of the steering head is effected in this example in a similar manner to that described with reference to Figures 4 and 5.

The steering head at its lower end carries the bearings of the two driving steering wheels *d*, which as mentioned above are disposed close to each other and the drive is conveyed to these wheels by a bevel gear *m* and propeller shaft *n*, the two wheels either being mutually rigid on a common spindle or driven through differential mechanism (not shown).

Steering is performed by rotating the steering head tube which contains the propeller shaft *n*. Conveniently this may be effected by attaching a steering wheel *o* to a substantially vertical spindle *p* carried in fixed bearings on the truck platform, this steering wheel spindle being geared to the steering head tube by a gearing train *q*, *r*, *s*, as shown, or by a chain passing over suitable sprockets mounted on the two members. In order to reverse the direction of motion it is merely necessary to move the steering head tube through 180° and it will be observed that when a differential gear is provided this angular movement may be effected even while the vehicle brake is applied. Reversal of direction can be produced, however, by reversing the drive as explained above.

According to a modification, the engine is coupled with or without an engine shaft clutch to or embodies a driving shaft carrying two splined pinions (not shown) for selectively engaging appropriate pinions fast on a lay shaft (not shown). The lay shaft carries a pinion in constant mesh with a pinion which is rotationally free upon the said driving shaft and which is rigid with a bevel pinion engaging a further bevel wheel attached to a propeller shaft passing longitudinally through the steering head tube. Brake mechanism operating on the propeller shaft is provided in this case.

Obviously by inserting a further pinion an extra speed can be obtained. Also pinions may be provided for obtaining a reverse drive.

The driving shaft carrying the splined gear wheels is disposed in a substantially horizontal plane and intersects the axis of the steering head at right angles.

According to the modification last described the engine and speed change gearing are mounted one forward and one to the rear of the propeller shaft and these parts may thus be covered readily by a suitable bonnet if desired. A construction on similar lines but embodying three or four seats may readily be applied for public hire service as taximeters, particularly in view of the extremely large lock possible.

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. An automobile embodying a driving motor, toothed or friction change speed mechanism and a steering head carrying two steering and driving wheels disposed adjacent each other and all mounted upon a sub-frame which is pivoted to and sprung in relation to a chassis.

2. An automobile as claimed in Claim 1 wherein the steering driving wheels are driven by a shaft passing between them radially in co-operation with a differential gear.

3. An automobile as claimed in Claim 1 or Claim 2 embodying friction driving and braking mechanism, the arrangement being such that as the drive is disconnected the brake is automatically applied and vice versa.

4. An automobile as claimed in Claim 2 wherein epicyclic gear is provided in conjunction with bevel gearing, the arrangement preferably being such that as the drive is disconnected the brake is automatically applied and vice versa.

5. An automobile as claimed in Claim 1 or Claim 2, wherein the gear change mechanism comprises a pair of constant mesh pinions one on a lay shaft and the other rotationally rigid with a gear wheel meshing with a gear wheel on the propeller shaft, the two rotationally rigid wheels being loosely mounted upon a driving shaft connected to the engine or motor, and one or more gear wheels splined on said driving shaft and adapted to be brought into mesh selectively with co-operating gear wheels on the lay shaft.

6. Automobiles constructed and operating substantially as herein described with reference to the accompanying drawings.

Dated this 3rd day of September, 1929.

MARKS & CLERK.

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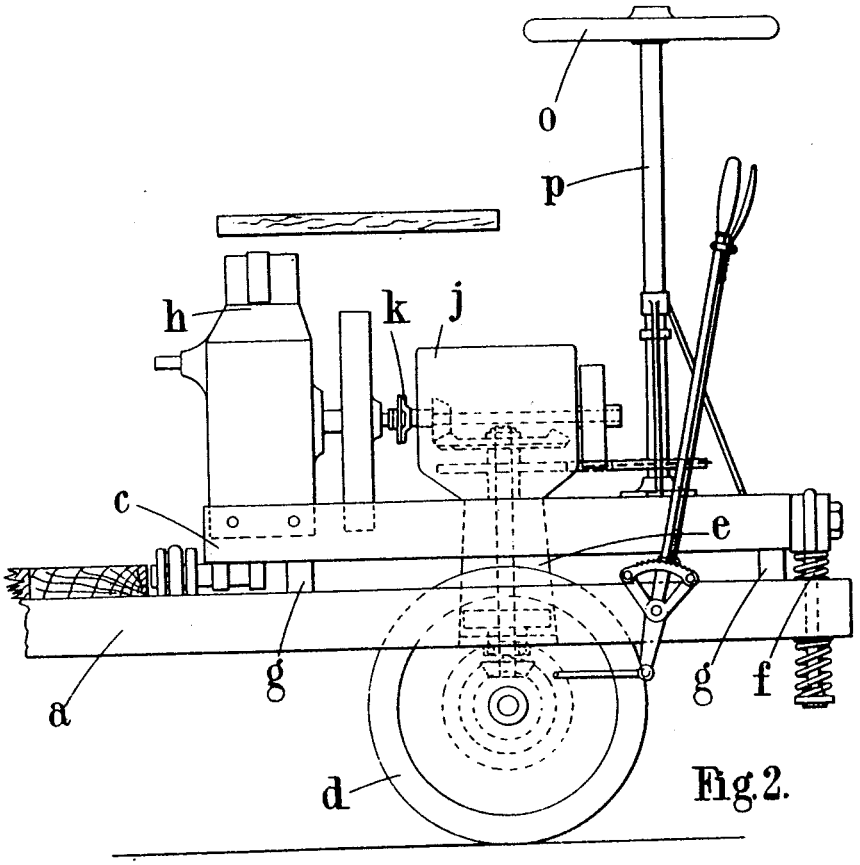


Fig.2.

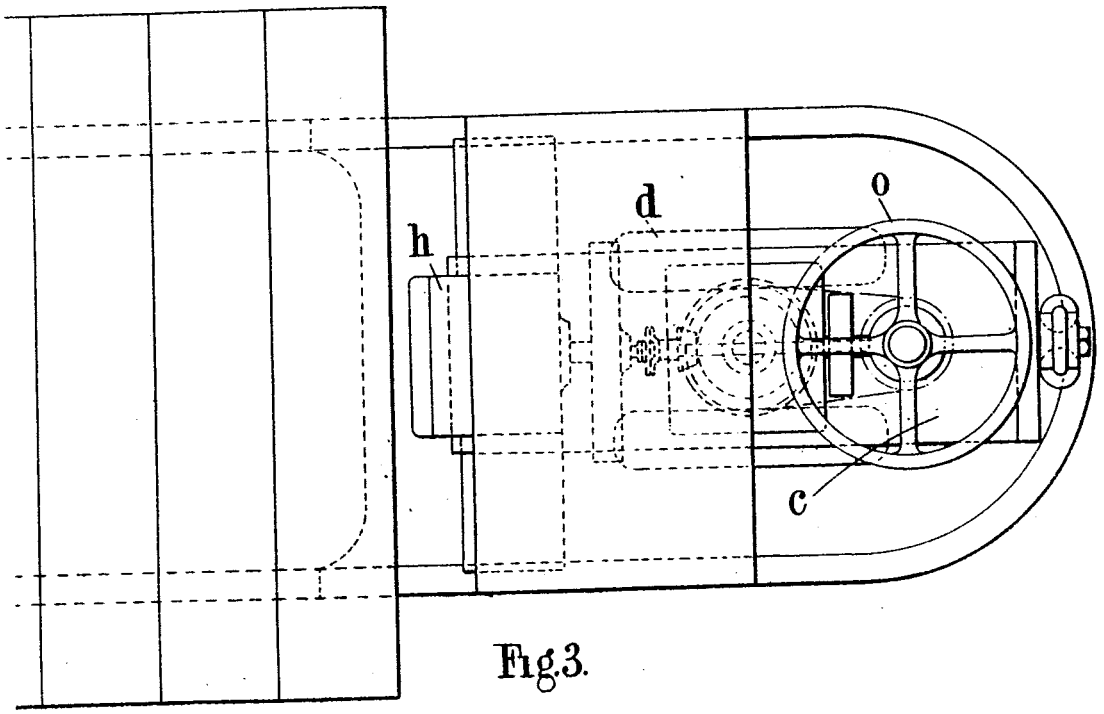


Fig.3.

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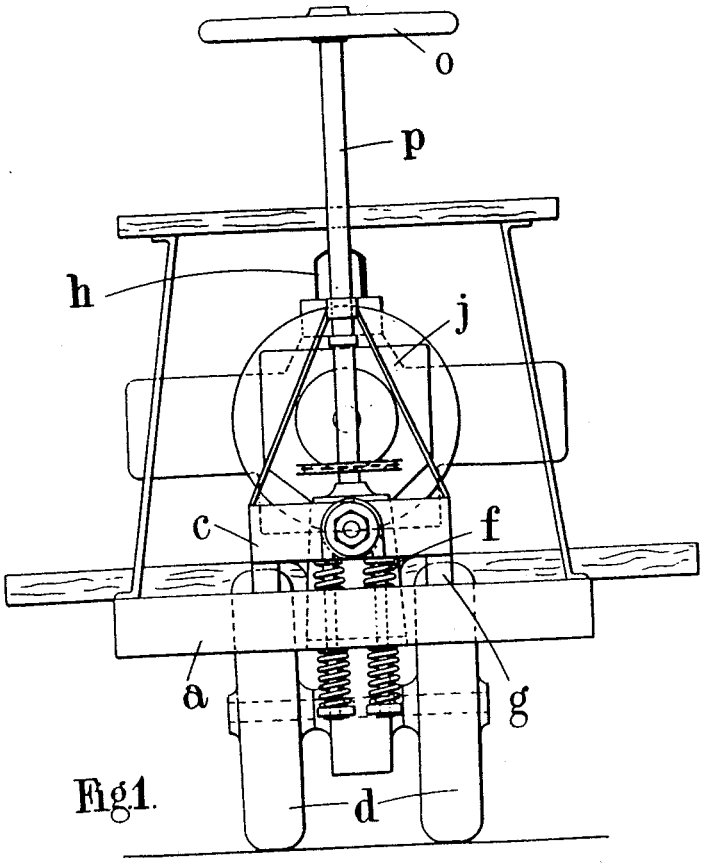
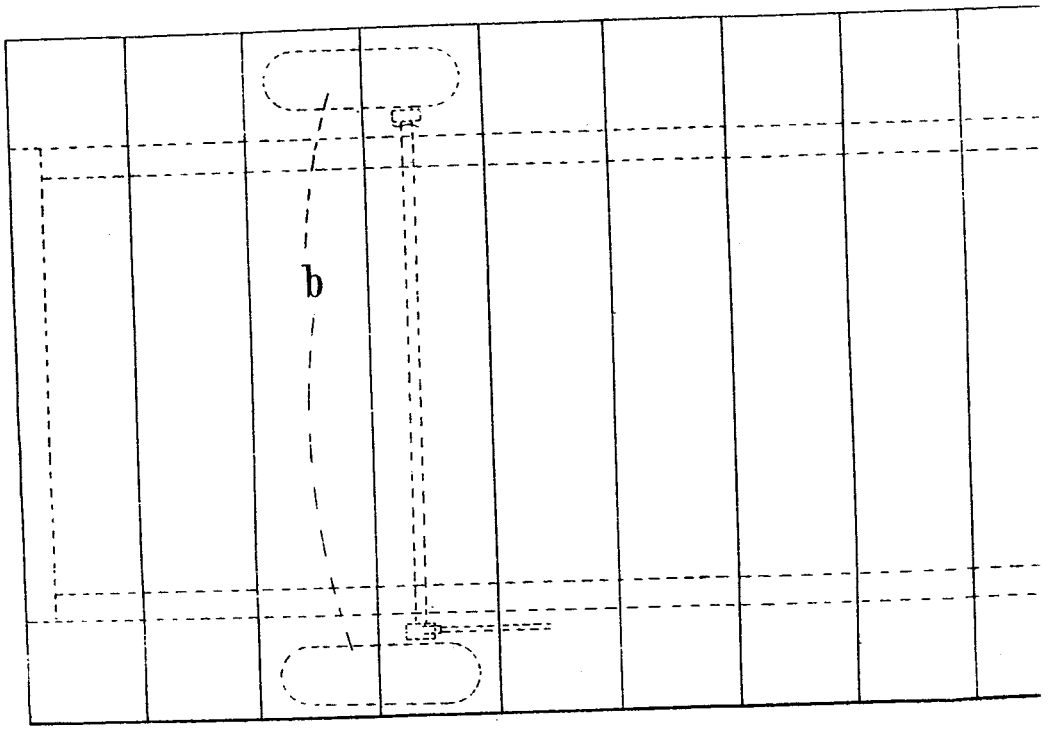


Fig1.



[This Drawing is a reproduction of the Original on a reduced scale.]

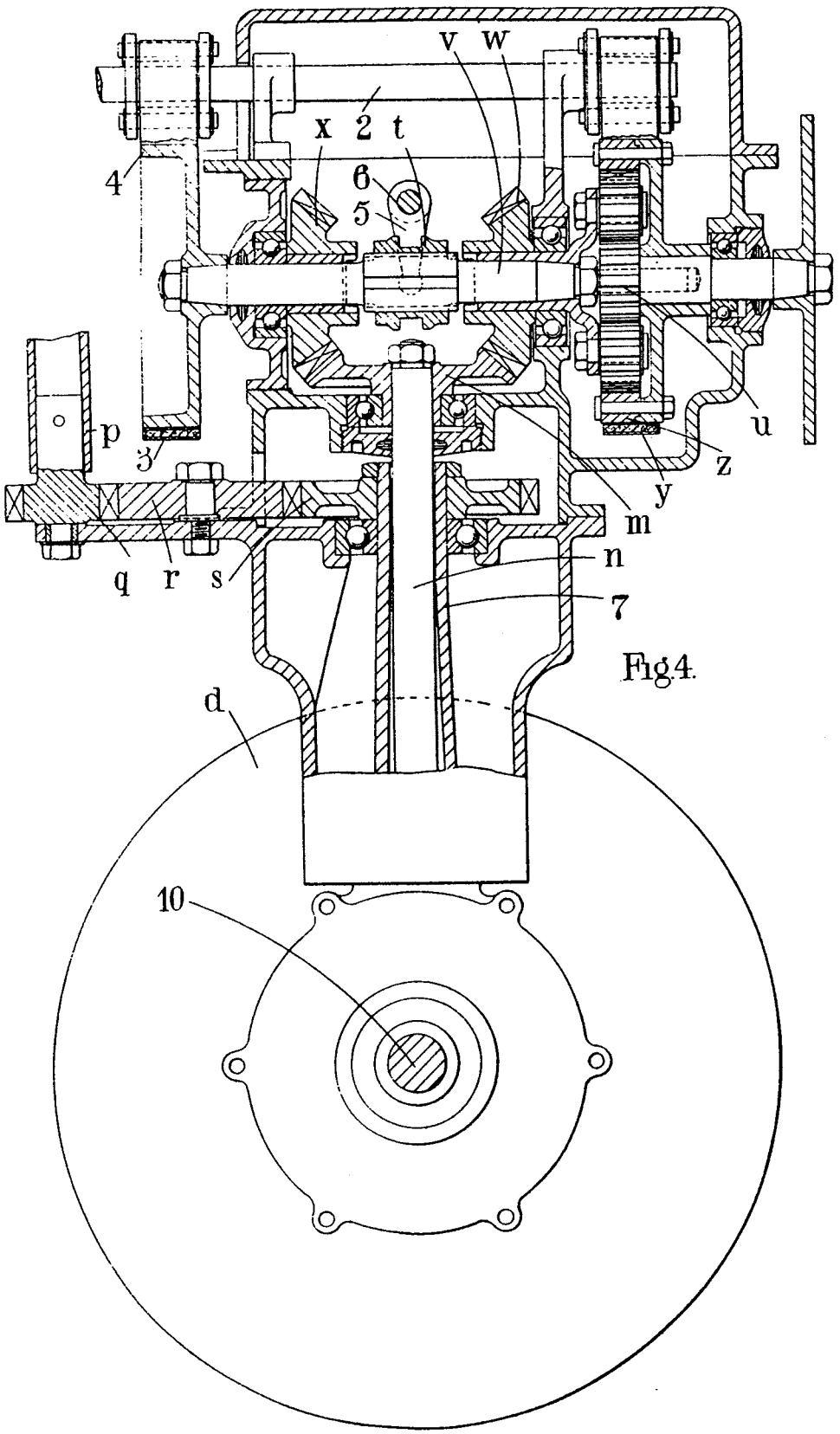


Fig.4.

SHEET 2

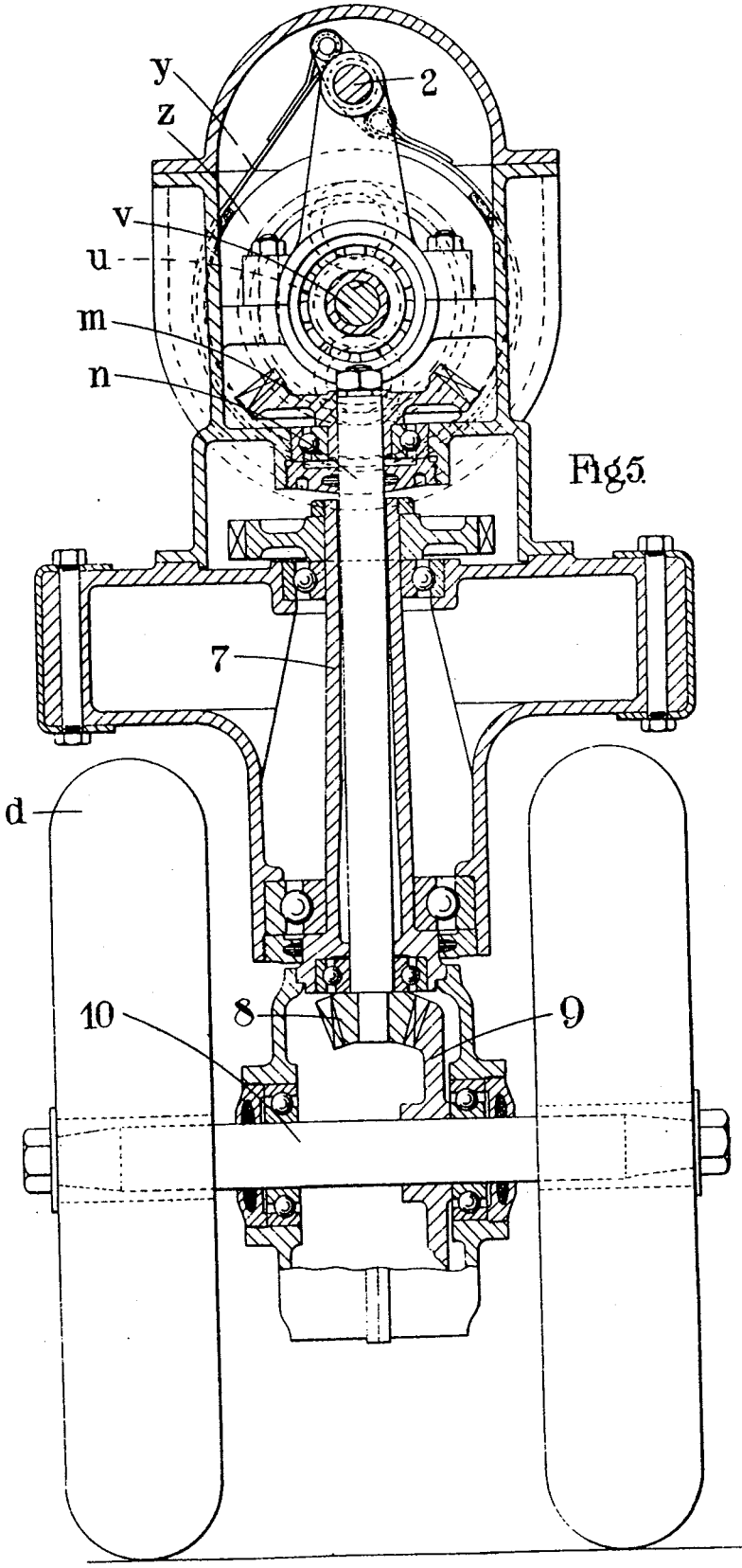


Fig5.

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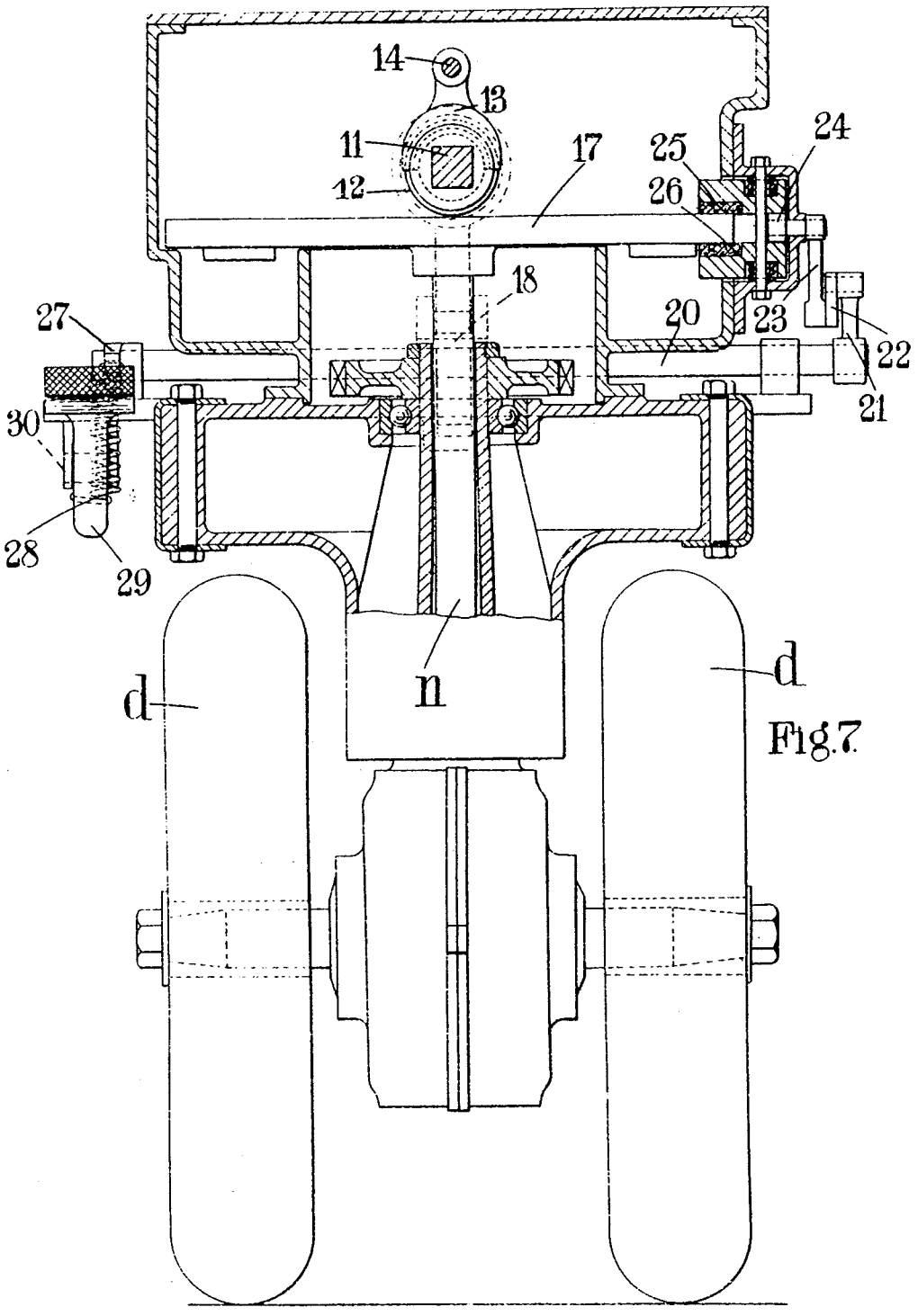


Fig.7

Charles & Read Ltd. Photo Litho

[This Drawing is a reproduction of the Original on a reduced scale]

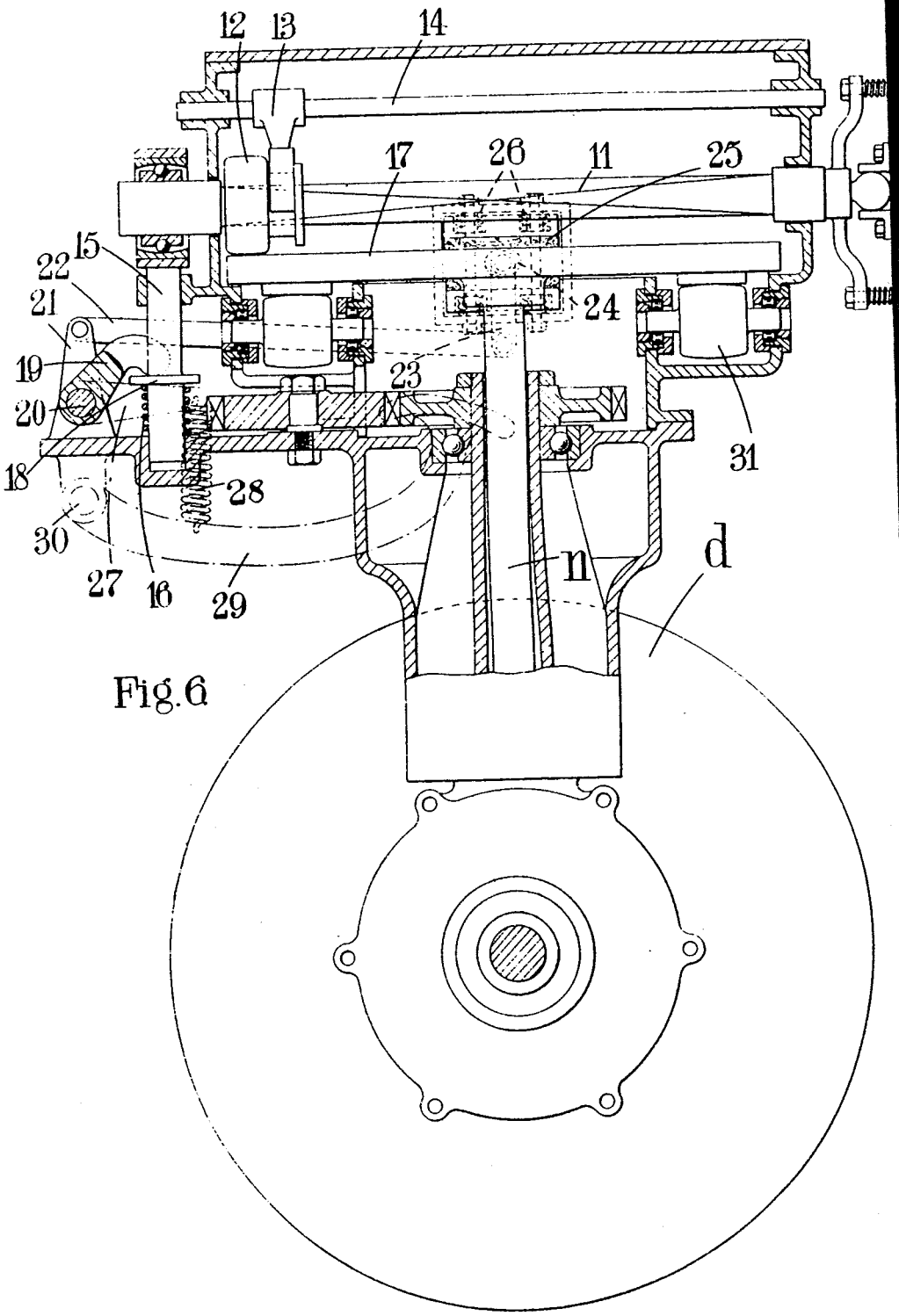


Fig.6