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(54) FREE WHEEL ASSEMBLIES FOR VEHICLES

(71) We, COVEC SUSPENSIONS LIMITED, a British Company, of Masonic Street, Llandudno, North Wales, do hereby declare the invention, for which we pray that a patent may be granted to us, and the method by which it is to be performed, to be particularly described in and by the following statement:—

The present invention concerns a free wheel assembly for vehicles and to vehicles when fitted with such an assembly.

According to the present invention a free wheel assembly for a vehicle comprises a wheel hub, a member for driving the hub and a free wheel facility located between the hub and the driving member for transmitting drive in one rotational direction only when the speed of the hub is less than the speed of the driving member, means for urging the driving member into driving engagement with the hub to isolate and override the freewheel facility and means operable to displace the driving member against the action of said urging means and out of engagement with the hub.

Preferably, the driving member comprises a ring secured for rotation with the drive axle of the vehicle. Conveniently, the ring is secured for rotation with and displaceable axially upon a second ring which is fixedly secured to the drive axle. The ring can be moved axially relative to the second ring into driving engagement with the wheel hub thereby isolating and overriding the free wheel facility.

The invention will be described further, by way of example, with reference to the accompanying drawing which is a diagrammatic section through a wheel assembly.

Axle 1 is rotatably journalled in a fixed housing 2. A wheel hub 3 having threaded studs 4 to secure a road wheel (not shown) is mounted at the end of the axle. The hub 3 is supported on a bearing 5, conveniently a taper roller bearing, which in turn is carried on a bolt 6 engageable in a correspondingly threaded bore in the end of the axle. Conveniently, the bolt 6 is provided with a left hand thread. Alternative means can be provided for mounting the hub on the axle.

An inner ring 7 is secured by bolts 8 to the inwardly directed face of axle flange 9 adjacent the periphery of the axle flange. The radially outer face of the ring 7 is axially splined to accept corresponding splines on the radially inner face of outer ring 10. The splines are denoted by the reference numeral 11. The radial outer face of the outer ring 10 is supported within the inwardly directed flange 12 of the wheel hub. The outer ring 10 is stepped to form a seat for a chain roller clutch assembly 13. One form of such an assembly comprises an endless chain linkage having pockets to receive two sets of rollers. A first set of rollers, preferably alternate rollers in the chain, are idlers. A second set of rollers are spring loaded and each is provided with an axial lip. The lips project outwardly beyond the links of the chain to provide a wedging action between the ring 10 and the flange 12 of the hub 3. However, when the rotational speed of the hub exceeds that of the ring the rollers are rotated against their springs to urge the lips into the pockets in the chain to provide a free wheel facility.

A brake drum 14 is secured by bolts 15 to the flange 12 of the hub and a back plate 16 is fixedly secured to the housing 2. Brake shoes or pads 17 cooperate with the brake drum 14 in a conventional manner.

Solenoids 18, conveniently two in number, are secured to the back plate 16. Each solenoid 18 actuates a pull rod 19 the end of which is in threaded engagement with an annular clutch release bearing 20. The rods 19 are slidably supported in an annular support plate 21. A compression spring 22 is arranged about each rod 19 between the plate 21 and the bearing 20, and additional such springs can be arranged at spaced intervals between the plate 21 and the bearing ring 20.

A clutch lining 23 is provided at the hub end of the outer ring 10, that is between

the end of the ring and the opposing portion of the inner face of the hub.

The assembly 13 enables the ring 10 to drive the wheel hub 3 for rotation in one direction but provides an overrunning or free wheel facility when the rotational speed of the axle drops below that of the hub.

The assembly operates as follows.

Drive from the axle 1 is transmitted to the wheel hub 3 and hence the road wheel through the inner ring 7, the outer ring 10 and the assembly 13. The outer ring 10 is urged axially outwardly on its splined connection to the inner ring 7 by means of the springs 22 on the rods 19 pushing the ring 20 into first engagement with the ring 10. The ring 10 is thus in driving engagement with the hub 3. This condition remains in operation while the vehicle is being driven in the lower gears. Upon selecting top gear the solenoids are actuated to bring the free wheel assembly into operation. The solenoids can be actuated by means of a switch in the gear change mechanism so as to come into operation automatically upon engaging top gear.

The solenoids 18 pull the rods 19 and the attached ring 20 to the left as shown in the drawing to compress the springs 22 and to allow the ring 10 to slip relative to the clutch lining 23. The arrangement now functions as a free wheel facility. Drive is still transmitted by the chain roller clutch assembly 13 to the hub 3 provided the rotational speed of the ring 10 does not fall below that of the hub. However when the rotational speed of the axle 1, and hence the ring 10, is allowed to drop below that of the hub the hub can freewheel about the axle. Such a condition will persist with the vehicle in top gear until the speed of the vehicle drops and the driver reengages the throttle to apply drive to the axle and through the rings 7, 10 and clutch 13 to the hub.

Upon disengaging top gear the solenoids are deactivated to allow the compression springs 22 to urge the bearing ring 20 against the outer ring 10 and the ring 10 against the clutch lining 23 thereby reverting to a fixed wheel drive condition.

Instead of an automatic facility coupled to the gear selector for engaging the freewheel facility when in top gear it is possible to employ a separate switch for activating and deactivating the solenoids.

As an alternative to electrically operated solenoids the rods 19 can be displaced by pneumatic or hydraulic means. A recess forming a seat for the chain assembly 13 can be provided in the flange 12 instead of in the ring 10.

The free wheel assembly can be fitted to existing vehicles by simple modifications. The free wheel assembly can be adapted to suit different types of vehicles and can be included between each driven road wheel and the differential.

In vehicles not having a fixed axle housing, the fixed component parts of the assembly can be secured to alternative fixed supports.

It is envisaged that the assembly can be modified and used to replace a conventional differential.

WHAT WE CLAIM IS:—

1. A free wheel assembly for a vehicle comprising a wheel hub, a member for driving the hub and a freewheel facility located between the hub and the driving member for transmitting drive in one rotational direction only when the speed of the hub is less than the speed of the driving member, means for urging the driving member into driving engagement with the hub to isolate and override the freewheel facility and means operable to displace the driving member against the action of said urging means and out of driving engagement with the hub.

2. A freewheel assembly as claimed in claim 1 in which the driving member comprises a ring secured for rotation with the drive axle of the vehicle.

3. A freewheel assembly as claimed in claim 2 in which the ring is secured for rotation with and axially displaceable upon a second ring which is fixedly secured to the drive axle.

4. A freewheel assembly as claimed in claim 3 including spring means operable to urge the ring into driving engagement with the hub and means selectively operable to displace the ring against the action of the spring means.

5. A freewheel assembly as claimed in any preceding claim in which the freewheel facility comprises a chain roller clutch assembly arranged between the hub and the driving member.

6. A freewheel assembly as claimed in claim 4 in which the selectively operable means for displacing the ring comprises solenoids arranged to be energised upon engaging top gear.

7. A freewheel assembly for a vehicle substantially as herein described with reference to and as shown in the accompanying drawing.

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1567305 COMPLETE SPECIFICATION

1 SHEET *This drawing is a reproduction of the Original on a reduced scale*