

MARLES

(PATENT)

STEERING GEAR

MADE UNDER BRITISH PATENTS Nos.
25573/13 169011 182634 183961 196374 311296

FULLY PATENTED IN OTHER COUNTRIES

A8 Model

ISSUED BY:

ADAMANT ENGINEERING Co., Ltd.
LUTON - - - - ENGLAND

Marles Steering Gear

MODEL A.8.

DESCRIPTION. The Marles Steering Gear operates on a fully patented principle, quite different from other types of steering gears. A hardened steel cam, in which a spiral groove is cut, is mounted on the shaft carrying the steering wheel. This groove is engaged by a hardened steel roller mounted between roller races carried on the rocker shaft, to which the drop arm operating the drag link is fixed.

Referring to Fig. 11, the cam, roller and rocker shaft may be seen, being numbered P.2166, P.A.2230, and P.2167 respectively. The cam is mounted between special roller bearings expressly designed for the duty they have to perform, thus ensuring long life and freedom from wear. At the top end of the shaft carrying the cam and also the steering wheel, a third bearing is mounted, which bearing is arranged to eliminate any binding of the shaft should there be flexing of the chassis of the car on the road.

This bearing excludes all dust and dirt, both from its own working parts and from the gear, and is designed to damp out vibration of the steering column.

The rocker shaft is carried in massive phosphor bronze bearings providing adequately against the shocks to which this part is subjected in operation.

OPERATION. The operation of the gear is simplicity itself. As the steering wheel and cam are rotated, the roller engaging the cam is moved backwards and forwards in the groove, thus imparting the required motion to the drop arm and drag link. At the same time the roller is revolved about its own axis by the pressure between it and the cam.

From this it will be seen that we get a rolling motion between the roller and the cam, and this is the fundamental difference between the Marles and other types of steering gears.

The *rolling* motion obtained by employing a revolving roller, as against the *rubbing* action always present when gear wheels, worms or other devices are used, is responsible for the high efficiency and the delightfully sweet action of the Marles gear throughout the whole of its movement.

On account of the absence of rubbing action between faces, and owing to the contacting surfaces being of hardened steel, wear is entirely eliminated. Even after the gear has been in use for years, the backlash, which inevitably develops in other types of steering gears, is absent.

From this short description it will be apparent that the principle and mechanism of the gear is of the simplest type possible, but should any points arise or further information be required, we shall at all times be happy to give every assistance, and every effort will be made to give our customers complete satisfaction.

For those interested in further details of the gear we give illustrations of the complete arrangements.

As no wear takes place in the Marles Steering Gear, no adjustment of the moving parts is necessary. Full adjustments are, however, incorporated in case of damage due to accident to the car, and we give a description of these in the following pages.

In conclusion, we may mention the following important advantages, among others, which are gained by the use of the Marles Patented Steering Gear :—

Whether the car fitted with this gear is fitted with balloon tyres and front wheel brakes or not, the gear gives extreme ease of operation, with the consequent comfort and absence of strain over the longest runs. We claim that this gear is the only satisfactory and complete answer in existence to the difficulties which are experienced when using balloon tyres and front wheel brakes.

The fitting of a Marles Steering Gear to modern Commercial vehicles for passenger and goods service gives a control comparable to that of a private car. This, in spite of the great increase in weight and speed, together with the adoption of front wheel brakes and large balloon tyres on such vehicles which has recently taken place, is con-

clusive proof of the power made available to the driver through the use of this gear, and of the value of this device on all types of road vehicles.

The same ease throughout the whole movement of the gear is obtained by the use of this gear. All "stickiness" and "hard places" which are present in gears of other types, are eliminated.

The development of "backlash" which occurs in other gears, is entirely absent when using the Marles Gear. This, expressed in another way, means the complete lack of wear.

Accuracy of steering is a further advantage derived from using the Marles Gear. The car may be steered to a hair's breadth under all conditions of speed and road surface.

Another point is the absolute controllability of the car; the car may be driven at speed over ruts, pot holes, and even the kerb, without in any way inconveniencing the driver. On the other hand, the whole of the "castoring" or "straightening out" action given by the setting of the front wheel pivots, is available and fully effective.

The entire and absolute control of a car when fitted with the Marles Steering Gear, is a feature which must be experienced to be fully realised and appreciated. The feeling of safety when travelling over bad roads or at high speed, is truly remarkable, and is a sensation which it is quite impossible to describe.

ADJUSTMENTS OF MARLES STEERING GEAR—TYPE A.8.

The adjustments are three in number, which control all that can be required. They are as follows:—

1. Adjustment of the engagement between roller and cam.
2. Adjustment of roller bearings at each end of the cam, and for centring of the cam.
3. Adjustment for rocker shaft end play

ADJUSTMENT 1. Referring to Figs. 11 and 12, it will be noted that the roller engaging the cam track is mounted on an eccentric distance piece, P.2130, which again is carried by the bolt and nut P.2122 and P.2057. This bolt, P.2122, has its centre part serrated, which serrations are a fit both in the serrated hole of the distance

piece P.2130 and the hole in the rocker shaft P.2167 furthest away from the head of the bolt P.2122. (The other hole in the rocker shaft is not serrated). By means of these serrations, therefore, the bolt P.2122 ties together the positions of the distance piece P.2130 and the rocker shaft P.2167. Since, however, the distance piece P.2130 is made with its outside diameter eccentric with its serrated hole, we can raise the roller assembly P.A.2230, which is mounted on this distance piece, relative to the rocker shaft by rotating the bolt P.2122, and in this way the roller assembly can be raised into or lowered away from the cam P.2166. The method of carrying out this adjustment, therefore, is as follows :—

Remove drop arm from rocker shaft and rocker shaft from steering box.

Remove nut P.2057 and washer P.2123 from rocker shaft bolt P.2122, and withdraw bolt from rocker shaft until serrations on bolt are just free of the rocker shaft serrated hole. This will entail withdrawing the bolt one eighth of an inch.

With an ordinary spanner on head of bolt, turn bolt one serration, or more if required, in a clockwise direction for raising the roller into the cam, and in an anti-clockwise direction to lower roller away from the cam.

Push bolt home again into the rocker shaft. Replace lock washer P.2123 and nut P.2057. Tighten up nut P.2057 and carefully lock up washer P.2123 in position.

As stated above, it is to be noted that to raise the roller relative to the centre line of the rocker shaft, giving deeper engagement with the cam track, the bolt P.2122 must be turned in a clockwise direction, looking at the hexagon end of the bolt.

When this adjustment is correctly made, it will be found that there is a slight amount of "backlash" at the two extreme ends of the cam and roller movement, but absolutely none in the centre or straight ahead position.

Care should be taken to ensure that the roller is not advanced so far into the cam that the movement is stiffened. On the other hand, the adjustment must be close enough to ensure no trace of "backlash" in the central position of the cam and roller.

ADJUSTMENT 2. Referring to Fig. 12, it will be noted that at each end of the steering box casting M.1649, and between this casting and the column support P.2117 at one end and the bottom cover plate P.2165 at the other end, a number of thin washers, or shims P.2118, are interposed.

End play of the cam may therefore be taken up by taking out some of these thin washers, in this way allowing the roller bearing outer race to enter further into the steering box, and thus tighten up the roller bearing.

These shims are placed at each end of the box to enable the cam to be positioned correctly central with the roller in the rocker shaft.

When the cam is properly centred, the same amount of "backlash" at each extreme end of the cam and roller movement should be obtained, which can be conveniently tested by temporarily fitting the drop arm in place and measuring the "backlash" at the end of the drop arm at opposite ends of the cam travel.

When the adjustment 2 is properly made and the column support P.2117 and bottom cover P.2165 bolted in place, the cam and steering wheel should revolve smoothly without appreciable drag, but there should be no end play whatever of the cam.

ADJUSTMENT 3. Should there be end play of the rocker shaft P.2167, this may easily be taken up by slackening off lock nut P.1661 and tightening up adjusting screw P.1992, adjusting as required. Care should be taken to tighten up P.1661 again afterwards.

While we have gone carefully and fully through these adjustments, it is not intended to convey that they will be required to be carried out; indeed the probability is that no adjustment will be needed for years. In case of collision or accident, however, it may be useful to have these instructions, for which purpose they are described here.

FITTING DROP ARM TO ROCKER SHAFT.

In carrying out Adjustment 1, it will be appreciated that it will be necessary to remove the drop arm from the rocker shaft, and we recommend that before doing this, both these items should be marked so that they can be fitted together again afterwards in the same relative position.

In case this marking has been omitted or in case the marking has become obliterated, we give below the correct method of fixing this, and we would draw attention to this matter, which is of some importance. Should this operation not be properly carried out, damage may result to the internal mechanism of the gear, and almost certainly the available lock will be limited in one direction or the other.

The Marles Steering column, complete with steering box, but without the drop arm attached, should first be fitted in place in the vehicle, taking care to tighten up all fixings holding the unit to the car, including that on the dashboard, the steering wheel being placed in its final position. Next, the lower end of the drop arm carrying the ball pin should be fixed correctly to the drag link, but the top end should not yet be connected to the rocker shaft of the steering box.

Now jack up the front wheels and place them approximately in the straight ahead position.

If now the steering wheel is rotated gently, you will find that its movement is limited by internal stops in the steering box at each end of the travel of the internal mechanism of the gear. The number of turns of the steering wheel required to bring the gear from one end of its travel to the other should be counted. Then commencing from one of these stops, take the wheel back half the complete number of turns available, which will bring the steering mechanism into its central position.

This central position should be finally checked by the fact that in the central position the cross bolt fixing the steering wheel to the inner column should be *horizontally underneath* the column.

Now, with the gear mechanism in this, its central position, as explained above, and the front wheels set pointing slightly as though the car were turning a left-hand corner, fit the serrated cone in the top of the drop arm to the rocker shaft. The reason the front wheels are set in this position is because in the ordinary fore and aft system of steering, the steering wheel has always to be moved through a greater angle when going from straight ahead to full right lock than when going from straight ahead to full left lock.

Before tightening up, however, the following check should *always* be carried out.

With the steering wheel pull the steering, the front wheels still being jacked up, right over to lock, either right or left. With the steering wheel and front wheels in this position, drop the drag link off the drop arm, and see whether you can move the steering wheel any further in this same direction. If you can, everything is in order, and the same procedure should then be followed on the other lock.

Should further movement of the steering wheel be unobtainable, it means the front axle stops are not operating, and some adjustment must be made as follows:—

If there is movement of the steering wheel available on one lock, but not on the other, the drop arm should be put on the next serration on the rocker shaft, which may put matters right.

If no serration will give free movement of the steering wheel at both locks, then the front axle stops must be looked to and altered so that there is.

The amount of free movement available after dropping the drag link off the drop arm, should be the same at both locks, and this condition is what should be aimed at.

The instructions given in this section may appear complicated, but in reality the operation is one of the simplest character.

It will be appreciated that the movement of the rocker shaft and drop arm is restricted by the internal stops fitted in the steering box, and it is therefore necessary to fix the drop arm and connect the same up to the front wheels on the one hand, and to the steering box mechanism on the other hand, so that the necessary movement of the front wheels from lock to lock is obtained at the same time as the roller is travelling from end to end of the cam track, but not far enough in either direction to hit the internal stops in the steering box.

The whole of the instructions in this section are designed to attain this end.