SECTION B-3 PART A
ISSUE 2, MARCH 1958
Supersedes Issue 1, August 1950

LUCAS

Quality

EQUIPMENT

VOLUME 2

WORKSHOP INSTRUCTIONS

STARTER DRIVE

"S" PATTERN

JOSEPH LUCAS LTD · BIRMINGHAM 19 · ENGLAND

Printed in England

STARTER DRIVE

"S" PATTERN

1. GENERAL

The pinion is mounted on a threaded sleeve which is carried on splines on the armature shaft, the sleeve being arranged so that it can move along the shaft against a compression spring so as to reduce the shock loading at the moment engagement takes place.

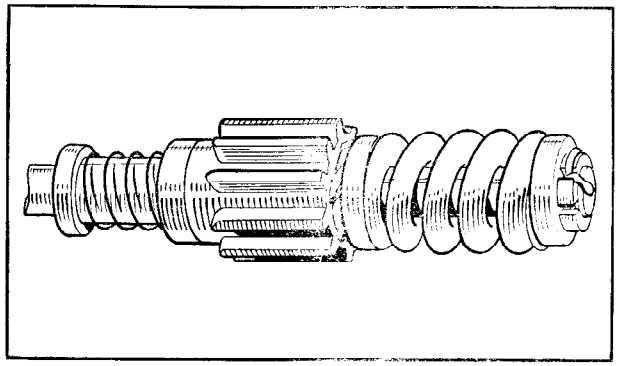

Fig. 1
Inboard Pattern

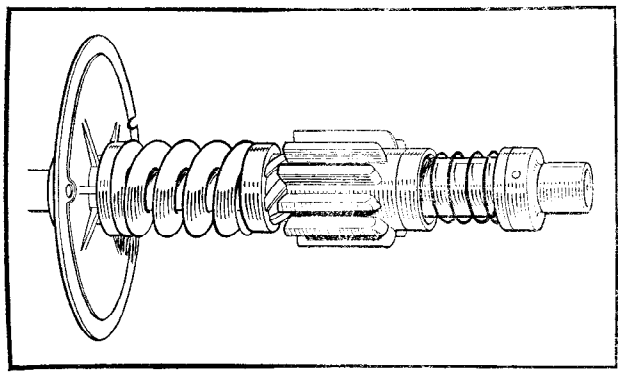

Fig. 2
Outboard Pattern

When the starter switch is operated, the shaft and screwed sleeve rotate and, owing to the inertia of the pinion, the screwed sleeve turns inside the pinion causing the latter to move along the sleeve into engagement with the flywheel ring. The starter will then turn the engine.

As soon as the engine fires and commences to run under its own power, the flywheel will be driven faster by the engine than by the starter. This will cause the pinion to be screwed back along the sleeve and so thrown out of mesh with the flywheel teeth. In this manner the drive safeguards the starter against damage due to being driven at high speeds by the engine.

A pinion restraining spring is fitted over the starter shaft to prevent the pinion being vibrated into contact with the flywheel when the engine is running.

'Run-Off Helix' Drive

'S' Pattern drives of the type shown in Fig. 3 incorporate a protective feature known as the 'Run-off Helix'. The purpose of this feature is to prevent possible damage occurring to the starting motor through excessive torque being applied while the pinion is in engagement, as would arise for example in the event of an engine back-fire during starting.

Under normal conditions of engagement, axial movement of the pinion in any 'S' Pattern drive is arrested when, in the one direction, the cup washer (or collar) has fully compressed the restraining spring and is abutted hard against the shoulder of the fixed sleeve and, in the opposite direction, the helically screwed sleeve is pressing the thrust washer hard against the main spring.

In the 'Run-off Helix' drive, the main spring is capable of greater compression than are the equivalent springs shown in Figs. 4 and 5. In addition, the trailing faces of the pinion and helically screwed sleeve are machined to form indented rachet recesses.

In the event of a back-fire occurring during starting, the pinion (being able to rotate but incapable of further axial movement) forces the helically screwed sleeve along the straight-splines of the starter shaft. This further compresses the main spring and permits axial movement of the screwed sleeve to continue until it is clear of the interior of the pinion. At this stage, axial movement of the screwed sleeve ceases and the pinion, now jointly supported by the fixed sleeve and the recessed end of the screwed sleeve, is free to be rotated by the engine ring gear. In this way, excessive torque is harmlessly dissipated by the ratchetting action of the pinion and screwed sleeve against the reaction-pressure of the main spring.

(When the run-off feature is not incorporated, a thicker stiffer main spring is used and the helically screwed

sleeve is prevented from leaving the pinion interior by the longer length of the main spring when in the fully compressed condition).

The operation of a 'Run-off Helix' drive can be checked by securing the armature and drive assembly in a vice and applying a torque wrench to the pinion. The ratchet action must occur at some figure safely in excess of the lock torque specified for the machine—an acceptable figure being some 10—30 lb.-ft. above the lock torque. In the case of Model M418 G starting motors for example, whose lock torque is 17 lb.-ft., the rachet action should occur between 27 and 45 pounds-feet.

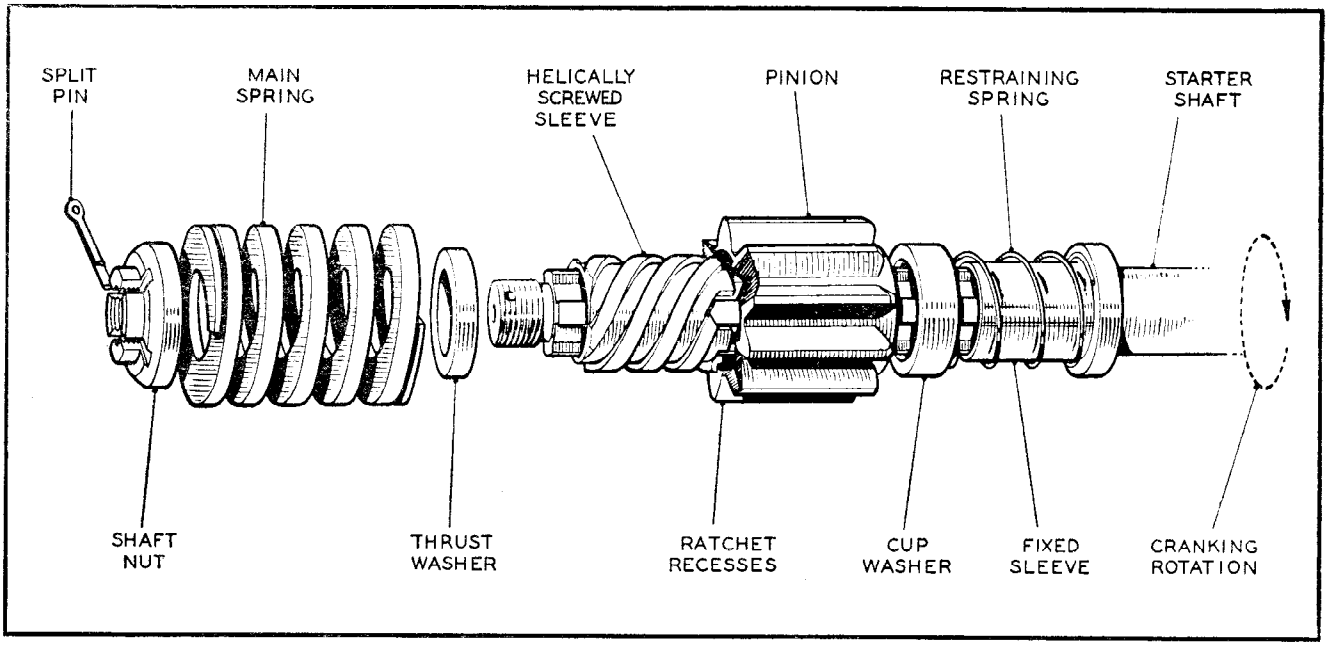

Fig. 3
Inboard drive with 'Run-off Helix', dismantled

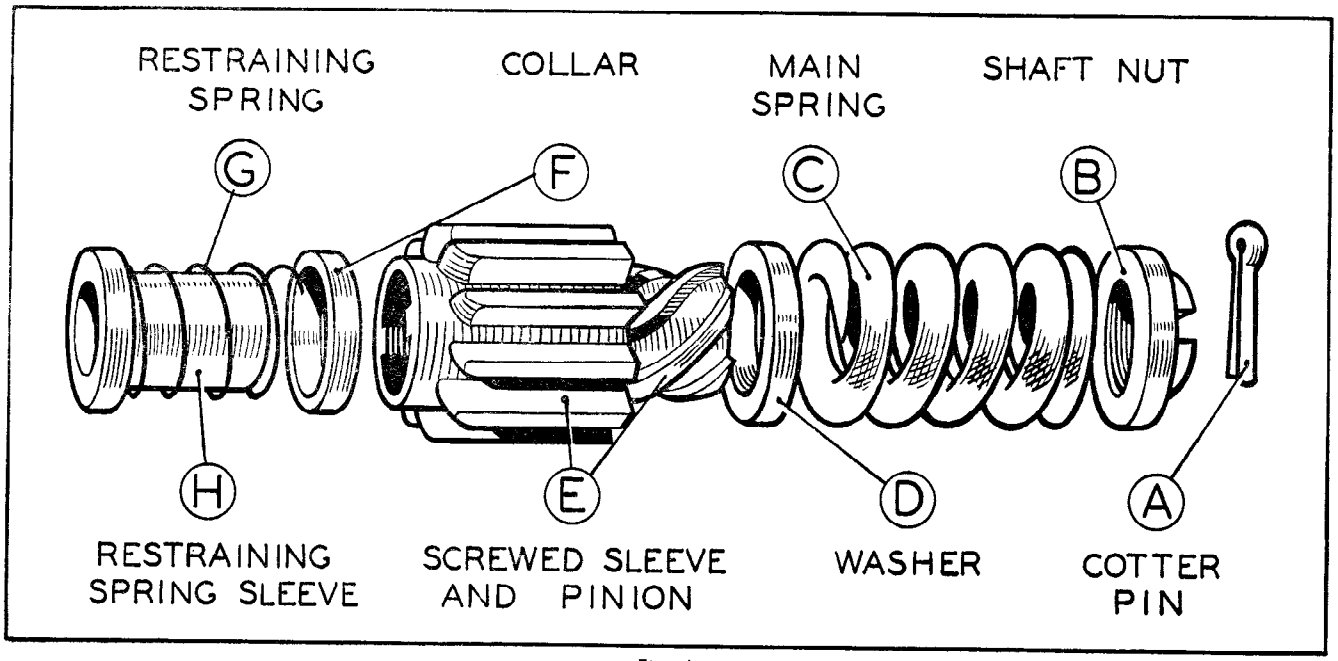

Fig. 4
Inboard drive, dismantled

2. ROUTINE MAINTENANCE

If any difficulty is experienced with the starting motor not meshing correctly with the flywheel, it may be that the drive requires cleaning. The pinion should move freely on the screwed sleeve; if there is any dirt or other foreign matter on the sleeve it must be washed off with paraffin.

In the event of the pinion becoming jammed in mesh with the flywheel, it can usually be freed by turning the starter motor armature by means of a spanner applied to the shaft extension at the commutator end. This is accessible by removing the cap which is either a push fit or is secured by two screws.

3. DISMANTLING AND REASSEMBLY

Having removed the armature as described in the section dealing with starting motors the drive can be dismantled as follows:—

(a) DISMANTLING.

Inboard Patterns

Remove the cotter pin (A) from the shaft nut (B) at the end of the starter drive. Hold the squared starter shaft extension at the commutator end by means of a spanner and unscrew the square shaft nut (B). Lift off the main spring (C), washer (D), screwed sleeve with pinion (E), collar (F), pinion restraining spring (G) and spring restraining sleeve (H).

Outboard Patterns

Remove the peg (A) from the bearing collar (B) at the end of the starter drive. Hold the squared starter shaft extension at the commutator end by means of a spanner and unscrew the bearing collar (B). Remove the restraining spring sleeve (C) and then withdraw the restraining spring (D) and collar (E). Lift off the screwed sleeve with pinion (F), washer (G), main spring (H) washer (G) and intermediate Bracket (J).

NOTE.—If either the screwed sleeve or pinion are worn or damaged they must be replaced as a pair, not separately.

(b) REASSEMBLY

The reassembly of the drive is a reversal of the dismantling procedure.

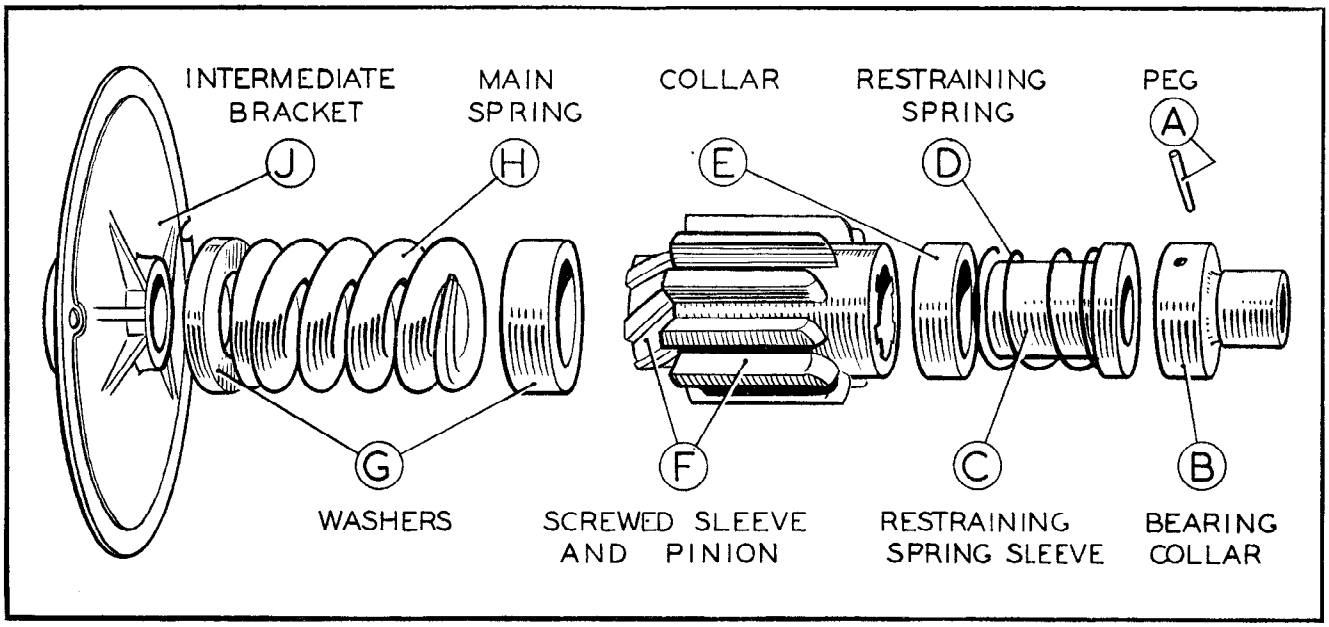

Fig. 5
Outboard drive, dismantled