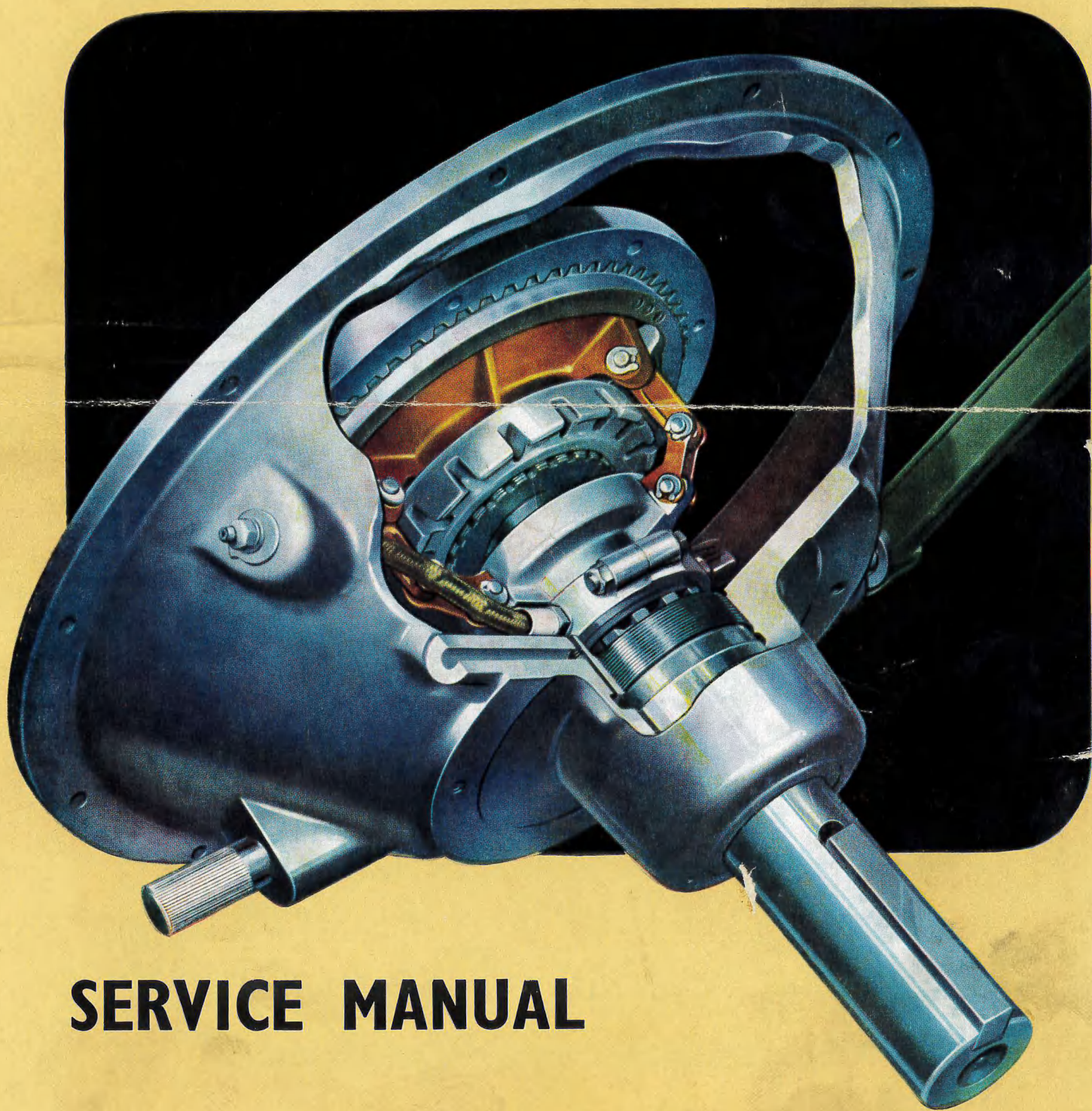


ROCKFORD

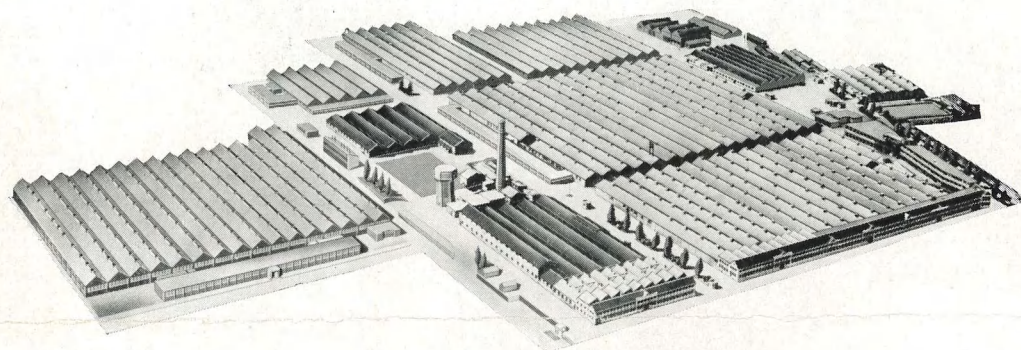
CLUTCHES & POWER TAKE-OFFS



SERVICE MANUAL

PRODUCT OF THE LARGEST CLUTCH ORGANISATION IN THIS COUNTRY

Rockford Clutches and Power Take-offs are manufactured in England by Borg & Beck Company Ltd., the makers of the famous Borg & Beck Clutch of which over 10,000,000 have been produced. Thirty years experience of concentrated development and specialization in the manufacture of clutches ensures meticulous attention to every detail and complete reliability in operation.



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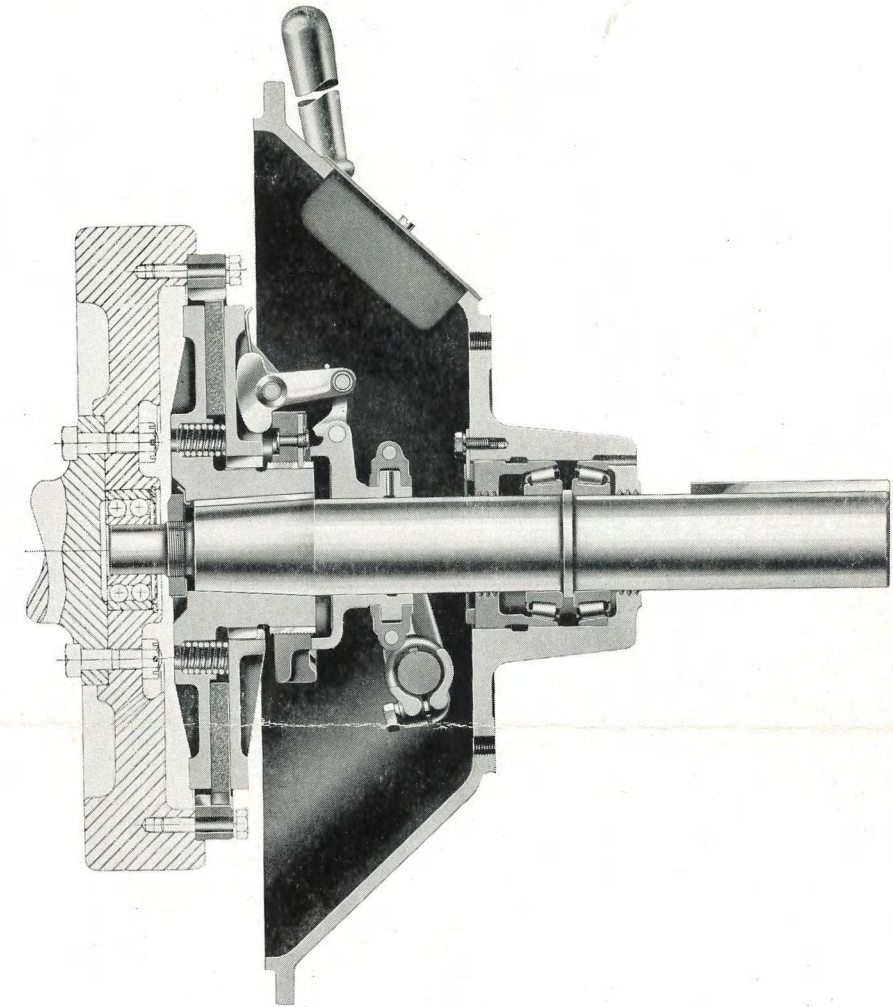


Fig. 1.—Sectioned view of single-plate clutch.

DESCRIPTION

(Refer to Figs. 1, 2 and 3)

ROCKFORD clutches mainly consist of a housing assembly and a clutch unit assembly, the former being attached to the engine crankcase whilst the latter is mounted on the power take-off shaft; additionally, the clutch unit incorporates a drive ring which is bolted to the flywheel. The clutch operating lever is carried on a cross-shaft running through the housing and to which a clutch withdrawal yoke is keyed; the yoke is secured by two bolts and is formed with two jaws which engage the release-bearing trunnions.

HOUSING ASSEMBLY

The power take-off shaft is incorporated in the housing assembly and runs in two tapered roller

bearings which are kept in position by a bearing retainer; the latter part is formed with slots in order that it may be screwed in or out to adjust the bearings and give correct end-float to the shaft, it is secured against vibration by a lockplate which engages one of the slots. (In some cases it will be found that the bearings are contained within a bearing-housing which is bolted to the clutch housing). Annular grooves formed in the bore of the housing and of the bearing retainer prevent the egress of lubricant from the bearing housing when the clutch is revolving.

Two grease nipples are located on the outside of the clutch housing, one being screwed in and serving the main bearings with lubricant whilst the

other is secured by a circlip and serves the clutch release bearing through a flexible tube. A further grease nipple is screwed into the end of the shaft for the purpose of lubricating the pilot bearing in the flywheel; for convenience this nipple may be fitted in place of a screwed plug part-way along the shaft, and the plug fitted in the nipple's original position.

NOTE.—There are some clutches in which the shaft does not carry a grease nipple; in such an instance the pilot bearing is lubricated simultaneously with the main bearings. Certain other clutches do not incorporate the flexible tube for lubricating the release bearing, but have a grease nipple screwed into the release bearing trunnion to which access is gained by releasing a plate at the side of the clutch housing.

Access to the interior of the clutch, and to the adjusting ring in particular, is permitted by the removal of an inspection cover which is secured by two screws.

CLUTCH-UNIT ASSEMBLY

The inner end of the power take-off shaft is tapered to carry the body of the clutch-unit which is keyed into position and secured by a nut and a lockwasher. Splines are formed on the body to receive a pressure plate carrying three pins upon which release levers are mounted, the levers being counter-balanced to off-set the effects of centrifugal force which might otherwise tend to disengage the clutch; each release lever carries an anti-rattle spring which reacts against the pressure plate to eliminate any "shake" which may be present. (In the instance of Twin Plate Clutches, four release levers are fitted and also an intermediate pressure plate is used). The heels of the release levers are

OPERATION

WHEN the operating handle is moved to engage the clutch, the release sleeve moves inwards and the links cause the release levers to pivot about the pins on which they are mounted, thus displacing the pressure plate inwards. Continued movement of the release sleeve causes the inner ends of the links to move "over-centre" (i.e. further inwards than the outer ends), which positively clamps the facing member between the pressure plate and the

ADJUSTMENT INSTRUCTIONS

REGULAR attention to clutch adjustment is necessary to obviate the onset of clutch slip. The time interval between checks will depend upon the application and usage of the clutch. Failure to maintain the clutch in correct adjustment may lead to serious damage for which we cannot be held responsible.

Procedure*—Remove the inspection cover and turn the adjusting ring in the required direction (using a tommybar) until torque-transmitting

LUBRICATION INSTRUCTIONS

IT is recommended that the grease used at the various lubrication points be SHELL ALVANIA No. 2 or other equivalent high melting point grease.

When lubricating, the object is to use a quantity of grease sufficient to ensure that the clutch will not run dry and overheat (causing possible seizure of the bearings); on the other hand, the use of too great a quantity would lead to a

arranged to contact the inner face of an adjusting ring which is screwed on to the clutch body.

Torque transmission is effected through a facing member which is in three sections and, when the clutch is engaged, is clamped between the pressure plate and the flange of the clutch body; the facing sections are formed with gear teeth which engage corresponding teeth on the inside diameter of the clutch drive ring. (With Twin Plate clutches, two sets of facings are used, one being interposed between the pressure plate and the intermediate pressure plate whilst the other is between the latter part and the clutch body).

As the facing member wears, the clamping action will become less positive; in order to avoid clutch slip, therefore, it will be necessary periodically to compensate for this wear by screwing the adjusting ring further on to the body. Positive adjustment is ensured by an automatic locking device comprising a pinion which is loaded by a Belleville washer and mounted on a rivet in the adjusting ring. The pinion engages the splines on the clutch body and is able to rotate as the adjusting ring is turned; at the conclusion of adjustment the pinion is locked by the loading of the Belleville washer and prevents the adjusting ring from slackening itself off.

RELEASE BEARING

A release sleeve is mounted on the shaft, beyond the clutch body, and is formed with a flange encircled by the two halves of a release bearing which are held together by two bolts fitted with self-locking nuts; a trunnion is formed upon each half of the release bearing to engage the jaws of the release yoke; the sleeve is connected to the release levers by means of links fitted in pairs.

(Refer to Fig. 1).

clutch body. The engine torque is now transmitted to the power take-off shaft via the drive ring, the facing member and the clutch body. Upon moving the handle to disengage the clutch, the pressure plate is displaced away from the facing member by the action of the release levers and by four springs assembled between the plate and the clutch body, and torque transmission is thus discontinued.

capacity is obtained without incurring excessive hand loads at the operating lever (in most applications, 55 lb. hand load will be found adequate). The adjusting ring should be stiff to operate; on no account is lubricant to be applied to the pinion. After the clutch has been satisfactorily adjusted, refit the inspection cover.

*In some applications an Allen screw is fitted in the adjusting ring to provide an additional lock. It must be unscrewed before adjustment is made, and re-tightened after adjustment, ensuring that it engages in a tooth space and not on the crest of the threads.

greasy clutch with resultant slip. The housing for the main bearings should be maintained two-thirds full of grease and, whilst this cannot be measured, overpacking should be avoided as it would cause overheating; the rule should be to apply a little grease and often to the bearings, with only the slightest trace of leakage when the clutch is running.

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CLUTCHES AND POWER TAKE-OFFS

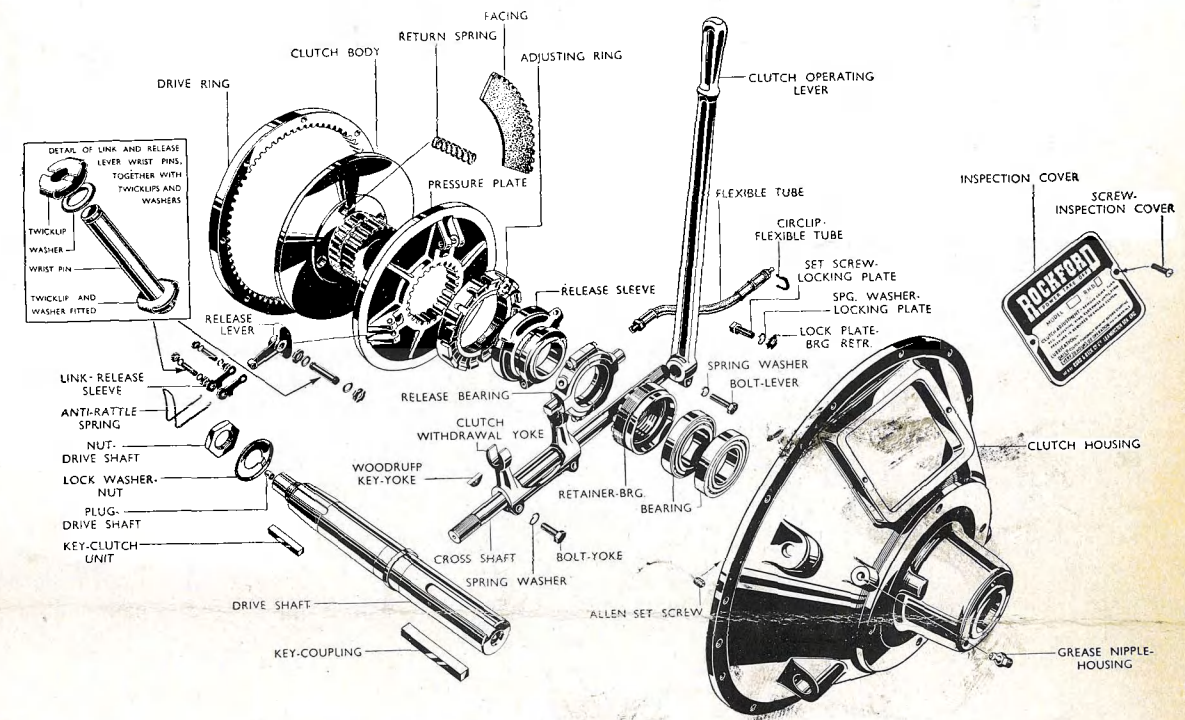


Fig. 2.—Exploded view of single-plate clutch.

DISMANTLING

IT is assumed in the following notes that the clutch assembly and the drive ring have been removed from the engine (the clutch should be in the engaged position when removed in order to ensure simultaneous withdrawal of the facing sections).

- 1 Move the operating lever to disengage the clutch, withdraw the facing sections and remove the lever from the cross-shaft.
- 2 Remove the inspection cover and disconnect the flexible hose (where applicable) by removing the circlip at the outer end and unscrewing the union at the inner end (in some cases it will also be necessary to release a locking clip inside the housing).
- 3 Remove the nut and the lockwasher, and extract the clutch unit from the power take-off shaft.

- 4 Remove one Twicklip* (or circlip, if fitted) from each of the wrist pins, expel the pins and separate the release levers, the links and the release sleeve. Unscrew the self-locking nuts from the release bearing bolts, and separate the halves of the bearing.
- 5 Unscrew the adjusting ring from the clutch body, slide off the pressure plate and, where applicable, the intermediate pressure plate, and remove the four return springs.
- 6 Slacken the release-yoke clamping bolts, slide the yoke clear of the Woodruff keys, remove the keys from the cross-shaft and push the shaft out of the housing.
- 7 Remove the key from the outer end of the power take-off shaft, unscrew the bearing retainer and expel the shaft and its bearings, using a hide-faced mallet. Drive the bearings off the shaft, if required, remembering that they are prevented from moving in one direction by a shoulder on the shaft. The cup of one bearing may, in all probability, remain in its housing, and its removal may be effected by tapping metal rods inserted through holes in the outer end of the housing.

* Using the special Twicklip pliers shown on Fig. 5 in the manner indicated on Fig. 4.

Fig. 3.—Exploded view of double-plate clutch.

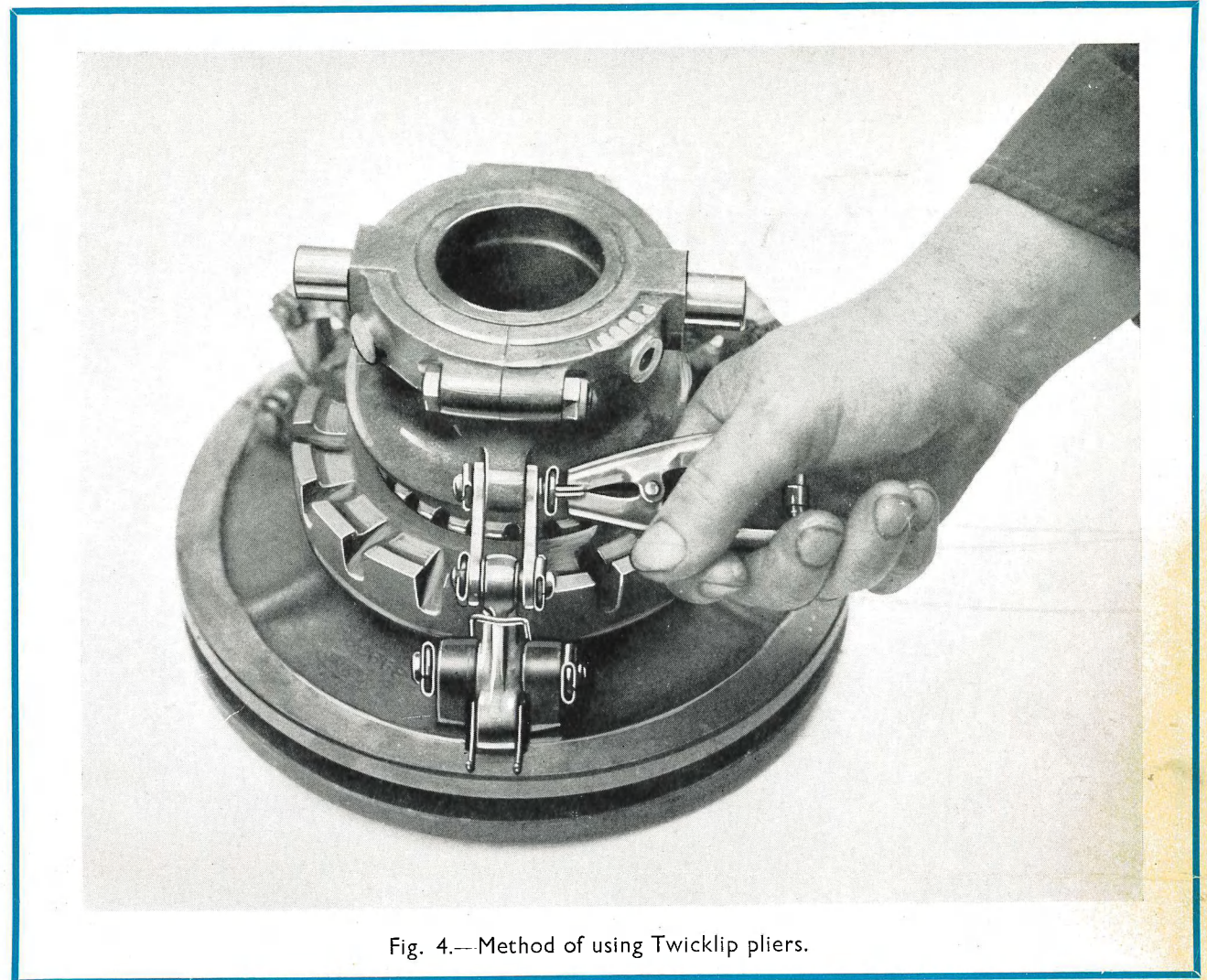
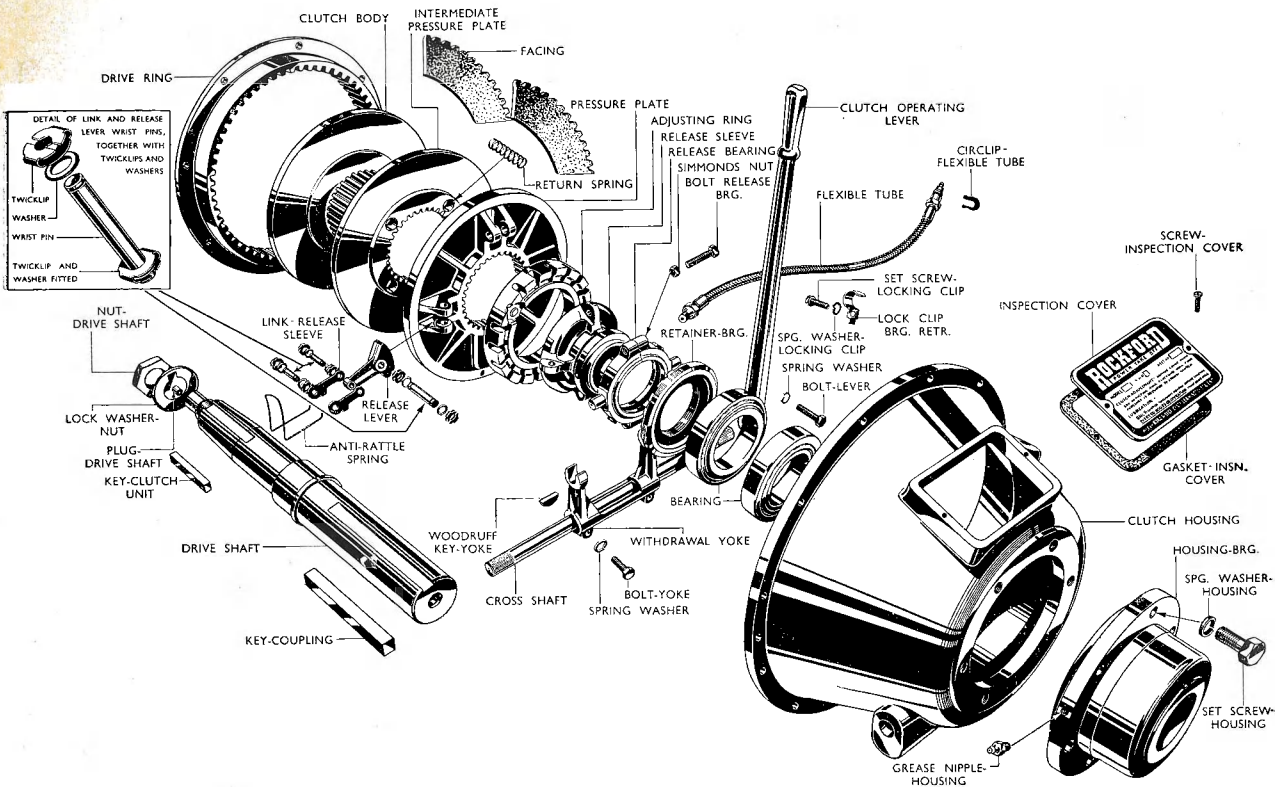


Fig. 4.—Method of using Twicklip pliers.

EXAMINATION OF FACINGS

AFTER the clutch has been in use for some time, the facings should present a polished appearance through which the grain of the material is clearly visible. If small quantities of lubricant have contacted the facings they will present a darker appearance due to burning of the lubricant consequent upon the heat generated during engagement. Provided that the grain of the facing material remains clearly distinguishable the clutch will continue to yield a satisfactory performance.

If an excessive amount of lubricant has fouled the facings they may be glazed with a thin carbon deposit which obliterates the grain of the material. The lubricant

may be only partially burned, and in this case a resinous deposit will be apparent, the effect of which is undesirable.

An even greater quantity of lubricant will blacken the facings, and the torque-transmitting capacity of the clutch will diminish.

In all cases where excessive fouling of the facings has occurred, renewal will be necessary and the presence of lubricant must be determined and remedied.

It is unlikely that the teeth of the facings will be worn, but they should nevertheless be subjected to careful inspection.

If any one section of a facing is faulty, all three sections must be renewed.

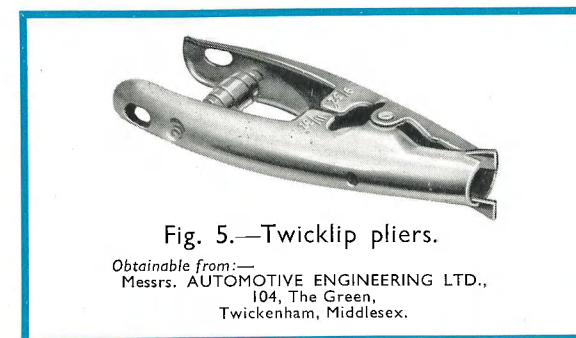


Fig. 5.—Twicklip pliers.

Obtainable from—
Messrs. AUTOMOTIVE ENGINEERING LTD.,
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CLUTCHES AND POWER TAKE-OFFS

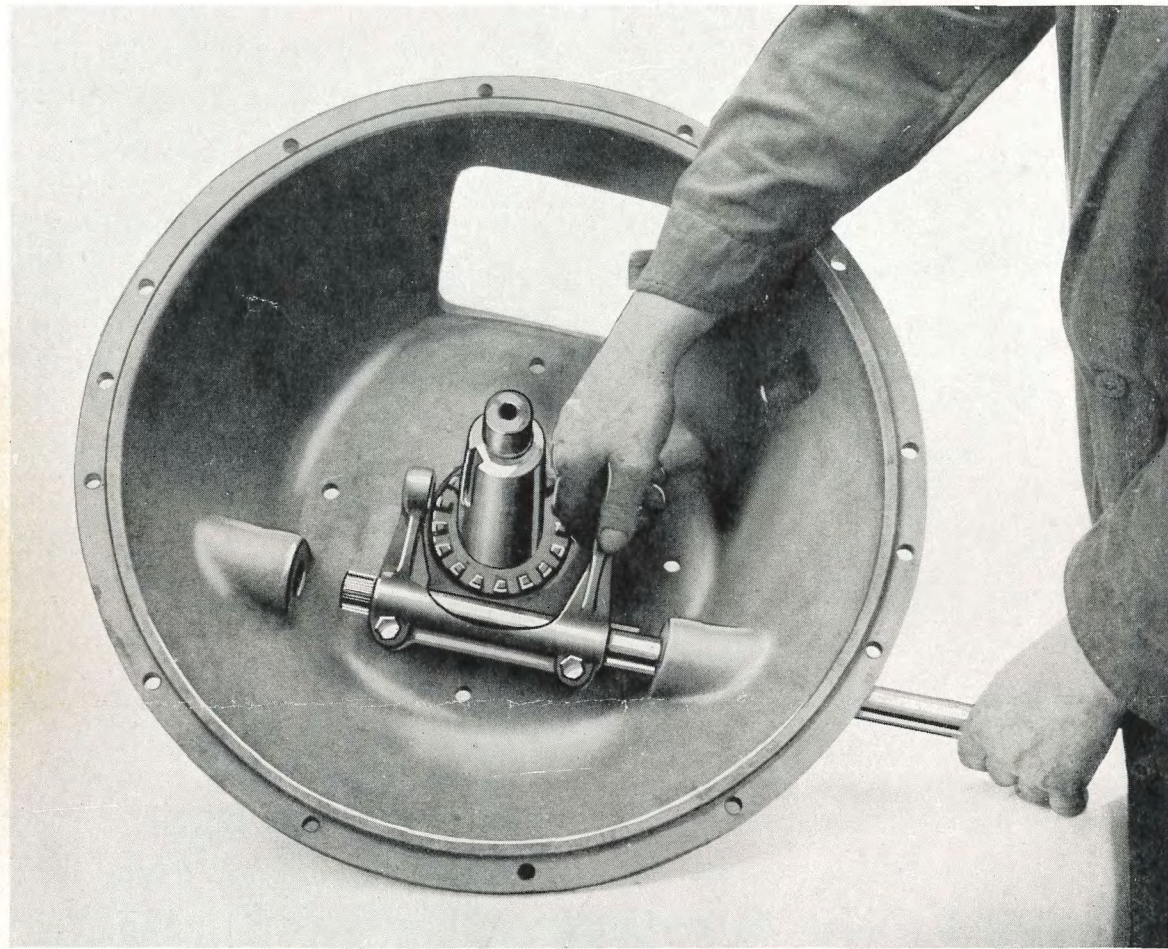


Fig. 6.—Fitting the cross-shaft and the withdrawal yoke.

ASSEMBLING

IMEDIATELY prior to assembly, lightly smear with grease the jaws of the withdrawal yoke, the bores of the cross-shaft bosses in the clutch housing, the wrist pins, the heels of the release levers and the inner contact surfaces of the links. The recommended lubricant is SHELL ALVANIA No. 2 or other equivalent high melting-point grease.

HOUSING ASSEMBLY

- 1 Ensure that the Allen grub-screw is fitted inside the clutch-housing to blank-off the longitudinal channel through which the main bearings are lubricated (this grub-screw is not used if the bearing-housing is a separate part). The bearing-housing, if applicable, is to be securely attached to the clutch-housing, each of the setscrews being fitted with a spring washer.
- 2 Fit the rear tapered-roller bearing cup, if previously removed, in the clutch housing or (bearing housing ensuring that it is square and firmly home.
- 3 If the roller and cone assemblies have been removed from the shaft, press them into position against the spacing shoulder, ensuring that they are perfectly square against the shoulder. At this stage, apply the specified grease in the space between the bearings; it is important to remember that over-packing with grease is most undesirable, and the aim should be to have the whole of the space inside the bearing housing filled to no more than two thirds of its capacity.

- 4 Assemble the shaft and bearings in the housing, followed by the forward roller bearing cup which must be inserted into the bore squarely and true; lightly tap the cup until the bearing retainer can be engaged in the threads. Screw up the retainer, by means of the slots provided, until the end-float of the shaft has been reduced to approximately 0.050 inches.
- 5 Attach a clock indicator to the flange of the clutch housing, so that the plunger of the indicator is in contact with the face of the pilot-end of the shaft.
- 6 Whilst slowly revolving the shaft, screw up the bearing retainer until the 0.050 inch end-float has been reduced to 0.005 inch/0.007 inch.
- 7 Remove the clock indicator and strike the outer end of the shaft with a hide-faced mallet to ensure that the forward cup is in register with the bearing retainer; re-check the end-float and make any slight adjustment that may be necessary. Fit the locking plate inside the housing to secure the bearing retainer, using a spring washer on the setscrew (if the locking plate is of the type which incorporates a clip for securing the flexible tube, it should not be fitted until a later stage).
- 8 Hold the withdrawal yoke inside the housing (as shown on Fig. 6) with the clamp bolts facing outwards, and push the cross-shaft through the housing and the yoke, fitting two Woodruff keys. Ensure that the yoke is centrally disposed and tighten the clamp bolts.

CLUTCH UNIT

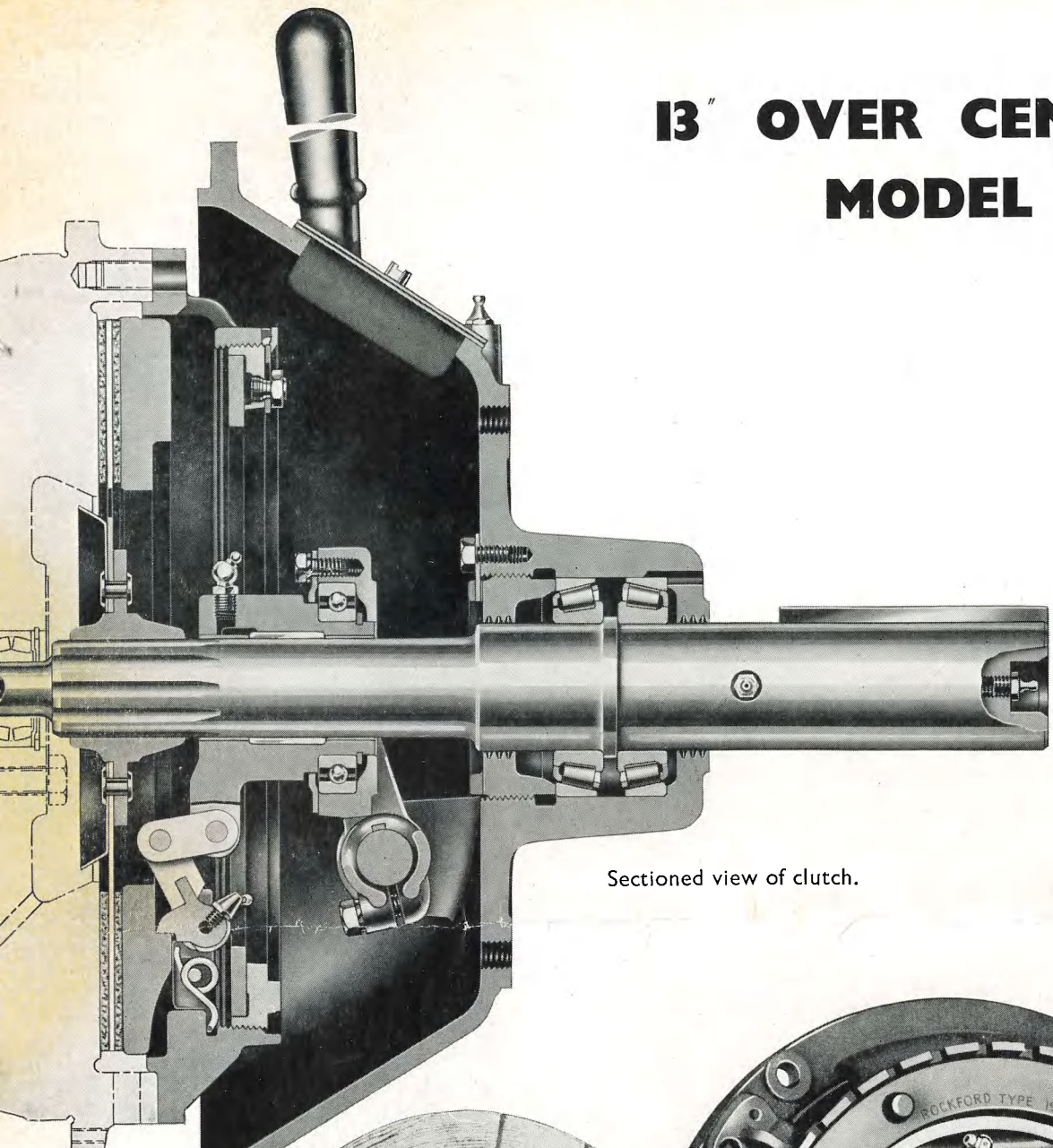
- 9 Lay the clutch body on the bench, with the splines uppermost, and, if applicable, locate the intermediate pressure plate upon it (the flat side facing downwards); fit the four return springs in the pockets and slide the pressure plate on to the body, flat face first. Screw the adjusting ring on to the body, exercising the utmost caution when the pinion engages the splines; the setting of the adjusting ring will be performed after the clutch has been attached to the engine.
- 10 Fit the anti-rattle springs on the release levers, position the levers within the lugs on the pressure plate so that the web on each faces outwards, and fit the wrist pins; fit the Twicklips or, if applicable, the circlips (note that if the former are used they must be fitted with the round-section washers before being attached to the wrist pins). Attach a pair of links to each release lever, again using wrist pins together with the Twicklips and washers or, if applicable, the circlips (note that the enlarged ends of the links are to point inwards).
- 11 Place the halves of the release bearing around the release sleeve and secure with the bolts and self-locking nuts. Offer up the release sleeve to the links, fit the wrist pins, and secure with the Twicklips and washers or, if applicable, the circlips.
- 12 Fit the facing segments between the pressure plate and the clutch body; in the case of a Twin Plate clutch, the first set of facings is fitted between the clutch body and the intermediate pressure plate, whilst the second set is fitted between the intermediate pressure plate and the main pressure plate. Locate the drive ring over the facings, so that the teeth are correctly engaged, and place blocks beneath the ring to support it in that position.
- 13 Press down upon the release bearing to engage the clutch; the drive ring may now be removed and the facing segments will remain firmly gripped between the pressure plate and the clutch body.
- 14 Screw the flexible tube or the grease nipple (whichever is applicable) into the release bearing.

NOTE.—On later clutches, a shakeproof washer is fitted at the threaded end of the tube.

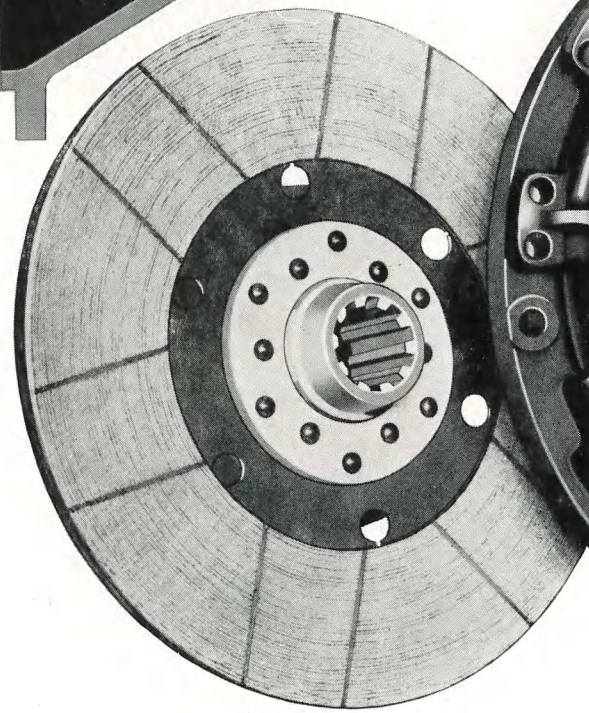
ASSEMBLING THE CLUTCH UNIT TO THE SHAFT

- 15 Offer up the clutch unit to the power take-off shaft, with the keyways aligned and with the release bearing trunnions engaging the jaws of the withdrawal yoke; the bearing is to be located so that the boss into which the flexible tube is screwed is on the same side as the inspection hole in the clutch housing; if a grease nipple is fitted on the bearing trunnion it is to be on the same side as the smaller hole at the side of the housing. Fit the key, the lock-washer and the nut; securely tighten the nut and set the lock-washer.
- 16 Pass the outer end of the flexible tube through the appropriate hole in the housing, and secure with the circlip; if applicable, fit the tube locking-clip inside the housing. Fit the inspection cover, the lubrication cover and the grease nipple which serves the main bearings; fit the operating lever at the most suitable angle on the cross-shaft, and secure by tightening the clamp bolt.
- 17 After the clutch has been installed on the engine, it must be adjusted as detailed under the heading ADJUSTMENT INSTRUCTIONS, and the grease nipples are to be charged as detailed in the LUBRICATION INSTRUCTIONS. Disengage the clutch and check that the power take-off shaft will rotate easily by hand without showing any binding tendencies.

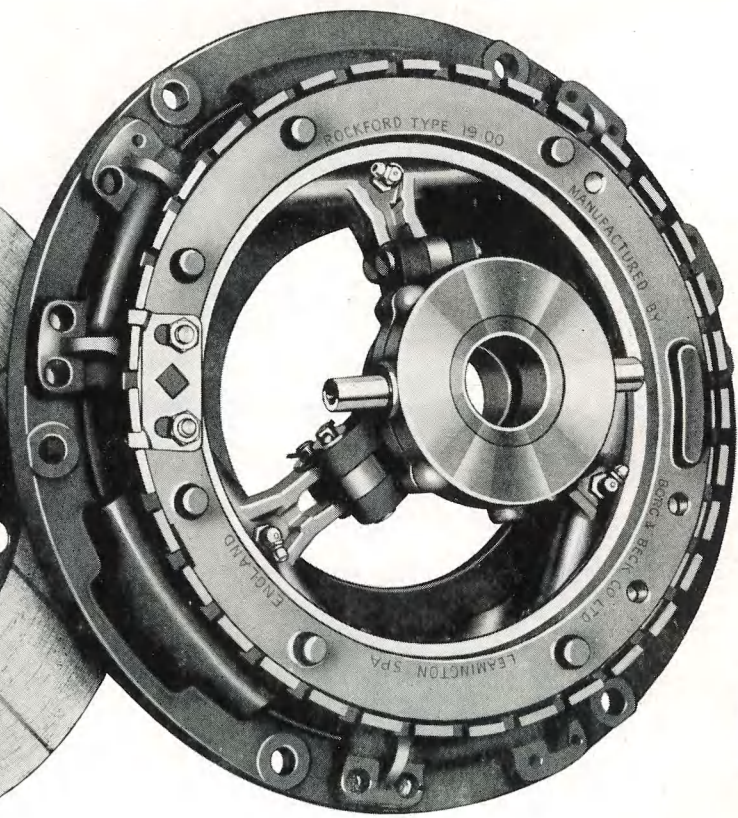
13" OVER CENTRE MODEL



Sectioned view of clutch.

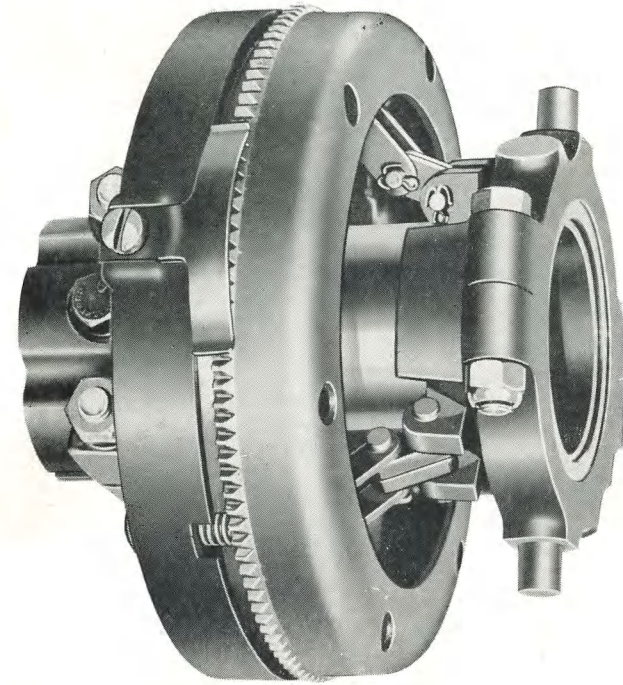


Driven plate.

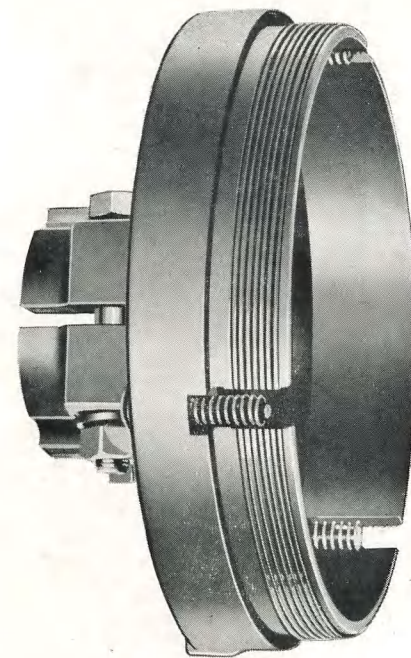


Combined cover assembly.

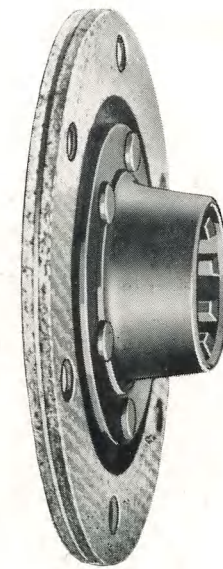
5½" ROCKFORD CLUTCH UNIT



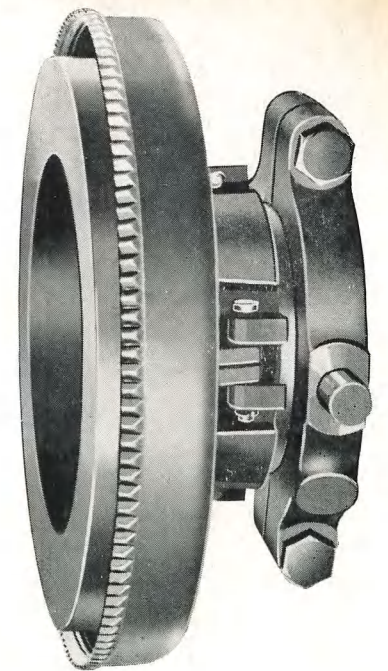
Complete clutch.



Clutch body.



Driven plate.



Pressure plate and sleeve.

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"ROCKFORD" CLUTCH OPERATION

1. Do not slip the clutch unnecessarily when starting up the plant.
2. If it is necessary to slip the clutch when starting up the plant under load, check the adjustment of the clutch as soon as practicable afterwards.
3. When correctly adjusted, a pull of 50 lbs. should be necessary on the clutch lever. This can be tested by use of a spring balance.

-oOo-

(Sten. 765)