

SECTION P

STARTERS

FOUR-CYCLE ENGINES

and

TWO-CYCLE ENGINES

DISMANTLING AND SERVICING "SURE START" IMPULSE STARTERS

Refer to the exploded view drawing of the starter, Fig. P1.

- (a) Before attempting to remove the starter from the engine, make sure that the starter spring is in a released condition. If the handle will not release, open the handle fully and wind it anti-clockwise until it engages the next cog on the ratchet. With the handle in the open or extended position it is safe to remove the four mounting screws. Immediately after removing the starter, place it on the floor and fold the handle to release the spring tension. (Keep free hand and feet away from starter during this operation).
- (b) Remove two screws holding retainer (20) to hub (15). Note hook on retainer. When assembling, be sure the spring from the hub assembly is attached to this hook.
- (c) Remove brake screw (21) and brake (19).
- (d) Take handle assembly from housing and remove ratchet (10) and spacer (11). Check brake (19) for tight fit on retainer hub. (If loose, replace.)
Remove and clean dog (16).
- (e) The hub assembly is removed by lifting straight up.
Clean and recoat hub shaft with light grease.
- (f) To check the spring remove the four screws holding the spring and keeper assembly to the housing assembly (12).
Lift out spring and keeper assembly (13).
(If spring is broken or stretched, replace entire assembly.) Lubricate spring with light oil if operation of starter is sluggish.
Remove foreign material from spring and keeper assembly. **DO NOT ATTEMPT TO REMOVE SPRING FROM KEEPER.**
Reassemble to housing.
- (g) Dismantle handle assembly (2) by removing retainer (8) from post on which ratchet dogs (4) and (7) pivot.
(Replace retainer if it is worn or bent during removal).
- (h) Lift off lower dog (7), dog release spring (6), two washers (5), upper dog (4) and washer (3).
Check to determine if spring has sufficient tension to hold dogs against ratchet gear. Check parts for wear. (Replace where necessary.)
Clean and recoat with light grease.
- (i) Clean ratchet (10) and ratchet bearing (9). Replace ratchet bearing (9) on handle. **DO NOT REPLACE RATCHET (10) IN HANDLE.**
- (j) On pivot post, replace washer (3), upper starter dog (4), washer (5), spring (6) and lower offset starter dog (7).
Be certain that hook on spring is against lower starter dog.

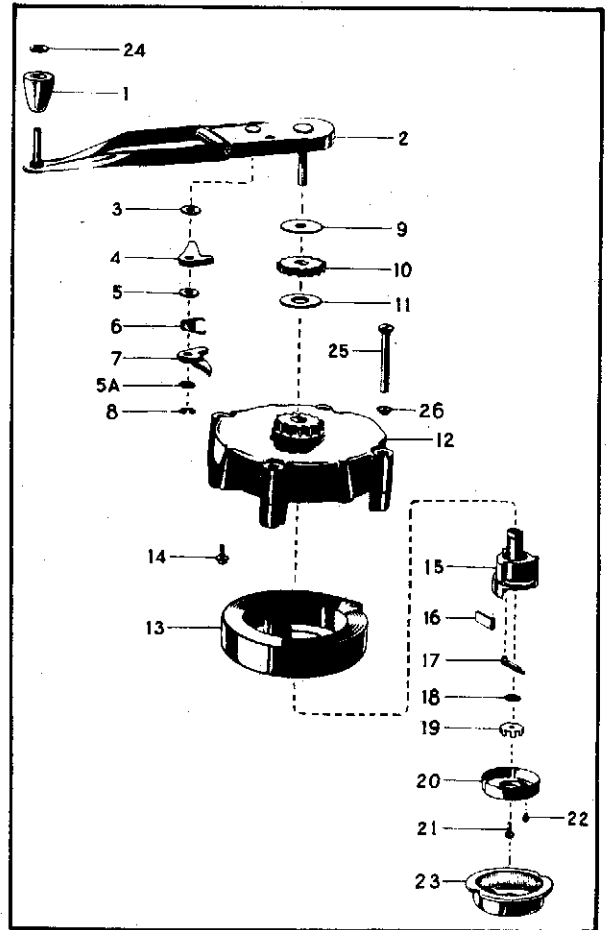


Fig. P1

- Replace retainer clip (8) using screwdriver or needle nose pliers.
Check end float of release dogs on pivot post. If necessary, add extra washers between dogs to minimise end float, but be sure that dogs are absolutely free to rotate. This is a most important check to ensure safe starter operation.
Release dog pivot should be oiled frequently. Oil through trip hole in handle.
- (k) Hold back end of starter spring with screwdriver and replace hub (15).
Place ratchet spacer (11) on end of hub shaft which protrudes through housing assembly. Position ratchet (10) on top of spacer. Teeth on ratchet must point in opposite direction to teeth on housing.
 - (l) Fold over handle. Hold back lower dog with screwdriver and re-install handle.
 - (m) Replace the brake washer (18), brake (19) and fasten with screw.
 - (n) Replace dog (pawl) (16) hook spring (17) to retainer (20).
 - (o) Position retainer on hub, fasten with two screws removed at start of disassembly.
 - (p) Remount starter to engine.

DISMANTLING AND SERVICING OF "TRIP RELEASE" IMPULSE STARTERS

Before attempting to remove the starter from the engine, pull the release lever 26 to make certain that the tension of the heavy drive spring is released. Refer Fig. P2.

TO DISMANTLE THE STARTER

1. Remove $\frac{11}{16}$ " hex. nut 14 right-hand thread, lift off retainer 13, brake 10 and thrust washer 9.
2. Dismantle starter engagement mechanism — this consists of three pawls 12 and brake spring 11, examine the parts for wear and replace if necessary.
3. Unfold the starter handle 3 and while holding the starter in a horizontal position, pull out the handle from the top, check wind dog 16 in post of handle for wear.
4. While the starter is in a horizontal position, turn the spring hub 33 in the direction of ratcheting, and at the same time put light pressure on the top of the centre bearing 21. The internal parts will then drop out.
5. Remove centre bearing 21 and spacer washer 24 from spring and hub assembly 33 and check for wear.
6. Check lock dog 23 and spring 22 inside the hub of the housing 8. The spring should actuate the dog toward the centre so that the dog will click into the teeth on the bearing centre as the starter is being wound up. It is essential for the safe working of the starter that the dog 23 and the spring 22 be in perfect condition, therefore replace either item if it shows signs of wear.
7. The release dog 31 will bind in its housing 29 in dusty conditions; or, if the housing is rivetted down too tightly the dog will not engage the teeth of the hub, in either case the spring will not wind up.

If dust is the problem, wash out with solvent and do not re-lubricate, this will prevent the accumulation of more dust and will not interfere with the operation.

If the housing 29 is too tightly rivetted, lever the point of the dog 31 with a screw-driver to give it more clearance.

Part Nos. 29 to 32 are supplied only as a unit. To replace, place the starter over the open jaws of a vice, so that the housing 8 is supported in the vicinity of the release dog centre. Place a suitable punch over the top rivetted portion of the assembly 29-32, it will knock out quite easily. Rivet the new assembly in place with washer 28 between handle 26 and housing 8. When completed check for free movement of the dog 31.

RE-ASSEMBLY

1. Clean all the parts with solvent, coat the bearing surfaces of the centre and hub and cover assembly with light grease.
2. Item 33 shows the starter spring and hub as a single unit, these parts are obtainable

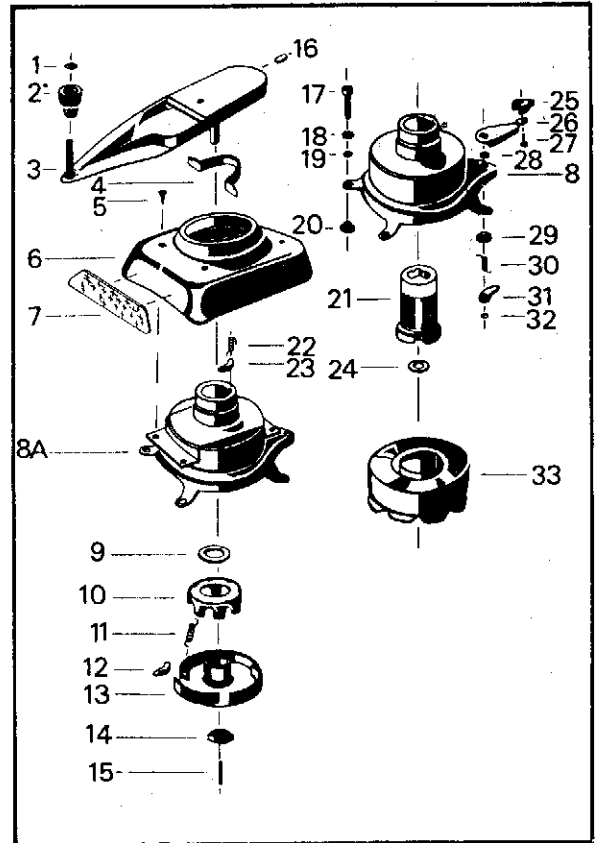


Fig. P2

separately, replace the spring if the operation of the starter is sluggish, or if the spring will not wind up to at least $3\frac{1}{2}$ turns. Coat the spring with light grease when assembling it to the hub.

To fit new spring, locate one tongue of spring in the slot in the hub assembly, engage the centre bearing with the other tongue, slip the handle into this with the wind dog and turn the handle clockwise. This will close the coils of the spring and it will drop easily into its housing. Remove handle and bearing centre and proceed as in Para. 3.

3. Locate spacing washer 24 in spring hub 33 with grease and engage slot in lower end of centre bearing with starter spring.
4. Install spring and hub, washer and centre bearing as an assembly into the starter housing, holding back the lock dog 23 and spring 22, to enable the centre bearing 21 to enter fully into the housing.
5. Install handle assembly 3 with wind dog 16 into centre bearing.
6. If the three drive dogs 12 need replacement, make sure the late model hardened dogs are used—check with a file before fitting.
7. Fit thrust washer 9 and brake 10, some brakes have three prongs, others have six, either is usable providing it gives the correct amount of friction to the retainer.

SERVICING "TRIP RELEASE" STARTERS STARTER DRUM BREAKAGE

Most drum breakage is caused by the brake (10) failing to retard the retainer (13) sufficiently (see illustration of this section of starter). When there is not enough tension, the starter gains too much speed before the dogs engage. The result is noisy operation and excessive loading on the drum.

In all cases of drum breakage, remove the nut (14) and examine the brake and the retainer. Replace both parts if there is appreciable wear.

If there is not enough friction between the brake and the retainer the prongs of the brake may be bent inwards to get extra pressure. Reset the prongs by tapping them in with a small plastic hammer. They may break if reset with pliers.

When assembling, smear the retainer with light grease where the brake bears. If the brake is not lubricated, rapid wear will take place. The brake

will fail and drum breakage will again occur. Make sure that the spring (11) is properly located on its peg during assembly. After tightening the nut (14) to 175 to 200 inch lb. test the operation of the retainer. It should be possible to turn it through its range of travel with the fingers.

Even with the spring (11) fully extended, the brake should hold the retainer in any place where it is set.

DOGS NOT ENGAGING

This fault is characterised by noisy operation of the starter and the crankshaft not turning.

On inspection the dogs (12) will be found to be retracted right inside the retainer (13) whereas the tips should protrude slightly when the retainer is rotated to the extent of its closing travel.

The cause of this trouble is wear in the dog sockets of the starter hub P/N. 12-234. The remedy is to replace the hub and the dog.

KIRBY-LAUSON REWIND STARTER

REWIND STARTER REMOVAL AND DISASSEMBLY.

Refer to the exploded view drawing of the rewind starter Fig. P3. Follow the general instructions given below:

(a) Remove four screws that hold rewind starter to engine housing; lift off rewind starter.

(b) Release tension of rewind spring before proceeding with disassembly. Release tension as follows:

- (1) Hold starter assembly with the pulley up. Pull on starter rope until notch in pulley is aligned with hole in rope bushing. Use thumb pressure on starter pulley to prevent pulley from rotating.
- (2) Feed rope through rope bushing in reverse direction to obtain slack between pulley and rope bushing.
- (3) Lift slack portion of rope so that it engages notch in pulley.
- (4) Slowly release thumb pressure to allow spring to unwind until all tension is released.

CAUTION

When removing starter pulley, use extreme care to keep spring confined in housing.

(c) If rope of a rewind starter is damaged, remove screws that join pulley halves. This will free the rope.

(d) If starter spring is damaged, carefully remove it from housing, noting the direction of rotation of spring before removing.

CHECKING REWIND STARTER PARTS.

(a) Check starter spring for breaks, cracks, distortion, or other damage; replace a damaged spring.

(b) Check pawl for wear or distortion. Replace damaged pawl.

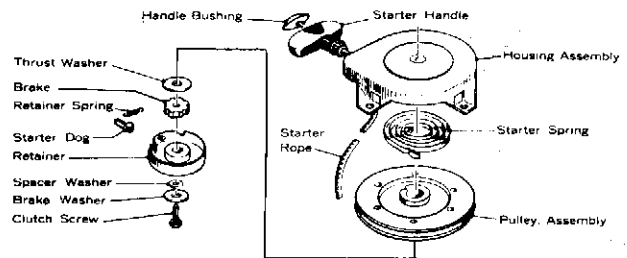


Fig. P3

(c) Check starter rope for fraying or other signs of wear; replace worn or damaged starter rope.

(d) Check rotation of the starter pulley on its pivot; pulley should rotate freely without binding. Replace parts as necessary.

REWIND STARTER RE-ASSEMBLY AND INSTALLATION.

Refer to exploded view drawing of rewind starter. Carefully follow instructions given below.

(a) If starter spring was removed, install new spring, being careful to keep new spring confined in housing. Replacement springs are provided with holders to aid assembly. The holders slip off as spring is inserted in housing. Make sure spring is installed so that windings are in the same direction as removed spring. (See Fig. P3.)

(b) If starter rope is being replaced, crimp rope between two halves of starter pulley and firmly tighten screws that join pulley halves. Insert free end of rope through rope bushing in housing and through starter handle. Tie a double knot in end of rope. Wind rope onto pulley.

(c) To install pulley housing, align notch in pulley hub with hook in end of spring. Use wire bent to form a hook to move spring into correct

alignment with hub on underside of pulley. When correct alignment is achieved, pulley can be pushed down part way. Remove wire hook and fully seat pulley in housing.

(d) After securing re-assembled pulley to housing, align notch in pulley with rope bushing in housing. Feed rope through rope bushing and hook one finger through loop in the slack por-

tion of rope. Pull up rope to engage notch in pulley. Holding rope in this manner, rotate pulley at least two full turns in same direction as it is pulled to properly pre-tension spring.

(e) After pre-tensioning spring, pull rope to fully extended position. Spring should be pre-tensioned so that it fully rewinds rope when handle is released.

THE SIDE MOUNTED STARTER (VERTICAL PULL TYPE)—MODEL D8A

Disassembly:

Remove starter handle and feed cord back through engine cowl and guide block and allow tension of spring to slowly relax. The starter unit can then be removed from the engine block by undoing the three Phillips head retaining screws. Remove the starter spring cover by loosening the two small screws. This exposes the rewind spring which can easily be replaced at this point if necessary . . . **CAUTION ALWAYS REMOVE SPRING TENSION BEFORE REMOVING COVER.** After removing the old spring, reinsert the placement spring in the same relative position and push spring out of retainer into position. (Discard the retainer). To further disassemble starter, remove the centre hub screw. This will allow the pulley and gear to be removed as an assembly. If the starter rope needs replacing remove the knotted end from the pulley receptacle, cut off knot, and then remove rope.

Fit new rope, ensuring that the knotted end

fits recessed area in pulley. While holding the starter with recoil spring side facing you, wind the rope onto the pulley in the anti-clockwise direction. When reassembling take care to note the following instructions.

(a) Smear centre shaft with light grease. **DO NOT LUBRICATE EXPOSED SPIRAL OR BRAKE SPRING GROOVE.**

(b) Ensure the brake spring loop fits over the mounting bracket tab, or starter gear will not operate.

Tension spring by winding rope (anti-clockwise) approximately 2-2½ turns. Pass rope through guide slot and tie a temporary knot to hold tension.

Refit starter to engine block, untie cord and pass it through engine cowl to fit handle.

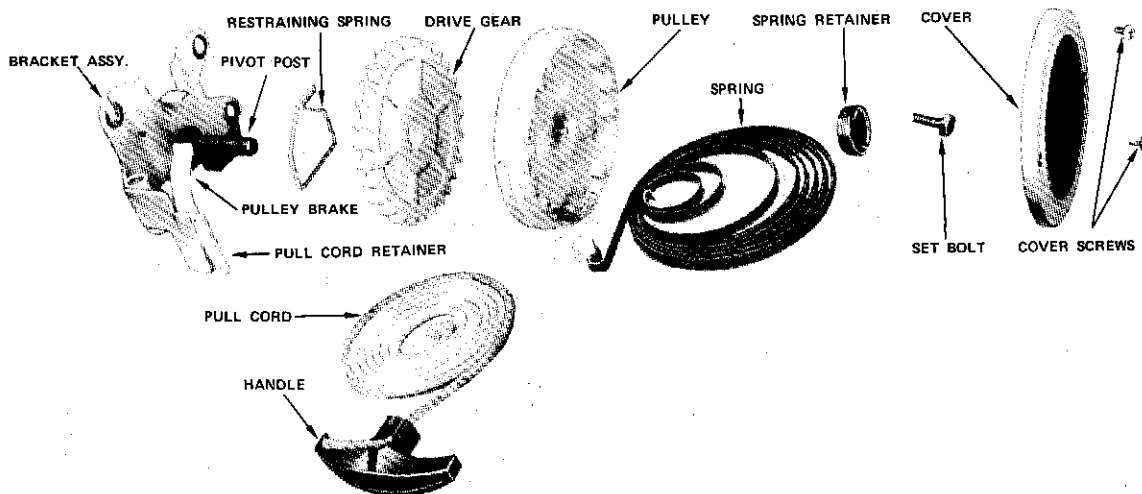


Fig. P4

VICTA REWIND STARTERS

DISMANTLING AND SERVICING.

Models 12A and 12B.

Before making any adjustments the Rewind Starter must be removed from the engine cowl by removing the four (4) locating screws. (Do not not remove or slacken centre nut.)

1. To replace the wire rope assembly:

Prise the rubber handle from the handle centres (see Fig. P5), remove 4 cheese head

screws from the sheave plates (see Fig. P6), and lift sheave plates from the housing. Remove 2 self-tapping screws and separate sheave plates. Remove the wire rope and fit a new assembly. Re-assemble in reverse order, pass wire rope through guide bush, re-fit rubber handle and handle centres. The rubber handle will pass easily over the handle centres if first dipped in kerosene, petrol or soapy water.

2. To adjust the clutch tension:

Remove the handle and sheave plates as described in paragraph 1, remove centre nut and carefully withdraw the pawl engaging cap and bolt. If removed carelessly the spring may jump from the housing. Screw the starter bearing collar down as far as it will go (finger tight) and slacken off half a turn. (See Fig. P7.) Place back in housing, fit and tighten centre nut. Clutch should then restrain pawl cap enough to make pawls engage but leave it free enough to turn.

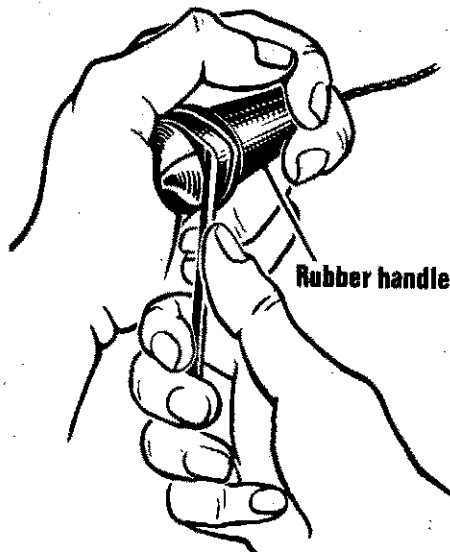


Fig. P5

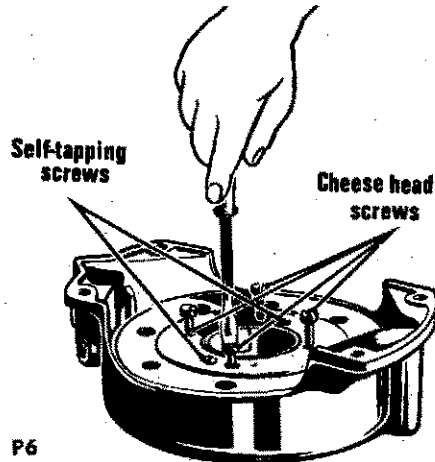


Fig. P6

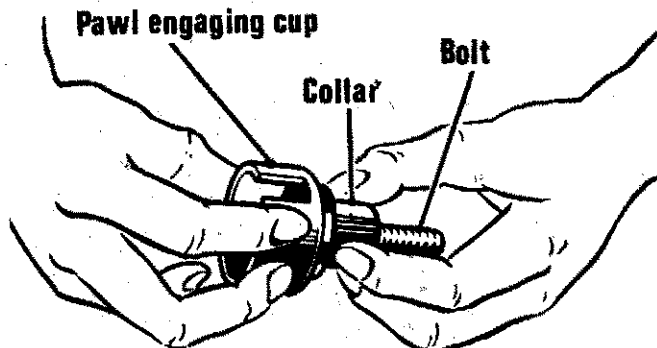


Fig. P7

3. To replace the pawl carrier and/or pawls:

Dismantle the sheave plates (see paragraph 1), fit new parts and re-assemble. When fitting the pawl carrier the two spigots must face the spring drum (see Fig. P8). The pawls are interchangeable.

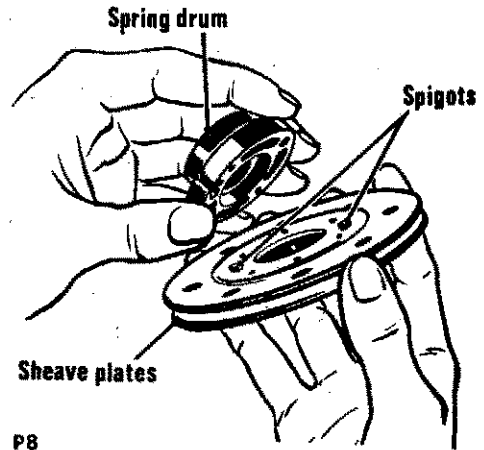


Fig. P8

4. To replace the rope guide block:

Remove the rubber handle and handle centres from the wire rope, pass the rope through guide block, lock the sheave plates with a wooden wedge to stop the spring unwinding. Remove the guide block and fit replacement.

5. To replace the spring:

Dismantle the rewind starter as described in 1 and 2 above, punch out the spring retaining rivet and remove spring. Place new spring and magazine in position and fit a new rivet. Fit inner end of spring into spring drum. To remove the unwanted magazine from the housing it is necessary to take up spring tension. This is done by rotating the spring drum anti-clockwise (see Fig. P9). This is made easier by inserting plier handles in the slots of the spring drum to provide leverage. When sufficient tension has been taken up the magazine may be lifted out; carefully allow the spring to unwind in housing. Check clutch tension and re-assemble.

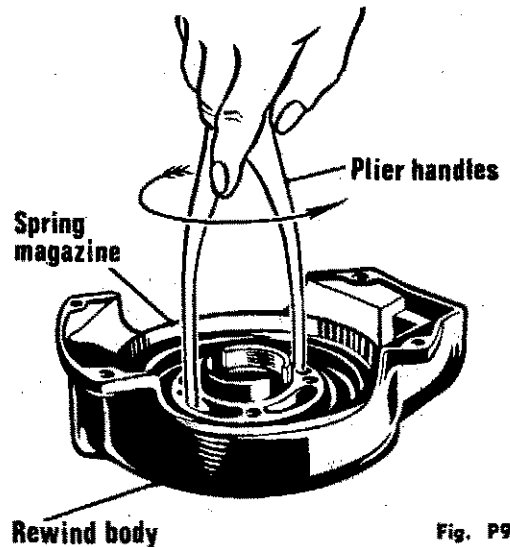


Fig. P9

General Hints:

When correctly assembled, the wire rope should return and hold the handle snugly to the housing. Should the handle not return snugly, remove the sheave plates, rotate 180 degrees and refit.

The wire rope assembly must always be fully wound on the sheave plates before refitting.

NOTE: Do not remove the top nut (see Fig. P10) unless servicing the Rewind Starter. Slackening of this nut will cause the clutch tension to alter and the starter will become inoperative.

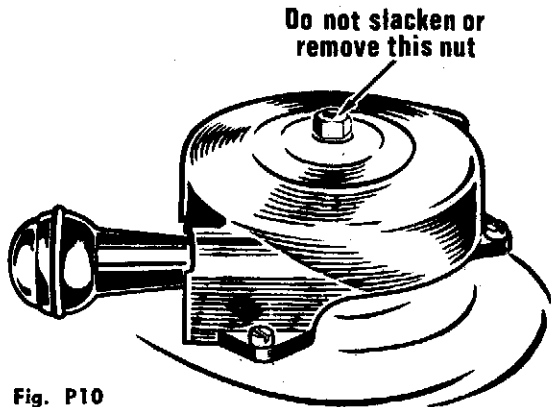


Fig. P10

Model 12D.

The order of assembly is shown in Fig. P11, all the working parts being detachable from the housing on removal of the "E" type circlip (12), and handle (13).

Re-assembly of the unit is quite straightforward, but certain precautions are necessary to ensure correct operation.

A dismantled starter is re-assembled in the following sequence.

1. Preliminary Assembly

Place spacer washer (2) over centre spindle and lightly smear spindle with grease, **not oil**.

2. Fitting New Recoil Spring

Take magazine containing new spring and place in housing (1) external loop of spring to go over pin provided. Keep spring pressed down in housing and prise off the spring magazine. See Fig. P12.

3. Fitting Pulley

Wind rope (5) on pulley (4) in anti-clockwise direction until last 4 or 5 inches which is pulled into the notch provided in the rim of the pulley, place the pulley over the housing spindle and locate the inner eye of the spring in the retaining groove. Access hole for this operation is provided in the pulley.

4. Tension Recoil Spring and fit Handle

Place tension on spring by taking end of rope and winding pulley 2 to 2½ turns anti-clockwise, Fig. P13. Feed rope through guide hole, draw out enough to slip on handle and tie a double knot, i.e., slip tail of rope back through loop.

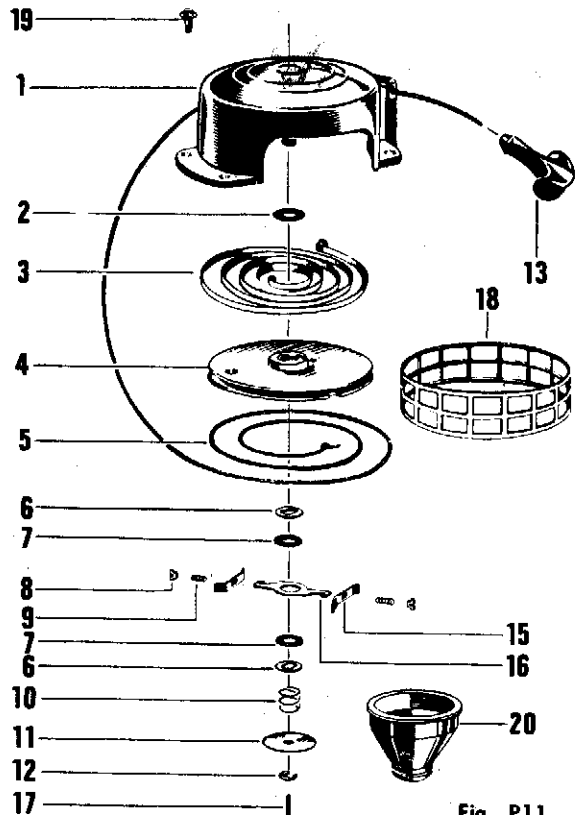


Fig. P11

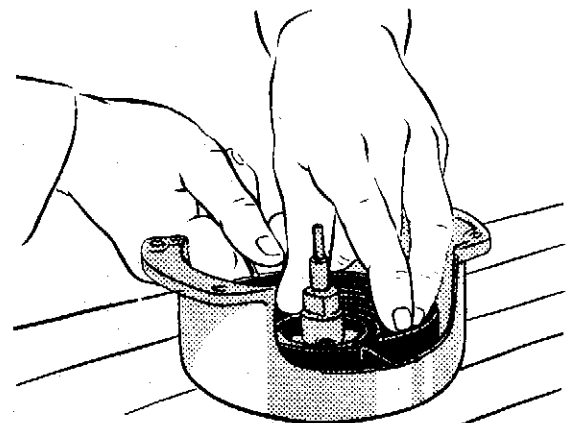


Fig. P12

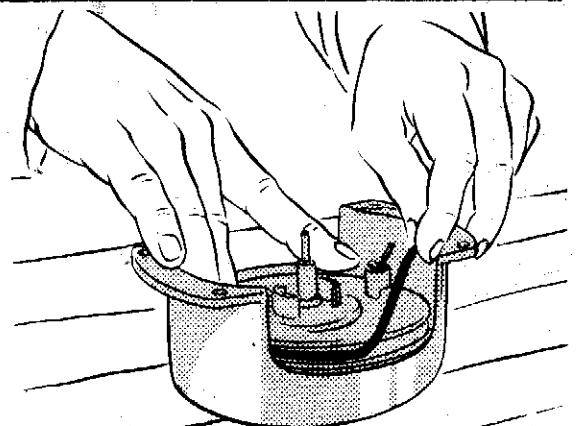


Fig. P13

5. To make up Pawl Sub-assembly

Take the flat of the lever between the thumb and forefinger of the left hand with one leg of the lever projecting vertically and the open side of its notch pointing to the left; place a pawl (15) over the lever, ensuring that the ends are pointing outwards with the end identified by a dash (—) on the right, then fit a pawl spring (9) and its retainer (8). Turn other leg of lever up and carry out same procedure.

If the ends of the pawls marked with a dash (—) become blunt, the pawls will not grip when the rope is actuated. The pawls should be replaced or they may be sharpened with a file. If this is done, make sure that the original angle is maintained. Sharpen only the marked end. Ensure that no oil or grease is on the thrust or friction washers (6), (7) as this will cause the starter to slip. Clean the washers in straight petrol or replace if necessary, see item 6.

6. To fit Pawl Sub-assembly

Place over housing centre spindle one thrust washer (6), one friction washer (7) then the pawl sub-assembly in the same way that it appeared when held between the fingers, i.e., with the identification dash (—) to the top and to the right.

Now fit the other friction washer (7), a thrust washer (6), friction spring (10), large plain washer (11) and "E" type circlip (12). Fig. P14.

At no time should oil or grease be allowed to reach the friction washers.

7. Centering Pin

The purpose of the brass pin (17) in the spindle is to centre the starter in relation to the engine shaft as it is fitted, the pin being designed to push into the spindle as the starter is screwed down.

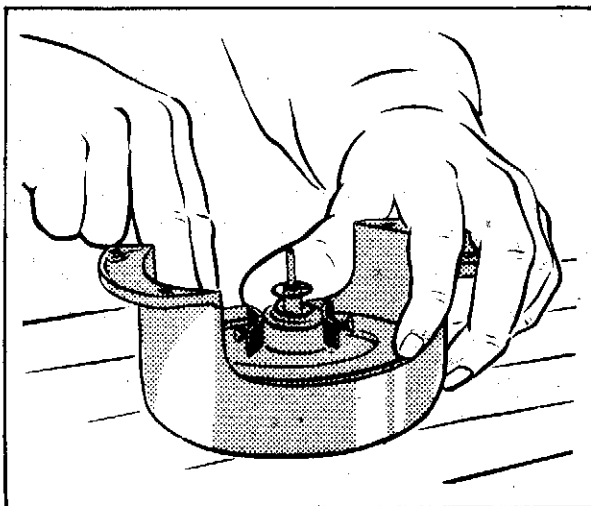


Fig. P14

The pin is actually a tube rolled from flat brass and may be drawn down for recentring if required, by applying a screwing action with a pair of pliers.

NOTE: ZIP STARTER MODELS

The dismantling and reassembly of the 12D Model starter also applies to starters fitted to "ZIP Starter" model engines. See fig. No. P15. However slight modifications have taken place.

These are, a screw (No. 22) taking the place of a circlip and a special insert (No. 10) replacing the fixed centre spindle of the starter housing.

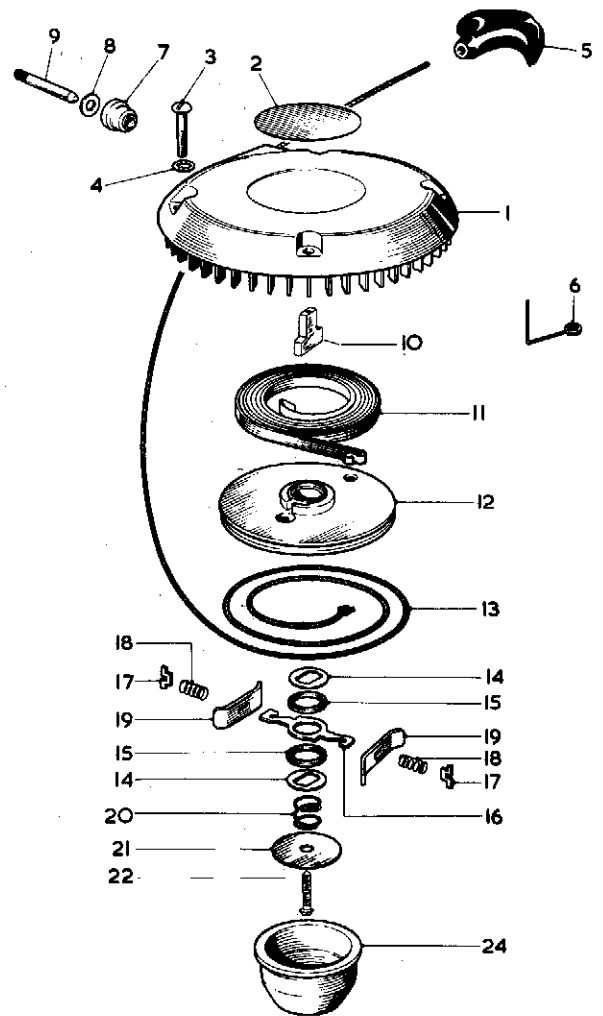


Fig. P15