Hudsonotes

Column of Mechanical Miscellany
by George Schmidt
Mishicot, Wisc.

The Cork Clutch

HUDSON'S EXCLUSIVE clutch design, sealed and running in oil, with facings made of corks which are fitted tightly into holes through the disc, rather than with the usual facings which are made of a dry brake-lining type material, was one of the distinctive mechanical features for which Hudsons long were known. An early version of this cork clutch, shown in *Dyke's Automotive Encyclopedia,* was of the multiple-disc or "clutch pack" type, like those in some other early cars and many large trucks (and those inside most modern automatic transmissions); but by 1930 or so, Hudson had settled upon the familiar layout of flywheel, single cork-faced driven disc, and a pressure plate applied by coil springs.

Along with its durability and easy operation, this clutch when in good condition offers a particular smoothness not readily duplicated by typical dry-disc units. When not in good condition, however, the opposite is too often true. This column lists some of the clutch troubles occasionally encountered, and suggests possible corrections for them. It was prepared with the help of Al Saffrahn, who conducted the cork-clutch/overdrive portion of the tech sessions at the 1981 H-E-T National Meet.

IF CORKS ARE simply worn out, the usual symptom is slippage under load, especially when warm. If clutch asembly is in otherwise good condition, slipping may occur with little or no roughness or vibration, but cork disc should be replaced without delay in order to avoid damaging flywheel and pressure-plate surfaces. Probably no other parts will need to be replaced in this instance, except perhaps for fluid seals.

Springs at pressure plate, if weakened by age and overheating, can also cause clutch slippage, but in this case there is more likely to be some perceptible unevenness. If this appears to be the problem, springs can be removed from clutch cover for testing (see instructions in factory or *Motor*'s manuals). Many automotive machine shops have a spring tester, either as a separate device or as an attachment for a standard torque wrench. It is commonly used for testing engine valve springs. Manuals specify 120 pounds (110 minimum) for each of the large outer clutch springs when compressed to 1⅝-inch length, and it is especially important that the springs of a set be uniform within a few pounds.

LINKAGE OUT OF adjustment, usually due to gradual wear of the cork disc, will also eventually cause clutch slippage. The factory specification — 1½ inches free play at top of clutch pedal stroke, on nearly all models — should be followed, using the threaded clevis on linkage underneath car for adjustment. At the same time, on models with Vacumotive Clutch, Drive-Master, etc., a matching adjustment must be made at slotted clevis on upper end of vacuum pull rod, to allow about ⅛-inch of lash at that point when pedal linkage is correctly adjusted.

All pivoting points on clutch linkage should be oiled occasionally, using heavy motor oil (or oil containing a portion of STP or similar thickener), with especial attention being given to outer bearing for the clutch cross shaft (at car frame). In place of the grease fitting found on many Brand X's at this point, Hudson uses a heavy felt collar as an oil retainer. On an old car it is well to remove this collar, shake with solvent in a jar to clean, wipe and allow to dry; then place it in a shallow puddle of clean heavy oil overnight or till saturated; and finally reinstall it on car. This lubrication will last for many miles, and will then require only a few additional drops of oil occasionally.

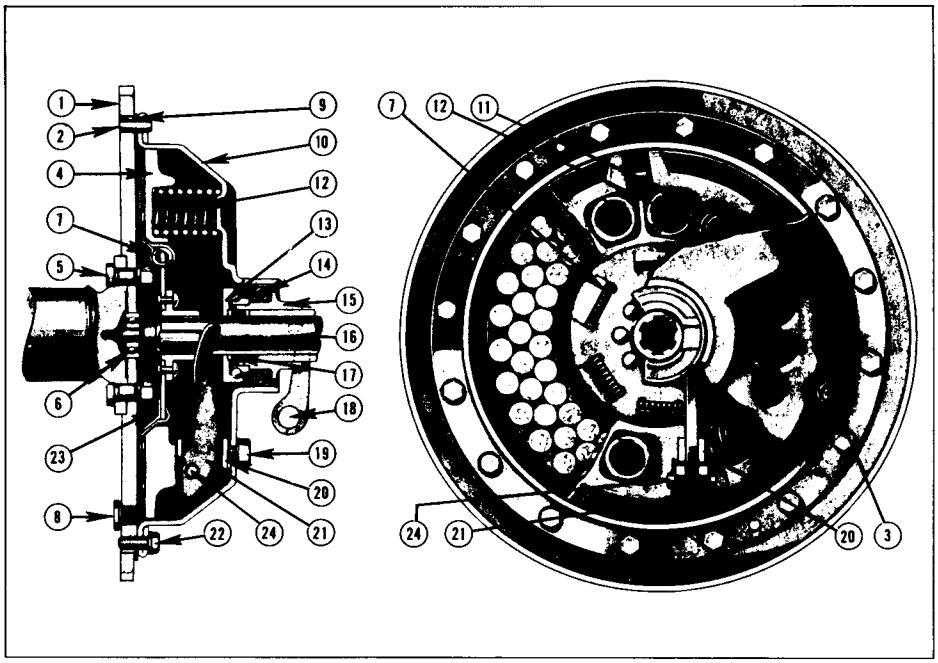
Check (before adjusting) to be sure that the two rubber pads and bushing at clutch coupling lever, and also the rubber seal at pedal stem, under car floor, are O.K. Rubber parts should not be oiled, but coupling pads will last longer and remain squeak-free if a touch of silicone or Door-Ease wax is used on them. Linkage for vacuum clutch control should also be oiled occasionally, and any excess wiped away.

CLUTCH FLUID leakage is most often due to hardening and wear of the leather seal around throwout bearing. It soon causes rough operation and deterioration of cork surfaces, owing to an insufficient supply of fluid in clutch. Sometimes the leaked fluid also causes Bendix drive on starter motor to stick.

Replacement of this seal of course requires the removal of bellhousing and transmission (though not necessarily of clutch assembly). Throwout collar and seal are a snug press fit on the bearing. New seal should be pressed carefully onto collar, avoiding distortion or possible installation backwards (lip or seal must point forward, into clutch).

Inspect surface at center hole of clutch cover where edge of this seal must fit, for any grooving or roughness which might injure new seal or cause further leakage. If roughness is slight, it can probably be machined out without enlarging hole excessively. As Al noted at the meet, a slight oversize at this point (used with a new seal) is preferable to any scoring or eccentricity.

Throwout bearing also has an inner oil seal: a plain leather washer of 1-inch inside diameter which should be a reasonably



1948-1954
CLUTCH — ALL MODELS EXCEPT JET

1. Flywheel
2. Flywheel dowel pin
3. Clutch cover driving lug
4. Pressure plate
5. Flywheel bolt
6. Clutch pilot bearing
7. Clutch driven disc spring
8. Clutch filler plug
9. Clutch cover gasket
10. Clutch cover
11. Clutch engaging spring, inner
12. Clutch engaging spring, outer
13. Clutch throwout bearing
14. Throwout bearing oil seal
15. Clutch collar
16. Main drive shaft
17. Throwout bearing grease retainer
18. Clutch shifter yoke
19. Throwout finger retainer nut
20. Throwout finger retainer
21. Throwout finger
22. Clutch cover bolt
23. Clutch driven disc
24. Throwout finger pin

snug fit over the transmission shaft. If the center hole can be accurately cut, it is possible to make a new replacement seal washer at home. Outside diameter is less critical, and may be larger than the original, up to about 1¾-inches.

Check condition of clutch throwout collar, particularly where it contacts throwout fork. Excessive wear at these two points, especially if unequal, can help to cause vibration or roughness as clutch engages. The fork, too, needs to be in good condition (note that it does not have a compensating swivel). This is also a good time to check for excessive wear and looseness at the throwout shaft upon which fork is mounted. Shaft is supported in bellhousing by three bronze bushings which can be replaced if worn. Usually a generator or starter bushing can be found to fit as a replacement here. To remove shaft, drive out the three taper pins (the large outer one first).

Damage to the outer leather seal on throwout bearing can most easily occur upon reassembly. It is necessary to ease the transmission, with bellhousing and splined clutch shaft, carefully back into place, while at the same time guiding the throwout bearing with its stiff new seal into the hole in clutch cover, and keeping it there, without bruising or turning over an edge of the seal at one side; and also without allowing throwout collar to engage the fork upside down (note that the heavy part of collar, with tiny grease relief hole, goes to the top). The task can be especially difficult on overdrive models, due to the added length and weight of transmission; but with care and patience, deft fingers, a love for Hudsons, and a strong back, it can usually be accomplished.

Standard procedure for gearbox removal is given in *Motor*'s and other manuals; however, if a transmission jack is available, it may be easier to remove and replace transmission from below (floor panel removed) rather than from above as specified. If necessary, remove the support rod for handbrake linkage which is located at right side of transmission on stepdown models. The two leather throwout seals will also be easier to install, with less risk of damage, if they are soaked in oil for a half-hour or so before installing.

Sometimes minor leakage of clutch fluid is found at front surface of flywheel (where it makes timing marks difficult to see), especially after the flywheel has been removed and replaced. This can be prevented if a thin coat of sealer, such as a Permatex-type cement, or perhaps one of the products used when installing Hydra-Matic, is applied to outer edge of crankshaft flange (or to center recess in flywheel) before wheel is bolted in place. When replacing wheel, note that the spacing of the six mounting bolts is slightly unequal, to ensure installation of wheel (and timing marks) in the correct position. Visibility of marks can be improved if front surface of wheel is cleaned, the marks slightly deepened if necessary, and the surface sprayed with pale-gray flat primer paint, before wheel is replaced. Check to be sure that pilot bearing at center of wheel turns smoothly and easily, and is free of dirt, sealer, etc.

GLAZING AND oxidation of cork surfaces can be caused by excessively hard use and overheating, by poor-quality clutch fluid; or by lack of driving in stop-and-go traffic. In many cases, however, it is wiser to flush out clutch first before adding new fluid. Instructions for flushing clutch have been given in past *WTN*'s (see February 1977 issue and the May 1977 supplement), and several flushing materials suggested. In older Hudson literature (and *Motor*'s as late as 1952), kerosene is specified, and this still is satisfactory when only a mild — and inexpensive — solvent is needed. It should be fresh and clean, and preferably of a good lamp-and-cookstove grade, rather than fuel oil. Although white unleaded gasoline has also been suggested, a better alternative here might be ordinary paint or enamel thinner, to reduce fire hazard.

For a stronger solvent to remove gummy and oxidized material from inside clutch, the factory in 1951 recommended a mixture of 80% acetone and 20% carbon tetrachloride. At present, however, since carbon tetrachloride is difficult to obtain due to government "safety" restrictions, it may be necessary to substitute the more generally available trichloroethylene, at least until a pesticide effective against bureaucrats can be found. Another solvent which this writer has used in clutches is lacquer thinner. It must be kept away from excessive heat, and away from the car's paint job, but it readily dissolves sticky oxidized material, and is harmless to cork, metal, and leather. At least a cupful of flushing solvent is needed (factory recommended a full pint).

If the clutch on an old car is stuck and will not disengage, particularly after long disuse, and mechanical damage (as to splines or other parts) is not suspected, the first remedy to be tried is flushing, allowing solvent to remain in clutch for a day or more if necessary, and turning flywheel occasionally so that all parts will be soaked. Clutch and engine should be somewhat warm if possible. To prevent any sticking during long storage, the same precaution has been suggested as for antique Brand X's with leather cone clutches: store with clutch pedal blocked to floor and clutch disengaged.

When a used clutch disc is found with corks somewhat blackened and glazed, but otherwise in good condition, it is best to clean each cork individually by hand before reinstalling disc. This can be done using lacquer thinner and a clean rag of fairly rough weave.

NEARLY EVERY Hudson owner today probably has his own device for inserting fluid (or flushing solvent) into clutch through hole in front of flywheel. Factory offered a special gun, #J-485, for use by dealers, though some of them also used merely a suitably bent piece of copper tubing, with funnel soldered at one end. Many home-made devices also are similar to this, using 3/8- or 5/16-inch tubing. If spillage still occurs at filler opening, try parking car in a somewhat uphill position, and holding down (or blocking) clutch pedal, while the fluid is being put in.

Many brands of clutch fluid, in addition to the factory's own Hudsonite, were offered in past years (see listing by Bill Albright in Feb. '77 *WTN*). Price per can was commonly in the 25¢ – 75¢ range (for ⅓ pint), except for a few brands such as Royal and Flare which were sold in quarts. The NAPA auto-parts people also had their own brand of clutch fluid, sold in small yellow-and-black cans, for a time.

Today there are still several brands to be found, including the one from H-E-T Club Store; and some of them are claimed to be even better than the original Hudsonite. We would like to know whether there are any club members who have tried several of the available brands, and can tell us approximately how they compare in performance. Write to this columnist or to the Editor, and we'll report in a future issue. Requirements may be a bit more critical on models with vacuum clutch control, since clutch performance on these must remain quite uniform over a wide range of conditions.

A number of substitute mixtures have been suggested for emergency use. According to some older Hudson dealers, a 50/50 combination of kerosene and motor oil (with #10 and #30 weights variously suggested) can be temporarily used; and in fact this was the usual fluid for early multiple-disc versions of the cork clutch before a special Hudsonite compound became available. In later years, automatic-transmission fluid (type not specified) has also occasionally been used. Neither of these substitutes is ideal, particularly for hard use (as for example in a Twin-H Hornet); but either is obviously better than allowing cork clutch to be operated dry.

Normal fluid capacity for all models 1932-1954 is ⅓ pint, or 5⅓ ounces. Capacity for 1930-31 models is listed as ¼ pint; and for the 1929 Hudson, ½ pint.

HOW WERE THE corks compressed for insertion so that they would slip readily into their holes in the disc without injury, and yet would fit very snugly in place? If you have seen one of the modern tools which installs the rubber valve stem for a tubeless tire in the hole in wheel, working entirely from the outside (without loosening tire on rim), you will understand how the corks were inserted. This tool includes two parts: a tapered tube used as a guide, and a handle used to push valve stem into place. In the early years of the cork clutch, particularly the multiple-disc version, local mechanics commonly replaced cork inserts themselves — as they did the usual riveted dry clutch linings — rather than depending upon an outside rebuilding firm. (For description of 1913 clutch, see January 1976 *WTN*, p. 16). When a book titled *Automobile Repair Shop Shortcuts* was pub-

lished in 1918, it listed no fewer than three different tools of this general design, for inserting replacement clutch corks — one a Hudson factory item, one evidently aftermarket, and one homemade. (See excerpts from this book reprinted in *WTN* for January/February 1978, p. 29.) Corks were to be soaked in water before using.

After the new corks were inserted and dry, the next obvious task was to plane or level all of them down to the correct, and exactly uniform, thickness on both sides . . . though I've found no instructions telling how this should be done. With the later single-disc cork clutch, accuracy at this point appears to be especially important, as are corks of uniform compressibility all the way around the disc. It is possible that this may account for problems occasionally reported with some rebuilt clutch discs in the past, although quality and condition of the metal clutch disc core is undoubtedly also a factor. Discs of Hudson's own manufacture reportedly have a triangle trademark stamped in the metal somewhere near corks; and these are said to be more reliable than are those from other sources (unmarked).

Corks originally installed by Hudson at the factory, Al points out, were also specially heat-treated in a furnace after insertion, thus hardening them for greater durability.

DISC MUST at least be free of perceptible runout, with center splines in good condition, the rivets tight, all spotwelds (on later discs) undamaged, and the cushion springs in hub unbroken and not loose. Earlier single-disc cork clutches had 8 small hub springs; the later ones (first used on 1940 overdrive models, and subsequently on all with 10-inch size driven disc) had 6 larger hub springs. A very few replacement cork discs, it appears, were of the plain "rigid" type with no cushion springs in hub. This writer has seen only one of these rigid discs, and would like to hear from any club member who has used a cork disc of ths type.

The springs in hub tend to make clutch engagement smoother, but if subjected to abnormal stresses (as from a slightly warped flywheel or pressure plate, or perhaps too-frequent "popping" of clutch), some or all of them may break, in some instances while cork inserts are still in excellent condition. Usually this results merely in loss of cushioning action, but in extreme cases the small broken pieces can all drop out of place, resulting in complete loss of drive to the transmission and rear wheels.

However, if clutch disc is in otherwise good condition with merely a few broken hub springs, these can usually be replaced successfully, using spare springs from another old disc. To avoid distorting disc, it can be placed in a press or perhaps between a flywheel and a spare pressure plate (removed from clutch cover), with several large C-clamps to hold assembly together. Metal tab can then be pried upward just enough to permit removal and replacement of a spring; and then carefully bent back. This apparently works best with a 6-spring disc, and with replacements made symetrically (the 3 alternate springs, or the 2 or 4 opposite ones).

AT THE MILWAUKEE tech session, discussion centered mainly upon the more difficult causes of clutch trouble, especially rough operation due to flywheel or pressure plate runout, finger misalignment, etc. We'll report on those next time.