

THE MAN WHO MENDS HIS CAR

Tools and Mechanical Ability the First Requisites.

IF YOU HAVE BOTH, GET BUSY

Some Overhauling that the Owner Can Do—Pointers on the Way to Do It—Things to Avoid.

As a general proposition, overhauling a car in a small private garage is, perhaps, best attempted only when the equipment for the purpose is ample. Nevertheless, the owner who possesses mechanical discretion, and who has access to the aid of an outside shop for special jobs, can often do wonders with very meager facilities. The accompanying vignette, taken by the writer during the process of overhauling his car last spring, will suggest some of the numerous possibilities; and the subjoined notes indicate roughly the limitations within which good results may be expected.

Aside from the usual tools—viz., the following shop outfit is necessary: Bench and iron vise, soldering iron and torch, anvil or substitute, props for axle, hack-saw, bench or breast drill (preferably both), brace and bits, and small tools as needed.

Certain work, such as pulling off and pressing on gears, grinding journals, true, and the making of special parts, which cannot be furnished by the manufacturer, must necessarily be done in a good machine shop. Usually the parts requiring machine treatment can be boxed separately and sent to the shop. Certain other work, conspicuously the refitting of the main and crank-pin bearings, is quite beyond the skill of the amateur and should not be attempted. If the engine bearings need to be overhauled the car must be taken bodily to the shop.

To overhaul the transmission properly the body must be removed. If there is no room to set it aside, it may be drawn back on the chassis frame and blocked up at front and back as shown in one of the photographs. The same procedure is useful when the car is to be painted at home.

The first step in overhauling after washing the car is to strip it of lamps, fenders, generators, fire-irons, bonnet and radiator, etc. In order to give easy access to the parts, in some cases it is desirable to take off the rear wheels also, and this is the only way to get at certain types of rear brakes.

Begin with Simple Parts.

It is well for the amateur to begin with the simplest parts, which is usually the brakes. If the latter are so worn that there is little adjustment left, the shoes or linings must be replaced. In any case, they must be adjusted so that they will work without dragging and without needless play. If they rattle, owing to wear, this is a good time to cure the noise.

The universal joints of a shaft-driven car should be examined for wear, and to determine whether there is any liability of the pivot pins in the joints working loose. It is frequently possible to improve the universal joints of the old cars by supplying better means of lubrication, for instance, by drilling and tapping the cross for a small grease cup or for inserting the nozzle of a grease gun.

An amateur, if he knows how to handle tools and has due regard for mechanical fits, clearances and alignments, can take the transmission gears from the gear case and replace worn gears with new whenever bolts are sufficient to hold them.

Press fits, as above mentioned, are a shop job. Unless the gear shafts run in high-grade ball or roller bearings, it is quite probable that after 5,000 or 10,000 miles something will have to be done to the bearings. If the latter are of the plain bushed type the owner can refit them himself, should he know how. The principal points are as follows: See first that the shafts are not sprung and that their journals are true and smooth (having been re-ground if necessary); replace worn solid bushings with new ones (these must be bored specially to fit the journals if the latter have been reduced by wear); replace worn thrust washers as needed; refit split bearings by lining up the worn half with shallock paper and scraping it till the shaft is a true fit and just touches the inner half when the bearing cap is bolted on. The object of shallock paper lining under the bushing is to cause it to adhere to the bushing. The latter also must be riveted solidly to the case with brass rivets, otherwise it will loosen up and hammer the paper under it into fragments. When the job is finished, the edges of the cap must bear on shims of suitable thickness to give the shaft a running fit without shake. The pressure of the nuts comes on the shims, not on the shaft.

Special Tools for Scraping.

Scraping is done with special tools for that purpose. It is known, however, that application to an oilstone. The journal is first smeared with red lead mixed with oil. The bushing and bearing cap are bolted down, and the shaft is turned in the bearing so that the red lead will indicate the spots where contact with the bushing. The spots are scraped and the process is repeated until a uniform bearing is secured. Practically there will be a slight wearing down of high spots in the first fifty miles of running, and to allow for this the bearing is made very slightly tight just enough so that on turning the shaft one can detect that it is not perfectly free, and oil is fed liberally at first. If the bearing is set up more than just perceptibly so it will probably wear some more rapidly on the surface of refitted bushings lightly with graphite before assembling, in addition to greasing oil on the journals.

If the car has side chains the level gears in the frame must be restored to their original alignment. If, on refitting, one shaft starts a little too high or too low at one end, even the matter of a few hundredths of an inch, the teeth of the level gears will not make true contact over their entire width. One may test, with a strip of paper inserted first at the top and then at the small end of the teeth, whether or not perfect contact is made when the gears are rotated in their working position.

By jacking up one rear wheel, setting the gears in mesh, and rotating the free wheel, one can judge how much looseness there is in the differential and transmission generally. If the differential is under suspicion it is well to take it out, as the small phons tend to wear somewhat rapidly on the spider which supports them. If the differential is taken apart care must be used to replace everything correctly, including the thrust washers back of the level pinions; also to make sure that the bolts holding the differential shell and the large level gear together cannot possibly work loose. Usually the ends of these bolts are headed over so that a chisel or file is necessary to start them loose, and this is the safest plan.

Taking Up Slack.

If the steering-gear shows considerable play in the reducing mechanism, or if the steering-column is loose on the chassis frame, it is well to take out the base bolts holding the column and overhaul the whole thing. In some steering-gears the holding bolts have a chronic habit of loosening up, due generally to their being too small to fill their holes. The best remedy for this is to ream the holes to the next larger size and make special tips of annealed tool steel. In some cases the

steering-column can be corrected by bracing the trouble-column to the footboard, dashboard, or some part of the frame.

In an old car the steering-knuckles are quite likely to be loose on their pivots. To correct this properly is a shop job.

A multiple disk clutch of the metal-metal type rarely requires more than cleaning with kerosene. If of the dry-plate type its facings, leather or asbestos, may need to be replaced. A cone clutch occasionally needs a new leather facing. To apply this properly the old leather should be used as a pattern, and the new leather cut half an inch short, soaked thoroughly in water, marked for the rivet-holes, and riveted on before it has time to dry. This job calls for some dexterity, but the shrinkage of the leather insures a good fit. Leather belting of good quality and of thickness equal to the original thickness of the old leather is suitable for the purpose, but through-out the leather is the best. Ordinary belting should be thoroughly soaked in near-foot oil after the water has dried out.

As above mentioned, the amateur is advised not to attempt overhauling the motor, but to have it replaced with worn valves, pistons, heads. One of the curved scrapers lies on top of the cylinders, together with the battery-lamp used for exploration. An obnoxious flow, if the engine makes any sound from breakage. The dentist's mirror also shown is occasionally useful in detecting stray fragments of carbon which have been loosened by the scraper, but not dragged out.

Tuning the Auxiliaries.

The auxiliaries of the motor, such as the water-pump, piping, radiator, and ignition, should be examined within the amateur's scope. Hubcap-lime frequently rots inside and fragments become detached which may lodge in the hose or in some constricted portion of the circulating system, thereby obstructing the flow. If the engine makes this is one of the first things to look for.

Another possibility in case of overheating is that the radiator may be clogged. Only the softest water obtainable is desirable for use in the radiator, and frequently the radiator may be gradually cleaned by washing it out once a week and refilling with clean rain-water. Occasionally the stuffing-box of the pump needs to be re-packed. For this purpose cotton wicking with flake graphite thoroughly worked into it is good.

Another thing which may need attention is outside oil-pipes, as these sometimes spring leaks at the joints and require to be patched up with solder.

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Brooklyn cloak rooms take in \$30,000 a year in tips.

The barber shop is another source of big money to the hotel proprietors. In one hotel as high as \$10,000 a year is paid.

The valet privilege in some hotels is valued at \$2,000 a year. For postal card stands along Fourteenth street and Sixth avenue \$15 and \$25 a week are paid. Not long ago a real estate broker offered the manager of Keith & Proctor's Fourteenth street theater \$10 a month for the souvenir card stand in the front of their theater. It measures 2 1/2 feet and is movable. The manager told the broker that he was very well satisfied with the rent he was already getting for the stand.

In the hotels postcard and news stand privileges are worth \$1,000 a year. It has been estimated that at least \$1,000,000 a year is paid in New York for privileges of the kind mentioned above. "Yes," said a man well acquainted with this form of business, "the \$1,000,000 is a safe estimate, but it is by no means a close one. I believe \$3,000,000 would be nearer the mark and the sum is increasing every year."—New York Sun.

COLD TRUTHS ABOUT PANTS

Hollow Mockery of the Tailor's System of Measurement Boldly Revealed.

When a tailor puts you on the measuring hook, with a man guarding the door so that you can't get away, and another man making a book on the game, he reels off something like this, as he goes about you with his measuring tape: "33-34-35-36-37-38-39-40-41-42-43-44-45-46-47-48-49-50-51-52-53-54-55-56-57-58-59-60-61-62-63-64-65-66-67-68-69-70-71-72-73-74-75-76-77-78-79-80-81-82-83-84-85-86-87-88-89-90-91-92-93-94-95-96-97-98-99-100-101-102-103-104-105-106-107-108-109-110-111-112-113-114-115-116-117-118-119-120-121-122-123-124-125-126-127-128-129-130-131-132-133-134-135-136-137-138-139-140-141-142-143-144-145-146-147-148-149-150-151-152-153-154-155-156-157-158-159-160-161-162-163-164-165-166-167-168-169-170-171-172-173-174-175-176-177-178-179-180-181-182-183-184-185-186-187-188-189-190-191-192-193-194-195-196-197-198-199-200-201-202-203-204-205-206-207-208-209-210-211-212-213-214-215-216-217-218-219-220-221-222-223-224-225-226-227-228-229-230-231-232-233-234-235-236-237-238-23