If you own a car or truck from the 'teens or early 1920s, you have probably noticed that the owner's manual suggests more owner-maintenance than you would find in a later model vehicle. Automobiles were still, while not a rarity, a less-than-common conveyance. Motor-mechanics weren't necessarily conveniently available; more mechanically inclined or able owners did their own work. Often the owner's manual included schedules of maintenance - lubrication, spark plugs, tappet adjustment and even valve grinding.

Grinding valves wasn't considered a 'major' repair. It was often done at home or on the farm when engine performance had decreased.

A 1922 edition of the book, Everyman's Guide to Motor Efficiency by Slauson and Greene was dedicated to maintaining one's vehicle, or, as they subtitled their work, 'Simplified Shortcuts to Maximum Mileage at Minimum Cost.' Valve grinding was included as do-it-yourself maintenance.

VALVE GRINDING

Everyman's Guide to Motor Efficiency 1922
H.W. Slauson & Howard Greene

Why Valves Need Grinding

The constant hammering of the valves on their seats causes wear, and such wear is not quite equal at all points. In time the points of greatest wear separate sufficiently to allow leakage, and this in itself increases the wear, especially in the exhaust valves. Grinding cuts down the high places to the same level as the worn places, smooths up the surfaces and makes them gas-tight again.

The exhaust valves suffer more than the intake valves, for they are always at a very high temperature, which not only reduces their ability to resist the effects of pounding, but causes pitting, or the formation of little depressions, in the surfaces. There is also some tendency to warp from the heat, though a good valve rarely gives much trouble from this cause.

How to Grind Valves

The first operation is to remove the valves, and the worst part of this is usually taking off the springs, though this is not quite so troublesome as getting them back. The main thing is to get the spring compressed so that the pin or key holding it at the bottom can he removed. It pays to invest in a tool made for this purpose, which does not cost much and saves a lot of time and pinched fingers. In the case of a big engine it is difficult to do much without the tool.

Slack back the tappet adjustment so that there will be at least a sixteenth of an inch clearance under the end of the valve stern. This is done because as the valve is ground it is allowed to set closer to the lifter, and if there is not sufficient clearance the stem may rest on the lifter and keep the valve off its seat so that it will not grind.

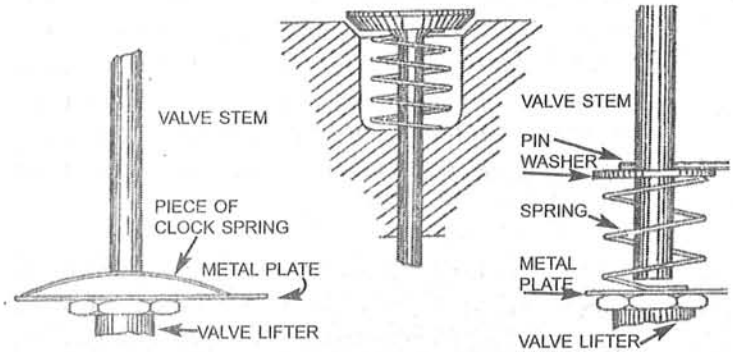
Clean the valve carefully, scraping off carbon if there is any, and washing it with gasoline all over. Clean the valve seat and all parts within reach in the same way. Stuff rags or waste into all openings leading into the cylinder to prevent grinding compound from getting in. Do all that can be done to keep the compound from getting anywhere except on the surfaces to the ground, for it is most destructive in the wrong place.

If it can conveniently be arranged, put a light coiled spring under the valve head, or arrange it in any way so that the valve will not go down on its seat unless lightly pressed. This allows the valve to rise from its seat during the grinding process whenever pressure is relaxed.

Use a fine grinding compound, which is obtainable at any supply store ready for use. Two grades, fine and coarse, often are put up in the same box, in different compartments. Use the fine grade. The coarse grade is usually too coarse for ordinary work, and it is easy for the inexpert grinder to score and cut the valve and seat. Flour emery mixed with oil can be

used with just as good results as the prepared compound, but. it is more bothersome.

Dab the valve lightly with the compound. Only a little is needed - a light film. Dab a little oil on the valve seat. Put the valve in place and turn it, under light pressure, back and forth about a quarter of a turn. Use a screw-driver or a brace with a screw-driver bit. Every half dozen or so turns let the valve come up off its seat, if a spring is used, or put your finger under the end of the stem and raise it, if there is no spring, and give it a turn to bring it into a new position before starting to grind again.

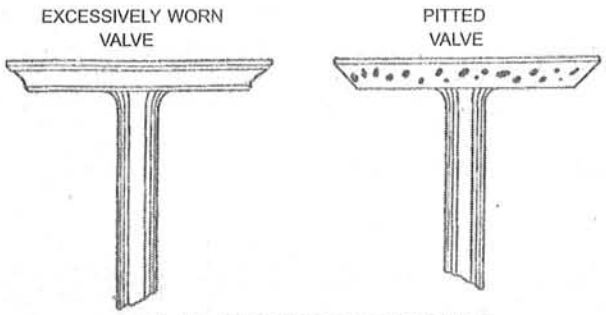


THREE WAYS OF HOLDING THE VALVE OFF ITS SEAT

As soon as the grinding pressure is removed, the valve should lift off its seat so that it may be turned to a new grinding position. It is more convenient to use springs than to lift it by hand each time.

and do not turn more than quarter of a circle or about that. You can make a leaky valve look like a perfectly ground job by pressing hard, or giving a few complete turns. But this will not make it a good job.

If the valve was in bad shape, a good deal of grinding will be required, and fresh compound must be put on from time to time. Wipe off the old stuff each time to give the new charge full play. This speeds up the grinding. Put on a little oil occasionally to keep the valve from grinding dry. In fact, it is a good idea to mix a little of the compound with oil to have it ready for use.



VALVES WHICH NEED GRINDING

The one on the left is so badly worn that it would probably need re-seating with a special tool. The one on the right is pitted from the action of the carbon and the heat. This condition, however, can be remedied by proper grinding.

What follows depends a good deal on the condition of the valve. If it was in fair condition before grinding, with only slight indications of leakage, grind until there is a feeling that the compound has ceased to 'bite.' Then lift the valve, smear a little oil on it, but no more compound, grind again for a few minutes as before, and then wipe both valve and seat clean, put them together and give a couple of quarter turns, and look to see if enough grinding has been done.

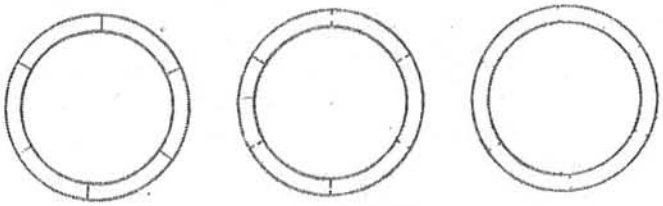
The marks should show that there is contact over at least half the width of the surfaces. It is not necessary, and moreover it is very difficult, to get really good contact over the whole surface.

In trying the valve do not press hard, do not move the valve more than a few times

As the grinding nears completion, stop putting on fresh compound, but instead put on a little oil. This will make the cut finer and finer, and a smoother surface will result. The smoother and better finished the final surface, the longer the valve will run without regrinding.

The sense of feeling is important in grinding valves, There is rather a strong tendency for the compound to 'ball up' and cut grooves. It is to avoid this that the valve is raised and shifted around. But a tendency to cut grooves can be felt; there will be a grating feeling, more harsh than the grating of the new compound and quite distinguishable from it. This is a danger signal. Lift the valve, spread the compound with a finger, and put on less pressure next time.

When you think the job is finished, wipe valve and seat very clean and make half a dozen marks across the valve seat with a soft pencil, chalk, or anything that will leave a light mark. Set the valve down and give it a couple of quarter turns, just as you would in grinding. If the job is finished, all the marks will be wiped away along the zone of contact. If some of the marks are untouched, go on grinding; for there will be a leak if you do not. Remember that in making this test too much pressure or too much turning will give a false story. Very slight movement under very slight pressure will take out the marks on a properly ground valve.



TESTING THE VALVE
When all pencil marks or chalk marks are rubbed out throughout the greater part of their length, a good gas-tight seat has been achieved.

If you want to do an extra good job, put a little graphite on the valve seat along with the old, nearly worn-out grinding compound for the last stage of the grinding. Apply just a trifle more pressure than before. Use plenty of oil. The result will be an exceedingly smooth finish. Some mechanics like to give the valve a final rubbing in with only graphite and oil, turning it through a complete circle. This is simply a polishing operation.

Wipe away all the mess of grinding compound and oil. A rag dampened with kerosene or gasoline is good for this. Avoid washing compound down into the valve-stem guide where it can do a lot of damage, even if there is not much of it.

What To Do With Very Bad Valves

If a reasonable amount of grinding will not bring the valve to a good seating, as may happen when grinding is long overdue and is more likely to happen with the exhaust valves, do not keep on in the hope of 'reaching bottom' sometime. The valve seat will unnecessarily cut down and you will waste time and energy. Put in a new valve or, if this is not practicable or convenient, get the old valve trued up by a repairman. In either case it is necessary to grind in.

If ridges project above or below the seating zone, either on the valve or the seat, do not grind until the ridges have been removed. If you are somewhat skilled with tools, you can do the job with a fine half-round file or perhaps a scraper. If you are not, the repairman can do it in short order with a special reamer made for the purpose, and while he is about it he should true up the valves, for the cutting process is almost sure to slightly change the angle of the bevel. Finally, they must be ground in. Do not try to grind in very badly pitted valves. Have them trued up or get new ones.

If the valve is in a cage, a test for tightness can be made by turning the cage upside down and pouring a little gasoline in. Gasoline will go through an exceedingly minute crack, and if the valve holds it, it can he considered tight enough. A valve in a removable cylinder head can he tested in the same way.

Adjustment Necessary After Grinding

As the grinding allows the valve to drop lower, readjustment of the lifters will be necessary every time grinding is done, even if the adjustment was perfect before grinding. If you omit this you will probably find that some of the valves will not seat. The grinding makes more difference in this respect than the inexperienced user would expect.

Before you begin the job of lapping your valves, order the necessary gaskets - head gaskets, valve cover gaskets, and even valve stem seals, too. For the gaskets, contact Olson's Gaskets (see ad, page 44). Do not trust that the gaskets you will remove will do a proper sealing job if re-used.

Although the above article pretty well covers valve grinding, there are just a few additions that we would like to offer. Actually they are really nothing new, just a variation on the instructions presented in the preceding article.

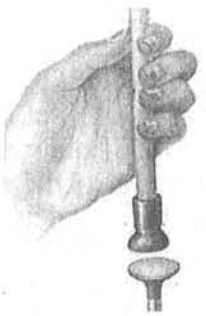
As indicated, the exhaust valve suffers the most from the constant opening and closing of the valves. The extremely high heat will cause pitting and possibly distortion in the valve. The seats themselves are also subject to wear. The seats and the underlying metal will be pounded away or eroded so that a good mating between the valve and seat is not possible. One method is to grind the seats. A better alternative though is to replace the original seats with hardened seats.

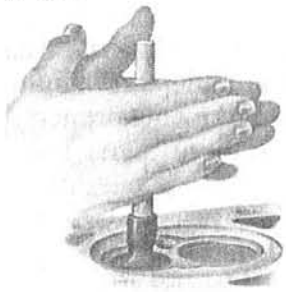
A good machine shop, experienced in valves and valve lapping, should be able to install hardened seats. This involves removing the original valve seats, machining the engine and installing the new, hardened seats. Although more extensive work than merely grinding the valves, it will prevent distortion and wear of the exhaust valve seats.

Valve grinding compound, or paste, is usually obtainable in most quality auto parts stores. Often the tin of compound has two lids: one on the bottom, the other on top. One side is the coarse compound and the opposite end the fine.

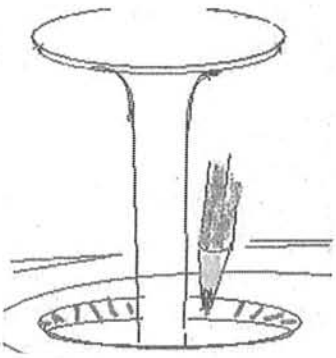
Messrs. Slauson and Greene recommend using "a screw-driver or a brace with a screw-driver bit" to grind the valves. A simpler solution is to purchase a very inexpensive valve grinding tool. While nothing more than a piece of wood with a suction cup on each end, it will better grip the valve face and will allow a smoother rotation of the valve against the seat.

Clean the valve face to allow a good suction connection with the tool. Attach the proper size suction cup to the valve face, and rotate the wooden stem between both hands. It will provide an even pressure and rotation resulting in a better valve grind.





As a check of the quality of the valve grinding, take the suggestion of making pencil or chalk marks around the valve seat. When the valve is again rotated, the marks should all be obliterated indicating a good, even grind. If some remain, additional work has to be done.



And this bears repeating: WORK CLEAN! The valve compound is an aggressive abrasive. Be sure that it doesn't get into areas where it can migrate to the crankcase or get into the cylinders. It can do serious damage resulting in major engine work. Be sure that all traces of the compound are thoroughly cleaned before you complete the job.

S.K.