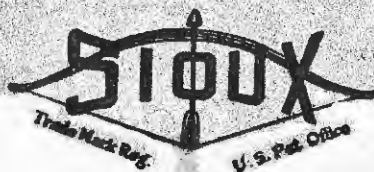


The A-B-C *of* Ford Valve Repairing



FIRST EDITION
COPYRIGHT 1919
REVISED SECOND EDITION
COPYRIGHT 1920
BY
ALBERTSON & COMPANY
SIOUX CITY, IOWA

All Rights Reserved

INTRODUCTION

IN designing and building the Ford car it is very evident that the manufacturers exerted every effort to build it so that its operation was a matter of utter simplicity and so that the greatest efficiency and the least possible difficulty would be encountered. The Ford owner encounters little or no difficulty in securing repairs in almost any out of the way place. A common expression is that "any blacksmith shop can fix it." This again proves that it does not require an expert mechanic to keep it in good running order.

Hundreds and thousands of Ford owners repair and care for their cars, knowing full well that they can do it as well as the garage man and in many cases better because they are not pressed for time and may do it at their leisure.

The one big difficulty confronting the Ford owner has been in keeping the engine at its full efficiency and practically all of their trouble has been due to carbon. When the motor is full of carbon it causes a very distinct pounding or knocking and when such conditions exist it indicates that the motor needs cleaning and the valves need grinding. Carbon causes lack of power and is very hard on the bearings.

The only remedy lies in having the motor overhauled—cutting out the carbon from the valve seat and from the valve face. While this is a comparatively simple operation, yet at the garageman's price it is prohibitive to have it done as often as it should be done.

Ford owners everywhere have longed for tools with which to do this work themselves and while they have been on the market for years (we patented and marketed these tools for years) yet no attempt has been made heretofore to call them to the attention of the Ford owner.

However, the insistent demand from the Ford owner has caused us to place the complete set on the market so that any Ford owner can easily and accurately grind, reface and reseal his valves and valve seats almost as quickly as an expert mechanic can do it.

One expert mechanic who repairs only Fords made the following statement: "I would fire the man in my shop who couldn't do a carbon removing and valve grinding job and put the engine in order and have it on the road testing it out in 45 minutes." If an ordinary mechanic can do it in that time, any Ford owner whether he is mechanically inclined or not, can do it the first time with the use of our tools and this instruction book in less than double the time, and after the first time should be able to do it in an hour. It's as simple as the ABC's.

Any fifteen-year old boy can do it and do it right with the use of our tools and this instruction book.

These tools will outlast the life of the car and will earn their cost many times over as their cost is less than the cost of one carbon removing and valve grinding job in the average garage. Yet they can be used time and again on your Ford car with no cost to you and in only an hour or so during your leisure time.

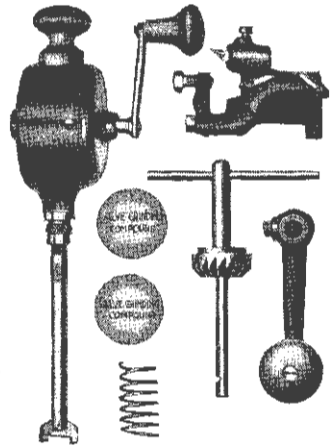
To get the best efficiency from a Ford motor the valves should be ground every 1,500 to 2,000 miles and the valve faces and seats should be refaced every other grinding. Therefore, if you drive your car 10,000 miles and give the motor the proper attention, our tools will cost you less than one-fifth the cost of these jobs, to say nothing of the added resale value of your car because of the excellent condition of the motor.

The "Little Sioux" Tool Set for Fords

This is the same set of tools that are used in thousands upon thousands of garages to do the same identical work on all kinds of automobiles, but is especially designed and built for the Ford motor.

It comprises ***The "Little Sioux" Valve Grinder for Fords***, which combines true mechanical working principles with the utmost ease and smoothness of operation. A steady turn of

the handle in one direction, gives the valve the reciprocating or forward and back movement which is absolutely necessary to perfect valve grinding. At the same time it automatically advances the valve periodically on its seat by alternating a full turn in one direction with a three-quarter turn in the opposite direction. Thus it gradually completes the circle and ensures an even grind, which means a perfect contact of all parts of the valve with all parts of the seat.



The "Little Sioux" Valve Seat Reamer for Fords which ensures accurate grinding of valve seats and makes perfect fitting valves. It is made at absolutely the accurate angles so as to seat the valve perfectly. The reamer shank keeps the Reamer perfectly centered and ensures accurate cutting.

The "Little Sioux" Valve Refacing Tool for Fords applies the same principle to the valve face as the Reamer does to the seat and smooths the face of the valve in short order. Works like a miniature lathe. A few turns fits the valve perfectly to the valve seat.

Valve Grinding Compound which is placed on the valve before grinding. This is used to put the finishing touch on the face of the valve and valve seat.

A Valve Spring which is placed in valve chamber and on the valve stem to permit "jumping" and to avoid too much pressure when grinding.

The photographs and instructions that are shown on the pages that follow make the job simplicity itself, and after reading them you can not fail to do the work with the "**Little Sioux" Tool Set for Fords** easily, quickly and accurately, thus saving time and money and adding life to your Ford motor.

ALBERTSON & COMPANY

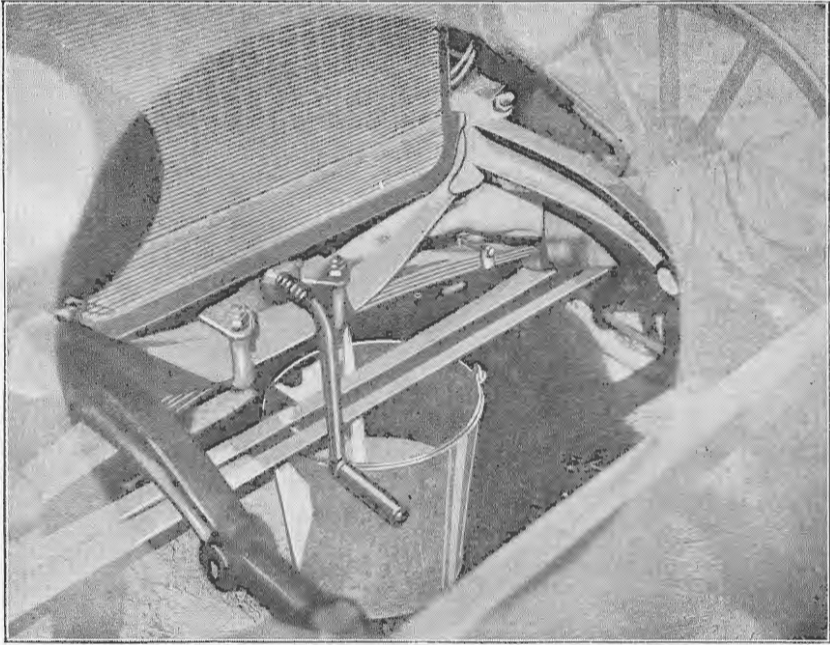
Manufacturers and Patentees
SIOUX CITY, IOWA

Complete
Illustrated Directions
for Using
The "Little Sioux"
Tool Set for Fords



IMPORTANT SUGGESTION

While there is no possibility of mixing the various bolts or parts because they can only be put on in their proper place, we would suggest placing each in their proper order as removed on a newspaper. In this way the first would be put back last and the last taken out would be put back first.



Operation No. 1

Operation No. 1. The very first operation is to drain all the water from the radiator and engine. To do this, open the pet cock directly beneath the radiator and located just back of the front spring. In order to avoid working in a mud puddle, drain the water into a pail.

This operation is very necessary for the reason that it will be impossible for you to do the work with the water in the engine.

January 16, 1920.

Albertson & Co.,
Sioux City, Iowa.
Gentlemen:

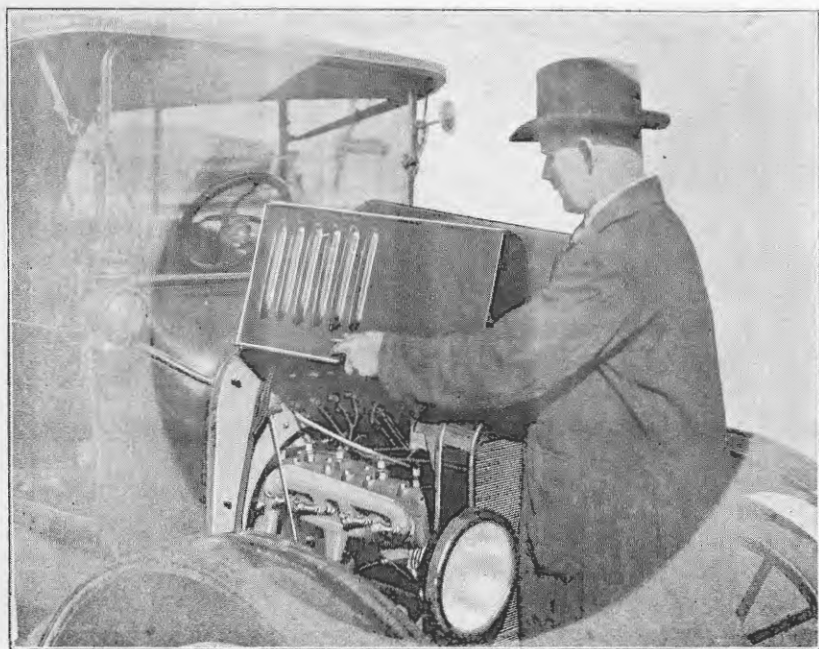
Received your Little Sioux Tool Set in good condition, and have used it on my 1913 Model Ford Car.

I was absolutely surprised at the kind of work these tools do, and how much better the car runs after I have reseated, refaced and ground the valves.

I would not sell my Little Ford Tool Set at any price, if I could not get another set.

Yours truly,

J. W. BERRY,
700 Fowler Ave.
Sioux City, Iowa.

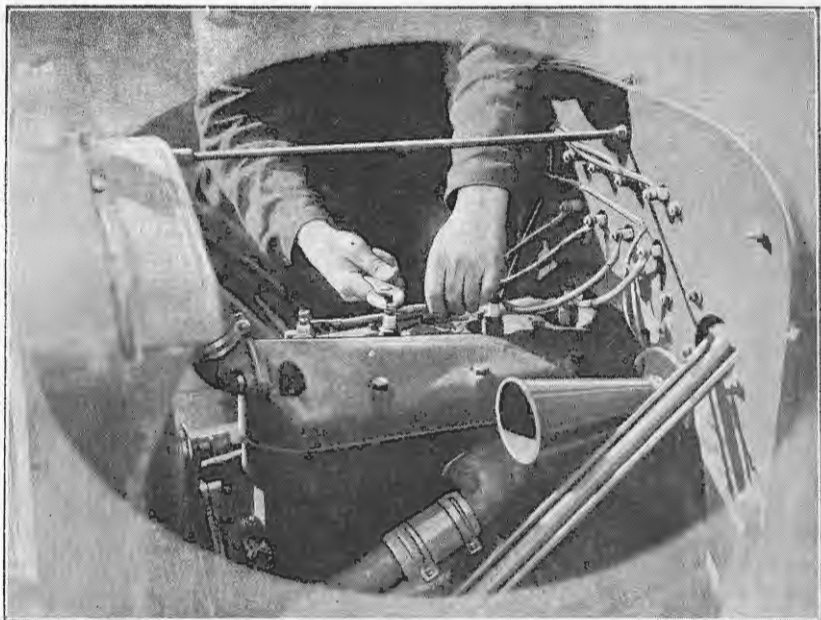


Operation No. 2

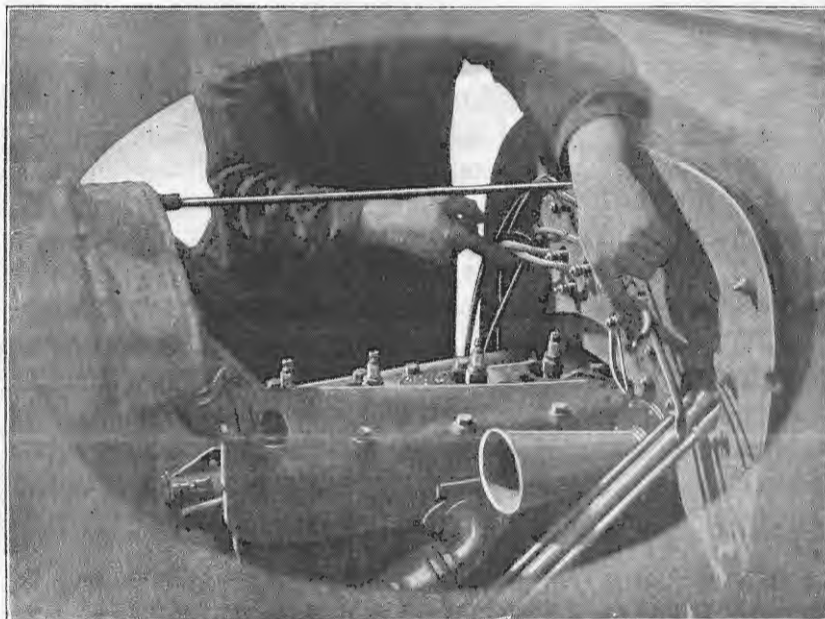
Operation No. 2. While you are draining the water out of the engine and radiator, take off the hood, so as to make the engine easily accessible. Put the hood in a safe place out of the way so that it will not be damaged.

Operation No. 3. Now remove the wiring on the spark plugs. This is a simple operation. Just loosen the screws and disconnect wires from the plugs, as shown in photograph of operation No. 3. Be sure and mark wires carefully so you will get each one back on the right spark plug.

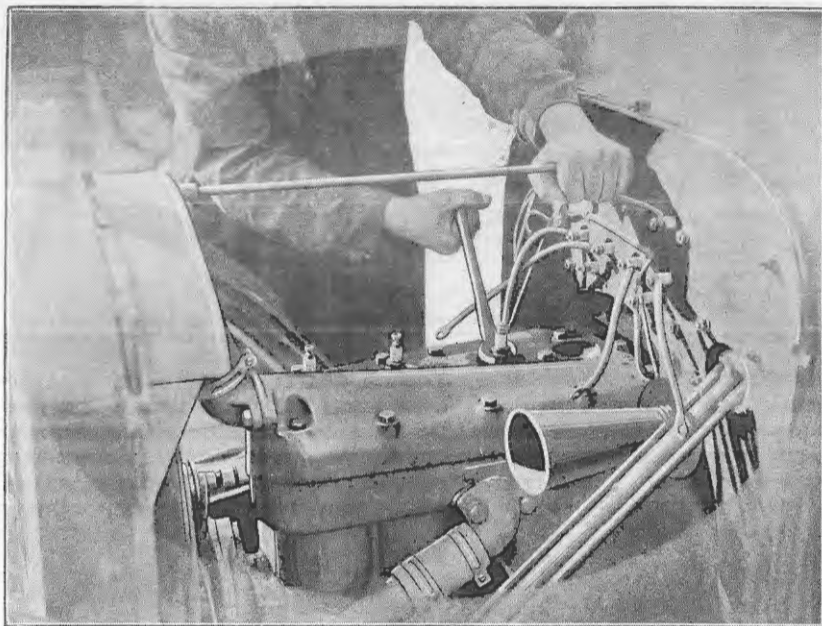
Operation No. 4. Place wiring out of the way so that it will not interfere with your work. The best way is to push them back and anchor them behind any convenient rod.



Operation No. 3



Operation No. 4



Operation No. 5

Operation No. 5. Now remove all spark plugs. Be sure to put them in a convenient place, so they will not be lost.

Sixteenth Year

Tuner for Missouri Valley College

Telephone 460

FRANK Q. T. UTZ

FINE PIANO TUNING AND REPAIRING

Res. 540 N. Jefferson Ave.

Albertson & Co.,
Sioux City, Iowa.
Gentlemen:

Marshall, Missouri, May 13, 1919.

Some time ago I purchased one of your Little Sioux Valve Grinders to use on my Ford car. After using it for some time on my own car and on my neighbors it began to turn very hard and I took the front plate off to oil it with graphite cup grease. The two little screws that hold the front plate on are stripped and will not hold since I took it off.

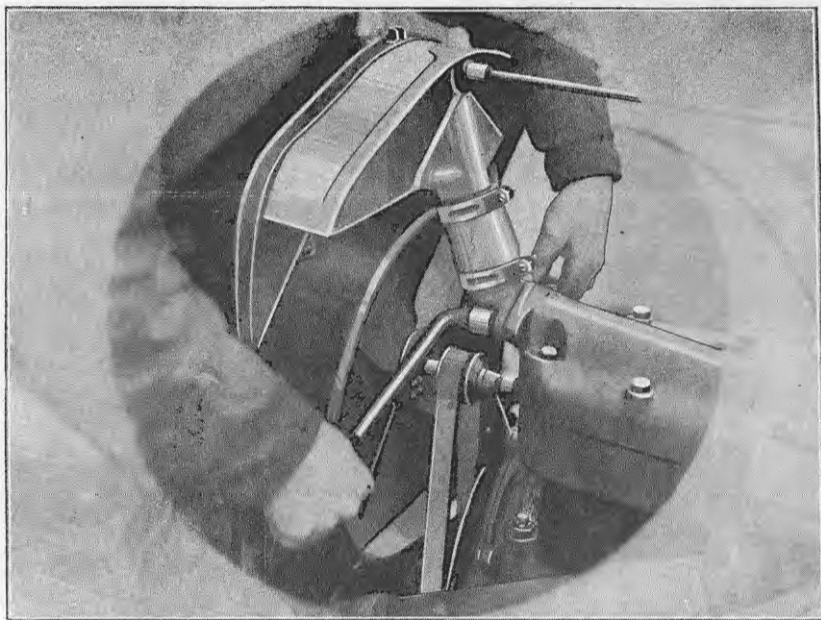
Please send me the two little screws that hold the front plate by return mail. I am enclosing six cents in stamps to cover cost and postage. If this is not sufficient let me know.

The Sioux Valve Grinder is sure a fine tool and makes the job very quick and does it right. In fact I have seen some of my neighbors grind their valves as good as an expert could. They were even surprised themselves. I believe that every car owner ought to do as much of his own work as possible. Then too it saves money. Since putting in the oil the little grinder runs easier than ever. It sure is a pippin.

Thanking you and trusting you will send me the two screws by return mail, I am:

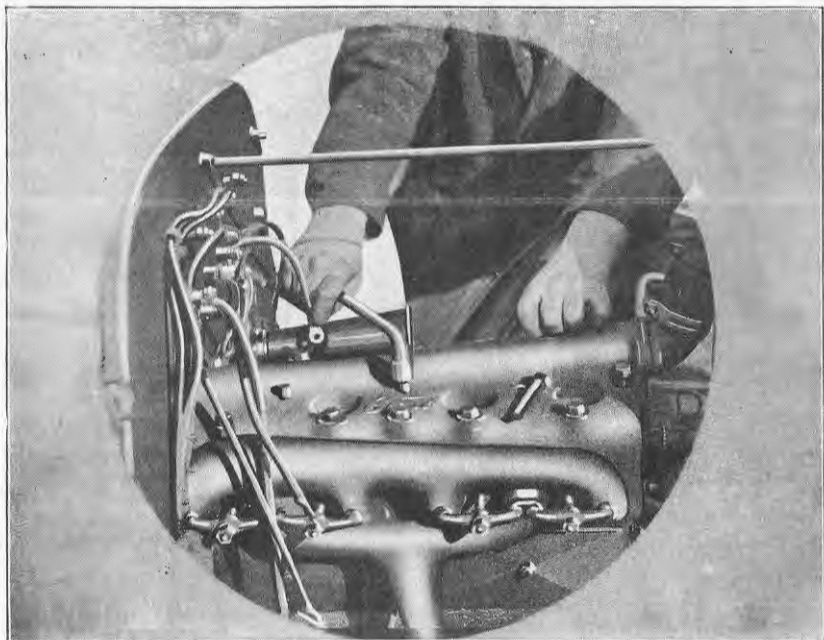
Yours very truly,

(Signed) FRANK Q. T. UTZ.

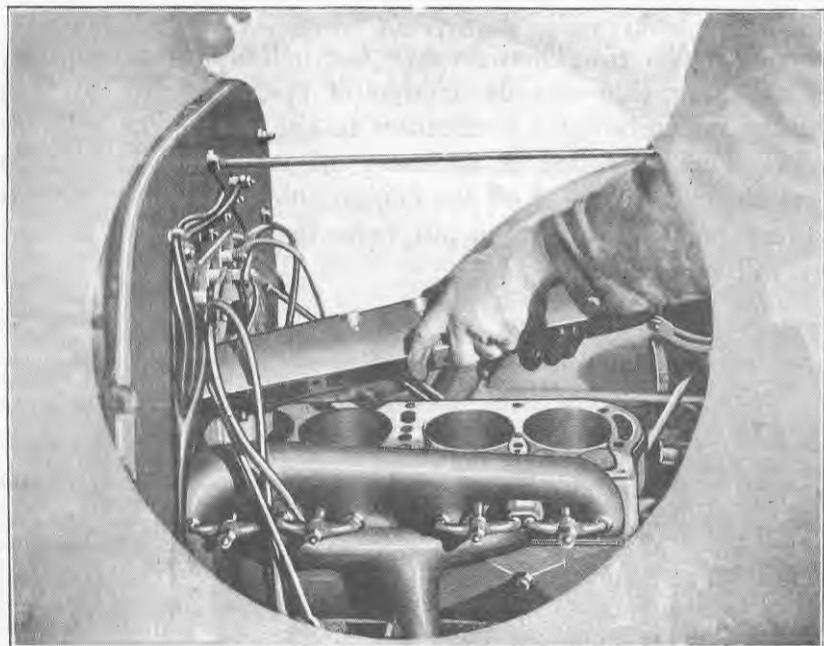


Operation No. 6

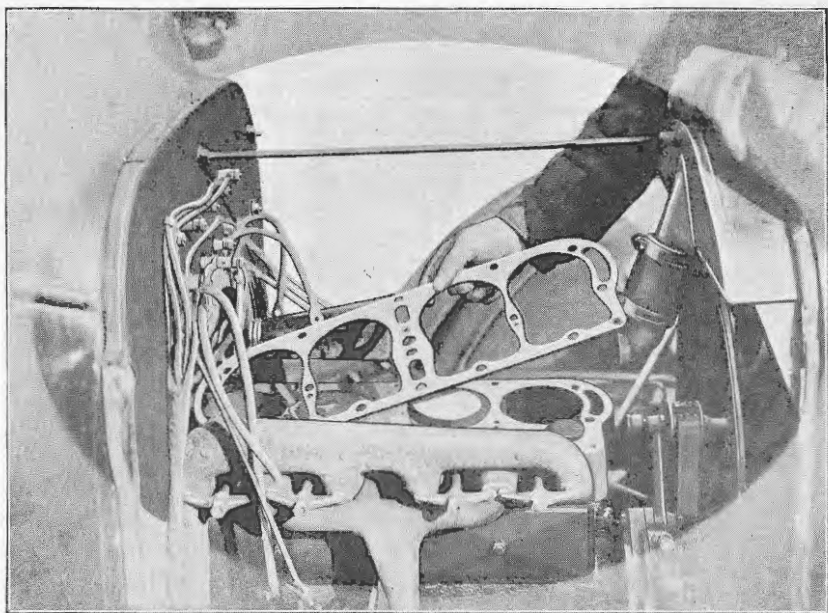
Operation No. 6. Then remove the bolts (two in number, one on either side—see illustration of operation No. 6) that hold the upper radiator connection to the engine (or cylinder head). This operation is necessary as it will be impossible to get the cylinder head off the engine unless it is disconnected at every point. Be sure to put bolts in a safe place so that they will not be lost.



Operation No. 7



Operation No. 8

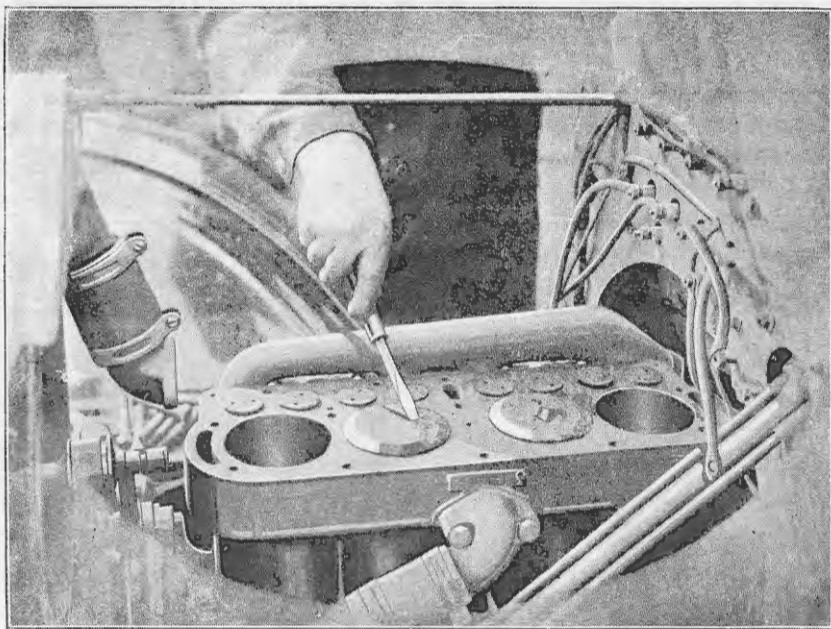


Operation No. 9

Operation No. 7. Now remove the cylinder head bolts (15 in number, as shown in the illustration of operation No. 7) so that you may easily take off the cylinder head. Put bolts where they will be easily found.

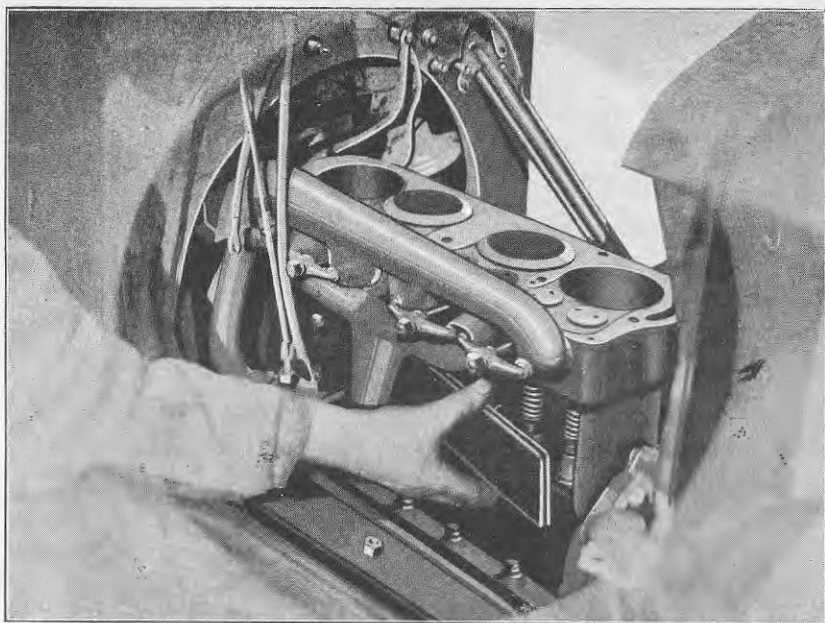
Operation No. 8. Then take off the cylinder head and put it in a convenient place out of the way.

Operation No. 9. Now remove the cylinder head gasket or packing. **Caution**—this gasket should be handled with care as it is easily damaged. In order to avoid danger of damage, it is best hung up on a nail out of the way.



Operation No. 10

Operation No. 10. Now remove with a screw driver all of the carbon on all of the piston heads (four large ones) and valves (the eight small ones). Be sure to brush the carbon off on the side so that it will not get back into the engine. The pistons come up in pairs, that is the center two will come up together and the two outside pistons come up together. After cleaning one pair raise the other two by slowly turning the crank and raising the pistons to a level with the top of the engine. Do not fail to remove all of the carbon from the tops of both valves and pistons.



Operation No. 11

Operation No. 11. Now loosen the nuts that hold the two valve doors in place and remove the doors. (Illustration of operation No. 11 shows the forward door being removed—the other door is immediately back or to the left of this one and on the same side.) Put nuts and doors in a safe place so that they will not be lost.

Albertson & Co.,
Sioux City, Ia.
Gentlemen:

January 15, 1920.

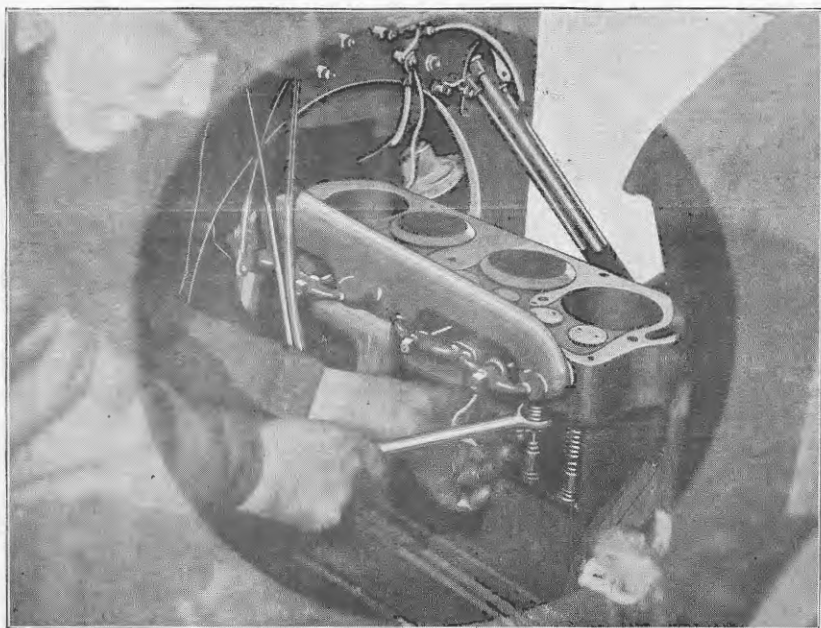
I have received your most wonderful Ford tuning apparatus I believe there is on the market. The Ford feels good after the operation and so does the driver that sits behind the wheel. It certainly don't take long to get it in good order with this outfit. I have tried it with the Little Sioux set of tools, it works like magic.

I hereby give you the names of the hardware dealers in town: Stark & Company, Hardware, Atwater, Minn., and Holm Bros., Hardware Co., Atwater, Minn., and Christensen Bros., Garage, Spicer, Minn., and Evandson Garage, Litchfield, Minn. That's all I know.

Yours truly,

OLAUS JOHNSON,
Atwater, Minn

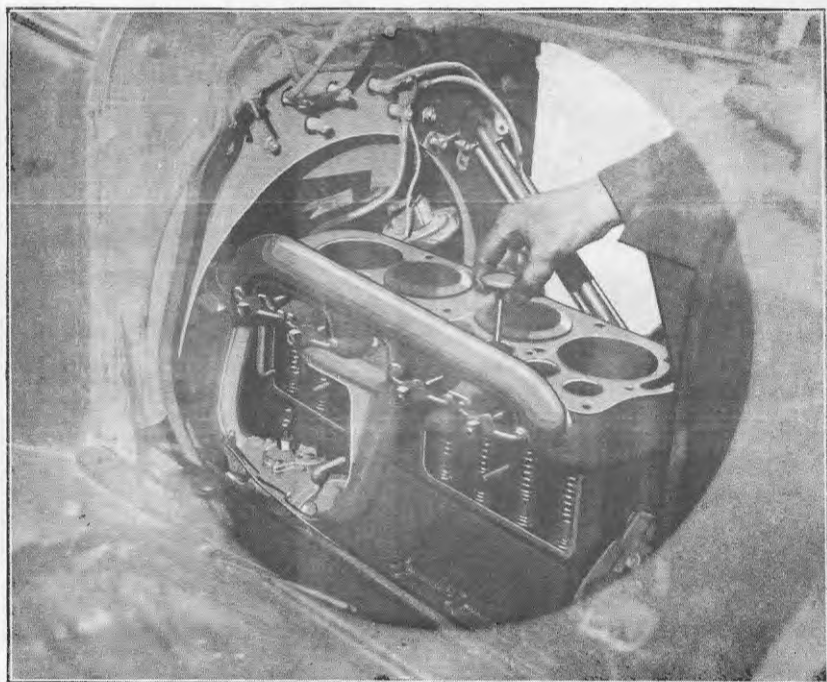
R 2, Box 3



Operation No. 12

Operation No. 12. Your next move is to compress each valve spring so that the pin which is inserted in the end of the valve may be readily removed. In turn compress each spring and remove the pins so that the valves may be taken out. After removing pins be sure that you put them in a safe place so that they will not be lost.

The simplest way to compress the springs is by the use of a fulcrum or hook, as shown in the illustration of operation No. 12 and a spring lifter. The spring lifter is placed beneath the spring and then in one end of the hook so as to pry up the spring. This method is also used to place pins back into the valves. The springs must sit on the pin, thus forcing the valve to close.

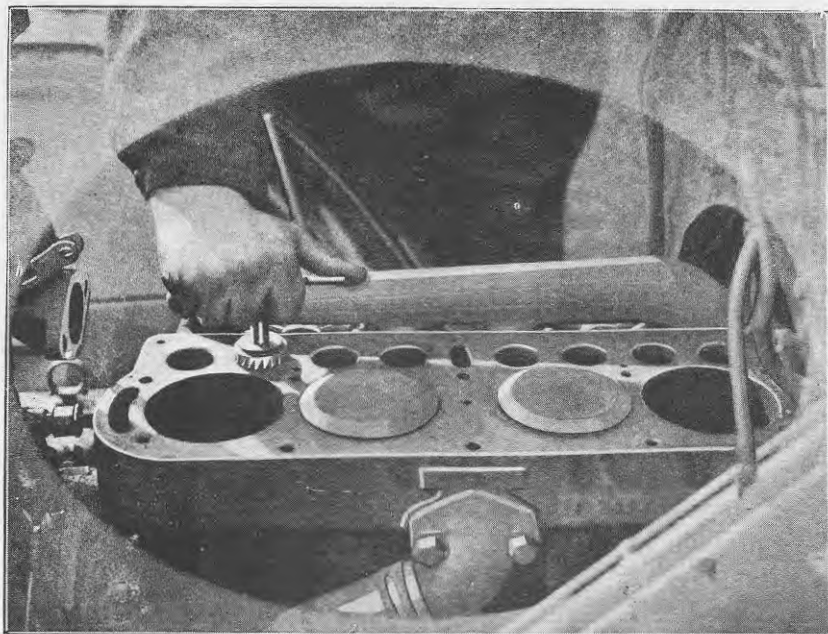


Operation No. 13

Operation No. 13. Now remove all of the valves and place them in a convenient and handy place.

After the pins are removed the valves can be easily removed without the use of a tool. Just lift them out, as shown in illustration of Operation No. 13.

Be sure and mark the valves as you take them out so you will get them back in the same place. This will also insure your grinding the proper valve to the valve seat.



Operation No. 14

Operation No. 14. The next operation is to ream out all of the carbon and burnt pits on all the valve seats. To do this insert handle in "Sioux Valve Seat Reamer" and insert Reamer into valve seat, turning the Reamer to the right only (do not turn backward as that will not only spoil the tool; but is apt to spoil the valve seat) and in this way cut out the carbon. The Reaming is finished when you have a smooth and shiny surface on the valve seat. In most cases a perfect job does not require more than three or four turns of the "Sioux Valve Seat Reamer."

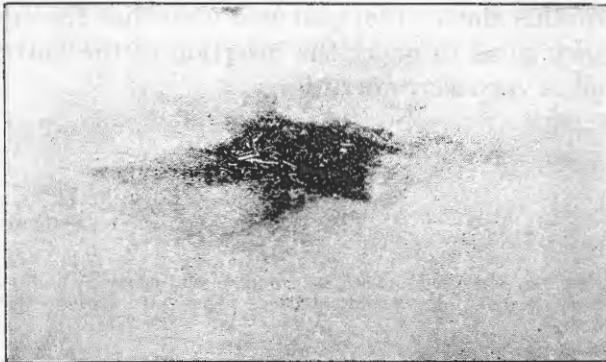
Watch this operation carefully and do not bear down hard on the Reamer, but use only a slight pressure, so as not to cut in too deeply. Anyone can tell by a glance when to stop. This operation requires just a little judgment. There are eight valve seats that must be reamed. A glance at them will enable you to judge just how much each one has to be reamed. In order that the valve may seat properly and thereby eliminate the loss of compression the valve face must sit in the valve seat snugly. The Reaming should not be done any oftener than every other grinding.

While photograph of Operation No. 14 shows the valve seats being trued as well as those that have been reamed out (The six valve seats nearest the dash board), photograph No. 14-A shows a close up of a valve seat before it has been reamed out and shows the uneven seat. It also shows how thickly the carbon forms on and around the valves and the pistons.

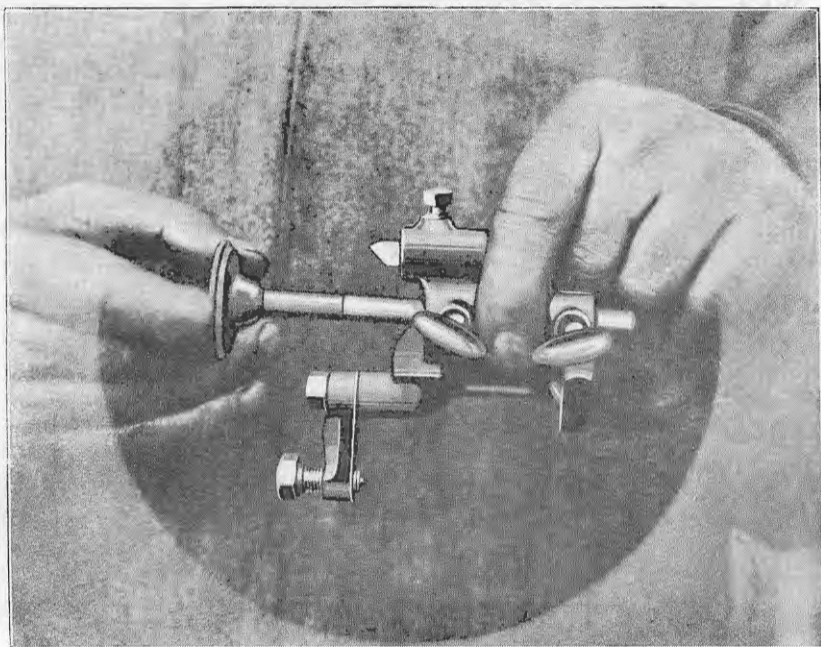
Photograph No. 14-B shows the small amount of cuttings it is ordinarily necessary to ream out in order to get a perfect valve seat.



Photograph No. 14-A



Photograph No. 14-B



Operation No. 15

Operation No. 15. You are now ready to reface the valves. Take the "Sioux Refacing Tool" and loosen the end screw so that the end piece can be dropped down and then insert the valve stem into the hole in the refacing tool as shown in the above illustration. In this illustration you will note that the end piece is dropped down so as to make the insertion of the valve into the refacing tool, a very easy operation.

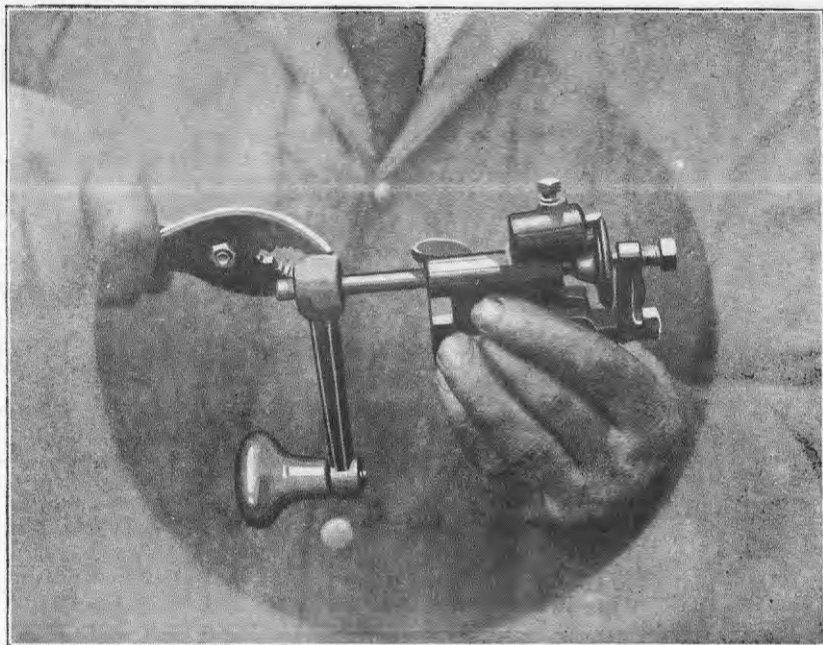
Albertson & Co.,
Sioux City, Iowa.
Gentlemen:

December 20, 1919.

I have received the Little Sioux Tool Set complete and in good condition. The free book is very interesting and very plainly written. The Valve Grinder is excellent, am much pleased with it.

I remain,

Mr. L. HUNT,
113½ Chebucto Rd.,
Halifax, N. S., Canada.



Operation No. 16

Operation No. 16. After you have inserted the valve in the refacing tool, raise the end piece and screw it up to the face of the valve, as shown in the above illustration. Do not screw it very tight, just sufficiently so that it will hold the valve in place against the cutting edge of cutting piece. In this way you can cut the valve face evenly. Give the screw a slight turn from time to time as you do the cutting or refacing.

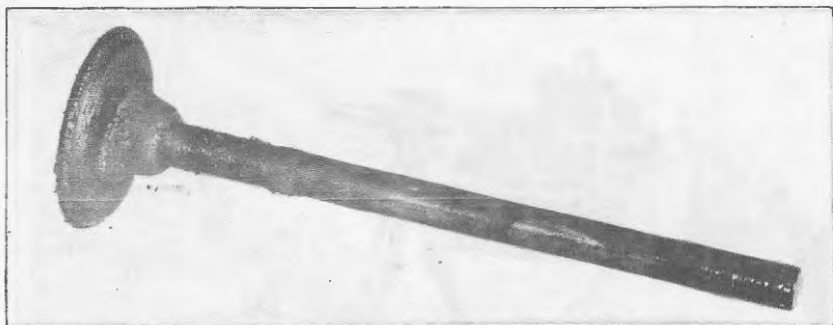
Now take the handle and place it on the valve stem, as shown in the above illustration and screw the set screw very tight so that the valve will turn with the handle.



Operation No. 17

Operation No. 17. Now tighten the thumb screws (the two screws shown on either side of the index finger in illustration of Operation No. 15). Do not tighten them too much—just sufficiently to hold the valve stem centered and so that the valve will turn easily.

Now turn the handle forward and carefully reface the valve on the cutting piece until it is perfectly smooth all around. During this operation it will be necessary from time to time to slightly tighten the set screw that fits against the face of the valve. This operation can be done by hand as shown or with the use of a vise as shown in photographic illustration number 18. When doing this be sure that it is done steadily and that no more cutting is done than is necessary to make the valve face perfectly smooth, and at the same angle all around. The cutting piece is anchored in the refacing tool at the proper angle.



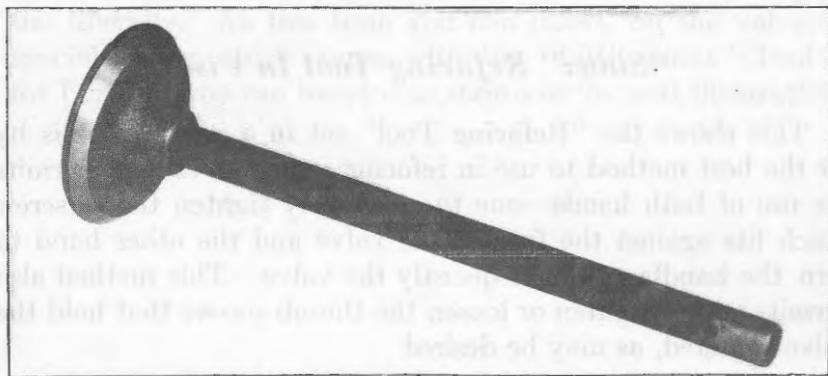
Photograph No. 17-A

Shows valve as it was taken out of the engine. Note carbon and burnt pits on valve face which makes it impossible for valve to seat properly even if valve seat were in proper condition. However, with it in the condition shown above and the condition of the seat shown in Photograph No. 14-A it is easily seen where the loss of compression comes.



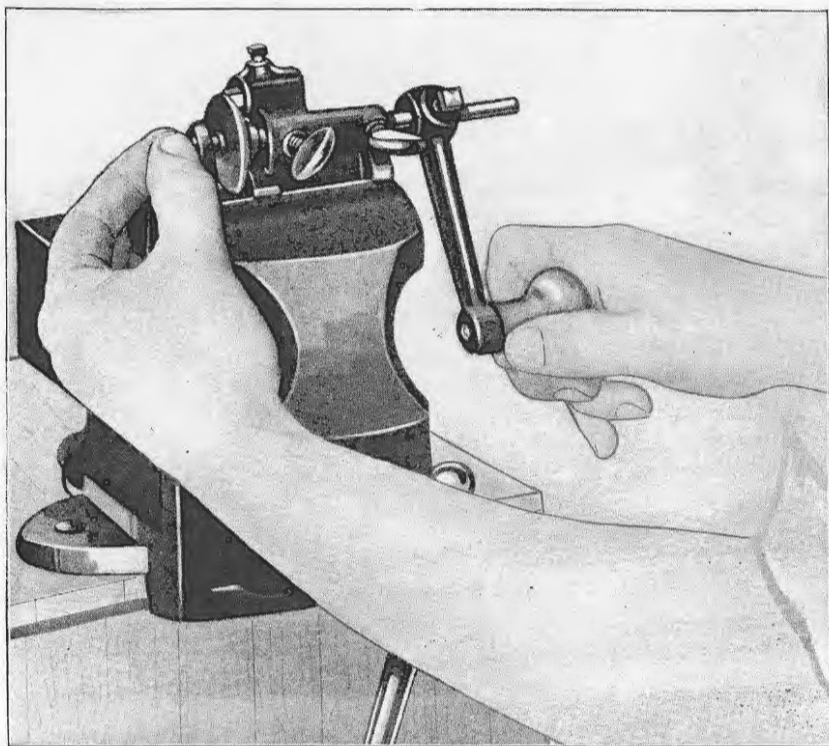
Photograph No. 17-B

Shows cuttings taken off this valve by method shown in photographs and operations Nos. 17 and 18.



Photograph No. 17-C

Shows this valve after it has been refaced by above methods. Note clean, perfect surface.

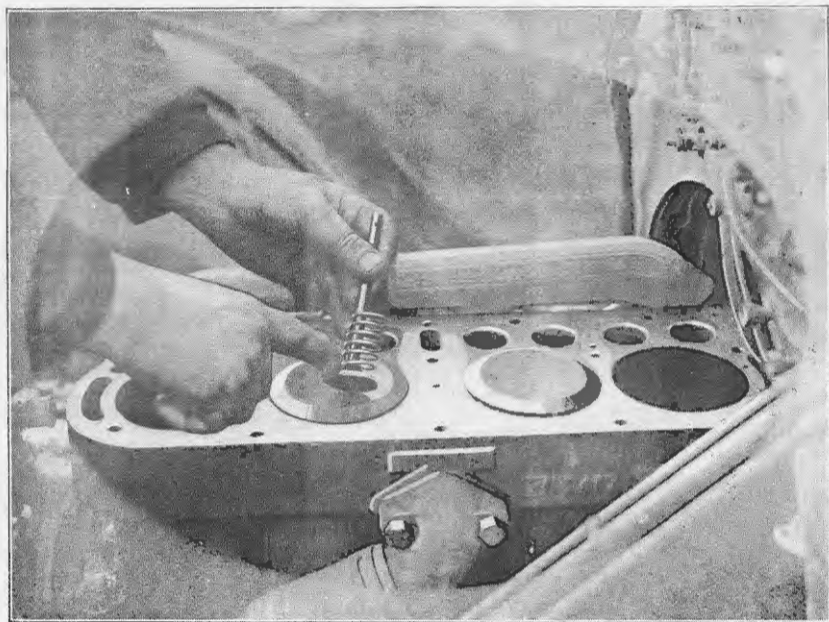


Photograph No. 18

“Sioux” Refacing Tool In Vise

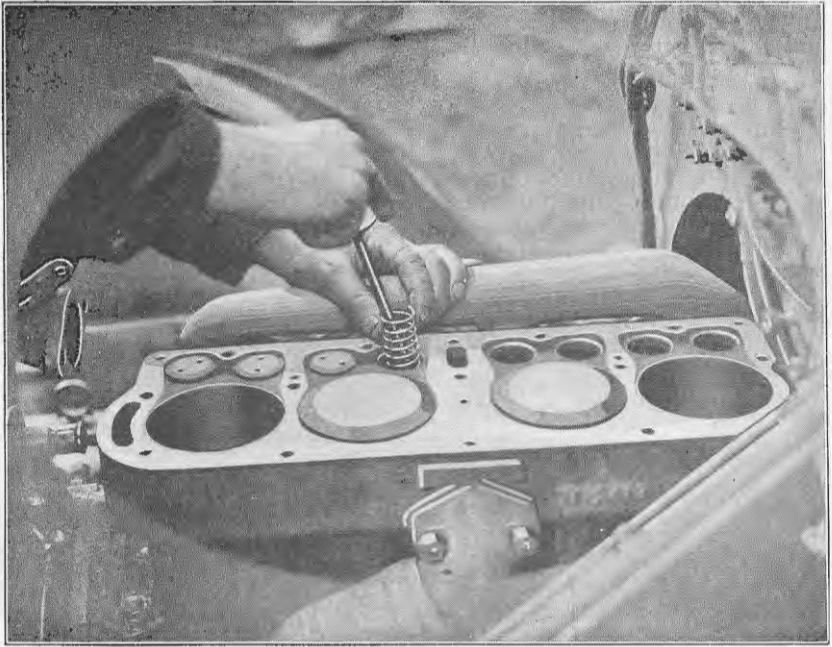
This shows the “Refacing Tool” set in a vise. This is by far the best method to use in refacing your valves as it permits the use of both hands—one to constantly tighten the setscrew which fits against the face of the valve and the other hand to turn the handle and consequently the valve. This method also permits you to tighten or loosen the thumb screws that hold the valve centered, as may be desired.

Whenever it is necessary to put in new valves it is advisable to “true” them up. This is easily done by the above operation with the “Refacing Tool.”



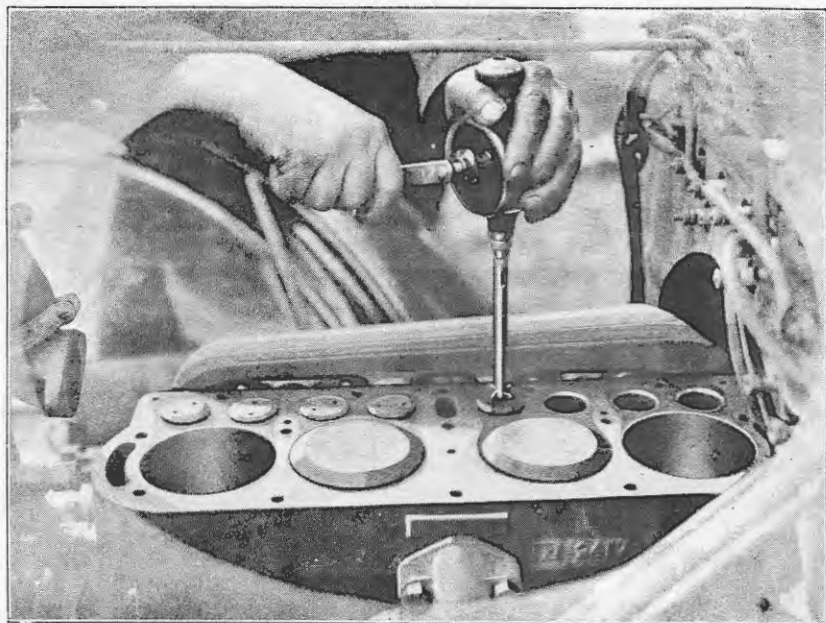
Operation No. 19

Operation No. 19. After refacing the valves, put a thin coat of the valve grinding compound on the face of each valve as shown in the above illustration. Do not use it too sparingly or too liberally. At this time you can insert, on the valve, the special spring which comes with the "Little Sioux" Tool Set for Fords or you can insert it as shown in the next illustration.



Operation No. 20

Operation No. 20. Now insert the spring and the valve in the valve hole as shown in the above illustration. Insert spring first and then the valve, letting the valve rest on the spring. When this operation is done the valve is ready to be ground as shown in the next operation.



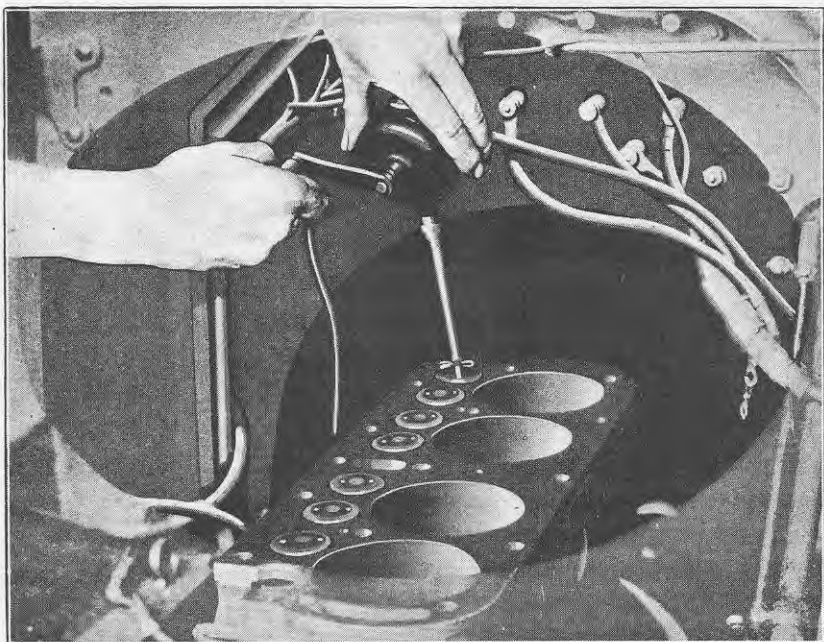
Operation No. 21

Operation No. 21. Put the handle on the "Sioux Valve Grinder" and insert the points on the stem of the grinder into the two holes in the top of the valve. Now turn the handle forward and at the same time press down firmly on the grinder so that the spring compresses and the valve face touches the valve seat. Then turn the handle in one direction and the grinder will turn the valve forward and backward and will grind the valve so that it will fit tightly in the seat. It is only necessary to turn the handle a very few times in order to have the valve "seat" perfectly.

While grinding the valve it is advisable to permit the valve to raise occasionally—this is called jumping.

After the grinding is completed on each valve, be sure and thoroughly clean off all the grinding compound from both the valve and valve seat.

To get the best efficiency from your motor it is advisable to grind the valves after having driven the car every 1500 to 2000 miles. Do not Ream out the valve seats except on every other grinding.



Photograph No. 22

Operation No. 22. This shows how easily the "Sioux Grinder" gets at the last valve. This valve is the hardest one to grind because of its location and it is almost impossible to do the job right with any other tool. It also shows how perfectly the valve sits in the valve seat after reaming out valve seat and refacing and grinding valves.

After all of the valves have been ground, the engine is again in prime condition and your next operation is to put it together again. Be sure, however, to remove the extra spring from the last valve ground and place it with your "Little Sioux" Tool Set for Fords.

IMPORTANT SUGGESTION

While there is no possibility of mixing the various bolts or parts because they can only be put on in their proper place, we would suggest placing each in their proper order as removed on a newspaper. In this way the first would be put back last and the last taken out would be put back first.

Putting Your Engine Together Again

The utter simplicity of the Ford Motor makes this a simple job. You can easily put it back together again by following the illustrations backward. To illustrate:

First Put back all valves in the proper valve holes (the eight small ones).

Second: Replace the pins in the valves by using the same method as shown in illustration of Operation No. 12.

At this point it is very important that the valves be timed with the pistons. The valves are the eight small ones and the pistons are the four large ones. If the valves are not properly timed the engine will not give full efficiency. By timing we mean the opening and the closing of the valves. If you follow these instructions you will have little difficulty in seeing whether the valves are properly timed.

The opening and closing of the valves with respect to the position of the pistons are as follows: Exhaust valves open when the piston reaches 5-16 inch before bottom center, the distance from the top of the piston head to the top of the cylinder casting measuring $3\frac{3}{8}$ inch. The exhaust valve closes at top center the piston being 5-16 inch above the cylinder casting. The intake valve opens 1-16 inch past top center or $\frac{1}{4}$ inch from top of cylinder to face of cylinder casting, the intake valve closes 9-16

inch past bottom center, the distance from the top of the piston to the face of the cylinder casting being $3\frac{1}{8}$ inch. (Exhaust valves are valves Nos. 1-4-5-8 counting from the radiator or front of motor, while intake valves are Nos. 2-3-6-7). Another way to distinguish the exhaust valves is by the accumulation of carbon on them.

The exact point of opening or closure of a valve according to the piston movement may be determined by applying a twisting tension to the valve head with the thumb and forefinger while turning the crankshaft slowly over. While the valve is closed, the fingers will be unable to turn the valve head, while at the opening point the pressure between valve and seat will be relieved and the valve head may be turned easily with the fingers. The point of closure may be found in a similar manner.

If exhaust valve closes before top center, it indicates that valve is too short and it should be replaced with a new valve, or you can secure valve adjusters from your supply house to fit over the end of the valve stem and make up for any loss in length. The same is true with the intake valve. (Short valves will close too soon and open too late.) If, however, either one should not close entirely at the point as indicated above it indicates that the valve is too long and it should be filed off very slightly at the end of the stem until it does close at the proper point.

The firing order of the Ford is 1-2-4-3.

Third: After replacing all pins in all valves and timing the valves, replace the valve doors and screw up nuts tightly.

Fourth: Carefully replace the cylinder head gasket in proper position. Refer to illustration of Operation No. 9.

- Fifth:** Replace cylinder head, being sure that it is put on correctly. This can be easily judged by comparing it with bolt holes.
- Sixth:** Now replace 15 cylinder head bolts and screw them down as tight as possible.
- Seventh:** Replace and tighten up bolts on upper radiator connection, so as to connect radiator with engine.
- Eighth:** Replace spark plugs, screwing them in as tight as necessary.
- Ninth:** Now replace wiring from battery to spark plugs. You can tell which wire belongs on each plug by the length of the wire, or by the mark you made on the wires before you removed them from the plugs. Then tighten screw that holds wire connection to the spark plug.
- Tenth:** Then replace the hood, fill the radiator with water, turn on the gas, crank it up and try the car out and see how much smoother it runs, how much more power it has, how the knocking and missing disappears. How much farther it will go on a gallon and how much cooler it runs. This is the result of removing the carbon and bringing the compression back where it belongs.

We also manufacture similar tools for any make of automobile, truck, tractor or gas engine.

If you are interested, write for booklet and full particulars. When writing state valve size, the make of car or engine and model. If possible send us a valve from the engine.

Albertson & Company

*Manufacturers and Patentees
Sioux City, Iowa*

¶ NOTE.—The operations as shown on preceding pages apply only to Ford motors and motors that have approximately the same valve size. In grinding other motors be sure and refer to your manual which is supplied with the car by the manufacturer.

