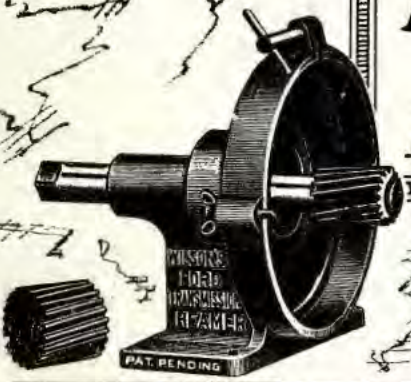
1926 CATALOG

K.R.WILSON TOOLS

K.R.WILSON
Originator

Special Tools for Ford Repair Shops ~ and a Book of Valuable Information for Ford Repairmen



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History of K. R. Wilson Tools

Flat broke, $3,000 in debt—but not discouraged—September 15, 1916, I started an exclusive Ford Service Station in an old barn at 1016 Main Street, Buffalo, catering to commercial cars almost exclusively. I had only a few small tools, no modern equipment, so I had to take the big jobs out to other shops, and, it was then I began to realize how crude their tools and equipment were. In trying to ream bushings in transmission drums they used expansion reamers, which were held in a vise, then the transmission drums were turned around the reamer with a big monkey wrench. They often cracked or broke more than half the drums which they tried to ream. The cost of these broken parts became quite an item, and my conscience would not allow me to put in new parts and "soak" the customers for them, as is still common practice in a great many repair shops (see cartoon page 30), so I decided to build a jig that would hold the transmission drums and support the reamers in perfect alignment, and which would centrally locate them with the drum so that this reaming operation could be accomplished with accurate and uniform results and eliminate the breaking of these parts.

I saved up my money and had a pattern made; then a set of reamers. This fixture was tested and was so successful that I sent out 100 post cards to as many Ford Agents in Western New York, asking them to bring in a transmission and let me overhaul it free of charge just to demonstrate the new machine. The response was instantaneous—more than 50 dealers brought in jobs within the next two weeks, and were so surprised at the ease of operation and accuracy of the job, and that it was done so quickly, that most of them wanted to buy a machine right away, because they too had had the same experience in trying to ream transmission drums with expansion reamers, or fit them by various other methods. Some of them pleaded for prompt delivery, but, because I hadn't the capital to go ahead and make them in quantities, I simply had to "stall them off," saying I had more orders waiting than I could fill in two months—and as a matter of fact I did have. Some of the customers suggested paying me in advance in order that they could get preferred delivery. I accepted their orders and they received delivery of their reaming machines within thirty days as promised. Thus you will see how my customers actually financed the first K. R. Wilson tool. From then on the business was self-supporting and during the next three years of wartime conditions I was able to sell more than I could make, because at times it was almost impossible to get steel to make these reamers.

In 1919 jobbers began to buy these tools and business picked up so fast that I sold out my Ford Service Station and contracted to have these tools made for me in quantities. Then I opened an office where I could handle correspondence and fill orders promptly. By January 1, 1920, I had accumulated a total capital of about $8,200.00, after squaring myself with the world. On January 3, 1920, while at the New York Automobile Show I made a very favorable contract with the Fairbanks Company, and for the next six months I had two machine shops and a foundry running day and night making K. R. Wilson tools to be shipped through that organization to all parts of the world.

On April 10th, 1920, I laid the cornerstone for a factory of my own, in my "old home town," Arcade, New York, to include a foundry and machine shop so that I could manufacture K. R. Wilson tools complete from the raw material to the finished product—thereby saving the profits which I had been giving to others. On August 3, 1920, my new plant was officially opened, but that was about the time that the business depression of 1920 set in. Orders were scarce, and consequently business went flat until May, 1921.

From the personal contact I had with Ford dealers and repair shops, and the large number of complaints I had heard, I was convinced that the equipment which had been forced on them by high-pressure selling methods was not right; it was crude, high-priced, and unsatisfactory to say the least. That lack of actual experience in Ford repair work on the part of the designers and manufacturers was responsible. Having had plenty of experience in repairing automobiles ever since automobiles were built, and having confidence in myself, I decided to get the true facts—to find out exactly what the Ford dealer or repair shop needed in order to turn out satisfactory repair work—so made up my mind to start at the bottom, to try and learn more than any other man had ever attempted to learn about re-manufacturing Fords; to delve into the "mysteries" which had gone unsolved and were costing the dealers real money in the way of come-backs and dissatisfied customers, and, with that "determination" as a target, I have been shooting straight towards it ever since.

I then proceeded to perfect the now famous "K. R. Wilson Combination Machine," which would incorporate all the necessary equipment to duplicate the same process of fitting bearings used by manufacturers of high grade cars like Pierce-Arrow, Lincoln, Packard, and hundreds of others, and at the same time build a machine so simple that any handy man could operate it; and at a price so low that every Ford agent and service station could afford to own one.

On May 2, 1921, the first K. R. Wilson combination machine was demonstrated to a large crowd of Ford dealers, who came in from hundreds of miles to Scranton, Pa. Twenty-two machines were sold the first two days. Another demonstration in New York City two days later sold nearly as many more. I got a flying start and orders came in so fast that I was absolutely swamped. Then my troubles began. My competitors, upset by the unexpected competition and the startling claims which I made for the K. R. Wilson combination machine in advertising matter, started all kinds of stories and rumors that the machine was no good, that it was too light, that it would not do what I claimed for it. Even some Ford engineers and service men, who had sponsored the sale of burning-in-and-out machines for "certain" friendly manufacturers, took exception to some of the statements I made, because the process differed slightly from their method, and therefore, these same engineers and service men could not very well come out and admit that the K. R. Wilson Combination Machine was as good, or better, than the other machines and equipment which they had "strong-armed" their dealers into buying, and which had cost their dealers about nine times as much for the same combination of equipment as was built into the Wilson machine. But soon after the Ford Motor Company acquired the Lincoln automobile, in which the bearings are so carefully align-reamed by a process identical with the K. R. Wilson process, they then adopted a "neutral" policy, and I have since received more or less cooperation.

January 1st, 1923, the Ford Motor Company of Canada adopted the K. R. Wilson Combination Machine in preference to any other equipment and have recommended it to their dealers ever since.

During May, 1923, I found it necessary to further increase my manufacturing facilities and I built a fire-proof assembly plant and warehouse. In June, 1924, further expansion was necessary and I constructed two more buildings, one of which I am using for a Training School for Ford mechanics. And, during 1925 the ever increasing volume of business had made it necessary to add two more buildings with several thousand more square feet of floor space (not shown on front cover page).

Now safely over the top with more than 2,700 Combination Machines in the hands of Ford dealers and service stations, including some of the largest dealers in the country, it is ample proof that the K. R. Wilson Combination Machine is all and more than I claim for it; that my competitors' propaganda was wrong; that most of their statements were lies made only to discredit this machine.

My low prices have saved Ford dealers thousands of dollars for equipment required in each and every service station, and I have given them a machine which up to this time has never been equaled for accuracy, speed, and high quality of work.

Recent improvements made on the Ford motors, such as re-inforced crankcase, transmission cover bolted to cylinder block, and a heavier crankshaft, will convince you that K. R. Wilson was years ahead of competition and absolutely correct in every statement I have ever made for the K. R. W. Machine; and I will let you be the judge as to whether or not my determination-to-win has been successful.

Now considering the fact that this business was started without capital; that I went through the battles of wartime manufacturing conditions from 1916 to 1919, and the hard times of 1920 and 21, and that single-handed I have battled more than twenty competitors (most of whom are now out of business), in less than four years I have built the largest and best equipped plant in the world for the exclusive manufacture of special tools for Ford repair shops—a plant so complete and highly efficient that I make all the profits from the raw material to the finished product and pass part of the saving on to my customers by way of low prices, while my competitors who get their goods made outside have to add their profits after two or three other profits have already been made.

I have been "boycotted" by a large number of jobbers who are not satisfied with a reasonable margin of profit, and who claim they will handle only such lines as pay them the most money, but I am glad to say that I still have a very large number of jobbers with me, who have found that K. R. Wilson tools offer so much more value for the money that it is more profitable for them to sell my tools than attempt to compete with them.

Now, Mr. Ford Dealer and Repairmen,

I solicit your business because I have proven the merits of my products in competition with others, and I hope that you will read this catalog through from cover to cover, as it will show you what K. R. Wilson has done for the betterment of Ford service.

Yours for results,
K. R. WILSON.

This Picture Has Been Drawn To Answer Thousands of Inquiries

Why haven't K. R. Wilson tools been exhibited and demonstrated at "The Clinics"?

I have never been invited to join that association — neither have I found it necessary to "call for help" to obtain business.

K. R. Wilson Tools are correctly designed, well made and worth the money. That is just why I am now the largest manufacturer of Ford Service Station Equipment in the world.

The balance of the story I'll leave to your imagination.

"Uncommon Common Sense"

In writing this catalog and book of information, I have set out to conquer every problem of the Ford Repairman—by the liberal use of *Common Sense.* I am sure that if you will read it through from cover to cover *you* will say:
"K. R. Wilson has done something for the industry"

Lesson No. 1

Just "mike up" a crank shaft, also a piston, and be sure to mark down these measurements so you won't forget. Then place them in a boiler, or any other receptacle, so that you can heat them up in water to the boiling point, which is 212 degrees Fahr. Now, assuming that the atmospheric temperature of the room in which you "miked" those parts was 70 degrees, it would prove that we had actually raised the temperature of the water and Ford parts only 142 degrees. Remove the piston and "mike" it as quickly as possible; you will find it has grown more than three thousandths of an inch in diameter, and the crank shaft more than one full thousandth larger.

Prominent automotive engineers claim that the temperature inside of a well limbered motor will average 280 degrees under normal operating conditions, and this, of course, is about 50% higher than the hot water test, therefore, the piston would grow four and one-half thousandths larger and the crank shaft one and one-half thousandths larger in actual operation over the size which they measured when you were starting to rebuild the motor.

Try this experiment yourself! It will change your ideas about rebuilding motors.

But, it is impossible to pass by the "limbering-up" period in a new or rebuilt motor, so that we are actually confronted with an abnormal condition under which the motor is trying to free itself, or wear-in. We get additional heat due to the friction of tight pistons, ring, cylinder walls, and crank shaft bearings. This additional friction calls for more gasoline to keep the motor turning. This abnormal condition is only temporary and lasts only during the "limbering-up" period, but while it lasts our normal temperature may be doubled or more.

If so, it is perfectly reasonable to expect the piston to expand twice as much, and the crank shaft to do likewise. If you have fitted your pistons with a clearance of say only two thousandths under normal conditions it would have to wear off another thousandth just to clear itself, and still more for lubrication. In doing this it became so tight no oil could lubricate it, and localized friction set in and expanded it still larger from the same cause. A look at the piston will prove that statement, and also convince you that while wearing off the piston you also did likewise to the cylinder—possibly wearing off as much during the first hour of limbering-up as you would wear off in a year of actual operation.

In the case of the crank shaft, it had expanded one and one-half thousandths under normal conditions, and doubled under abnormal conditions. What happened? Assuming bearings are stiff in the beginning, localized friction set in immediately and they heat up and become tighter; more gasoline must be burned to turn it over, hot oil splashing up inside the pistons gets hotter, then drips back onto the crank shaft, making it expand more and more. This means still tighter bearings, more friction, more heat and more expansion. The whole process keeps on growing abnormally until the peak temperature is reached. The crank shaft was expanding and revolving and pushing down the high spots on the babbitt bearings until at this peak temperature and under this abnormal condition the bearings make 100% metal to metal contact all over. Now, after the motor has stopped, even for an instant, the excessive heat and expansion has dissipated and the cause has been eliminated, and now an oil film around the pistons, bearing, etc., takes the place of abnormal expansion—then we get the normal condition.

From this explanation you will see that the greatest powers of mere man cannot prevent the pistons and crank shaft bearings from fitting themselves, so why waste a lot of time trying to twist a motor apart by putting it up so tight, then make it wriggle and wrench itself free?

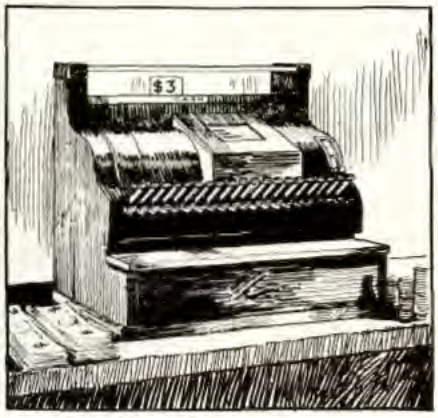
Throughout the following pages I have elaborated on every important operation pertaining to the remanufacture of Ford engines and have simplified the process to a point, where any ordinary mechanic, who will use uncommon COMMON SENSE and a few good tools, can overcome any obstacle and turn out repair jobs of the highest quality.

Learn To Read A Micrometer — *First!*

You Are Not A Mechanic Until You Can

A Micrometer to a First-Class Mechanic is Just as Important as a Battery is to a Flashlight.

Look at these pictures and read the following and you will see that reading a micrometer is just as easy as operating a cash register. Do It Now!



A Micrometer Divides the Inch into 1000 Parts

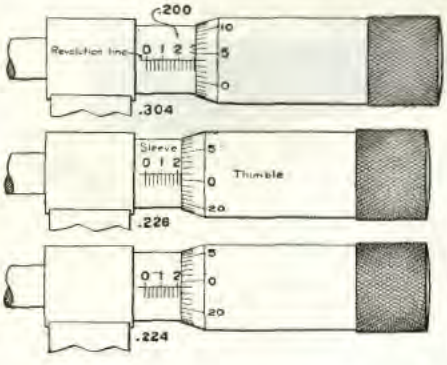
10.00	Equals 1,000	Thousandths or 1		Inch
5.00	Equals .500	Thousandths or	½	Inch
2.50	Equals .250	Thousandths or	¼	Inch
1.25	Equals .125	Thousandths or	⅛	Inch
.62½	Equals .0625	Thousandths or	1/16	Inch
.31¼	Equals .03125	Thousandths or	1/32	Inch
.15	Equals .015	Thousandths or	1/64	Inch
.01	Equals .001	Thousandths or 1		Thou.

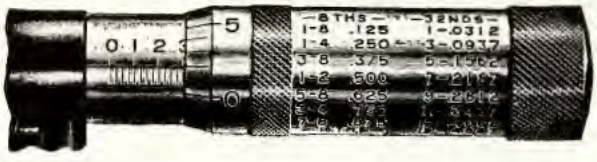
EXPLANATION—All standard makes of micrometers are made to measure in units of one-inch only, i. e. nothing to 1 inch, 1 inch to 2 inch, 2 inch to 3 inch, 3 inch to 4 inch, etc. The SPINDLE is laid out into 10 equal sections above the revolution line. Which would be similar in comparison to 10 one dollar bills. Each one of these ten sections is also sub-divided into four smaller sections each of 25 or 25c. The REVOLVING THIMBLE is also divided off into 25 sections per revolution. Now that the spindle is threaded 40 threads per inch it would require 4 complete revolutions to make a dollar, or forty complete revolutions to make ten dollars or one inch on the micrometer.

TO READ A MIKE—Look for the number of large divisions on top of the revolution line (or one dollar bills) then the quarter divisions or 25c pieces, then the number of thousandths on the thimble from the zero mark to the revolution line. The total of all these will give you the correct reading. The Spindle has a right hand thread. If we turn it clock-wise it will decrease and counter clockwise will increase the number of thousandths.

EXAMPLE—First spindle shows $3.04; second spindle $2.26; third, $2.24, or the same amount in thousandths of an inch.

How much is ⅜ths of an inch in thousandths? Answer, if ⅛th of a ten dollar bill is $1.25 then ⅜ths would be 3 x $1.25 or $3.75 or .375 thousandths. 13/16ths would be 13 x 62½c or $8.12½ or .8125 thousandths, etc. See table of decimal equivalents. Practice it.





Decimal Equivalents

INCH		INCH	
1/64	.0156	33/64	.5156
1/32	.0313	17/32	.5313
3/64	.0469	35/64	.5469
1/16	.0625	9/16	.5625
5/64	.0781	37/64	.5781
3/32	.0938	19/32	.5938
7/64	.1094	39/64	.6094
1/8	.1250	5/8	.6250
9/64	.1406	41/64	.6406
5/32	.1563	21/32	.6563
11/64	.1719	43/64	.6719
3/16	.1875	11/16	.6875
13/64	.2031	45/64	.7031
7/32	.2188	23/32	.7188
15/64	.2344	47/64	.7344
1/4	.2500	3/4	.7500
17/64	.2656	49/64	.7656
9/32	.2813	25/32	.7813
19/64	.2969	51/64	.7969
5/16	.3125	13/16	.8125
21/64	.3281	53/64	.8281
11/32	.3438	27/32	.8438
23/64	.3594	55/64	.8594
3/8	.3750	7/8	.8750
25/64	.3906	57/64	.8906
13/32	.4063	29/32	.9063
27/64	.4219	59/64	.9219
7/16	.4375	15/16	.9375
29/64	.4531	61/64	.9531
15/32	.4688	31/32	.9688
31/64	.4844	63/64	.9844
1/2	.5000	1	1.0000

Rebabbitt Every Motor Block

The Old Babbitt Is Impregnated with Grit and Metal Particles, Making An Abrasive Surface. Bearings "Just Tightened Up" As In Ordinary Practice, Will Soon Wear Out and Become Loose.

What Becomes of the Metal Particles

which wear off the cylinders, pistons, rings, transmission drums, timing gears and other parts? It becomes a saturate solution with the lubricating oil. Some of it goes down through the oil holes and is rolled into the babbitt linings. No repairman would ever think of wrapping a piece of emery cloth around a bearing, any more than he would recommend adding a few ounces of emery grit to the oil to help limber up a new or rebuilt motor. Yet he is doing something just as bad when he tightens up an old bearing instead of replacing it. Further proof of this statement can easily be had by thoroughly washing out an average engine with gasoline or kerosene, then measuring the amount of metal particles which settle in the bottom of the drainage can. I have often found two to four tablespoonfuls of such metal particles.

Old Bearings Are Always Out of Alignment

Invariably the center bearing is high (worn larger) making it necessary to cut down the front and rear bearings to the same levels. In doing this the cam gears are forced to mesh closer together. Often causing a disagreeable noise and an excessive side pressure on the front cam shaft bearing as well as the crank shaft bearing, which will eventually loosen them up before the timing gears have "worn in."

Rebabbitt Every Motor Block

then bore out and align ream them, leave nothing to chance. The cost of labor and material is cheap insurance for a job to be satisfactory. In fact, if you follow the K. R. W. Process you will find it cheaper to rebabbitt every block, then bore out and align the bearings and bearing caps simultaneously than to attempt to use any other method.

Ford Branches Will Supply Rough Babbitted Main Bearing Caps

3031 B Rear Bearing Cap
3032 B Front Bearing Cap
3033 B Center Bearing Cap

These numbers are taken from the wholesale parts price list. If you have any difficulty whatever in securing prompt delivery of these parts, advise us and arrangements will be made to supply you.

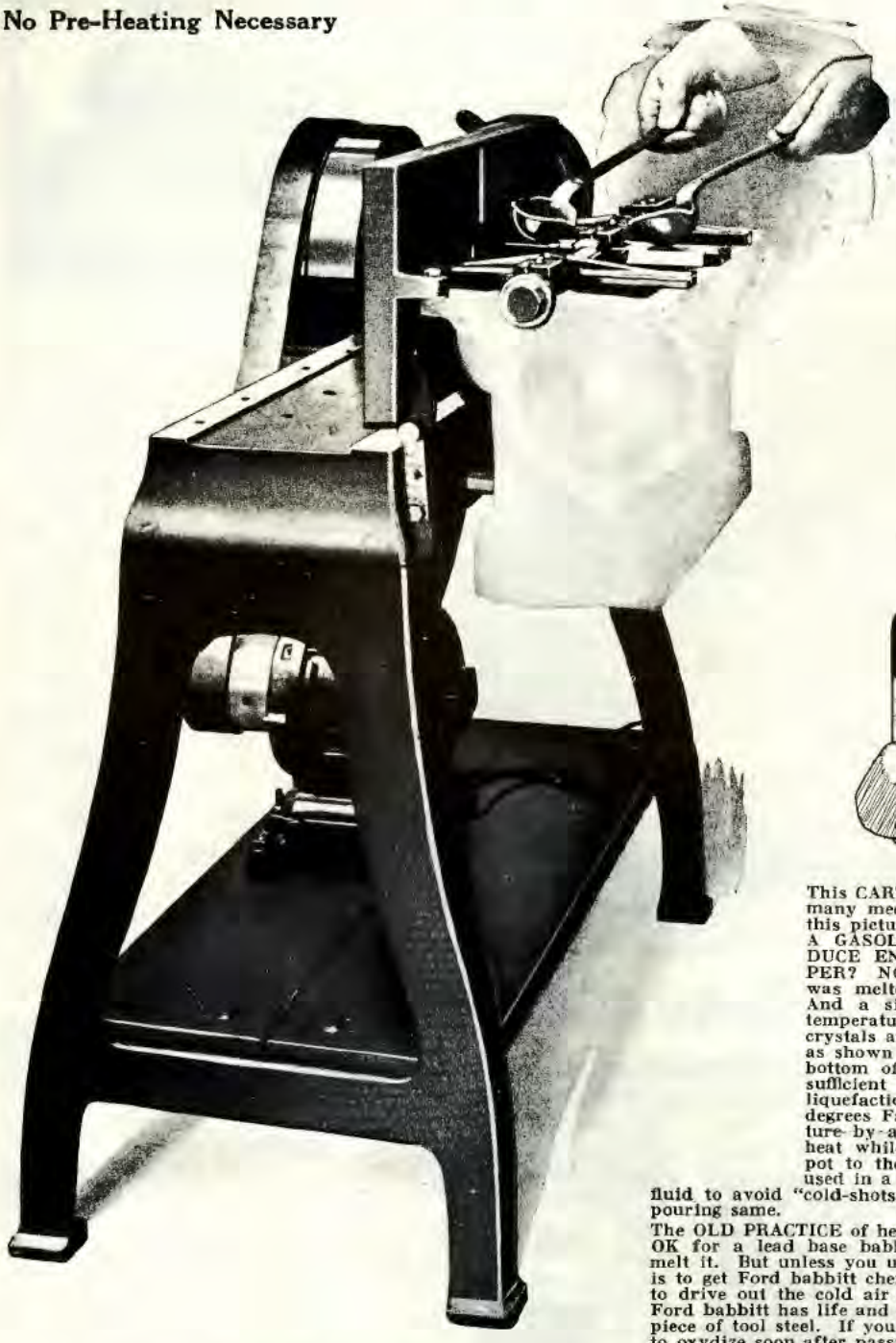
Prior to the K. R. W. Combination Machine becoming so popular there has been little or no demand on the Ford Motor Co. for rough babbitted main bearing caps. Therefore, many branches have not stocked them since repair work was discontinued by them.

At that time nearly every Ford branch was equipped with the same type of machine as used at the factory for boring out rough bearings and bearing caps simultaneously. (A cut of the machine is shown on page 9.

Rebabbiting Main Bearings With K. R. W. Babbitting Fixture

The First Operation in the K. R. Wilson Process of Re-manufacturing Ford Motors. This Babbitting Jig Also Casts the Fillets on the Ends of the Bearings, Saving 15 Minutes of Hand Scraping.

No Pre-Heating Necessary



Rebabbitt Every Block

It is cheaper to rebabbitt every block with the perfected K. R. W. rebabbitting jig, then bore out the bearings and rough main bearing caps into perfect alignment, than to attempt to use the old bearings. Perfect bearings are the foundation of every good motor and are secured only by following this process. (See next pages.)

Be Sure to Use Nothing But Genuine Ford Babbitt

And follow these directions closely, otherwise the rebabbitted bearings will not be of the same hardness and uniformity as the main bearing caps which you purchase from the Ford Motor Co. With the result that the wear will be uneven and most of it on that half of each bearing where the metal is softest and least resistant.

Genuine Ford Babbitt

CONTAINS { 86 Per Cent Tin
7 Per Cent Copper
7 Per Cent Antimony

This CARTOON has been made to show you the reason why so many mechanics are unable to pour perfect bearings. Study this picture carefully, then ask yourself this question. WILL A GASOLINE FIREPOT (Babbitt melting equipment) PRODUCE ENOUGH HEAT TO MELT THAT SOLDERING COPPER? NO it won't. But, a proportionate amount of copper was melted into the mixture when the babbitt was made. And a similar reheating will not effect it. Such a high temperature is not necessary due to the fact that the copper crystals are really held in suspension after once being melted, as shown by the little squares in the Photo-micrograph at the bottom of the next page. It is, however, necessary to have sufficient heat to bring the tin and antimony to complete liquefaction and the National Lead Co. says this starts at 765 degrees Fah. Therefore it is necessary to raise this temperature by at least 150 to 200 degrees to overcome the loss of heat while transferring the melted babbitt from the melting pot to the babbitting jig. On account of the thin bearings used in a Ford motor, the babbitt must be extremely hot and fluid to avoid "cold-shots," air pockets, and unfilled anchor pin holes while pouring same.

The OLD PRACTICE of heating babbitt until it would just char a pine stick is OK for a lead base babbitt, which requires a much lower temperature to melt it. But unless you use a thermometer or a pyrometer your next best bet is to get Ford babbitt cherry red, then pour it quickly and with force enough to drive out the cold air and gasses so that the bearing can completely fill. Ford babbitt has life and can be ruined in one melting. It is as sensitive as a piece of tool steel. If you heat it up slowly with a poor fire the tin will start to oxydize soon after passing the 460 degree point and quantities of dross will form on the surface of the babbitt which you naturally skim off. This effects the mixture to a very large degree and often more babbitt is wasted than is used for pouring bearings. If the babbitt is heated quickly to a cherry red color, then poured quickly into a cold block, using a cold mandrel or babbitting jig, it will completely fill the bearing and chill quickly and uniformly. The bearings will be of much greater hardness and uniformity of texture, than if poured into a pre-heated, slowly cooled block and babbitting jig. As illustrated by the two photomicrographs shown on the next page, which were sent to me by the chief chemist of the National Lead Co., makers of genuine Ford babbitt. Many mechanics who have had trouble pouring perfect bearings either try to avoid rebabbitting operations entirely or else go out and purchase other brands of babbitt that will melt at lower temperatures because it contains a high percentage of lead. They can pour it successfully and get "pretty" bearings. But, do they stand up? Those same mechanics should learn their lesson—use genuine Ford babbitt and get it HOT.

Read—What Ford Motor Company Service Bulletin Says!

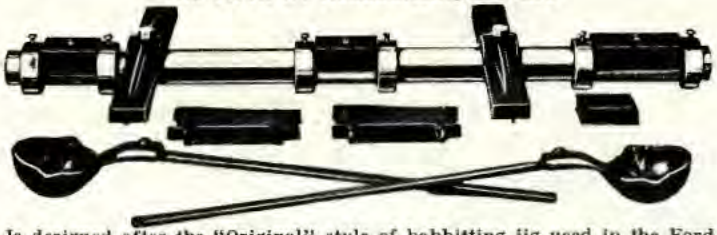
Better bearings can be poured at room temperature if babbitt is "hot." (Ford factory do not pre-heat). No skill is required to get perfect results with this simplified outfit.

"Pre-heating, according to Article 327, October, 1920, Ford Service Bulletin, results in a deposit of carbon on cast iron surface of bearing." Its insulating properties effecting the easy pouring of babbitt metal.

See Page 8 for a Real Babbitt Melter

Important Information — *The Answer to Your Rebabbitting Problems*

The K. R. W. Rebabbitting Fixture



Is designed after the "Original" style of babbitting jig used in the Ford factory. Except that the mandrel is supported in correct position by two cross arms instead of being suspended at each end in "V" ways. The adjustable collars are shaped so that they cast a round "fillett" on the end of each bearing, which prevents waste of babbitt and eliminates about 90% of the hand scraping operations. The cut-off blocks prevent the babbitt from gripping the mandrel and are just thick enough to cast a little ridge on the inside of the bearing as shown in Fig. 1 and 2. This ledge assists the mechanic in cutting off the sprues squarely with the cast iron surface of the bearing.

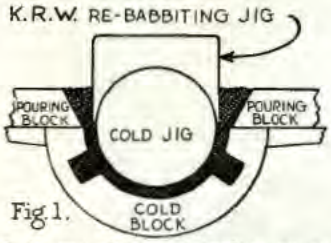


Fig. 1.

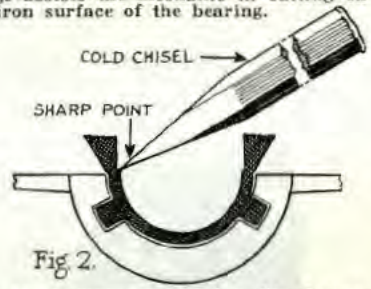


Fig. 2.

I do not claim originality or any great improvements for this fixture. But I have proven beyond a question of doubt, that to secure rebabbitted bearings of a uniform texture and hardness it is absolutely necessary to cast all three of them under identically the same conditions. The chief chemist of the National Lead Co. says that it is necessary to "chill" the bearings as quickly as possible to secure these results. The engine block and babbitting jig should never be preheated, nor warmer than room temperature. On account of the Ford bearings being very thin, it is necessary to have the babbitt thoroughly melted and well above the liquifaction point, then pour it quickly and with real force, from both sides of the fixture to insure filling the bearing completely and driving out the air and gasses, which cause bubbles, blow holes and coldshots. By using a fixture of this type the heat from one bearing cannot possibly effect the next one. So that all three bearings are cast just alike, as if we used three separate jigs for that purpose.

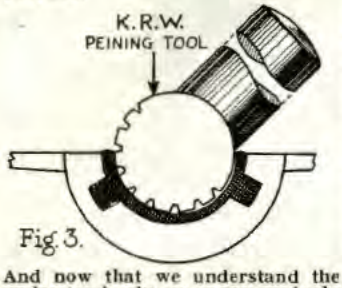


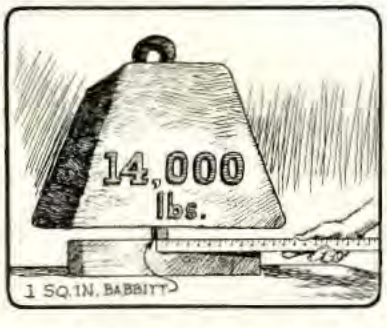
Fig. 3.

We must admit there is bound to be some shrinkage of the babbitt away from the cast iron surface as soon as it has cooled (See Fig. 2), because it is impossible to pour hot metal of any kind against a cooler surface and avoid it. I have designed the K. R. W. hand operated "peining tool" (similar to those used in the Ford factory) to stretch the babbitt lining enough to take up this shrinkage and make it fit tightly against the cast iron backing. This operation requires less than one minute per bearing and insures the job against bearing trouble (See Fig. 3).

And now that we understand the problem of shrinkage, it is easy to understand why so many main bearing jobs go wrong, unless they are first peined down tightly against the cast iron surface.

You wouldn't think of making the foundation for a building on top of the ground, then putting a house on top of it to make it settle, yet repairmen are doing something just as bad when they fail to fit the back of the bearing first.

Ford babbitt cannot be further compressed by burning-in or burnishing operations, if it has been poured properly and is free from blow holes, "pock-marks," etc., because it is already as "dense" as it can be made. Therefore, these operations are superfluous and apt to cause trouble, as shown in Fig. 5 next page.



National Lead Co. claim that one square inch of Ford babbitt will support 14,000 lbs. without compressing more than 2%, and there is certainly no time in the operation of a Ford motor where even a fraction of that amount is required, unless bearings are loose enough to pound.

A few months ago a K. R. W. Combination Machine owner wrote me that he was unable to pour good bearings with my babbitting jig. So he purchased one of the New Bullett-Mold-Type of rebabbitting fixtures and was getting "dandy" bearings. A few weeks later he wrote again that he was having all kinds of main bearing trouble and comebacks. I personally investigated and discovered the facts as described in the next column.

(Continued on Page 10)

Thousands of Ford agents and repairmen have been fooled, believing that the new Bullett-Mold-Type of rebabbitting fixture was superior to any other because it is so easily operated and produces the "prettiest looking" bearings you have ever seen. I therefore suggest that you rebabbitt a block, then saw a slot in the bottom of the bearings, and see how easily you can pick out either half with your fingers. This proves my argument on Shrinkage. Then look at the back of these bearings and see the "pock marks," blow holes, and unfilled anchor

Try It Yourself

pins, as shown in Fig. 4. Study the picture of filling the bottle—the air must come out to let the liquid in. In this type of rebabbitting fixture you have a similar condition. You pour the babbitt in through two large openings, each measuring 3x1¼ inches, and it must shoot through four small slots ½x⅛, which reduces the volume about 28 to 1. How can the air and gasses come up through those slots and two or three inches of babbitt, while it is going in with such force? The "pretty looking" bearing you get is due to the babbitt fixture getting hot, as it absorbs the heat from the large quantity of hot babbitt poured

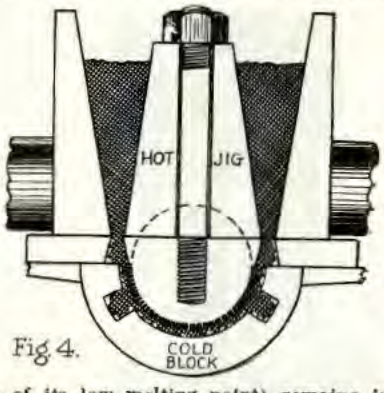
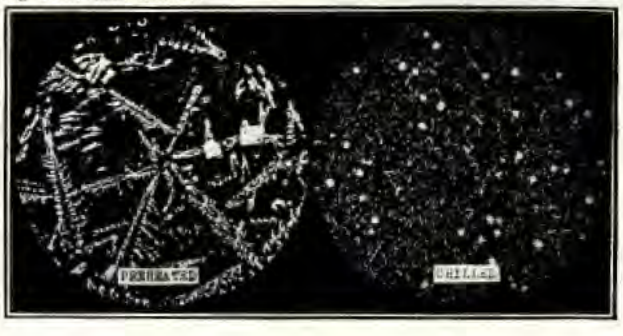


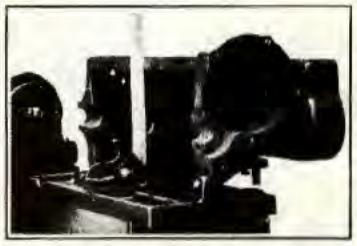
Fig. 4.

into it. The tin (on account of its low melting point) remains in a molten condition long after the copper and antimony have set, and leaves that wonderfully smooth surface you ADMIRE, as indicated by the black marks in Fig. 4. This condition is much worse than preheating blocks and mandrels, for the fixture gets HOTTER as it goes from one bearing to another, and the result is three different bearings which vary in texture and hardness almost as much as shown in the two photomicrographs. It is, therefore, impossible to pour a chilled bearing with this fixture.



Setting Up To Rough Align-Bore Rebabbitted Bearings

Babbitt Frame Is Rigidly Fastened to the Crank Case End of Motor Block on All Four Corners. False Cam Shaft Insures Perfect Gear Centers.



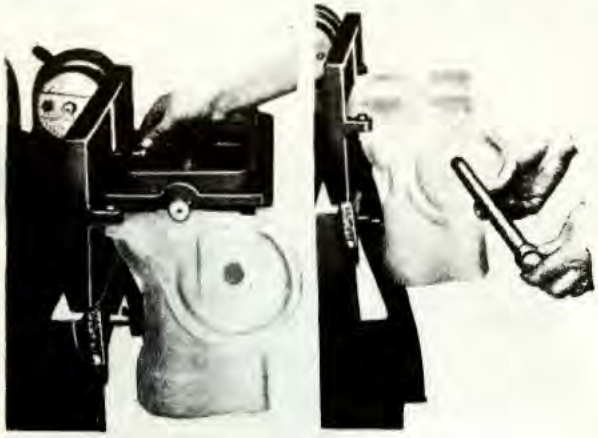
"Square the Block"

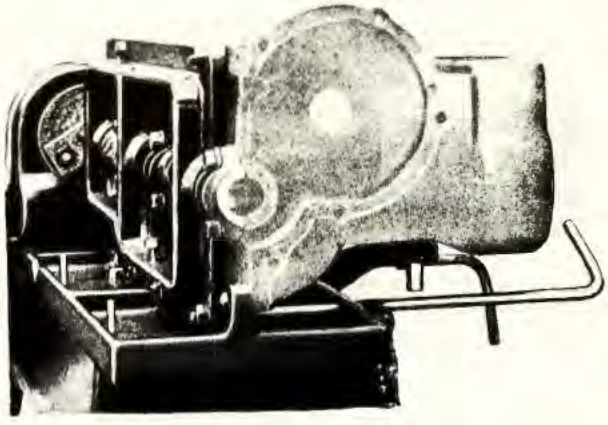
It must be exactly at right angles with the bed plate. This insures perfect alignment thruout all other operations. Now tip the block over to the position as shown below and insert the false cam shaft, then place the babbitt boring frame in position with the brackets resting lightly but firmly against the false cam shaft. This adjustment is made by the knurled screw shown near the center of the boring frame. Do not force this screw for too much pressure will raise the frame away from the cylinder block and after the bearings are bored out, cam gears will not mesh deep enough.

Now fasten the boring frame in place with the four special speed wrenches as shown here and on page 9. Then place the rough babbitted main bearing caps in position and bolt down securely (use W. G. QD Bolts to save time). Then the bed plate can now be tipped back on to the machine bed, where dowel pins will line it up perfectly, attach universal joint, throw in the feed lever and 3½ minutes later the job is finished and the boring frame can be removed ready for the align reaming operation.

Recent Improvements

A small diameter boring bar fitted with non-adjustable "fly-cutters" which are pressed into place, then accurately ground between centers. This eliminates all adjustments and the possibility of mis-alignment due to boring the bearings of different diameters. Shape of the cutter has been changed slightly to deflect the chips. Boring bar is instantly removable. (See picture Page 14). These improvements licked another problem—rough caps with too much babbitt in them.





Important Accessories That Insure Good Bearings

Babbitt Melting Equipment

"That Melts"

W-32 Price $11.00

Complete with Metal Pot

Shipping Weight, 20 Lbs.

The latest improved WILSON-TURNER babbitt melting furnace combines more real improvements than any other equipment now on the market. GUARANTEED to heat Ford babbitt hot enough to pour in 6 to 8 minutes. Orifice in burner is so designed that it shoots more heat than 5 average plumber's combined. Specially designed metal pot prevents spilling and maintains uniform space all the way around it. The flame is so intense that it actually comes together again over the top of metal pot thereby preventing the air getting to the surface of the melted babbitt and oxydizing it as is the case with most melting equipments. Tank is heavy drawn steel with welded bottom. A real pump that is not only effective but fool proof. With this outfit it is possible to melt babbitt so fast that practically no scum forms on it and the actual saving of babbitt will pay for it in a few months. I have made the price extremely low, to make you want the best melting outfit made and thereby get results in rebabbitting bearings.

F. E. MAC COLLUM, ELBRIDGE, N. Y. (FORD AGENT)—We have rebabbitted and re-bored a great many blocks with your machine and it has given us perfect satisfaction. Oct. 4, 1923.

HOLMES GARAGE OF CARTERVILLE, INC., CARTERVILLE, ILL.—We have been using K. R. Wilson Combination Machine for three years and find it O. K. in every respect. Sept. 28, 1923.

Pein Every Bearing

"Ford Does It"

W-27 Price $2.50

Shipping Weight, 3 Lbs.

Rebabbitted bearings must be peined to make them tight. Red-hot babbitt must be poured to make good bearings, and it shrinks away from the cast iron backing as it cools (see page 7 Fig. 2) resulting in a loose bearing unless the babbitt shell is swaged down tight to exactly conform to the rough cast iron bore and to eliminate the air pockets on the back side of the babbitted bearing shell. The K. R. W. peining tool is just like they use at the Ford factory, except that they use a pneumatic hammer to get high speed production. But this hand-hammer driven type will give you the same results.

The body of this tool is accurately machined, pack hardened and ground to exact size. The handle is cold rolled steel screwed into it. The indirect cost of one loose bearing will pay for several of them.

Genuine Ford Bearing Metal

Made by the National Lead Company

80c per lb. Lots of 20 lbs. or more

(Subject to change without notice)

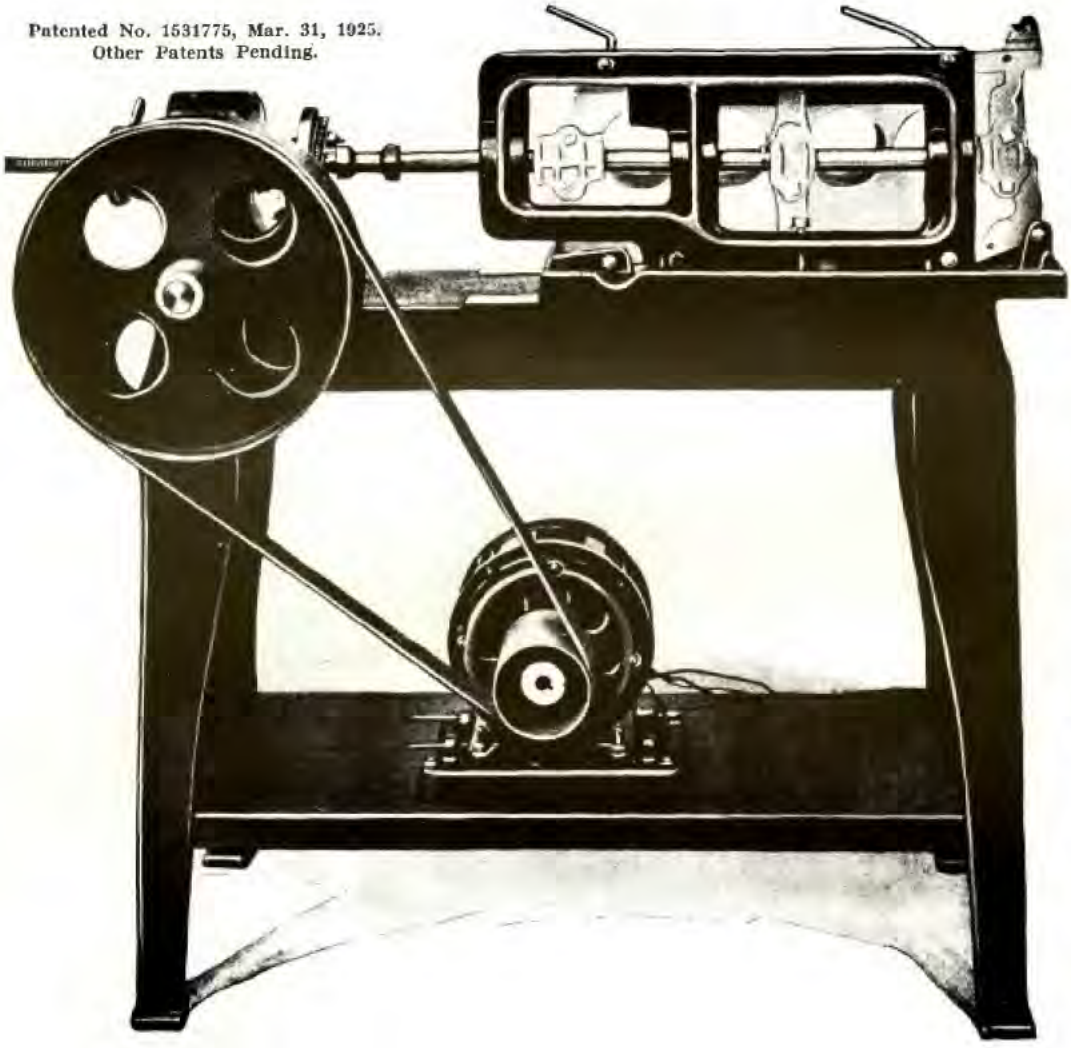
I handle this babbitt for accommodation only and would prefer that you purchase it direct from Ford branches or branches of the National Lead Co. My only interest is to see that you get going right. USE GENUINE FORD BABBITT and PERFECT BEARINGS WILL RESULT.

TRAIL GARAGE, TERRY, MONT. (FORD AGENTS)—We turn out some very nice work with your process and are perfectly satisfied. I will highly recommend your machine. Oct. 4, 1923.

Rough Boring Main Bearings with Assembled Caps

A Three and a Half Minute Operation Saving Hours of Hand Fitting. Bearings Are Bored Out Just Large Enough to Fit the Pilots of the Aligning Reamer. "Applying Factory Methods"

Patented No. 1531775, Mar. 31, 1925.
Other Patents Pending.



The Most Important Operation of the K. R. W. Process

I am sure that after you read what I say on this page, then "reason" with my arguments for perfect alignment, on pages 23-24-25-26-27-28, you will agree that this is by far the most important operation in the process of re-manufacturing a Ford motor.

Rigid Construction

The K. R. W. babbitt boring fixture is much heavier than any other babbitt boring device on the market, and being bolted directly to the motor block further increases its rigidity. THIS eliminates any possible argument (on the part of competitors) that it is "too light." It is accurately located in line with the power driven head, and is connected by means of a special double acting universal joint, which prevents any side thrust—a common occurrance with outfits operated by hand or with an electric drill.

Power Operated

This conserves man power and does the work better and cheaper than it can be done with any portable machine. The operation is completed in 3½ minutes, with no other effort, than setting up, on the part of the operator. Mechanics like it!

Compare the Cost

Compare the costs of portable machines—a babbitting jig, a hand boring fixture, an electric drill to operate it. A similar amount of money applied towards a K. R. W. (Power Operated) Combination Ma- and it's half paid for, to say nothing of the other valuable features of this machine.

Use Rough Main Bearing Caps

Ford Motor Co. Use Them—Why?

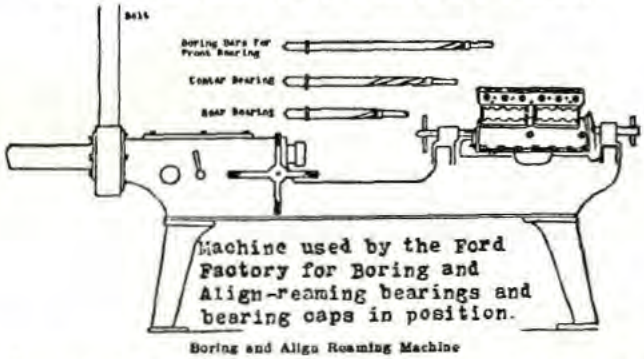
It is practically impossible to secure perfect alignment of all three main bearings unless ROUGH BABBITTED MAIN BEARING CAPS are used, then the re-babbitted bearings and bearing caps bored-out and align reamed to size. Look at this picture, then you will understand why it is impossible to turn out a good job if you just re-babbitt the block, then "fly-cut" that half of the bearing. After which you try to use the regular Ford replacement cap. Finished main bearing caps will register in a similar manner to this exaggerated picture on more than two-thirds of the motor blocks. A REMINDER—A few thousandths "off-set" at this point will force the crankshaft out of alignment when burnishing or limbering-in, although a "spotting-in-bar" might show the rebabbitted "fly-cut" half of the bearings to be perfect before the job was assembled.

Ford Can't Do It, Can You?

The average Ford repairman believes he can, but the mechanic who has investigated and "checked-up" the alignment with a spotting-in-bar will acknowledge his defeat. In Canada it is impossible to buy a motor block unless bearing caps and bolts are attached, just as they were bored out in the process of manufacture.

Again I Say. "Try It Yourself"

The K. R. W. Process Follows Out Identically the Same Methods Used in the Ford Factory by the Ford Motor Co.



Boring and Align Reaming Machine

The bearings and bearing caps are bored-out simultaneously to approximately 1.242 or just large enough to receive the pilots of the main bearing reamer. This leaves 5 to 8 thousandths of metal to be align-reamed in finishing the bearings. The pilots of the reamer automatically align the main bearing caps while they are being bolted down for the final finishing operation. This prevents any possible shifting of the cap. The finished bearings are mirror-like and more accurate than can be made by any other known method. It is the same process used by almost every motor manufacturer in the country.

For Rough Main Bearing Caps, See Page 5

Here's Where the K. R. W. Process Proves Its Accuracy

The K. R. W. Process Is Simple and Easy To Understand

Up to this operation it has not been necessary to consider the crank shaft. The bearing and bearing caps have been align-bored simultaneously just large enough to take the pilots of the align reamer. But NOW we must "check-up" on the crank shaft we are going to use. IF A NEW ONE—for nicks, bent flanges and the exact diameter of each bearing. IF AN OLD ONE—for bends, twists, cracks, bent flanges, out-of-roundness and undersize. Following the K. R. W. process it is customary to "mike" the bearings first as this often eliminates some of the other tests and saves time.

If a new crank shaft checks perfect in every way as above described and each main bearing measures exactly 1.248 (standard size). Then it is simply a matter of placing the reamer in position, fastening down the main bearing caps and align reaming them. BUT, if there is some variation in the diameter of all the main bearings, then this must be taken care of by adjusting the main bearing caps with Ford shims to ream to one standard size then with shims removed, the caps are pulled down that much closer to the bearing proper, as shown in Fig. 4 which is a highly magnified drawing and made for the purpose of stretching your imagination to the limit. The slightest difference in diameter of these three main bearings is worth taking care of when you consider the long life and satisfaction from the finished job. I will use measurements of an old crank shaft to show you how easily adjustments are made for the slight variation in the diameters of new or used crankshafts.

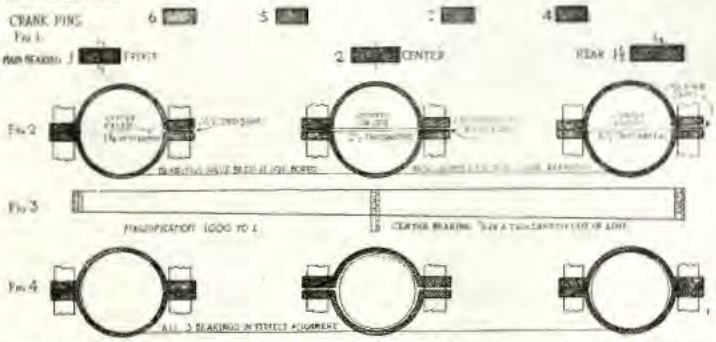


Fig.1 represents the undersize diameter of the 4 crank pin bearings which your micrometer would measure as 1.242, 1.243, 1.245, 1.244 or when mentioned as undersizes would be .006, .005, .003, .004. But being just crank pin bearings this variation does no harm as each connecting rod can easily be adjusted to its respective crank pin. When a crank shaft shows considerable wear, say .006 or more as in the case of this front crank pin, then it should be measured for out-of-roundness, and if found to be out-of-round on any bearing more than .0005 should be thrown away as unserviceable. For that man does not live, who can make it stay tight. (See Fig 7). This statement does not mean that you cannot fit a crank shaft by the K. R. W. process that is worn more than that or that you must discard crank shafts worn five times as much. It is only a suggestion that will save you money and give your customers a satisfactory repair job that will stand up and render long service, without causing trouble. I have often heard remarks like these: "We burn-in crank shafts that are .003 to .005 out-of-round." "Our customers won't stand for a new shaft unless the old one is broken." And I know some repairmen who secure most of their repair parts from junk yards and second hand stores, too. But that doesn't mean anything because the class of work they turn out is so rotten is speaks for itself. One look at Fig. 7 will convince a schoolboy that a single revolution of an out-of-round crankshaft will make the babbitt lining as large as its largest diameter, and after that the eccentric or cam shaped bearing will act just like a rotary pump and squeeze most of the oil out of the bearing, so that an unbroken oil film cannot be maintained; the result is insufficient lubrication and rapid wear. A short lived and expensive job at its best. This example proves that regardless of what process is used in fitting bearings, you cannot overcome that obstacle, and I am sure you will find it cheaper in the long run to install a new shaft to replace any of those worn out-of-round more than .0005 on any bearing, than to attempt to use a bad one that will cost more time and money to fit and is sure to cause trouble. Your customers WILL stand for it just as soon as you "sell" them on the idea. Use these pictures to argue the case if necessary. Then when a job is turned out, your customer is satisfied and a booster, instead of being dissatisfied and a "knocker" and don't forget that come-backs absorb profits you make on other jobs. MAIN BEARINGS ARE MOST IMPORTANT and if you discard all crank shafts with crank pins worn more than .0005 out-of-round then you will seldom find a main bearing on a serviceable shaft that is worn more than from 1 to 3 thousandths, and usually much less than this amount. In this diagram I have shown an average with crank-pins being worn up to the limit. So I'll use this for an example to explain the ease with which main bearings can be fitted.

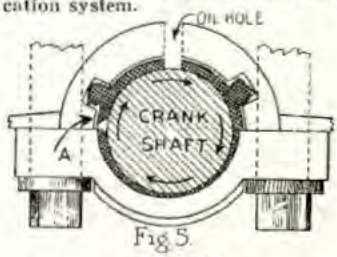
It should be understood however, that the center main bearing usually shows the greatest amount of wear, this is due to the fact that it has a piston rod assembly on each side of it, while the front and rear bearings have only one piston or power impulse to throw them out of line, also due to other conditions such as mis-aligned main bearings and bent crank cases, bent crank shaft flanges, etc., which would tend to throw the crank shaft sidewise and produce a "whip" on the center main bearing. In the example I have used, the front main bearing is worn .001 undersize, center .002, rear .0015. Now we place the align reamer in position with the pilots in the align bored bearings. In the case of the front bearing—put one Ford shim under one side of the bearing cap. (A standard Ford shim measures .0025). Therefore by using only one shim under one side, it has raised the bearing cap only half that amount or .00125 at the center of it. We are still "out" ¼ of .001 but that is easy; on tightening up the main bearing bolts of that bearing we just omit the last "grunt" of the wrench on one of them, which allows the bearing to be pulled down a little tighter after being reamed and the crank shaft fitted, thus making up the difference. The CENTER BEARING requires two shims—one on each side of it, this raises the cap .0025 or .0005 too high, so we pull down both main bearing bolts snug enough to prevent the cap from shifting, and so on with the same process for the rear bearing. The machine is started and in 3½ minutes the bearings have been reamed to a mirror finish and all 3 in perfect alignment, then the "filletts" are cut away to allow the crank shaft to drop down into place and the caps are likewise fitted. If the "filletts" are properly trimmed so that they do not serve as a brake in the corners of the 3 main bearings with all three caps tightened you should be able to turn the crank shaft easily with one hand and with only one main bearing tightened at a time you should "feel just a little drag," and by taking hold of the opposite end of the crankshaft you can feel no looseness, nothing more than the "spring" of the crank shaft itself. After a crank shaft has been revolved a few times by hand, a careful inspection of the bearings will reveal a few high spots where those "microscopic wrinkles" on the crank shaft bearings had been riding. To turn out the highest quality of work such as you find in Lincoln and other high grade automobiles, these high spots are scraped off, leaving no trace whatever of any metal-to-metal contact, and under conditions like these, there is no localized friction to heat up the bearing and cause it to expand the shaft abnormally, or squeeze out the babbitt.

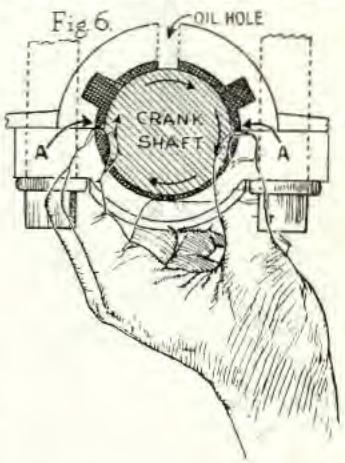
Fig. 3 has been drawn to to clarify your understanding of the whole process. Referring to Fig. 1 it is natural to assume the front bearing is worn almost uniformly all the way around it or only a half thousandth from an imaginary straight center line, the center bearing .001, rear .00075. It is therefore evident that if the crank shaft is straight, it will be suspended on the front and rear bearing and the center one will hang in mid-air, unless pulled down into the bearing with the bearing cap as shown in Fig. 4 and when this is done the crank shaft is certainly out of alignment. YES, in this case ⅜ of .001. Well, that's not as bad as it sounds, when we stop to think that a human hair measures about .0025 thick. ⅜ of .001 would be about one-seventh of the thickness of a human hair out of alignment. NOT BAD? I'll say, and a whole lot more accurate than you can get by any other known process. Did I hear you say, "Gee, I never thought of that?"

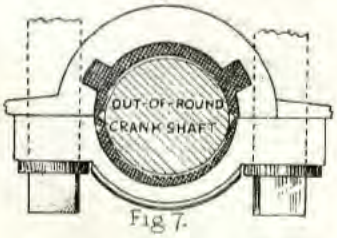
How To Fit Main Bearing Caps

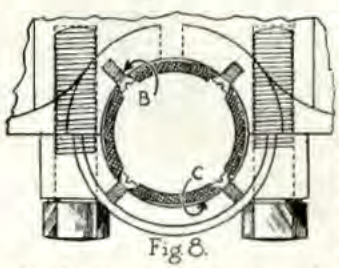
Looks easy—is easy if you know how. But the average repairman is doing more harm than good. So I have prepared figures 5-6-7-8 just to show you the correct method and what happens if you fail to follow instructions. Look at the main bearing caps on page 5; you will notice the oil grooves are cast in the babbitt, but not the entire length of the bearing. This forms an "oil trough" or reservoir and is intended to distribute the oil uniformly over the bearing.

It is customary practice amongst mechanics to file off the ends of this trough (they can't tell you why) so that it is the full length of the bearing, and this is just where the trouble begins. "Let's reason that out." If Mr. Ford wanted it that way, he could have saved thousands of tons of babbitt by casting it there, when the bearing cap was made and saved you the trouble of having to file it off. It was put there for two very important purposes and is a componant part of the lubrication system.







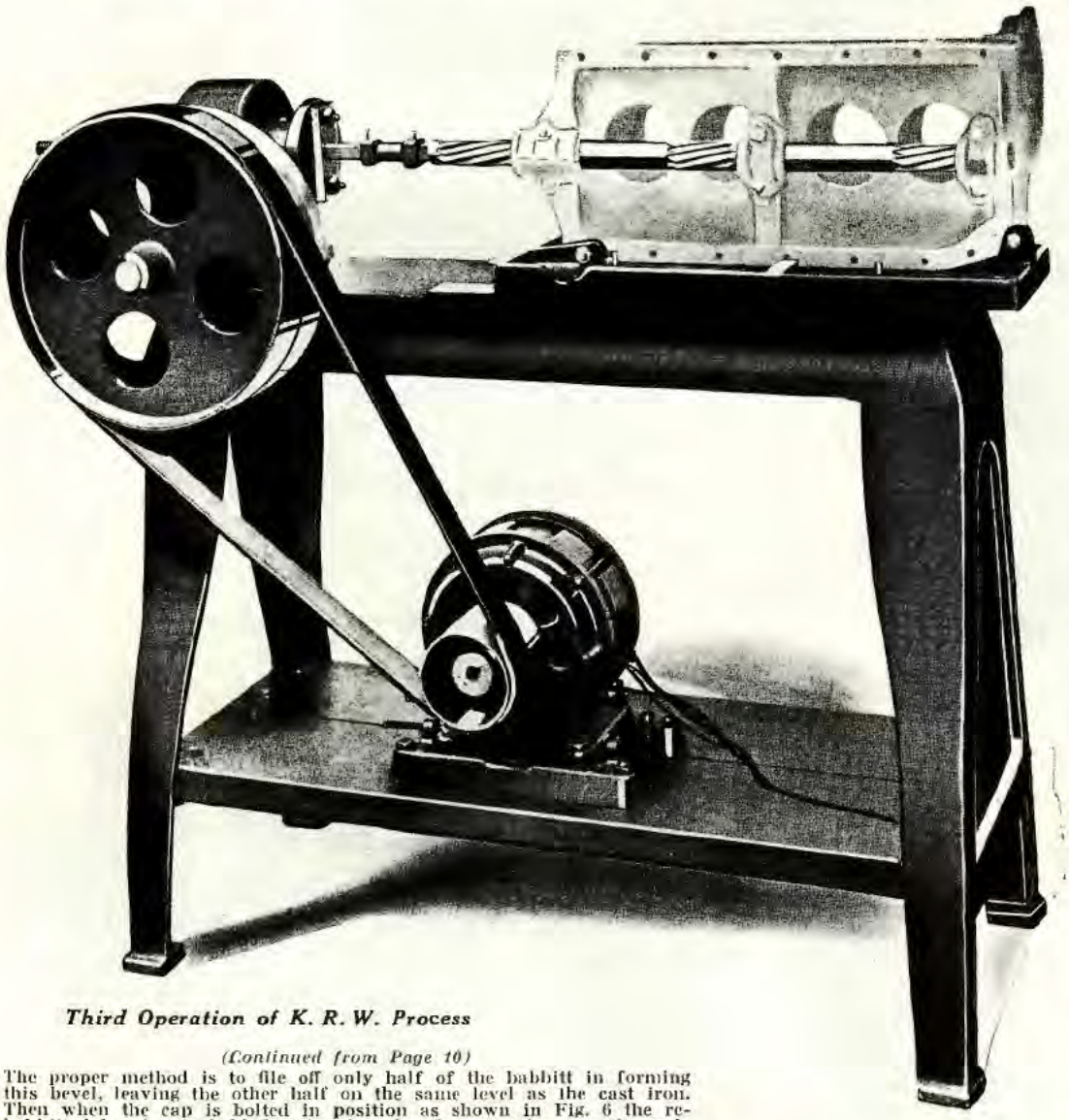


To alter it means to start trouble. Now refer to Fig. 5 then turn this book upside down to get the information easier. First, in trimming off the rebabbitted bearing in the block it is customary practice to "bevel" them way back to the cast iron. If this is done then nothing is left to hold that half of the bearing in place except the anchor pins. When a motor is first started up the bearings are tight and become tighter with expansion so that the shaft grips the babbitt something like a friction clutch, and the tendency is to pull it around with it as indicated by the arrows. This not only loosens the bearings, bends the anchor pins, etc., but pulls the bearing away from the original anchorage where it had been "peined" in place. Consequently it quickly becomes loose.

Align Reaming the Crank Shaft Main Bearings

"The Most Accurate Method Known"

The Process Used By 98 Per Cent of the Motor Manufacturers. A 3½ Minute Operation. The K. R. W. Machine Align Reams One Thousandth Larger Than the Crank Shaft.



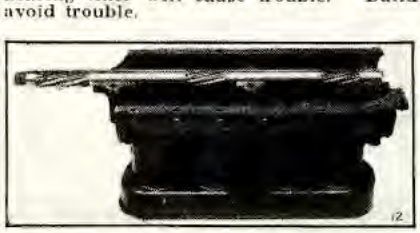
Third Operation of K. R. W. Process

(Continued from Page 10)

The proper method is to file off only half of the babbitt in forming this bevel, leaving the other half on the same level as the cast iron. Then when the cap is bolted in position as shown in Fig. 6 the re-babbitted bearing is held fast in place by the extensions on the ends of the oil trough and cannot even start to move or loosen up, as it did in Fig. 5 The pressure of the main bearing cap holds it firmly in place. Sufficient oil comes down through the oil hole, and the narrow beveled bearing to fill the oil trough and perfect lubrication is assured.

Fig. 7 further elaborates and explains the rotary pump action of an out of round crank shaft bearing.

Fig. 8 shows how a die cast or bronze backed bearing is usually fitted in place, and as a rule these jobs are short lived because the mechanic did not fit the back of the bearing first against the cylinder block before attempting to fit the crank shaft. Any looseness behind a babbitt bearing liner will cause trouble. "Build on a solid foundation" and avoid trouble.



A Great Detective

The K. R. W. main bearing reamer is also used as a spotting-in-bar and instantly detects the slightest misalignment of the three main bearings. It helps to check up the fly-cutters on the babbitt boring bar and keep them accurately adjusted so that they will bore all the rough bearings to exactly the same diameter. CLOSE INSPECTION IS NECESSARY on main bearing jobs and this bar will give you the information you need quickly and prevent troubles due to misalignment, which are so sommon to this operation. Most of the comebacks on main bearing jobs are due to carelessness on the part of the mechanic in not checking up the job with an aligning bar before the job is assembled. Following out the K. R. W. process numerous inspections are made on every important operation. We prevent trouble rather than try to cure it.

Align Reamed Bearings Are Superior

in every way to the best job that can be turned out by any other known process. This statement is best proven by the fact that 98% of all American motor car manufacturers use it. BEARINGS CAN BE ACCURATELY FITTED BY HAND SCRAPING, but this requires an expert with years of experience, and would require 10 to 25 times as long to complete the job. Even then the bearings might not be in alignment, due to the fact that they are usually scraped to fit the shaft and the weight of your hands or the "spring" in the shaft will throw "out."

BEARINGS CANNOT BE ACCURATELY FITTED BY THE BURNING-IN PROCESS because as soon as the babbitt is friction melted so it will soften enough to conform itself to the shape of the bearing, then it is too soft to resist the twisting strains put on it by the enormous power required to turn it, and on account of so many bends in the shaft the center main bearing is often found out of parallel with the other bearings. Any reader of this article who believes in the burning-in process should check up a half dozen jobs with a spotting-in bar, and I'm quite sure, he will then agree with me.

During the last two years, or since K. R. W. started debating this subject. Manufacturers of this kind of equipment have discarded the words "burning-in" from their vocabularly and now politely say "burnishing," for that doesn't sound so harsh, and as a matter of fact, it isn't—if that is just what they do. If bearings are properly fitted, first by align-boring the bearings and bearing caps together to get perfect alignment, absolutely round bearings, correct cam gear centers, and exactly the same clearance and friction surface (metal to metal contact) in proportion to the size of each bearing, then they can be burnished satisfactorily. But all this calls for considerable skill and careful fitting of the bearings up to this point to insure exactly the same clearance in each bearing (an almost impossible operation).

What Happens When Worn Shafts Are Used?

Whenever worn shafts are used, if one bearing has a little more friction surface than another, it will heat up quickly and soften the babbitt, while the other may have only a little metal to metal contact, and the heat generated by this friction is quickly absorbed into the motor block, and the babbitt does not soften. Therefore, the twisting action of the crank shaft is resisted by those bearings which do not soften and is thrown out of alignment in those which do. The majority of mechanics still using this process are actually trying to "burn-in," rather than "burnish" the bearings, because they bore out the bearings several thousandths smaller than the crank shaft, then use "finished" main bearing caps to force the crank shaft down into place as fast as they can melt the babbitt and make it squeeze in and out of shape to fit its particular crank shaft bearing. (See Page 9).

I say, "Alignment is impossible under those circumstances."

The align-reaming process eliminates all these troubles and enables inexperienced mechanics to get perfect results after a few hours practice. (See Page 15).

Connecting Rods Are Reamed To Fit Crank Pin

Place the reamer on end in the vise, then file off the face of the connecting rod cap and break up the glazed bearing surface with a hand scraper. "Mike" the crank pin you wish to fit and place shims equivalent to the amount of undersize between the connecting rod and the cap. Then ream to standard size of reamer. By turning the rod by hand around it. After the shims are removed, the connecting rod should fit the crank pin perfectly, and, while the clearance will, in some cases, be a little greater on the sides of the bearing than at the top and bottom, that condition is to be desired, and bearings are purposely made that way by the most motor car builders.

K. R. W. Main Bearing Facer and Filleting Tool

for Facing Off Thrust Bearings at Right Angles to Crank Shaft

W-50

Price $5.00

Complete As Shown

Shipping Weight, 3 Lbs.

A New K. R. W. Tool That Is—"Worth Its Weight In Gold"

Thousands of Ford dealers, repairmen and Ford owners have paid dearly in the way of comebacks and short-lived jobs because no satisfactory tool equipment has ever been made for properly fitting rear main bearing caps, (Thrust Bearings) so that the ends are square with the crankshaft. IT CAN'T BE DONE BY HAND. Many mechanics pay little or no attention to the importance of fitting this bearing accurately and file off the ends of the bearing cap, then drive it "home" with a hammer, as shown in the picture below. After which the main bearing bolts are pulled up tight and the job is finished—only to become loose after running a few hundred miles because the bearing cap did not line up with the crankshaft, and after being pulled down tight, the pressure against the crankshaft flanges is so great that it cannot be lubricated, consequently the friction soon softens the babbitt and allows the cap to shift into alignment and become loose.

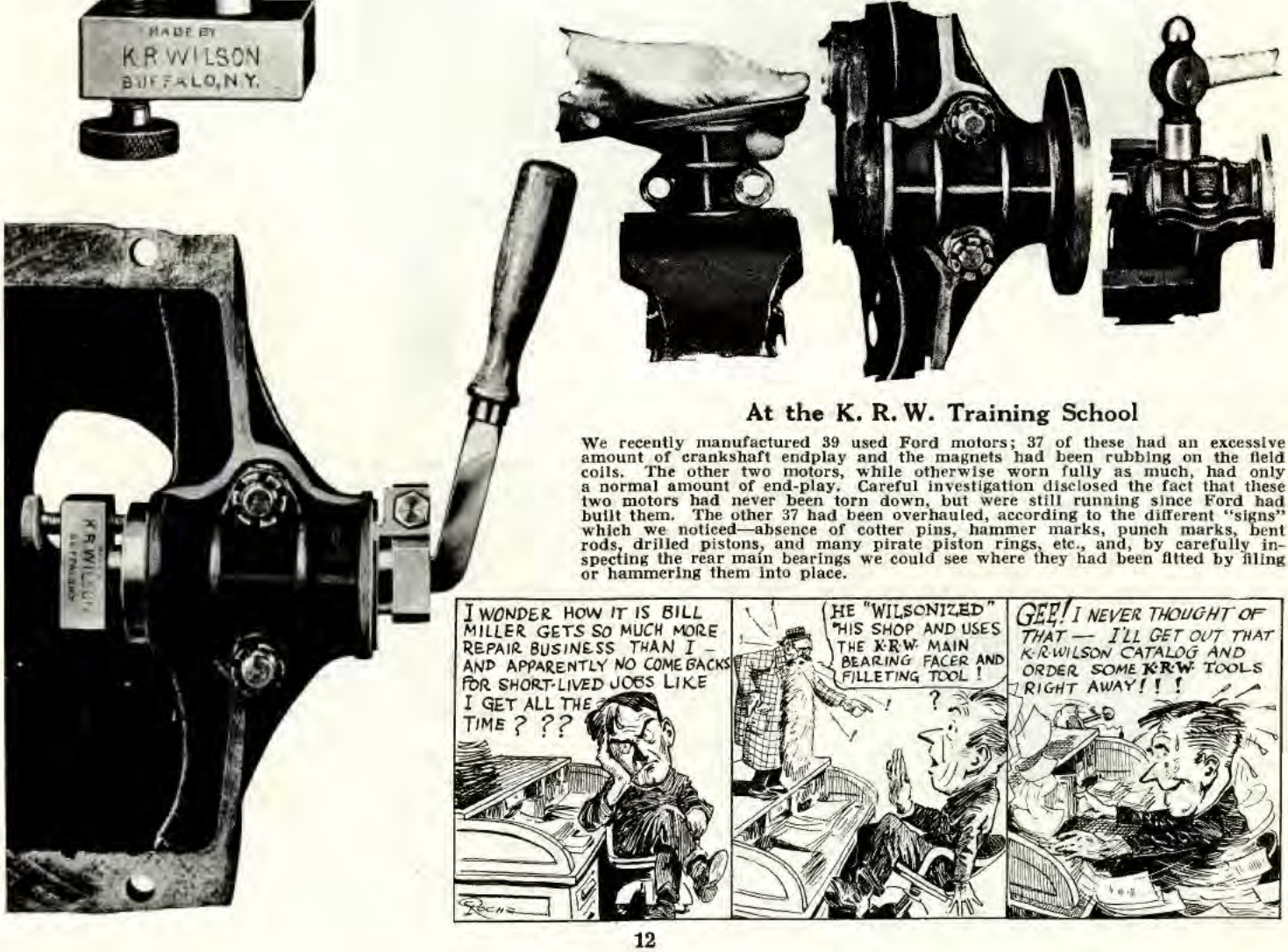
Saves 30 to 45 Minutes On Every Motor Job

The K. R. W. bearing facer and filletting tool will fit this bearing cap absolutely square with the crankshaft and accurate to a thousandth of an inch in just three minutes time, saving at least 30 to 45 minutes over any other method. It INSURES A PERFECT JOB every time and prevents comebacks which are expensive. This tool also cuts the fillets on the other bearings, eliminating the use of a hand scraper entirely.

Excessive End-Play Causes Rapid Wear

throughout the motor because the magnets rub against the cast iron poles of the field coil, wearing off small particles of cast iron which become a saturate solution with the lubricating oil, and soon finds its way through the oil holes into the babbitted bearings, causing excessive friction and wear, likewise effecting the cylinder walls, pistons, transmission, timing gears, etc., and one of the important reasons why the average overhaul job does not stand up.

Which of These Methods Do You Use?



At the K. R. W. Training School

We recently manufactured 39 used Ford motors; 37 of these had an excessive amount of crankshaft endplay and the magnets had been rubbing on the field coils. The other two motors, while otherwise worn fully as much, had only a normal amount of end-play. Careful investigation disclosed the fact that these two motors had never been torn down, but were still running since Ford had built them. The other 37 had been overhauled, according to the different "signs" which we noticed—absence of cotter pins, hammer marks, punch marks, bent rods, drilled pistons, and many pirate piston rings, etc., and, by carefully inspecting the rear main bearings we could see where they had been fitted by filing or hammering them into place.

W-G Quick Detachable Main Bearing Bolts

Save 3 to 60 Minutes on Every Main Bearing Job

The W-G Quick Detachable Main Bearing Bolt Can Be Inserted and Tightened In Three Seconds

W-39 Price $8.50 Set of Six

Shipping Weight, 4 Lbs.

MAIN BEARINGS SHOULD BE INSPECTED three or four times during the process of fitting them, no matter what method is used, whether it is hand-scraping, burning-in or align-reaming. To make these inspections when regular bolts are used takes too much time and the operation is so inconvenient that the mechanic is apt to slight the job by neglecting to do it. However, all good fitting bearings can be secured only by "seeing that they fit the crankshaft" it is necessary to provide a means which will encourage this inspection, and do it easily and with little effort on the part of the mechanic.

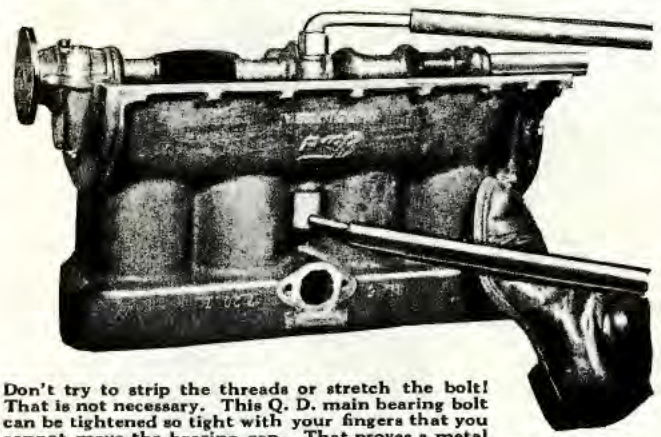
TO OPERATE—Simply slip the bolt into position (as shown in cut at extreme left) then insert forked socket. A quarter turn on the hex. nut and the bearing is tightened. They operate so quickly that no mechanic would ever think of being without a set after using them once.

These bolts are made from Chrome Nickel Steel, heat treated, hardened and ground to extreme accuracy. The hex. nuts and special wrenches are also hardened. Slots are cut on the threaded end as "sights" to indicate the position of the slot on opposite end of the bolt.

WE SAY—These are positively the "last word" in labor saving tools.

Money Back Guarantee

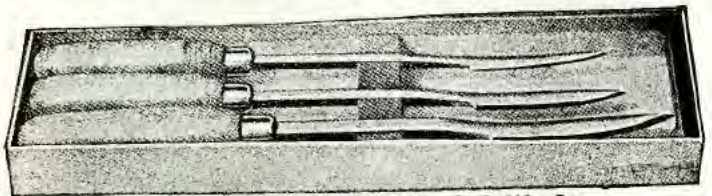
I want you to try out a set of these bolts because they are real time savers



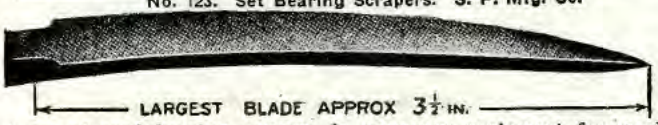
Don't try to strip the threads or stretch the bolt! That is not necessary. This Q. D. main bearing bolt can be tightened so tight with your fingers that you cannot move the bearing cap. That proves a metal to metal contact between cap and block. You cannot draw it tighter.

Bearing Scrapers

R-78 Price $3.75 Per Set



No. 123. Set Bearing Scrapers. S. P. Mfg. Co.



A set of good bearing scrapers is necessary equipment for good mechanics. Crank shaft and connecting rod bearing "fillette" must be individually fitted to their respective bearings and often scored shafts make some hand fitting necessary to secure the very best results.

I have searched the country far and wide to get a set of scrapers that are worth while and here they are—hand forged and tempered in a charcoal fire, from genuine crucible tool steel. Hollow ground on all three sides for easy resharpening. Shipped, ground to a keen-edge, ready for use.

K. R. W. Main Bearing Speed Wrenches

W-43

Price $1.50

Per Pair

Shipping Weight, 4 Lbs.

These wrenches are especially designed for use in connection with the K. R. W. Combination Machine and suggest their handiness in the pictures on the next page. They are of extra heavy construction and made especially for us by Walden-Worcester Co.

Two Position Motor Work Bench Feature

Location of Block on This Carriage Permits Handy Motor Bench Positions. Block Once Mounted Is Never Lifted or Carried, Fastened or Unfastened for Any Operation.

Grinding the Valves, Fitting Pistons, or Tightening Up Connecting Rods while "Limbering Up" Main Bearings

The two-position motor bench feature of the K. R. W. Combination Machine is ONE OF THE GREATEST LABOR SAVING IMPROVEMENTS EVER MADE IN GARAGE EQUIPMENT. It is difficult to imagine how many thousand steps are saved on every job by the use of it, as compared with other makes of equipment where the motor block must be moved from one machine to another for the various operations to be performed. No time is lost and no human energy wasted doing a lot of unnecessary work. From start to finish in the K. R. W. process of re-manufacturing Ford motors, the block remains on the machine until the final assembly of the transmission and flywheel. It is just the right height, and enables the mechanic to work in such comfortable positions that he will do his best and turn out a much greater amount of work with less physical effort. Most mechanics think it is play because all the real work has been eliminated. YOU ARE PAYING FOR IT in time lost chasing around the shop from one machine to another. It is just another "cog" in the K. R. W. process to cut your labor costs in half.

Recent Improvements That *"Licked"* Another Serious Problem

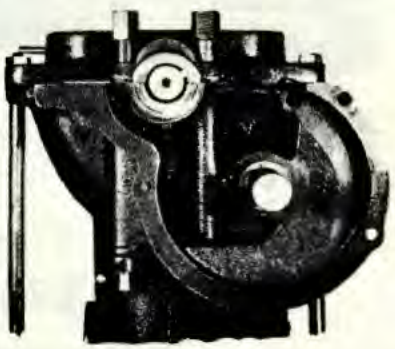
and Made the K. R. W. Combination Machine *"Better Than Ever"*

(Continued from Page 8)

Smaller Boring Bar — Easily Removable. Non-Adjustable Cutters.

A few months ago the service department sent out rough main bearing caps with so much babbitt in them that it was necessary to use 1/16 to ⅛-inch shims to raise them up far enough from the block so they could be rough bored. Hundreds of complaints came in from users of K. R. W. Machines who were having this trouble. So I set out to "lick" that problem by reducing the diameter of the boring bar to 15/16 of an inch. By casting slots in the bearings I have made the bar instantly removable. Cutters are non-adjustable and are first pressed into place, then accurately ground between centers, so that all three will cut the rough babbitted bearings exactly alike, and perfect alignment is assured. By eliminating these adjustments on the fly-cutters, it has simplified the process of fitting bearings, and enables inexperienced mechanics to get accurate and uniform results every time. In the past a large number of repairmen with little or no experience on machine tools have "monkeyed" with these fly-cutters and tried to improve them. Only to get them badly out of adjustment, so that they bored the bearings different diameters and this threw the main bearing reamer out of alignment. Of course the mechanic blamed the machine. These improvements prevent any such trouble.

In the second picture you will note that there is plenty of clearance for chips and absolutely no trouble is encountered from them packing, then scoring the bearing. In fact the new style cutter bores so smoothly, it is difficult to tell it from a reamed job.



K. R. W. Combination Machine Owners

I will rebuild your "old style" babbitt boring frame to include these improvements for $12.00. If interested, send your boring frame direct to my factory at Arcade, N. Y. Transportation prepaid and a letter with it stating that you want it rebuilt. We will return it on the same day it is received, all ready for use.

A New K. R. W. Combination Machine for Tractors — *Only*

Is Coming Soon, Price $425.00 Complete

I have delayed bringing out a K. R. W. Combination Machine and other tools for the tractor motor for the past two years due to the fact that certain changes were contemplated when adapting it to the new three-ton truck. But now that this matter is practically settled I am going righ ahead and get tooled and jigged up for production and should be able to start deliveries about April 1, 1926.

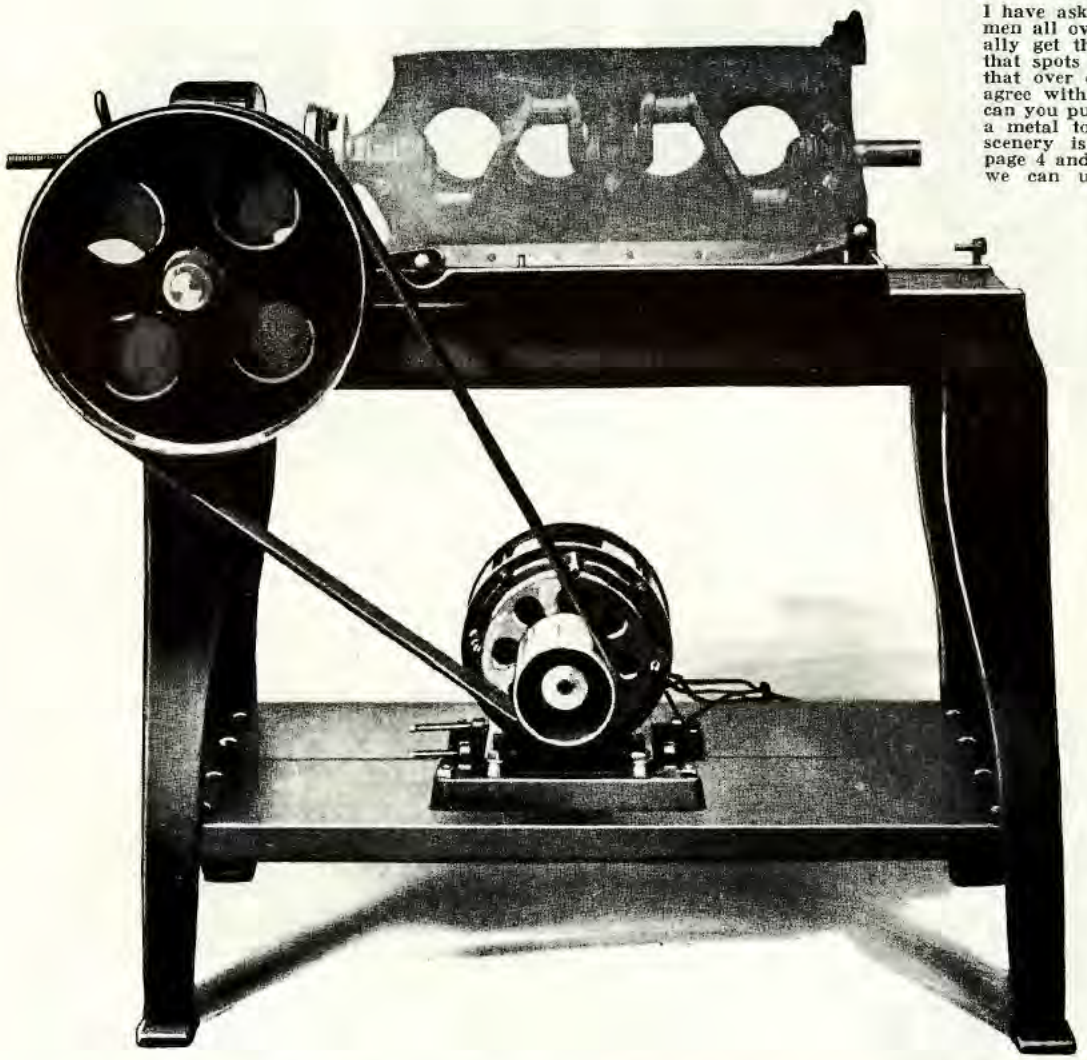
The Tractor Combination Machine is very similar in construction and operation to the Model "T" outfit, except much larger in size. It is a separate and distinct machine in every way and no parts are interchangeable, due to the wide difference in the sizes of the Model T and the tractor motors. It has been found impractical to attempt to combine both of them, and would actually cost more to build one machine to handle both motors than to build two separate machines, which would give double the capacity in a repair shop and would not impose a hardship or prevent the sale of a machine to dealers and repairmen who had no use for tractor equipment.

My price has been made extremely low because the machine should sell itself on the merits of which the present Model "T" K. R. W. Combination Machine has earned. SUGGESTION—Place your orders well in advance.

Running-In Crank Shaft Bearings—*Sure!*

But It's An Unnecessary, Superfluous Operation

Bearings Fitted by the K. R. W. Process Are So Perfectly Fitted, the Crank Shaft Is Easily Turned with One Hand.



What Is A Perfect Bearing?

I have asked more than fifteen thousand repairmen all over the country that question and usually get this reply: "A perfect bearing is one that spots in all over." Now Mr. Reader, think that over carefully and see whether or not you agree with the majority. Then I'll ask, "Where can you put the oil to lubricate it, if it is making a metal to metal contact all over?" Again the scenery is changed. Now let's refer back to page 4 and get some valuable information which we can use to advantage in answering this question.

On pages 6 and 7 I have shown you how to get a good foundation by rebabbitting correctly, then peining the bearing to make it fit tightly against the cylinder casting. This operation eliminates the necessity of friction-melting the babbitt so it can be forced down tight in the bearing. Having align-bored, and align-reamed some one thousandth larger than the crankshaft, it is evident that because of this looseness the crankshaft bearings could not spot-in all over (while motor is cold), on the other hand it might be touching some high spots in each of the bearings, and to the average mechanic who believes that a good bearing must spot-in, this kind of a job would look bad, and it would be rejected as a "bum job." On the other hand, remember that as soon as that motor starts to operate under its own power the hot oil, dripping down from the pistons onto the crankshaft, heats it up. It grows tighter in the bearings, the oil is squeezed out, then through lack of lubrication, friction sets in. The bearings warm up and further expand the shaft while the motor is operating. This continues to press down not only the high spots on the babbitt, but the entire surface, making it conform exactly to the shape and uneven surface of the crankshaft bearing. After the motor has been stopped, the cause for most of this expansion (localized friction) has been eliminated. A careful inspection of the bearings would show BEARING SURFACES WHICH HAD BEEN MAKING 100% METAL TO METAL CONTACT at the peak temperature, but when cooled off actually had 2½ to 3 thousandths clearance for oil film. Why waste time and energy doing unnecessary operations which put enormous strains on crank shaft and bearings.

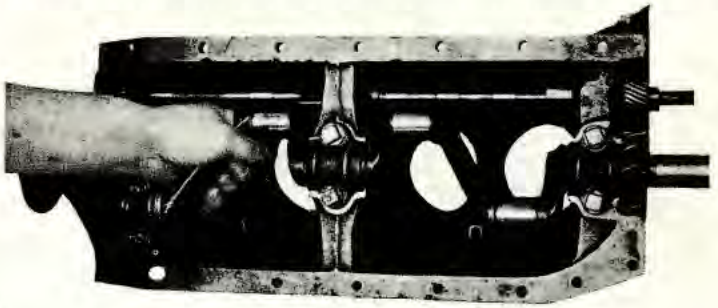
Bearings Fitted by the K. R. W. Process Cannot Be Improved By Running-In

The only purpose for which we use this set up is to check the alignment and clearances of pistons and rods after they have been assembled with the crankshaft.

In this position is is very convenient to assemble these parts. Just push the piston and connecting rod assembly into the cylinder, then go around to the opposite side of the machine and tighten up the bearing. (See opposite page). Then start the machine and watch the connecting rod as it travels from bottom to top of the stroke, etc. If it twists or moves sidewise against the piston bosses as shown at the left of this picture, it must be corrected, otherwise it will be the cause of a "piston slapper" and an oil pumper. If it shows a uniform clearance it is O. K. THE K. R. W. PROCESS checks assembly operations at every point.

Do You Still Think This Operation Is Necessary?

After reading pages 4-5-6-7-9-10-11. Anyway I'm going to prove to you in several more pages throughout this catalog that it is superfluous, time wasting and wholly unnecessary, and to first-class mechanics, it is disgusting. It is directly and indirectly the cause of more grief on "overhaul" jobs than all other troubles combined. Read on—through pages 23-24-25-26-27-28-54. You will find them all very interesting and full of pictures and "truths" that will amuse you. I feel quite certain you will be convinced that the K. R. W. Process is not only all I claim for it, but a whole lot more—and then some.



The K. R. Wilson Process of Reboring Cylinders

"Mike-Up" the Pistons, Then Bore the Cylinders To Fit Them

Test Your Pistons First

To determine their exact size, out-of-roundness, straight wrist pin bore, etc. Then mark the information on the end of the pistons and work to these measurements.
In the case of a Ford dealer who carries a large stock of pistons the out-of-round test is all that's necessary, because you can easily select a set of the same size, but for the smaller repair shop, who buys only one or two sets at a time from the dealer, if there is any variation in their diameter the holes should be bored to fit the individual pistons, otherwise you will have a different clearance in each cylinder.

To Round-Up A Piston

First "mike it" to determine where and how much it is out. Then lay the piston on its side, or a wooden block, place another wooden block on top of it at the open end, and one or more sharp blows with a hammer will bring it back to round. A little practice will enable you to round up a piston per minute. Now again measure your piston across the body of it. This gives the correct diameter. For example: The standard Ford cylinder bore is 3¾ inches or 3.750. If you select a piston that measures (with your micrometer) 3.780 then it is just .030 oversize, or 3.776, that's just .026 oversize, etc., and to this amount should be added enough for clearance as instructed in the next column.

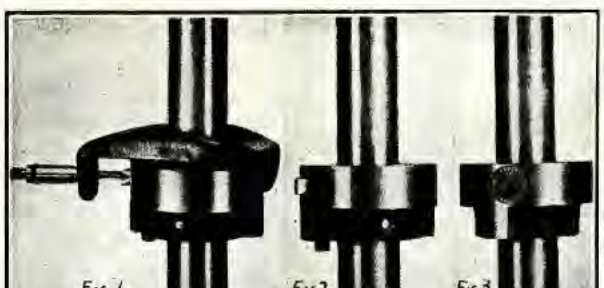
Ford Piston Markings Include Clearance

Do not make the mistake and bore your cylinders 3 or 4 thousandths larger than the Ford pistons are marked, because the usual running clearance is already included and the piston is just that much smaller than it is marked. A .031 oversize piston should actually measure from 3.777 to 3.779. That applies to genuine Ford pistons. In case you use other makes and types of pistons, every one of them should be "miked" as previously instructed.

Clearances Recommended

When cast iron pistons are used, I recommend a running clearance of .003 to .005 for pleasure cars, and .005 to .010 for trucks (see Page 28). If pressed steel pistons are used, these clearances must be increased by .001 to .002 due to the fact that they will not "wear off" and compensate for slight variations in the cylinder, but are apt to score it. Aluminum alloy pistons require at least 50% more clearance than cast iron, and if you fail to provide it, then it will wear itself free. Without a doubt, the average "overhauled motor" wears out more during the first 100 miles of running due to the pistons being fitted too tightly, than it does during the next twelve months of actual service. If you fit pistons too tight they must wear free, and in doing this they also wear off their cylinder wall at the same time.

Don't Buy Any Cylinder Boring Machine That Is Limited To One Oversize



How To Fit Pistons

The same clearance in every cylinder is necessary for a satisfactory job. It helps to eliminate oil pumping, piston slaps, loss of compression and insures a smooth running, long lived motor.
Boring the cylinders to fit the pistons is the only way to obtain these results, and by the K. R. W. Process it eliminates most of the work in fitting pistons such as lapping-in, filing and turning them down to fit the cylinders. Therefore it saves several hours of unnecessary labor and produces a uniform and satisfactory job EVERY TIME.

The Same Clearance In Every Cylinder

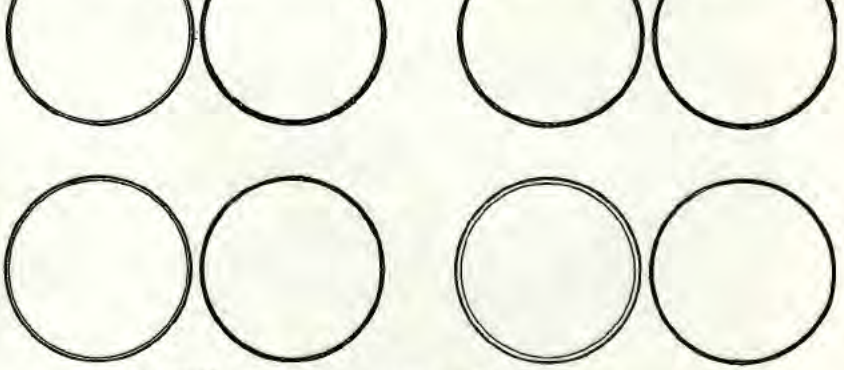
Assuming that they have been "rounded up" as per instructions elsewhere on this page. The piston should be held in the left hand by grasping hold of the wrist pin, then pushed up and down in the cylinder a few times to polish the high spots which make a metal-to-metal contact. Then file off these high spots, using a fine file and by slowly turning the piston at each stroke of the file, no flat spots or file marks will remain. Again test the piston in the cylinder for high spots and repeat these same operations, until the piston fits freely and no bright spots appear. A piston must fit free enough so you can spin it within the cylinder, otherwise it must wear itself free in service. And in doing so, there is considerable wear on the cylinder wall and a great danger of scoring it.

Because the variations in the sizes and styles of pistons will cause you trouble and delay. You may have 100 pistons of a certain size in stock from which you can select about 20 sets that will match up well enough to fit an oversize bore. But the "culls" or the other five sets will vary so much that it would be impractical to use them in a cylinder bored that same size. Therefore the cylinders should be bored to fit these pistons if a PERFECT job is to be expected.
I have been informed that .015 and possibly .045 oversize pistons will be furnished. If so it will be necessary to have a cylinder boring machine, with an easily adjustable cutter—to use them.

How To Set A K. R. W. Cylinder Boring Cutter

After having "miked" the piston you wish to use, add the clearance to its diameter. This total is the correct size to rebore the cylinder. Then set the special micrometer (Fig. 1) at just one-half that amount. FOR EXAMPLE: If the piston measures 3.767 plus .003 clearance equals 3.770 or .20 oversize. Set the special micrometer at .010. On account of only one cutter being used it is measured from an imaginary center of the shaft to its point. But it cuts all the way around the circle. This doubles these measurements, and gives you the correct sizes. The cutter can be quickly adjusted to any oversize, removed or replaced by loosening the set screw as shown in Fig. 2, or accurately adjusted larger or smaller by turning the "dialed" screw as shown in Fig. 3.

K.R. Wilson Process: Cylinders Rebored to fit the pistons. Same clearance in EVERY Cylinder



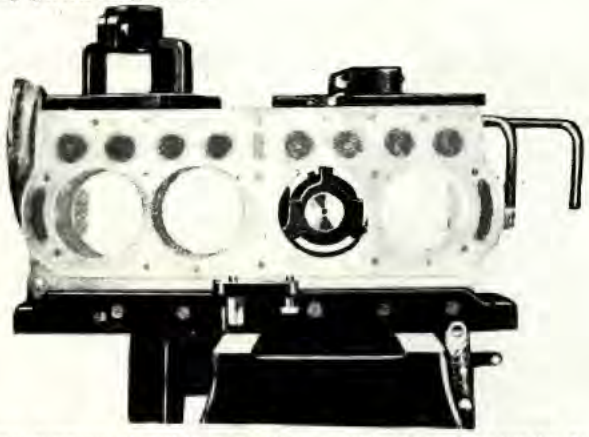
"Trust-To-Luck" Process: A Different Clearance In EVERY Cylinder.

A Guide On Each End of the Cylinder Block

Eliminates Possibility of Boring a Tapered or Uneven Hole—Prevents Chatter—Permits the Use of a Single Cutter Tool.

Locating Boring Bar

The boring bar is placed in the cylinder and accurately located by means of two tapered (2-piece) locating plugs, one plug from each end of the cylinder. This is the most accurate method known, for there is very little wear at the lower end of the cylinder and none at the extreme top, due to the fact that these two extreme points are not worn by piston ring travel.

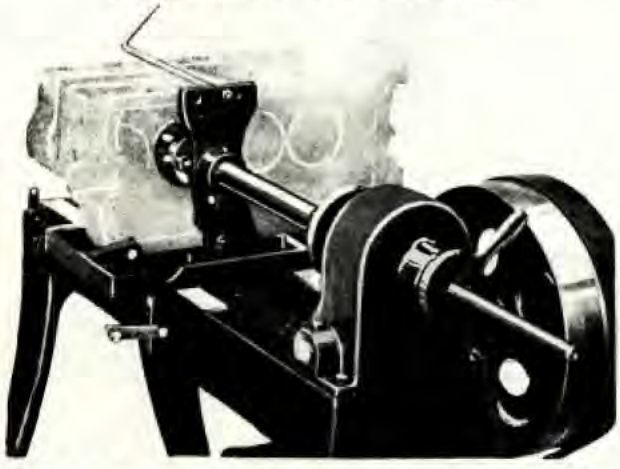


The two permanent guides are then positioned and securely fastened in place, the crankcase end, by the two long-semi-speed wrenches and the cylinder head end by two 7/16 cap screws. The temporary tapered locating plugs are then removed through the openings provided, then the boring bar pushed forwards until the cutter head is about ¼-inch from the bottom end of the cylinder. Now the split bearings in each of the permanent guides are tightened up until they show some "drag" on the boring bar which one can feel by using a 10-inch Crescent wrench, on the square end of the boring bar. This operation, an exclusive feature on the K. R. W. Combination Machine, insures a perfectly straight hole, absolutely free from taper and prevents the boring bar or the cutter from resisting or pushing away from hard spots or "digging-in" to the softer metal, which is a common occurrance with all other cylinder boring machines, and the reason for such "rough bored jobs." The universal joint is connected, feed lever thrown in and eight minutes later the cylinder is bored. The machine requires absolutely no attention and stops automatically, unless stopped by operator.

The boring bar is very rigid and is made from 1½-inch, special, heat treated, machinery steel accurately ground to a perfect fit. The bearings in the two permanent guides are accurately reamed and polished and designed to take up wear after boring each cylinder.

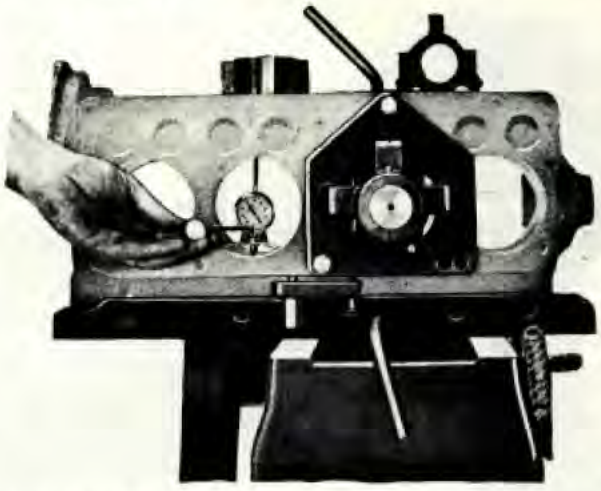
The table which holds the cylinder block, automatically aligns and positions each cylinder in its exact location for reboring (no mechanical skill necessary) by means of two No. 5 taper pin holes and another for 7/16 cap screw, opposite the center line of each cylinder. Corresponding holes are drilled in the bed of the machine. Thus by moving the table with the cylinder block attached, and cylinder is brought into exact location, whenever the two No. 5 tapered pins will fit into place. It is FOOL-PROOF and eliminates all other complicated methods and the necessity for an experienced operator.

A Guide On Each End of the Block



The rough and wavey surfaces left in cylinders by other cylinder boring and reaming machines is largely due to the hard and soft spots in the cylinder (see bottom Page 19) and when one of these hard spots is encountered, the entire cutter head is deflected towards the softer metal where it "digs-in and cuts a rough surface, sometimes deflecting the cutter so far out of alignment that the upper end of the blades also scratch and score the cylinder. These uneven surfaces make it impossible for a piston ring to accurately fit the cylinder and serve its purpose, therefore the real reason why many mechanics have condemned cylinder boring as an unsatisfactory service operation.

Dial Gauge Proves Accuracy of K. R. W. Machine



All manufacturers of cylinder reboring and regrinding equipment make wonderful claims for accuracy, including K. R. Wilson, but try the jobs done on these machines with an indicating dial gauge and you will soon know what concern builds the most accurate cylinder reboring tool. Cylinders bored with the K. R. Wilson machine will not vary ¼ of 1-1000th. Compare this with what you will find in all other makes.

Ames Indicating Dial Gauges

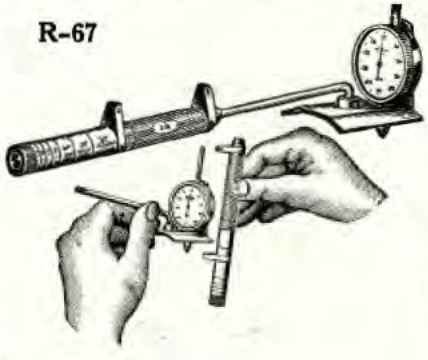
For Testing, Taper, Out-of-Roundness, and Other Variations In Cylinders

(See Pages 26-27)

"Old Style" Price $15.00 Postpaid

With this positively accurate instrument, tapered, out-of-round, or scored cylinders are instantly detected. Many times garagemen, against their own judgment, are forced to put in NO LEAK piston rings to satisfy their customers because they are unable to convince them that their cylinders are worn out and need re-boring. With this gauge it is a simple matter to show the customer the exact condition of his cylinders, and convince him of the necessity of re-boring. The garageman makes a larger profit on a cylinder boring job, and he also makes a satisfied customer.

R-67

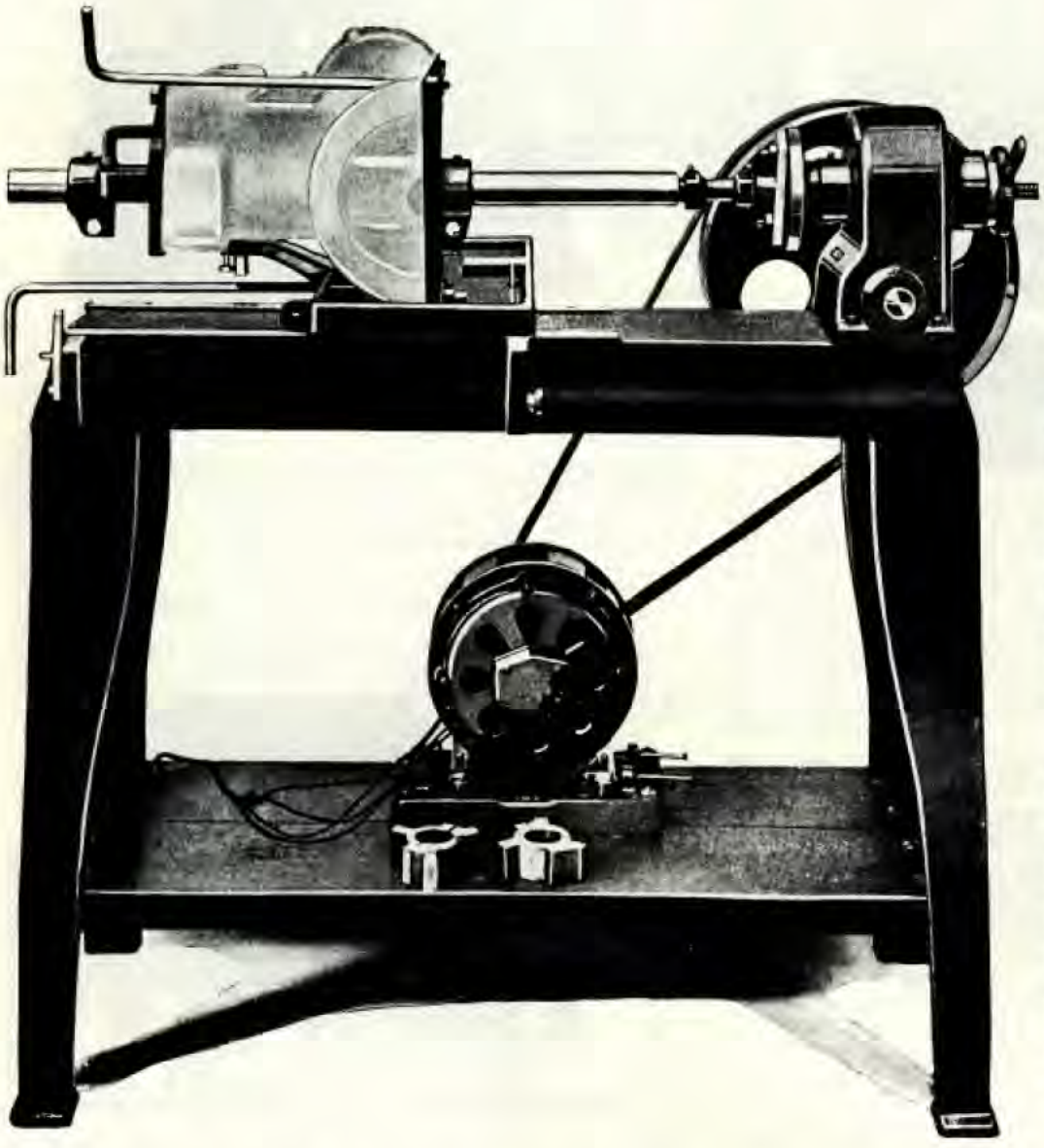


"New Style" Price $17.50 Postpaid

Including a self-contained Micrometer for setting gage to all standard sizes, then when placing indicator in the cylinder exact oversize is shown.

A Real Honest-To-Goodness Cylinder Reboring Machine

Instantly Adjustable — Bores Any Oversize — Requires No Attention
Simple and Easy To Operate — Stops Automatically



Eliminates Cost of Fitting Pistons

And that is another big item in the cost of producing a finished job, because considerable time is wasted in trying to make those "tight ones fit" in the holes which have been rebored with a standard .031 oversize cutter. Which may be newly re-sharpened and cutting oversize or it may dull and cutting undersized. Some shops try to turn down pistons in a lathe to fit the cylinders and this is bad practice because they cannot be correctly located with relation to the wrist pin as they were made at the factory and a cocked piston will result. Others file them down and often finish by lapping-in and that's not workmanlike or satisfactory (see page 28). All of these supplementary operations are expensive and unsatisfactory, in fact detrimental and should be avoided. By the K. R. W. process it is easy to adjust the cutter and bore the cylinder to fit the piston when necessary and get a much better job than is possible otherwise. Ford pistons are sometimes out of round but can easily be corrected (see page 16) and will give much better service and fit the cylinders better than if altered by turning or filing

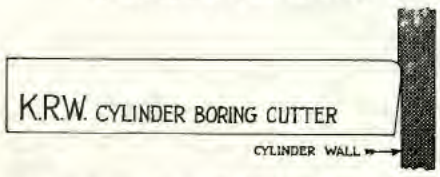
The Finished Surface

of a cylinder bored with this machine is the natural grey color of the iron instead of being brightly polished by the cutters scraping the cylinder walls and filling up the pores of the iron as is done with most other outfits including grinders. The K. R. W. Boring tool actually cuts the metal away so smoothly, instead of scraping it, that these pores are not closed. This leaves the finest kind of a bearing surface. When the motor is first started the intense heat created by tight pistons, rings and cylinders will thin up the lubricating oil and it will penetrate these pores and fill them up, resulting in a much better lubricated surface and longer life.

10 Minutes Labor Cost To Bore 4 Cylinders

Takes an average time of 1¾ minutes to set up each cylinder and start the machine. From then on it REQUIRES NO ATTENTION and when it reaches the end of the cut STOPS AUTOMATICALLY. During the time the cylinder is being bored (about 8 minutes) the operator can be grinding valves, fitting pistons and connecting rods, or overhauling the transmission or other odd jobs. Therefore the actual labor cost for boring all four cylinders on a Ford block is but 7 to 10 minutes.

Cutters Are Interchangeable — Cost 50c Each



It is not necessary to tie up a K. R. W. cylinder boring machine while the cutters are returned to the factory at considerable expense and inconvenience to be resharpened and adjusted, during which time it might be necessary to hold up a customer's job or take it out to a competitor. K. R. W. cutter is easily honed to bore as smooth as glass. It can be removed, replaced and accurately adjusted to BORE ANY OVERSIZE in 30 seconds. All the cutting is done on a narrow cutting point not more than 1/16th of an inch in width, and because of the high quality of steel used this cutter will not dub over or break when it hits a hard spot or a scored cylinder.

Be Prepared for the New Steel Pistons

I can't tell you when they are coming, but I know they are the greatest improvement ever made in Ford cars. After having used a set in my own Ford coupe for the past 7 months. Eight-cylinder smoothness and the speed of a swallow is the best way I can describe them. Dynamometer tests, 3300 R. P. M., 5 to 7 H. P. more.
These pistons are made from light gauge pressed steel stampings and are ground to extremely accurate measurements. Therefore it is necessary to bore the cylinders accurately to fit them and with at least .004 clearance. It is impossible to do any fitting on the pistons by turning, grinding, filing, or lapping-in.—the cylinder must be fitted to the piston. Otherwise they will score and cause trouble. While cast iron pistons under similar conditions, would wear off the high spots and fit themselves. I understand they will be made in standard .015 and .031. Oversizes, and due to the fact that the CYLINDERS MUST BE BORED TO FIT THE PISTONS, it will be necessary to have a boring machine that is quickly and easily adjustable to those oversizes and to compensate for cutter wear so that it is always possible to get exactly the right clearance. Regardless of whether the cutters are sharp or dull.
The K. R. W. Cylinder Boring Machine is the only outfit on the market today will will fill the bill.

I Claim

That the K. R.W. Machine will bore cylinders 50% more accurate, smoother, and at a less labor cost than any other machine built, regardless of price.

The K. R. W. Cylinder Reboring Machine

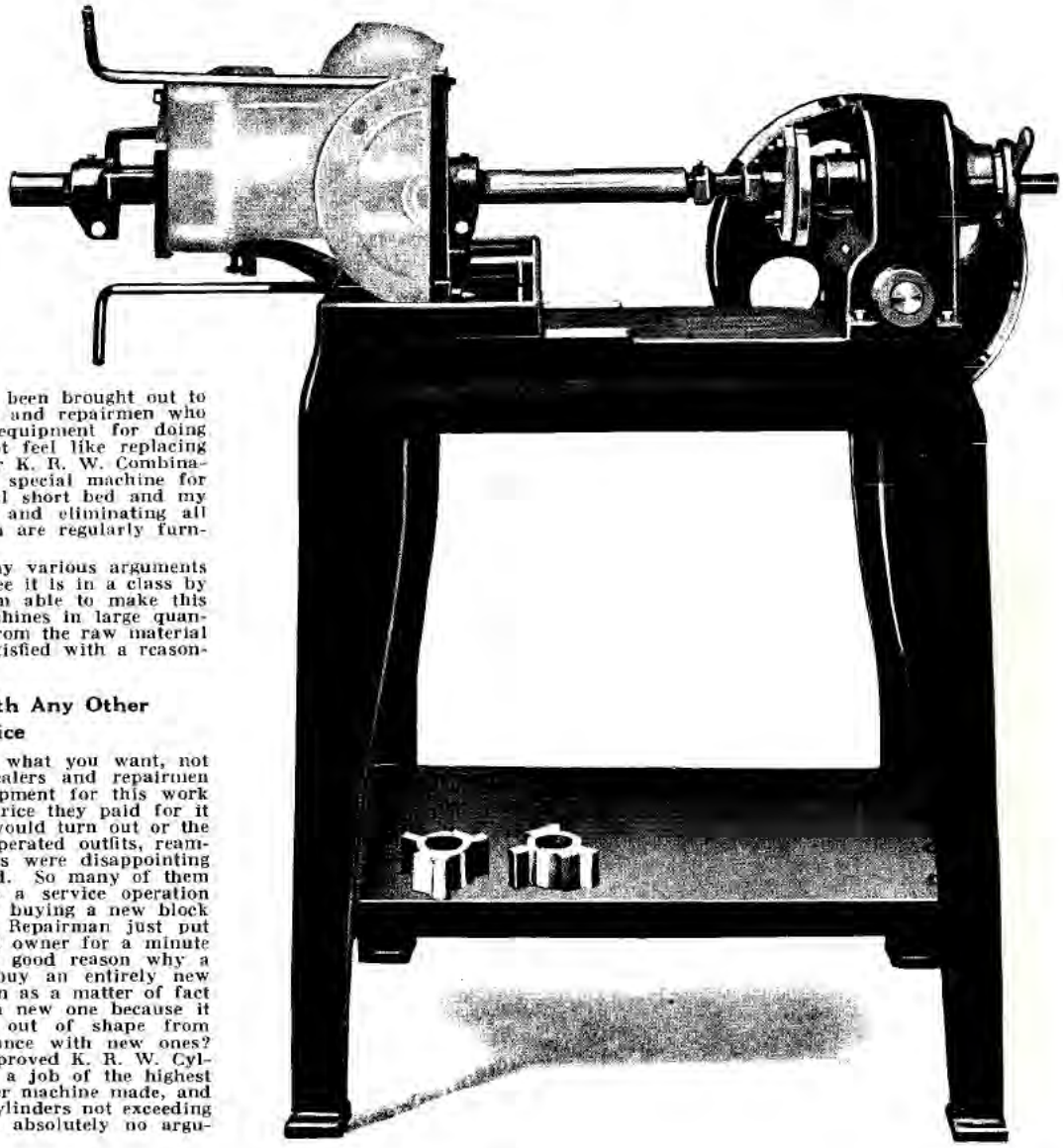
Without Other Attachments

W-30

Price $197.50

Complete As Shown

Shipping Weight, 450 Lbs.



The K. R. W. Reboring Machine has been brought out to satisfy a demand from Ford dealers and repairmen who already have large investments in equipment for doing main bearing work, etc., but do not feel like replacing their entire equipment with a regular K. R. W. Combination Machine. So I have built this special machine for cylinder boring only, using a special short bed and my regular cylinder boring attachment, and eliminating all other fixtures and attachments which are regularly furnished with the complete machine.

I am sure that after reading over my various arguments on cylinder boring that you will agree it is in a class by itself and has no competition. I am able to make this low price because I build these machines in large quantities entirely in my own factories from the raw material to the finished product and I am satisfied with a reasonable profit.

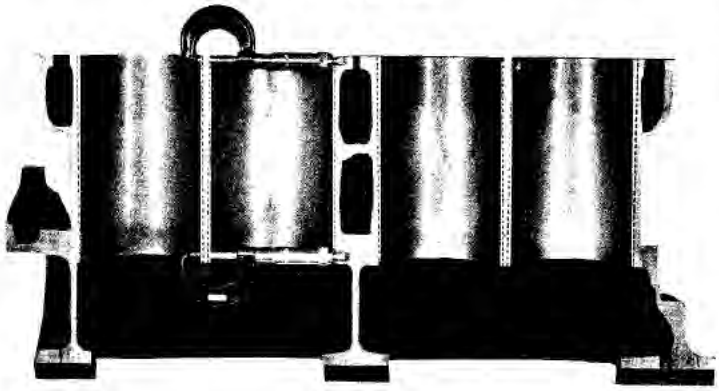
Compare This Machine With Any Other Regardless of Price

RESULTS and low labor costs are what you want, not just a low priced outfit. Some dealers and repairmen have bought various makes of equipment for this work and were interested mostly in the price they paid for it rather than the quality of work it would turn out or the cost of producing each job—hand operated outfits, reamers, hones and what not—the results were disappointing and their customers were dissatisfied. So many of them have condemned cylinder boring as a service operation and try to talk their customers into buying a new block instead. Now Mr. Ford Dealer or Repairman just put yourself in the position of the Ford owner for a minute and think this over: Is there any good reason why a Ford owner should be forced to buy an entirely new engine block at a cost of $25.00 when as a matter of fact his old one is usually better than a new one because it has "seasoned," and will not go out of shape from "casting strains," a common occurance with new ones? Would you do it yourself? The Improved K. R. W. Cylinder Boring Machine will turn out a job of the highest quality, more accurate than any other machine made, and at a labor cost for boring all four cylinders not exceeding more than 10 or 15c, which leaves absolutely no argument against reboring.

The Only Cylinder Boring Machine Made That Will Bore A Straight Line

That's a strong claim, but I can make it without fear of contradiction and will show you how to prove it. I SUGGEST that you "mike" the thickness of the "web" between each pair of cylinders, then rebore them with any other make of cylinder boring machine (no exceptions). Then mike them again and you will find that the cylinder bores have converged at the bottom by several thousandths, and are no longer square with the crankshaft. More proof in the next column.

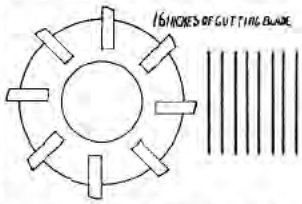
Try It Yourself



What Makes Cylinder Boring Machines Squeal, Squalk and Groan?

That's just another one of those questions that will make you say: "Gee, I never thought of that." But you can easily prove it as I have done. The majority of so-called cylinder re-boring machines (in reality cylinder reaming machines) squeal, squalk and groan soon after the boring head gets half way down in the cylinder or as soon as the slack and wear has been taken up in the bearings of the spindle that guides it. This is caused by the cutter being deflected by the hard iron on the ends of each pair of cylinders, towards the softer iron in the "web" between them. In casting the cylinders the hot iron quickly chills against the cylinder and water jacket cores, while the center web is about 2½ times thicker and cools off slowly and the iron is much softer.

Brinnell Hardness Tests



which I have recently made of four different cylinder blocks showed an average of 175 Brinnell hardness on the center web and 190 Brinnell on the ends of each pair of cylinders. This 15-point difference easily accounts for the multiple bladed cutter being deflected into the softer material.

The K. R. W. Cutter is so narrow and wear resisting that it cannot deflect away from the hard spots nor dig into the soft spots because the permanent (adjustable) guides on each end of the boring bar which are bolted to the motor block itself, prevent any possible shifting. The average reamer head used for cylinder re-boring has about 8 blades, each about 2 inches long, or a total contact with the cylinder wall of about 16 inches. The K. R. W. Cutter has a contact with the cylinder of only 1/16 of an inch. That's some difference, 256 to 1. See opposite page, also pages 20-28.

The K. R. Wilson Cylinder Hone

For Polishing Reamed, Rebored and Reground Cylinders

Hones collapsed to enter Cylinder

Price $15.00 W-51

Delivered

Hones expanded after being inserted

The K. R. W. Hone

has been developed and perfected for finishing Ford cylinders, only after they have been reamed, rebored or reground. To remove only the "wire edge" or tool marks left by the boring tool or the grinding wheel.

The design is very simple, yet positive in action. A device similar to the clutch on a lathe countershaft has been built in to it for contracting the stones while the hone is being inserted or removed from the cylinder, thus preventing the cylinder from being marked or honed "bell-mouthed" on the top or bottom ends, a common occurrence with most other makes.

The driving shaft is fastened in the center of the main casting in a similar manner to that of a universal joint, so that the complete hone is more or less flexible, making it adaptable for use with electric drills or drill presses.

The material and workmanship throughout is high grade in every respect.

Hones Will Not Replace Boring or Grinding

Any manufacturer who claims that his hone will replace boring, reaming or grinding for all cylinder re-finishing operations is either inexperienced, ignorant or deliberately lying, and we are ready to back up this statement with a challenge, and forfeit $100.00 in cash to any hone manufacturer who will demonstrate that he can true up any crooked cylinder so that it will be square with the crankshaft when he is finished.

Hones may be used for emergency repair jobs such as removing light score marks, removing the taper from the bottom of worn cylinders below the point of ring travel, etc., etc., but in no case can the results obtained be considered a first class job, or anything else but a makeshift, because the hone "floats" in the cylinder and there is nothing to prevent it from dropping into the pockets or hollow spots caused by the wear of a cocked piston, etc. Therefore it is evident that nothing short of reboring, reaming or regrinding can remove an excessive amount of metal from one side of the cylinder without effecting the other.

The K. R. W. Hone will do all that any other Hone can do—successfully

Ford Size Only

One Minute Per Cylinder

The K. R. W. Hone will remove the "wire edge" and polish off the high spots of newly rebored, reamed, or reground cylinders in just one minute.

To hone a cylinder longer than that will not further increase its smoothness, but there is a great danger of spoiling it by creating a taper or out-of-roundness.

Some of the Largest Automobile Manufacturers Have Proven—

that honing is only a small part of finishing cylinders. If a cylinder bore is crooked, i. e., not at right angles to the crankshaft, then it must be rebored or reground to square it up. After which it should be honed only just enough to remove the tool or grinder marks which eventually must wear off unless removed by some other method before excessive friction can be eliminated.

To attempt to remove more metal will usually spoil an otherwise good job because it has been definitely proven that a hone will not even follow-the-hole due to the variation (hardness and softness) of the iron, because automobile cylinders are generally harder on one side than on the other due to the thickness of the metal and the consequent chilling of the thin sections of the castings. The hone always cuts faster in the softer metal. Some motor builders are now using "chills" in the cores of cylinders to harden the iron uniformly around the cylinder walls while making the castings, in a desperate attempt to overcome this objection.

Can Be Used In Any Electric Drill or Power Drill Press

The K. R. W. Hone is extremely flexible. Satisfactory results can be obtained by using it in connection with a half-inch electric drill. It is always preferable, however, to use a drill press when convenient as this insures better alignment and eliminates the possibility of human errors.

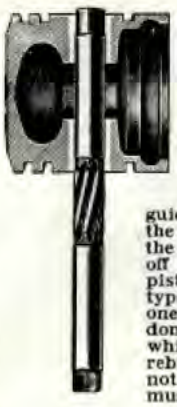
See Page 47 for Electric Drills

Harrington Differential Chain Hoist

Is a simple, cheap and safe type of chain hoist and is entirely satisfactory for Ford Repair Shops. Being very low priced every shop can afford to own one or more of them to take the drudgery out of repair work, such as lifting out motors, raising up the front and rear ends, etc. A chain hoist is several times faster than any other method and will save its cost in a short time, on hours of labor saved.

The utmost care is taken in the manufacture of both the chain and the sheave wheels so that they fit correctly, and, although low in price, the same care is exercised in their manufacture as in the Harrington Peerless and Screw Hoists. Can also supply hoists up to 40,000 lbs. capacity. If interested, write for prices.

	Capacity	Price	Shipping Weight
R-64	½ Ton	$14.50	41 Lbs. Boxed
	1 Ton	19.50	68 Lbs. Boxed
	2 Tons	29.50	100 Lbs. Boxed



K. R. W. Self-Aligning Piston Reamer

Price $5.00 W-14

I will first make it known that I do not advocate reaming piston bushings, and will say that it is impossible to ream them straight with the body of the piston, unless a very accurate jig is used to guide the reamer at exactly right angles to the body of the piston. Such as the Ford Motor Company use in the manufacture of the pistons. Only a few thousandths off and you get an "oil pumper." Hundreds of special piston bushing reamers of both plain and expanded type have been put on the market. I have tried every one that I have seen advertised. I still say it cannot be done. It is much better and safer to install a new piston which is already fitted with a pin at the factory, than to rebush it. However that does not mean that you do not need a piston bushing reamer, for there are times it must be used regardless of results.

The K. R. W. Improved All-Position Motor Stand

The Handiest Ford Motor Stand Ever Built

W-52 Price $30.00 ***And Worth It!*** **Shipping Weight, Crated, 190 Lbs.**

This Motor Stand Was Designed by 42 Expert Ford Mechanics at the K. R. Wilson Training School

where they had the opportunity of using every type of motor stand now on the market. This enabled them to test out and incorporate every good feature of the various makes, plus a few more labor saving ideas, into a new motor stand in which all the objectionable features are eliminated.

Motor can be completely assembled including crank case. Valve side unobstructed, mechanic can work from all sides without any inconvenience. Motor is well balanced in all positions. Pedestal is designed to take up very little room and is properly braced to prevent tipping over in case of poor anchorage. There are no angle irons in the way to stumble over; turrett locking lever always on top, easy to reach, with motor in any position; no danger of pinching the fingers; also friction locking lever which takes out all the lost motion and holds the motor rigid. Pedestal is made of grey iron, extra heavy design, and well braced; motor bracket of high grade malleable iron (unbreakable); shaft extra large, 1½" in diameter. All bearing surfaces are accurately machined. I'll stake K. R. W. reputation and claim that this stand is superior in design, workmanship, and quality of material to any other on the market, regardless of price.

Saves 1 to 2 Hours on Every Overhaul Job

For Owners and Mechanics

W-33 Price

$1.00

Postpaid

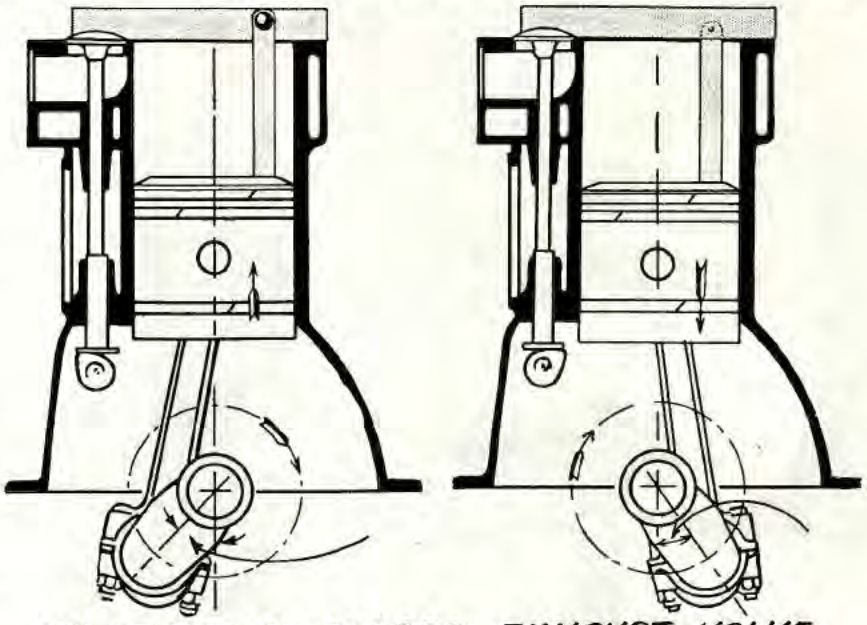
Six for $5.00

Order 33B for Tractor

Your Money Back if not entirely satisfied

Valve Timing Is Very Important

Correct Valve Timing Adds 10 to 40% Power To Average Motor



INLET VALVE CLOSES EXHAUST VALVE OPENS

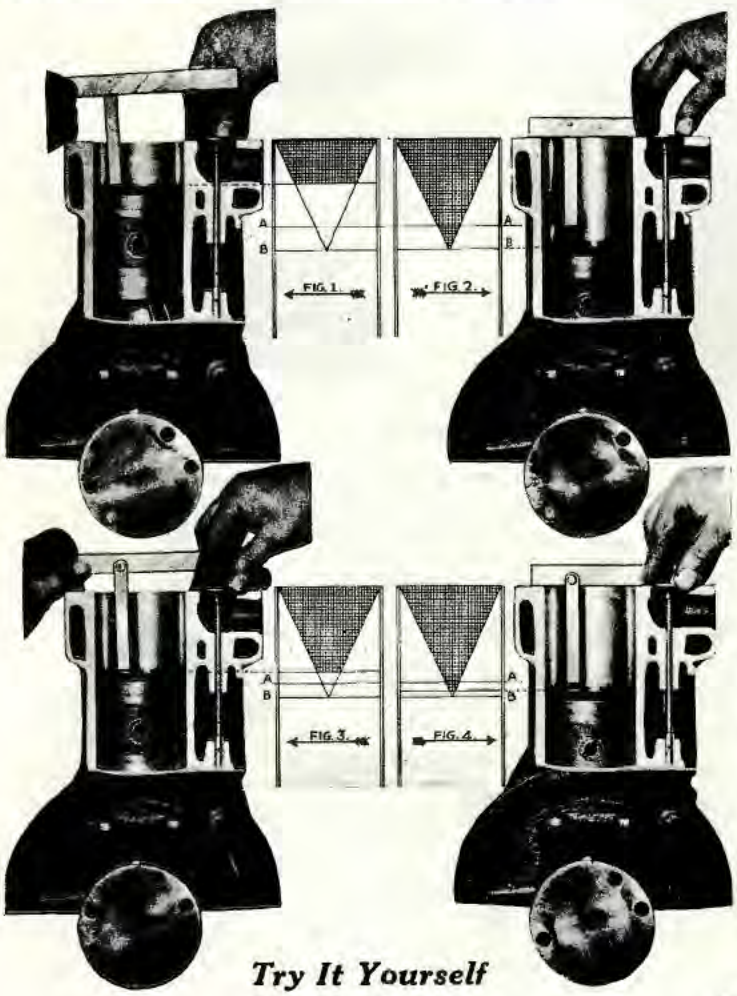
Twining Valve Timer

will enable any mechanic to properly time the Valves on a Ford Motor in two minutes, so that each and every cylinder will take in the same amount of gas, and exhaust it again at exactly the right time.

Read—December 1924 Ford Service Bulletin on Correct Valve Timing

Valves Should be Timed by Piston Travel

rather than by the clearance between the valve stems and push rods. Every cylinder must be timed separately and alike, otherwise one cylinder may take in gas equivalent to three-fourths of its volume, another seven-eighths, next one only half, etc. While the EXHAUST VALVES may open before the force of the explosion is spent in one cylinder, and open late in another, causing back pressure and resistance. These uneven power impulses make it impossible to get a smooth running motor and maximum power.



Try It Yourself

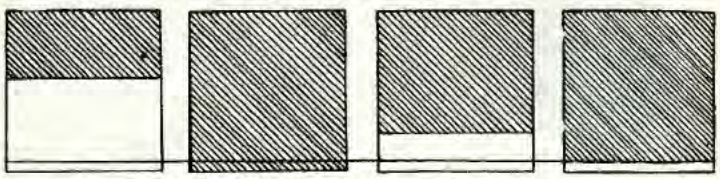
To Use This Timing Gage for the Intake Valves

simply turn the short lever to the position as shown in first picture, then crank the motor over until the intake valve (of the cylinder you wish to time) starts to close. The Valve should just touch its seat when the top of the piston just touches the bottom end of the timing gage, this is on compression stroke. If the Valve closes too early the stem must be "peined" to lengthen it. If it closes too late the valve stem is too long and must be filed off until OK. For EXHAUST VALVES use the timing gage with the short lever in the longest position as shown in second picture. Exhaust valve should just start to Unseat when the top of the piston has gone down in the cylinder the length of the timing gage. On power stroke—correct in the same manner as intake valves.

Fig. 1 shows the intake valve closing very late on compression stroke. Valve stem too long. Only .004 clearance. Part of the gas is forced out through the manifold and wasted, leaving only a small charge to produce power as shown by the "checkered section." REMEDY—Shorten valve stem. Fig. 2. intake valve closes too early, too much clearance. Valve is actually closing on suction stroke and fully closed on dead center. Also opens late, thereby reducing volume of gas in the cylinder. REMEDY—Lengthen valve stem. Fig. 3. Exhaust valve opens too early allowing unspent gases to escape before delivering their full power value. The large volume of flame burns valve seats, warps valves and often burns off valve heads; especially in tractors this condition is extremely wasteful.

Fig. 4. Exhaust valve opens late. Full power stroke but some of the power is wasted on scavenging stroke from back pressure due to exhaust valve opening late and closing too early because of the short cam lift.

Most Ford repairmen are under the impression that valves closely adjusted by valve tappet clearance will result in a quiet running motor, but such is not the case. Noises and uneven running are caused by uneven power impluses and the lag or back-lash between each explosion which breaks up the perfect rythm just like a bad note on the piano spoils good music. Worn cams and other conditions peculiar to Fords make timing-by-piston travel necessary for real results. Uneven power strokes of Fig. 1-2-3-4.



A Real Tune Up Job brings in the Business and Pays Big Profits

If you want to make a record for yourself, try this: In addition to the regular carbon cleaning and valve grind job take a few minutes extra and time the valves by piston travel. Do a careful job and get them exactly right. Then drain the sediment bulb, carburetor, clean and adjust the spark plugs, test and adjust the coil units. Then notice the difference.

Your customer won't believe it is the same car. He will "rave" about it to all his friends, relatives and business associates who will be coming to you for the same kind of a job. They are glad to pay $5.00 to $6.00 because their cars will run so much smoother and much more economical. (See page 54).

99% of All Ford Bearing Knocks Are Caused By Mis-Alignment of the 4 Main Bearings

Oh, where have I heard that expression before? Seems that about 9 out of every 10 mechanics claim they can do it, but during my 20 years of experience I have never seen it done—successfully.

Test every crankshaft. If it has been forcibly bent, throw it away; there is a kink in it and it cannot be straightened satisfactorily. It is cheaper to buy a new one, because a bent shaft must first be straightened as near as possible, then all 7 bearings reground by the same process they make new crankshafts, afterwards, you have an "undersized" shaft that costs real money to fit.

Now let's reason it out. You may test a crankshaft between centers, in "V" ways or on a balancing machine. In most cases, the indicating dial gauge contacts with the crankshaft on the side or at an angle for easy reading. Do you think YOU can test a shaft, then remove it to the straightening press (even though it may be handy) and get that "high spot" directly under the ram? I mean EXACTLY, degree for degree? Unless you can, then it is plain to see you will surely bend a kink into it, and by that I'll explain that the center bearing may show up nearly zero in the center of it, when again tested. But just move the indicator towards either end of the center bearing and make it read the same. You will soon discover that it can't be done. Then this proves that the center bearing is no longer parallel with front and rear bearings. When a shaft is straightened in this manner it is sure to cause trouble on the center bearing and wear it out quickly.

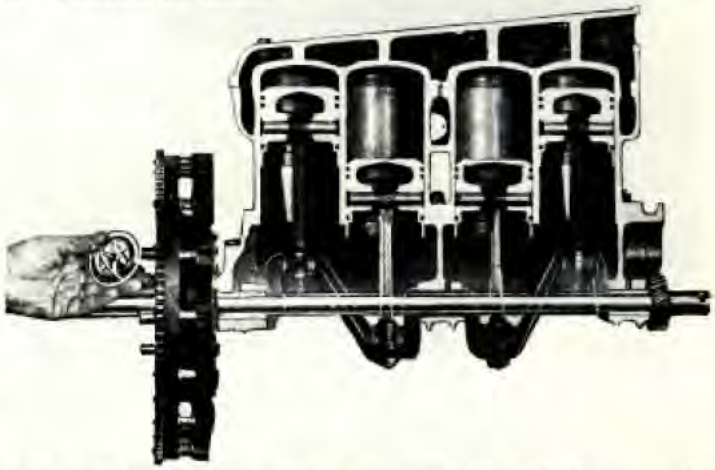
*See Page 36—**IF IT MUST BE DONE, the K. R. W. Hydraulic can do it better than any other straightening press made, because the crankshaft is tested and straightened at one setting. To Operate—Place the crankshaft in position and revolve to find highest point (using a regular cylinder indicating dial gauge. When this is found, the ram is brought down in contact with the crankshaft, the relief valve closed and a few strokes of the hand pump will force the crankshaft down where you want it, .001 of an inch at a time if desired. It is under perfect control at all times. The dial gauge shows just how far you bend it. This method saves all guesswork, and at least 75% of the labor over other methods where testing is done between centers and the crankshaft has to be removed to "V" blocks to be straightened.*

A sprung shaft is a different proposition. Crankshafts sometimes go out several thousandths of an inch while in stock or in service in a car. But why worry? The gyroscopic effect of the fly-wheel will straighten it for you, and here is plenty of proof that my claims are true.

Suppose we install a sprung crankshaft in a set of perfectly aligned bearings. This will pull it back into line, and it is true there will be an excessive pressure against the center bearing, but what of it, it can't do any harm so long as it doesn't revolve, and, on Page 7 the National Lead Company says: "Genuine Ford Babbitt will withstand a great many tons of pressure per square inch of surface without 'squeezing out.'"

When the motor is started up the fly-wheel finds its plane-of-rotation and forces all three main bearings into perfect alignment, just as if the crankshaft were a piece of ordinary round cold rolled shafting (see picture next column). If this is true, then there is no unequal or side pressure on that bearing while the motor is in operation, and no harm can result.

In your younger days no doubt you have owned a toy gyroscope top—a small affair weighing only a few ounces—yet capable of exerting forces so great it took considerable power on your wrist to change its position and plane-of-rotation. Probably you have owned a bicycle too. If so, you have had occasion to remove wheels for checking up on bent rims, etc. Did you notice while you were spinning the wheel (as shown in picture) how hard it was to change its plane-of-rotation by moving the hub? Took a lot of strength, didn't it? Yet that wheel weighed only 1½ or 2 lbs. and was revolving at only 200 or 300 revolutions per minute.



Now stretch your imagination to compare either of these examples to a Ford fly-wheel It's a long shot I'll admit. (See picture). For example 52 lbs. of Ford fly-wheel running at 1000 to 2500 R. P. M. in comparison with those gyroscopic forces of a bicycle wheel could be at least from 800 to 2000 to one. Doesn't this prove that perfectly aligned bearings are ABSOLUTELY NECESSARY and far more important than any other operation in the re-manufacture of a Ford Motor?

What Happens If Main Bearings Are Not In Alignment?

The pressure exerted by the fly-wheel's gyroscopic forces is so great that an oil film cannot be maintained in that, or those bearings which resist the crankshaft, therefore, we have a metal to metal contact, friction and wear, and the crankshaft will wrestle itself free after a few hundred miles of running, and bearings become loose. In the meantime, if this condition is bad, broken shafts often result from crystalization due to bending it at every revolution. I have often heard of 3 or 4 crank shafts being broken in the same motor in succession, and only new bearings and correct alignment stopped it. A SIMPLE EXAMPLE of the above: Often you wish to cut a piece of wire, but can't find your pliers, so you bend it a few times and it breaks. You crystalized it at that point because the molecules of metal were pulled apart by bending.

Can You Make A Center Main Bearing Knock When The Motor Is Idleing?

(Hitting on All Four Cylinders)

TRY IT YOURSELF. I know you can't, Why? Because the fly-wheel gyroscope held all 3 main bearings in perfect alignment and continued to do so until you opened the throttle and gave it a "side kick" from the exploding gases in the second and third cylinders and of a force greater than the stabelizing power of the gyro.

Some cars are snappy and full of pep, hills and valleys are alike to them. Others are lazy, lack power and speed and with throttle wide open will hardly get out of their own way. It's a safe bet that if all four main bearings are put in perfect alignment it will cure the trouble. Power used within a motor trying to overcome friction and resistance is lost, and cannot help turn the wheels. Lets unharness the friction by the K. R. W. Process.

Bent And Buckled Crank Cases

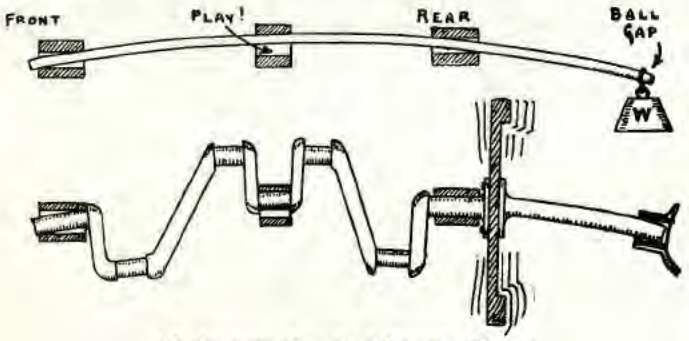
are responsible for more main bearing knocks than all other causes combined, and heretofore very little thought has ever been given to the alignment of crankcases. K. R. Wilson (himself) discovered it accidentally. It happened this way: We had been selling a large number of K. R. W. Combination Machines and now and then received complaints from some of our customers that they had followed our instructions to the "dot", but that their motors developed a KNOCK after running 100 to 200 miles. So I personally investigated to determine the exact cause. If it was the fault of our machine we wanted to remedy the trouble; if the fault of the operator so set him right, and if the fault of anything else to locate it, at least, in order to be able to answer further complaints. By the process of elimination I soon found the trouble, after which I tried the same tactics on other jobs which had developed this trouble and the results were the same. We then tested out NEW CRANK CASES which had been put in some of these jobs which had gone wrong, and we tested new crank cases in the dealers' stock rooms and found that they had been made at the factory, but had been damaged in shipment and rough handling and the majority of them were twisted or bent so badly it would be unsafe to assemble them into a motor. This information was startling to the service managers of the Ford Motor Company. They refused to believe it. But

Continued on Next Page

they got busy and investigated my claims and discovered that it was all true. In the meantime I designed and built a special jig for testing these crank cases and the results were still more interesting, to such an extent that the service department sent out a general letter with a circular of the K. R. W. Crank Case Jig attached to it, to every Ford dealer in the United States, because they realized the importance of straight crankcases, and they have found it much easier to straighten each crank case just before it is sold over the counter or assembled into a motor than it is to attempt to keep them straight in shipping and handling, and also the fact that the dealer should straighen all the used crankcases on overhauled jobs.

Some repairmen contend that a sprung crankcase will be pulled straight when it is bolted to the cylinder block. To a certain extent this is true, this will pull the front end of the crank case straight, but what about the rear end?

The average mechanic thinks of the Ford engine as having but three main bearings, but K. R. Wilson says there are four and will prove it. All we have to do is to consider the engine and transmission as a single unit, and it surely is. Thus we find there are three main bearings in the engine and one at the end of the transmission shaft—making four in all. Since the transmission shaft if firmly bolted to the flange of the crank shaft, it becomes in fact an extension of the crank-shaft and any misalignment of this shaft affects the crank shaft very materially.



Broken or Cracked Crank Shafts

We have had car owners and garagement write us that they had been having trouble breaking crankshafts and transmission shafts, and after new shafts were installed they soon followed the fate of the first one. Broken or cracked crankshafts can always be traced to mis-aligned bearings. The constant bending of the crankshaft or transmission shaft at each revolution crystalizes the steel until it becomes so brittle it breaks. Example: Did you ever break a piece of iron or copper wire by bending it back and forth a few times, when you couldn't find your pliers? It works the same way.

re-babbitt the block, fit and align the bearings, then test the crank case and assemble it correctly.

To Detect a Bent Crank Case

Remove the rear axle and pull out the universal ball cap bearing, if the babbitt lining shows even wear then it is O. K. But if the wear is nearly all on one side, then the crankcase is usually out of alignment. This pulls down on the transmission shaft, causing it to whip the crank shaft bearings.

While we have stressed the point that brand new crank cases can be very easily sprung before being installed in the Ford, it is also true that they can be easily sprung while in use. Example: Suppose we were driving over a rough and rutty road and the front wheels cross a "thank-you-ma'am" and drop into a rut on the other side, or suppose one of the front wheels drops off the end of a bridge or a deep ditch, the car being light it may not tip over and it may come out under its own power, and you might say "well that was a close call," but the Old Ford cannot forget it so easily, and even though the crank case may not be caved in, still it is possible that it may have received enough of a twist to throw it out of alignment and soon develop main bearing knocks. That is why EXPERT SERVICE MEN test every crank case before assembling into a complete engine. It may not occur to many of you that backing the rear wheels into a curbstone, or side-swiping the curb with the rear wheels may cause a sprung crank case. Consider the stiffness of the drive shaft housing (as braced by the rear radius rods) and think how easily backing the rear wheels into an obstruction can push the universal joint and crank case forward or to one side. That's why delivery cars break a lot of crank case arms. Or consider the front radius rods (attached to the long crank case) and how the striking of an obstruction or dropping into an open sluice, may be like a "punch in the stomach" of the crank case. It's a tribute to the Ford crank case that it ever remains straight, with so many careless drivers.

Installation of Universal Ball Cap

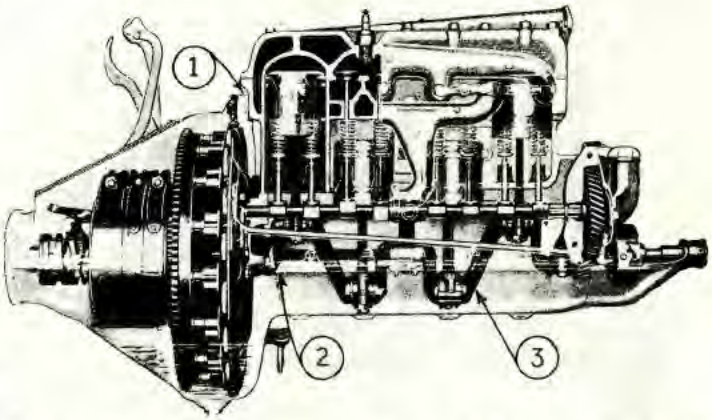
Being the 4th main bearing it must be in perfect alignment with the three crank shaft main bearings. In placing the motor in position be sure that the universal cap fits free in any position, without any bind. Do not bolt the crank case and transmission cover down solid unless it fits freely.

Bent Crank Shaft and Transmission Shaft Flanges

are responsible for most of the vibration in Fords. This condition makes the fly-wheel wobble and sets up a counter gyroscopic effect that kills power and speed (see results of tests, page 54). These conditions are usually due to careless handling and setting on concrete floors or throwing these parts in boxes with other parts where they become bent and niched. Dirt and grease between these flanges or in the recess of the fly-wheel give the same trouble. BE CAREFUL.

The New Improved Ford Engine

Incorporates 3 Important Improvements "For Alignment"
All of Which Prove the Correctness of the K. R. W. Process



1 Cylinder block and transmission cover are bolted together giving it the rigidity of one unit. This eliminates the hinge-like motion, bending and twisting of the crank case at this point. Also helps to keep the universal ball cap (4th main bearing) in perfect alignment with the other three main bearings. This improvement will prevent a large percentage of the former main bearing troubles due to bent crank cases and mis-alignment of this fourth main bearing.

2 Crank case has been greatly stiffened by additional reinforcements in the corners and elsewhere to secure greater rigidity and strength—to help perfect alignment.

3 Crank shaft has been re-designed and made much heavier and stiffer to give it more resistance against mis-aligned bearings. It will also withstand heavier loads and power impulses without deflection.

Many other improvements have been made that help to make this motor car far superior to any previous models. But I am trying to convince you that ALIGNMENT is more important than anything else and if you have read my story this far I am sure you are now convinced.

What About 13,000,000 Others?

In service, that do not have these improvements. They must be rebuilt from time to time, and put-in-alignment if satisfactory results are to be expected. The K. R. W. Crank Case Aligning Jig will help you obtain these results and will insure much better motor work going out of your shop. It PREVENTS COME-BACKS.

Ask Any Repairman

These three questions, then you will get the answer to a problem which has cost Ford Owners, Dealers and Repairmen

$ $ Millions $ $

1 ***Why does Ford use a rear main bearing cap to take out end play?***

2 ***What relation does the rear main bearing cap have to an oil pumper in No. 1 cylinder in a new or rebuilt motor?***

3 ***What is the cause of an oil pumper?***

Not one repairman in a thousand can answer these questions, and lack of this knowledge has cost Ford owners, dealers and repairmen millions of dollars, and as we go on through this discussion you will appreciate just how important a part this particular bearing plays.

The Answer To All Three Questions

When one stops to think that 85% of the different makes of automobiles use the center main bearing as a "thrust" bearing to take out end play, it is hard to understand why Mr. Ford ever thought of putting his "thrust" bearing on the rear bearing where it is out of reach and unhandy to get at; yet when you use a little of that uncommon common sense there is a good reason for it, and Mr. Ford had that particular problem in mind when he built it that way. He uses an Induction Type magneto, no brushes or contacts, therefore, the space between the magneto field and magnet must remain about the same at all times. (Take another look at Page 4). By placing the "thrust bearing" on the rear, the expansion of the crankshaft (when the motor is heated up) is only one-half the length of this bearing and might vary the air gap only .002 to .003 If Ford used the center main bearing for a "thrust bearing"

(Continued on Page 26)

The K. R. Wilson Crank Case Aligning Jig

75% of Your Main Bearing Knocks are Due to Bent or Buckled Crank Cases

W-31

Price $65.00

F. O. B. Factory, Arcade, N. Y.

Shipping Weight, 360 Lbs.
Boxed for Export, 453 Lbs.

This low price is possible only because we manufacture them in large quantities complete within our own plant from the pig iron to the finished product, and are satisfied with a reasonable profit.

Bent or Buckled Crank Cases

It has been definitely proven that 75% of all main bearing knocks originate from bent or buckled crank cases. Little attention has been paid to this very important point. If a Universal Ball cap (rear transmission bearing) could be forced into place it was good enough. Just stop and think that is one-of-four main bearings and must be in perfect alignment. If not, the transmission shaft pulls the flywheel out of alignment and makes it wobble at each revolution. This deflection is transmitted to the middle main bearing which quickly works loose and starts knocking.

Every Crank Case Should Be Aligned

whether it is old or new, before being assembled into a complete motor. Then there is nothing left to chance or luck. You know definitely that no trouble can develop from this point. The cost of an aligning jig is CHEAP INSURANCE against COMEBACKS which are expensive and disagreeable, to say the least.

The K. R. W. Crank Case Jig

is built to withstand heavy usage, and to correctly align all points on a Ford crank case. All parts are carefully machined to accurate jigs. The complete top is a smooth surface plate that can be used for other purposes as well. There are TEN hardened tool steel dowel pins, which pull the crank case into position as it is forced down upon them. Special fixtures for aligning the starting crank bearing, crank case arms, and a plug gage for the Universal joint end.

Broken Crank Shafts

can always be traced to mis-aligned bearings. The constant bending of the crank shaft or transmission shaft at each revolution crystallizes the steel until it becomes so brittle it breaks. Ever break a piece of iron or copper wire when you couldn't find your pliers? It works just the same.

Vibration

Wobbly flywheels set up a counter-gyroscopic motion and absorb the power. Ever notice some Fords have lots of "pep" and instantly respond to the slightest touch of the throttle, while others, regardless of how much you fuss with them or how much new equipment you install, are "dead", and will hardly get out of their own way? You can bet it is due to misalignment of main bearings, and win 99 times out of 100.

Installation of Universal Ball Cap

The universal ball cap is the rear bearing, and must be in perfect alignment with the 3 main bearings of the crank shaft. In placing the motor in position be sure the universal ball cap fits easily without any bind. Do not bolt crankcase down solid to the motor block or transmission cover until this universal ball cap fits freely. At this price can you afford to get along without it another day? Because it removes all chance of your mechanics allowing a bent or buckled case to enter a job and cause trouble.

Note Extra Heavy Construction

Stops Oil Leaks

Old crank cases often waste more oil than is burned in the motor because the engine bolts have pulled the crank case out of shape allowing oil to leak out between the crank case and gaskets. This rim can be flattened perfectly in one minute.

Pays for Itself

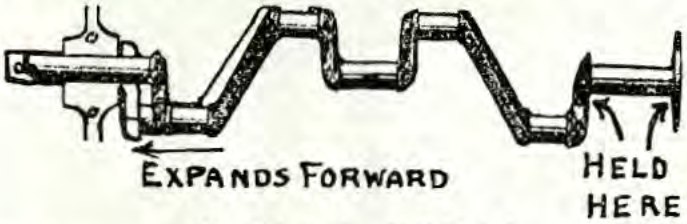
Hundreds of dealers and repairmen have written us enthusiastic letters stating that their JIGS had already paid for themselves on salvage crankcases, which had previously been junked.

YOU, too, can make big profits—putting on Arms. Stopping Oil leaks, etc.

More of the MYSTERIES Unravelled

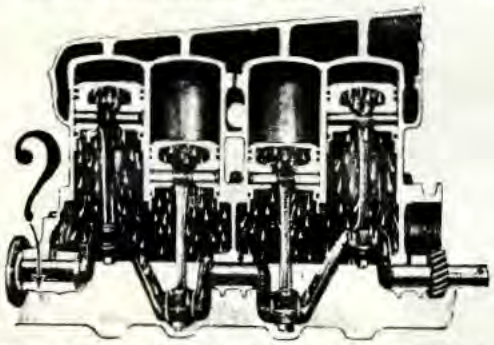
the expansion would be at least 6 times as much, the magnets would be forced so far away from the field that very little current would be generated, and the results would be about the same as a weak magneto, or a motor with a worn "thrust bearing." So it happens that the problem of EXPANSION must be dealt with.

Now when you stop to consider that a piece of steel of the same analysis as a Ford crank shaft will expand .00000636 of an inch for each degree Fahrenheit, assuming atmospheric temperature to be 70 degrees, and the average running temperature inside a well limbered motor to be 280 degrees, that shows a difference or increase of 210 degrees, which multiplied with that decimal shows that the crankshaft expands .0016 on its 1¼ inch diameter; and because of the fact that steel expands in all directions, it would naturally follow that it would expand lengthwise in the same proportion to its length.



The "Limbering-Up" Period

In all new or re-built motors we have the limbering-up period to contend with, so that we are actually confronted with an abnormal condition, during which time the motor is trying to free itself or wear-in. We get additional heat due to the friction of tight pistons, rings, cylinder walls, crankshaft bearings, etc. This additional friction is only temporary and lasts only during the limbering-up period, but while it lasts our normal temperature may be doubled or more. It is perfectly reasonable to expect the pistons to expand twice as much and the crankshaft to do likewise, because in the very beginning they are already so tight that it is difficult to start the motor, even when it is cold, because of the friction on those parts, and, as soon as we start to heat them up they expand and become tighter, causing more friction and heat, which calls for more gasoline to "turn-her-over."



The oil being splashed up into the pistons becomes hot and drips back onto the crankshaft, expanding it still further, until lack of lubrication within these bearings causes them to heat up and requires additional power to make it revolve. Therefore, it is easy to understand why we get this abnormal condition, and that it is not preventable. So that when we reduce this argument in terms of actual figures, under abnormal conditions the temperature frequently rises to more than 500 degrees, and must exceed even this figure to soften or melt the babbitt—which it often does when burning out a bearing. Therefore, you will see that the expansion in diameter of a Ford crankshaft at 500 degrees increase, would be .0034, and the same linear expansion applied to the length of the crankshaft would exceed one hundred thousandths, or more than one tenth of an inch, which amount greatly exceeds the space provided between the piston bosses and connecting rod (see Page 15). And, because of the fact that the expansion is all towards the front end of the motor, it is easy to understand what happens to No. 1 connecting rod and piston under such conditions.

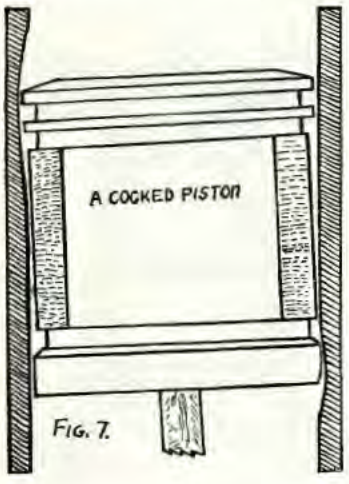


FIG. 7.

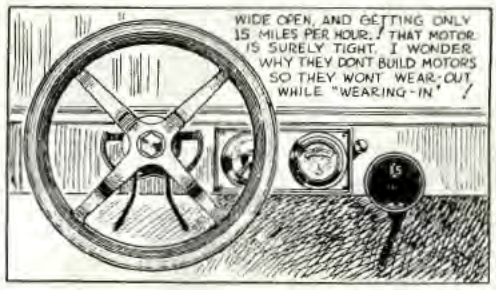
The connecting rod is pushed forward by the accumulated expansion of the crankshaft, and if the abnormal expansion is greater than the space provided between the connecting rod and piston boss, then nothing else can result but a bent rod and a "cocked" piston, which throws the piston and rings out of square with the cylinder wall and it starts wearing off on the two points of contact with the cylinder; the cylinder is soon gouged out of shape (as indicated by the sketch shown) which allows the oil to pass by the piston rings and cause oil pumping.

During the past two years the Ford factory has increased the clearance between the piston bosses. This, together with the help of the "oil groove," has practically eliminated oil pumpers, except in cases of extreme carelessness on the part of the drivers.

Now, a True Story To Prove It

Jim Brown just had his little Ford roadster "overhauled" at the Quick Service Garage. Bearings burned-in, cylinders honed, new pistons lapped-in and about everything else they could do for it. He paid his bill then started out to see how she would run. It was so stiff Jim couldn't crank it, but being a good athlete and powerful enough to raise the car off the ground he finally broke it loose and the motor commenced to snort. So Jim piled in and started for home.

Was she tight? I'll say so. With the spark and throttle wide open he could get only about 15 miles an hour, and every now and then it would squeak and groan and finally stop. He hadn't been driving more than an hour or so before it started to jerk and the front cylinder commenced to pump oil and foul the spark plug. Well, anyway it gave the engine a chance to cool off while Jim was cleaning the plug and this helped some. The next day Jim drove back to the garage and told them about it, so they pulled out No. 1 piston and drilled it full of holes and put on a "no leaker" piston ring and assured Jim that he could now forget about it. He DID, for a few days and then all of a sudden he heard a "new squeak" and upon investigation found that No. 1 piston had badly scored the cylinder. The cylinder was dry. He looked at the others and they were O. K. Could it be that the oil line had stopped up? NO, I guess not, because the other pistons were lubricating satisfactorily.



Jim sat down to think it over and finally decided that the pistons had been fitted too tightly, because most of the tool marks were worn off and the surface polished bright with only a few miles running. The skirt of the piston had polished bright and scored the cylinder on the side towards the front of the engine and the top of the piston on the opposite side had done likewise. That indicated that the piston had been "cocked" in the cylinder. So he had it tested on a connecting rod and piston aligning fixture and this proved that he had guessed correctly. He also noticed that the babbitt on the side of the connecting rod towards the fly-wheel was brightly polished and partly chewed off. What could cause this? He finally discovered that the crankshaft had been pushing against it. By this time Bill was thinking fast. Common sense told him that if holes need be drilled in the pistons that Ford would drill them when he made them. He grabbed hold of the no-leaker piston ring and it was so stiff he could hardly compress it and then he said no wonder they call them leak-proof rings, that ring is so D—— stiff nothing can get past it, so that's just why the cylinder is scored.

THIS LITTLE CARTOON has been made to further emphasize the effectiveness of leak-proof piston rings. They will absolutely stop oil pumping if they fit the cylinder, and they will also stop lubricating it. In a worn cylinder they fit only in spots and enough oil gets by to prolong the "agony" for a few hundred miles before the motor is actually worn out by lack of sufficient lubrication.

My experience with hundreds of different never-leak piston rings is that they are just about as effective in a Ford motor, as a shot of morphine is to a human being, they do more harm than good. I can prove this statement when I say that it is hard to find even one advertisement of "Miracle" Ford piston rings in any of the leading automobile magazines today. Two years ago hundreds of them were being advertised that were claimed to perform wonders for Fords. Well informed men claim that it was K. R. Wilson who boldly challenged their statements and exposed the truth in my 1924 Catalog and book of information. If this is true then I have saved Ford owners and dealers MILLIONS. Read why genuine Ford rings are better than any others regardless of price.

Piston Slaps

REMEMBER BILL JONES' OLD 1911 TOURING CAR?—Yes, the one with the flat top pistons. He has run that old "buggy" 150,000 miles in 13 years, and never overhauled it. She's running fine too. You just ought to see how loose the pistons are. Yes sir, loose enough to put a 10-cent piece down between them and the cylinders. But she don't pump oil and don't piston slap and she sure can go. I know a lot of others that are not worn half as much as this car, that pump oil so bad that the spark plugs have to be changed every few miles, and the piston slaps so much that you can hear them coming two miles away. I wonder if Henry made a special one for Bill. See next page.

Valuable Information—*How To Fit Piston Rings!*

Piston Slaps

And now that you have read my little story about Bill Jones' old touring car I am quite sure that you too have had a similar experience with old cars which were badly worn in the cylinders. Some of these old cars will piston slap and pump oil, while others worn fully as much, run quietly and give no trouble whatever. Therefore, I am going to tell you that there is "no such animal" as a piston slap. It is true you hear garagemen talking about them, and they really believe there is such a thing, but when pistons are fitted up at right angles with the crank shaft, even though the clearance is up to ten thousandths or more, providing the cylinder wall is straight and true, no slap will be heard. The fact remains that you have heard annoying noises which you had named "piston slaps," but by careful examination these troubles can be located in any one, or the combination of the following: Crooked wrist pin bore, bent connecting rods, and cylinders out of true with the crank shaft. Piston slaps are caused by the connecting rods striking the piston boss, sometime with sufficient pressure as to force the piston tight against the cylinder wall, but it was not the piston that slapped for the connecting rod itself was responsible.

How To Locate Piston Slaps

Remove the lower crank case cover plate, then have someone "crank" the motor over slowly while you watch the movement of the connecting rod in each cylinder (use a spotlight). You will notice the "slapper connecting rod" shift sidewise or twist as it moves from top to bottom of the stroke. The piston and rod assembly should then be removed and inspected in the following order: For bushing clearance, straight piston pin bore, bent or twisted connecting rod. With all these troubles eliminated, and piston rod assembly again installed, it should check perfect; if so, no piston slap will be heard.
ON REBUILT JOBS, make these tests as you go along—PREVENT these annoyances by closer inspection. Use extraordinary precaution and you will soon forget that you ever saw an oil pumper or heard a piston slap, see page 15.

What Is the Oil Groove For?

Suppose I had asked you that question. Could you have answered it correctly? Not more than one mechanic in a thousand knows. But they all have their "guesses". So let's reason that out, too.
You will recall that previous to the Ford Motor Company having put that groove on their pistons, oil pumpers, scored and burned pistons were common, but during the past two years the percentage has dropped to a very low figure, and one of the most common complaints now heard from Ford owners is "What's the matter with my car, it doesn't seem to use any oil. It still runs out the top pet cock and I haven't put any in for more than 2000 miles." Yes, this is a common statement and we know you have heard it a great many times. Well, the facts are that there is a certain amount of condensation of gasoline and moisture which dilutes the lubricant, even faster than the oil is actually consumed. Therefore, the volume of liquid is maintained. But the most important fact is that the piston is now actually lubricated all the way around. Please refer to the cut. Standing in front of the car you will note the direction of rotation of the crankshaft. The oil is splashed against the right hand cylinder wall. Centrifugal force puts it there, while the left wall receives none.

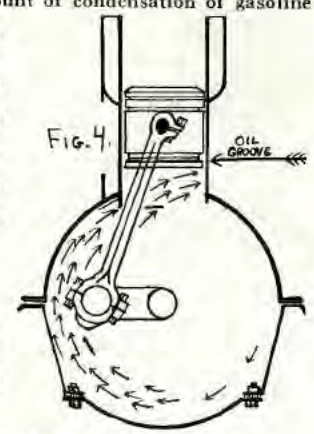
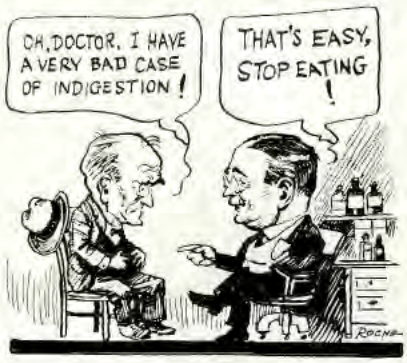


FIG. 4.

The Oil Groove Is Filled With Oil

which flows all the way around the piston, distributing the lubricant over the entire area. Therefore, the lubrication has been perfected, scored and burned cylinders have been eliminated or prevented.

Why Do Some Mechanics Drill Pistons?



Just ask one—of course, they think they know. But let them give you one reason that will defeat this argument we have given you. Now, let's eliminate the impossible—If the pistons should be drilled, don't you think the FORD MOTOR COMPANY could do it quicker and better than anyone else and thus avoid the possible forgetfulness of the mechanic? When the piston is drilled to "bleed" the oil away from this ring groove, then the oil groove ceases to function, and the piston does not receive sufficient lubrication. Some mechanics will counter this argument with the statement that "it stops oil pumping." So it does, we admit it. But if you were affected with stomach trouble and your doctor said "Stop eating and you won't have the trouble", you could endure it for a while, but if you continued to follow out his instructions your whole constitution and pep would soon drop, and so it does with a Ford motor in which the pistons have been drilled. Because the lack of lubrication, due to the fact that the oil is drained off the piston before it can possibly work up to the upper piston rings, causes rapid wear in the cylinder and on the rings at that point, and the extra friction caused by it, takes more power to overcome it, thereby reducing the efficiency of the motor and at its best means only a short-lived repair job of only a temporary nature.
To stop that oil pumper, follow out the processes previously described. Line up your pistons and connecting rods; test the cylinders and if they are in fair condition you will find that regular Ford pistons and GENUINE Ford piston rings will stop it absolutely and by their use will continue to give that car the long life it deserves. On the other hand, if you persist in drilling the pistons and using "bastard rings" you will still be classed with those who ought to know better.

How To Fit Piston Rings In New or Rebored Jobs

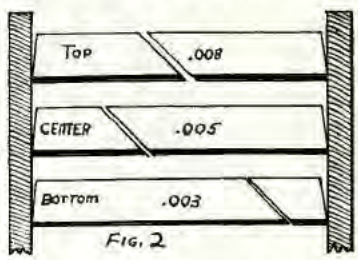


FIG. 2

After having watched thousands of Ford repairmen fit piston rings, I am convinced that not more than one out of a hundred knows how to do it correctly. It is customary to fit them as tightly as possible and with the smallest possible "gap." This is all wrong, EXPANSION will "undo" the whole job, and often do a lot of damage at the same time, which was preventable by using a little common sense. Now, if it is necessary to turn down the piston 5 and 9 thousandths of an inch smaller at the head of it, than on the body, to allow for expansion when the motor warms up, then isn't it reasonable to expect a similar amount of expansion on the piston rings in similar positions? Therefore, we must provide at least, as much clearance as suggested on this cut-out for cylinders that are straight and true, and a great deal more for worn and tapered ones.

In Used Cars

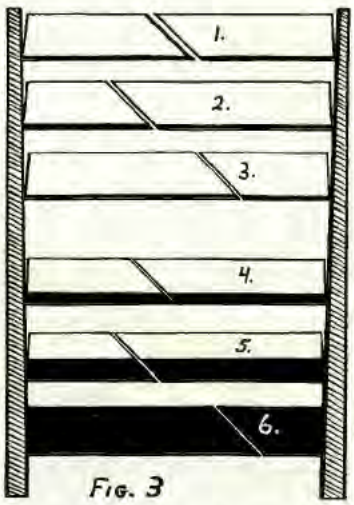


FIG. 3

This cut shows what happens when piston rings are not properly fitted in worn or tapered cylinders.
It is customary practice to fit the rings at the top end of the cylinder because it is handy, but on account of the extreme heat and lack of lubrication at this point the cylinder wears "bell-mouthed" or larger than it is at the lower end of the stroke. If the rings are fitted to the same clearance as for a straight cylinder, then it is natural that the "gap" or clearance on the points of the piston ring will be less as it goes down in the tapered cylinder. The ends finally come together and prevent further contraction. Thus, nothing else can happen but to forcibly wear off the piston ring and some of the cylinder at the same time—a condition that would indicate to some mechanics that the ring was "too soft" and wore out quickly. A cylinder indicating dial gauge test, would show that the cylinder had been worn excessively and prove my theory. See article about fitting pistons and rings in trucks next page.

Piston Rings Open and Close

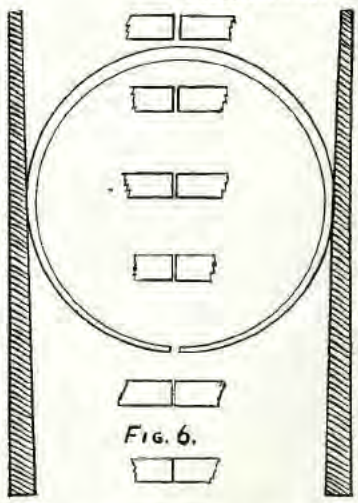


FIG. 6.

This picture shows how a piston ring must open and close from top to bottom of stroke in a tapered cylinder. My advise is, test your cylinder first, then you will know just how much taper must be figured. For example: If cylinder shows a two (.002) thousandths taper in the center of it, that would make the piston ring contract two (.002) thousandths at that point. This multiplied by 3.1416, the circumferance, would show that the points actually came .0062832 thousandths closer together on account of the taper. This, plus normal clearance for expansion (of top ring .008) would give us a total clearance of about .01425 thousandths. The average mechanic would throw up his hands in horror at this, claiming that the gaps were so large that the piston rings would surely leak by, but due to his "lack-of-thought" that same mechanic has actually been ruining motors by causing excessive wear and friction, which did many times as much damage as it did good. Recent experiments conducted at the K. R. W. Training School proved that cylinders bored to .031 oversize and fitted piston rings of only .010 oversize gave much more power on the dynamometer tests, and showed perfect "line" contact on the piston rings, and less wear in the cylinder than those fitted with regular .031 rings. The "gap" in this case was nearly 1/16 of an inch wide, and the ring compression much less.

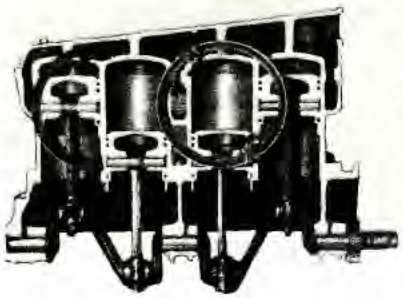
THE NEW K·R·W· CATALOG ARRIVES AT BINGVILLE GARAGE.

Why Don't Ford Ton Truck Motors Stand Up?

Now lets reason that out as follows: Truck motors are usually built up with about the same clearances on the pistons, rings, bearings as a pleasure car motor. Little if any thought is ever given to the different conditions under which they are operated. A truck motor runs at a much higher speed, often at a full load for hours at a time, which means more heat and expansion, perhaps two or three times as much.

If you have failed to provide sufficient clearance to meet these extraordinary conditions, then the pistons and rings must wear themselves free, so that the motor will not "set-up" and stall even under the heaviest load. That means if you fail to fit pistons and rings in truck motors for clearances of 6 to 10 thousandths (depending on the conditions under which that particular motor must operate) then that much metal must wear off the pistons, rings and cylinder walls before it is free at full loads. This iron saturates the lubricating oil, gets into the bearings and in a few days the motor is "knocking" and it goes to pieces. Preventable? YES, FIT THE PISTONS AND RINGS PROPERLY TO TAKE CARE OF THESE PEAK LOAD CONDITIONS, then they don't have to "wear out" trying to fit themselves. The majority of Engines wear more during the first two hundred miles than they do during the next year of service.

Piston Ring Friction



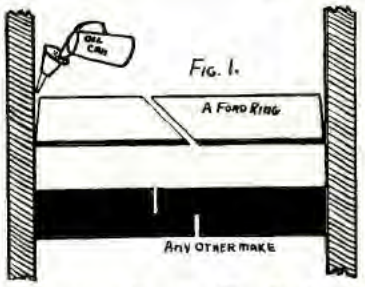
Here's some more food for thought. Has it ever occurred to you that an ordinary set of piston rings (not Fords) produce as much friction as 1½ Ford emergency brake shoes, with the same number of lbs. tension applied? At first, this statement may seem a little exaggerated but thesee figures tell their own story — 3¾ in diameter x 3.1416 circumferance, x ¼ in. width, x 12 piston rings equals 35.34 square inches of friction surface in contact with the cylinder wall. Now apply the same formulae to 1½ brake shoes and you will get very near to the same figures.

My object of this discussion is to show you just why so much power is "lost" within the engine, that never gets a chance to turn the wheels. Some manufacturers of piston rings have tried to satisfy the demand for rings to stop oil pumping, and instead of trying to find out the exact cause of it, they have been making rings a little stiffer and with various methods of lap joint construction, until some of them have reached wall pressures of 35 and 40 lbs., and others have put springs behind the rings to make them RUB on the cylinder walls. No different to an ordinary internal expanding brake shoe with the same proportionate pressure applied. A broach could do only a little more harm, for a piston ring with a wall pressure as high as this could not properly lubricate and consequently wears the cylinder walls excessively while they last and the metal becomes a solution with the oil and makes a quick job for the repairman (Ford undertaker).

In the next column you will learn why genuine Ford rings are better than any others for Fords, and now to prove all my statements about piston rings I need only to refer you to the new Ford pressed steel piston with its ⅛ inch wide, 4½ lb. wall pressure, concentric piston rings. Students at the last session of the K. R. W Training School built up a motor with these steel pistons and light weight connecting rods, just to check up some of my claims, and they were surprised to find that every one of the piston rings had seated 100% perfect, after just 5 minutes running on the dynamometer. This motor actually delivered about 5 H. P. more than the average job we had turned out and I am sure a large part of this increase was due to having eliminated most of the friction. If you have any doubts, just

Try It Yourself

Why Genuine Ford Piston Rings Are Better Than Any Other



Just take a look at this picture and you will quickly understand why a Ford piston ring is BETTER than any other for use in their motors. A Ford piston ring is tapered .002 all the way around. It makes a "line contact" against the cylinder and requires much less ring pressure to make it seat tightly and conform to slight variations in the cylinder bore. The average pressure is 12 lbs. The ordinary piston rings sometimes used in Fords will average at least 18 lbs. wall pressure and its entire width makes contact with the cylinder wall. Now let's reason it out: The Ford ring allows the oil to flow down the tapered edge and the velocity of the piston coming up forces some of the oil past the line contact of the ring with the cylinder, thereby lubricating it. The ordinary ring having 50% more wall pressure and no taper whatever receives very little lubrication, consequently much more friction and wear takes place betwcen the piston ring and cylinder wall. This causes the cylinder walls to wear out in a much shorter period of time than where genuine FORD rings are used.

Lapping In Pistons

Whenever you see a garageman lapping in pistons in a newly rebored or reground cylinder you can make up your mind he has a whole lot to learn. Abrasives are imbedded in the pores of the cast iron and can not be entirely removed. A close fitting piston means nothing, because there must be room enough to take care of all expansion from the lowest temperature to the highest, and still have room for a complete unbroken film of oil. If you don't provide it, it will provide itself by polishing down the pistons on these high spots until it has secured the perfect cleanance. It is much better to have the little pockets or lakes of oil, which usually turn into grease within a few minutes when starting a new rebored job. This gives a solid body of lubricant instead of metal contact. Again, I repeat, with correct alignment of pistons, proper clearance of connecting rod between piston bosses, with piston clearance even up to .010 in a straight cylinder, you could not make them slap or pump oil. So why spend a lot on money, time and energy doing useless operations? "An ounce of prevention is worth a pound of cure."

Honing Cylinders

Probably this subject is of interest to you in-as-much as this method of re-finishing cylinders is passing so fast it will soon become "ancient history." Likewise many manufacturers of these tools have already passed into the great beyond and are out of business.

Before starting my story please refer to the pictures at the bottom of page 19; they will give you a better understanding of why the honing process failed.

During the last two or three years, hundreds of "hone" makers have sprung up and each one tried to "out-do" the other fellow. First it was two, then three, four and finally six stones. Some were long and others were short. Some coarse, others fine, some use both coarse and fine, etc. Some had a fixed adjustment, others depended on spring pressure to make the stones cut. They all claimed to eliminate $3,000.00 grinders, and they showed such alluring pictures of how easy it was to hone the cylinders without taking the motor out of the car that the unsuspecting, unreasoning public "fell" for it. Yes, and they bought hundreds of thousands of them if reports are true. They tried to get results that were satisfactory, but it just couldn't be done, and for more reasons than one. First: Due to lack of any guide it is impossible to insert the hone in the cylinder or remove it without grinding it out "bell-mouthed," IF, it must be done with the hone revolving. Second: The metal being harder on one side of the cylinder than the other naturally deflected the hone into the softest portion, so that it did not even follow the hole, but shot off in almost any direction where it could get the biggest "bite." Third: Scored cylinders and others having pockets worn in them by "cocked" pistons would make the stones "bump" as they dropped into these recesses, and of course a similar effect was transmitted to the opposite side of the cylinder, finally it was almost anything but round. Fourth: Tapered cylinders contribute their share of trouble too. Hones having a fixed adjustment, had to be set for the smallest diameter of the cylinder, therefore the upper part of the cylinder could not serve as a guide to hold the hone straight with the hole, but this allowed the hone to sway from one side to the other and in addition to this, the weight and the position of the electric drill as held by the mechanic further contributed to make it an impossible job.

During a meeting of the Society of Automotive Engineers at the Automotive Maintenance Equipment Show at Detroit last May prominent automobile engineers, from some of Detroit's high grade automobile factories, "called-the-bluff" of hone manufacturers and explained why satisfactory results could not be obtained, not even expected, from the honing process as a refinishing operation, and with hundreds of hone makers present, not one of them dared to stand up and deny it.

No one has discovered a way to true up "crooked" cylinders except with a boring or grinding machine, and until something new and better is discovered, nothing else will replace them.

From this story I am sure you will understand the "short-comings" of the hone, and while it is possible to turn out a "pretty looking" job, it has been proven impossible to turn out an accurate one. Why waste your time and a whole lot of energy trying to beat the game, and get only rotten jobs with piston slaps and oil pumpers for your trouble. Because the cylinders are NOT square with the crankshaft. See page 20.

Something Worth Thinking About

Buy your equipment from responsible manufacturers who depend on their satisfied customers for future business. Many irresponsible concerns, with little or no capital, have sprung up and are trying to cash in on the efforts of the originator's advertising. Protect yourself and buy from those who have made good.

The K. R. W. Connecting Rod and Piston Aligning Jig

The Only Special FORD Connecting Rod and Piston Aligner Jig Made Which Takes Into Calculation the Difference in Diameter Between the Top and Bottom of the Piston.

2. Test the Connecting Rod for Parallelism and Twists.

One setting tests the rod both ways. The four-pointed indicator measures nearly twice the length of a wrist pin and magnifies slight errors to very noticeable ones. When the indicator faces bear on all four points, then the connecting rod is in perfect alignment. If only one point makes contact then the rod is twisted or bent and can easily be straightened without removing from the fixture. Simply pull out the Arbor and piston-rod assembly half-an-inch and with a bending iron or monkey wrench "twist" the rod one way or the other until all four points touch.

2. Test for Piston Bore Alignment.

A perfectly straight connecting rod attached to a piston with a crooked wrist pin bore is just as bad as a bent connecting rod. Pistons must travel absolutely straight in the cylinders otherwise piston slaps, oil pumpers, and scored cylinders will develop. A "cocked" piston squeegees the oil in something the same manner as a Ford piston ring put in wrong side up, and is the cause of practically all oil pumpers. Most service stations test only the connecting rods, and have never given any thought to the piston pin bore, therefore a great many cases of piston trouble have gone unsolved.

3. Installing Connecting Rod Clamp Bolt.

After pistons have been accurately fitted to the cylinders it is customary to put them in a piston vise while assembling the Wrist Pin and Connecting Rod. Unless the piston vise is bored out to exactly the same size as the piston, you will squeeze it out-of-round and spoil an otherwise perfectly good fit. We recommend using the hollow of the wrist pin while assembling the connecting rod or doing any other operations on the piston. In this way no strains are put on the body of the piston to force it out of round. We provide a steel pin on the side of this jig which saves time that is otherwise wasted going from the aligning jig to the piston vise, then back again. Use this method, it PREVENTS TROUBLE.

K. R. W. Alignment Jig

Costs Less — Does More

than any other piston and connecting rod alignment fixture ever made for Ford repair work.

W-28

Price $14.00

Shipping Weight, 16 Lbs.

4. Test Both Sides of the Piston.

Many Ford repairmen do not know that a Ford Piston is .005 smaller on the first "ring land" above the relieved portion of the piston than it is on the body of it, and those who have purchased various other makes of piston aligning jigs, have been testing only one side of the piston, trying to get the surfaces of this ring land and the bottom skirt to make contact with the opposite faces of their aligning fixture, and while attempting to secure alignment by this method were actually putting it out, because the piston would have to be "cocked" one-half of .005 if this ring land is to make contact with the fixture.

The K. R. W. Improved Jig takes this fact into consideration and a hardened and ground steel stud is located opposite this ring and projects .0025 above the regular surface, so that when the piston is tested on both sides it must check perfectly, otherwise it is "out". This valuable feature prevents any mechanic from making a mistake.

Patented in U. S. A.
July 28, 1925
No. 1547279

Patented in Canda
July 1st, 1924
No. 241227

See Pages 26 and 27

The Original K. R. W. Transmission Bushing Reaming Machine

The First K. R. W. Tool—Used and Endorsed by 17,000 Dealers and Repair Shops

The K. R. W. Transmission Bushing Reaming Machine is the first tool of its kind ever put on the market, and like the Ford engine, has stood the test of time, with only a few slight improvements which have been added to make it better than ever. Ten years ago this tool was born of necessity, and since that time more than seventeen thousand outfits have been sold all over the world. It has been imitated by four different concerns, but up to this time it has never been equaled for accuracy, speed and low cost of maintenance.

K. R. Wilson is the only manufacturer of Ford service station equipment in the business today who offers "real service" on resharpening and exchanging of worn out reamers.

It is a well known fact that Ford bronze bushings are hard on reamers, and unless they are kept sharpened to a keen edge at all times, they cannot give you the amount of service you deserve, for when one of these reamers starts to get dull, it will slide over the work in something the same manner as the runner on a sled or stone boat, and soon "roll over" the cutting edge. And, if this is allowed to continue too long, then the reamer is ruined beyond repair.

My competitors have made claims for greater accuracy, which I will "spike" right here with a "challenge." I WILL FORFEIT $100.00 IN CASH TO ANY OF THEM, WHO WILL PROVE IT IN A PUBLIC DEMONSTRATION IN COMPETITION WITH MINE.

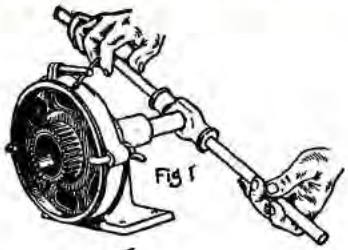
Some of them, in order to have new selling points, have re-designed their machines to locate the transmission drums by the gears instead of the outside of the drum, and, if you will carefully inspect the gear on a few drums which should be re-bushed, you will find that most of them are "burred up" or worn to such an extent that absolute accuracy could not be had, by locating from this point—referring particularly to the slow speed, and brake drum assemblies. Don't forget our service! It will outweigh everything else our competitors can offer, and then some.

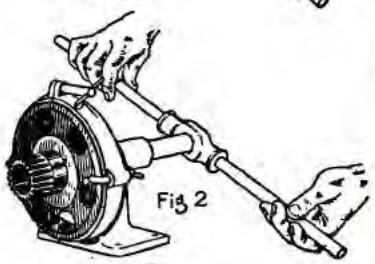
W-10 Price

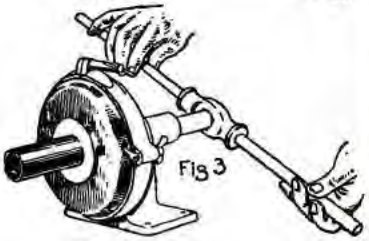
$75.00

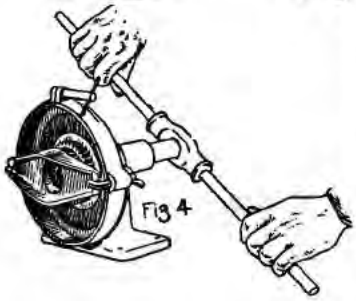
Shipping Weight, 35 Lbs.

Patented April 18, 1922. No. 1413550









The K. R. W. Reaming Machine

comprises a special jig which holds the three transmission drums or triple gears at a right angle and in perfect alignment with the reamers while being reamed, and a set of "especially designed" reamers having one size arbor and interchangeable cutters fitting all four bushings. The brake drum and triple gear reamers have their own arbors. These reamers do all the cutting on the point, the body of the reamer serving only to scrape away the "finny edge" and to leave a highly polished bearing.

It is one of the most valuable tools ever made for Ford repair shops, and users, without exception, say they could not get along without it.

Simple and Easy To Operate

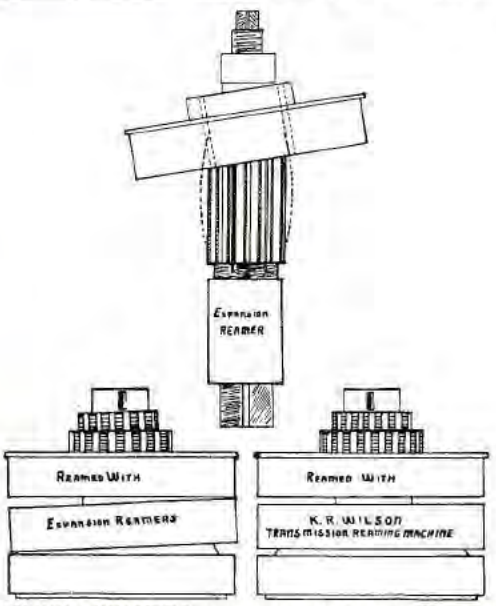
The most inexperienced mechanics can do a perfect job every time with this machine. Simply place the transmission drum in the machine, and if loose, use Ford shims to equalize the space between it and the transmission drum. Then tighten the two clamps on the side, and the T bolt on top and ream. It's just that easy. Transmission drums reamed by this method will revolve absolutely true (as accurately as when new) without wabble and noise, and it will enable you to make $3.50 profit on every job after paying your mechanic.

YOU CAN COMPLETELY REMANUFACTURE A FORD TRANSMISSION, INCLUDING DISASSEMBLING AND ASSEMBLING, IN LESS THAN 30 MINUTES, AND GET A PERFECT JOB EVERY TIME.

Pays for Itself

The present FORD schedule for labor cost of overhauling a transmission is $4.00, and on a basis of 300 transmission overhauls a year, figuring your labor costs at 60c an hour, this machine will pay for itself 11 times in one season on the actual saving of time over any other method, and, you have turned out as many "PERFECT" jobs with as many "satisfied" customers. Do you know of any other tool that will pay profits in proportion to the investment like this?

See new driving plate reamer (next page). The most important tool in the transmission outfit.



EXPANSION REAMERS are not satisfactory for reaming transmission drum bushings for reasons best explained by the illustrations. These drawings, while made from accurate measurements of a regular expansion reamer used in a local Ford shop are purposely exaggerated to show you clearly why it is impossible to get an accurate job.

Transmission drum bushings whether pressed or hammered in place are sometimes battered, or compressed more on one side than the other. This will cause the reamer to deflect to opposite side of the bushing, immediately throwing the reamer off center and out of true. The cutting edge of reamer is usually one inch in length on the taper, and when expanded has only one point on the body of reamer where diameter is greatest, therefore allowing drum to rock in any direction as there is no provision whatever for holding drum at right angle and in alignment with reamer. Labor costs for reaming by this old fashioned, inaccurate method are four or five times as much as with Wilson's Reaming Machine.

Some Do It This Way—Others Make Their Customers Pay—For Inefficiency

SERVICE
on Transmission Reamers

"I am interested to have my customers get maximum service at a minimum cost from every K. R. W. Tool."

RESHARPENING. On account of the special design of all K. R. Wilson reamers, the blunt cutting edge is all that is ever sharpened and this may be done two or three times during the life of the ordinary set of these reamers. KEEP YOUR REAMERS SHARP at all times if you want results. When a reamer gets dull it will start to bind, and dub over the cutting edge. If kept sharp it will always cut freely.
It has always been a K. R. Wilson policy to sell repairs at practically cost. Therefore if you need new transmission reamers to replace those which have worn out in service, we will give you a very liberal allowance on the old ones regardless of their condition or length of service. So that instead of paying the pro-rata cost of a new outfit for the repairs you need, you will get them at a big discount.

Exchange Proposition

When Worn Out or Damaged Reamers Are Returned, Transportation Prepaid to My Factory at Arcade, N. Y.,

I Will Supply New "Improved" Reamers at the Following Prices			Direct Sales on New Reamers When Old Reamers Are Not Returned		
No. 3	Slow Speed	$ 6.65	No. 3	Slow speed	$10.60
No. 4	Reverse	11.25	No. 4	Reverse	18.00
No. 5	Brake Drum	6.25	No. 5	Brake Drum	10.00
No. 6	Triple gear	6.85	No. 6	Triple gear	11.00
No. 7	Arbor only	4.40	No. 7	Arbor only	7.00

Other Important Transmission Repair Tools

Ford Inner Clutch Disc Drum Puller

Z-85 Price $3.30

Shipping Weight, 3 Lbs.

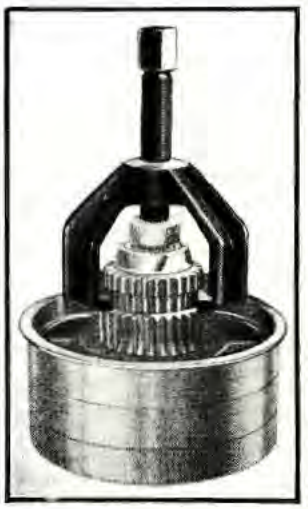
I know you will appreciate the value of a real puller for this job and here it is. Instead of the arms of the puller engaging the clutch drum from the outside, it is so constructed that the arm enters from the inside of the drum and gives a straight pull that will not distort the drum or pull it out of shape. It is impossible for small ends of the arms to slip off. They are made of Chrome Nickel Steel and will not break. This is a real husky tool and should last a lifetime. Think! How many clutch drums, transmission shafts and transmission drums you have ruined in the past by not having a real puller, then this one will sell itself?

Driven Gear Puller

Z-90

Price $2.85

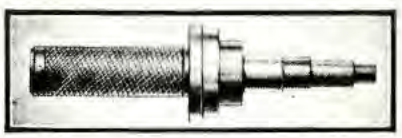
Shipping Weight, 6 Lbs.



This is a rugged tool for removing the Ford transmission driven gear Part No. 3317, heavily constructed of a steel casting which enables the mechanic to get fully a three-quarters hold of the gear, giving him quick action.
A large number of transmission drums are broken in trying to remove this gear by make-shift methods, some mechanics try to use an arbor press, others a drift and a hammer, but on account of its peculiar design nothing is as effective as this type of puller. A real workman-like job can be done, that leaves no signs of violence for the next repairman to criticize and the cost of it is less than replacing one broken drum.

Transmission Bushing Driver Set

All-In-One-Tool



Z-92 Price $4.35

Shipping Weight, 4 Lbs.

One tool will handle the complete set of bushings. made of high grade alloy steel specially heat treated. It will give you the service you expect. Fits driving gear sleeve bushings, reverse drum bushing, slow speed drum bushing, driving plate bushing and triple gear bushing.

K. R. W. Driving Plate Bushing Reamer

W-8 Price $5.00

Shipping Weight 4 Lbs.

This Tool Helps to Take the Vibration Out of Ford Motors

The K. R. W. driving plate bushing reamer has been brought out as a result of considerable research work done in the K. R. W. Training School and Experimental Laboratory. We set out to eliminate most of the vibration in Ford motors and have succeeded in being able to turn out motors on a regular production basis and without being "fussy," that will turn up 2700 to 3300 R. P. M. After eliminating everything else first, we finally traced the trouble to bent transmission shafts and driving plates, two parts which are seldom ever questioned, if they appear to "look O. K. Of 49 motors re-manufactured we had to replace as many shafts. Bent shafts cause the driving plate and fly-wheel to wobble, setting up vibration which kills the speed. By eliminating this cause we jumped from an average of 1500 or 1600 to 2700 to 3300 R. P. M. The K. R. W. special reamer is used in connection with a new brake drum as a fixture, on which is fastened the driving plate. This insures perfect alignment. Install new transmission shafts and drive plate bushings on every job and see the difference—a big difference.

Triple Gear Riveting Jig

W-12 Price $3.00

A little tool that pays big dividends and saves your customer the cost of new gears. Very few triple gears ever wear out, but the pins get loose and allow the three gears to reciprocate, which of course loosens the anchorage of the bronze bushings. In a great many shops this gear, valued at $1.50, is thrown away, and the customer must buy a new one. At the cost of 10 cents for two dozen new pins and 15 minutes' labor cost, three old triple gears can be made as good as new.

Ford Repair Work Is Play—When Done The K. R. W. Way!

The Complete K.R.W.

"A Shop

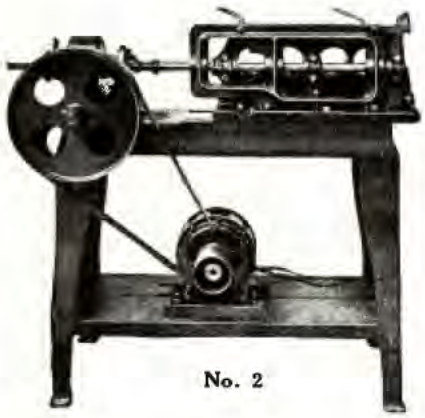
Comprising All Necessa
all the Major Operat

No. 1

1 As a Rebabbitting Outfit

It is superior to any other because factory methods are duplicated. The babbitt is poured into a cold block instantly chilling it. The resulting bearing being much harder and of more uniform and wear resisting texture than can be secured with any other outfit on which the bearng is slowly cooled. The "Filletts" on the ends of the bearings are cast-in-place. The rough bearings are then "peined" into place with a special tool just like they use at the factory. This takes out the bubbles and shrinkage and tightens the bearings in place.

See Pages 5 - 6 - 7



No. 2

2 As a Babbitt Boring Outfit

It is the only "built-in," power operated outfit made and sold as garage equipment that will duplicate factory methods by boring out the RE-BABBITTED BEARINGS and ROUGH MAIN BEARING CAPS simultaneously, and it requires only three and one-half minutes to complete that operation. Bearings are bored out just large enough to fit the pilots of the align reamer. ' This operation corrects misaligned bearings and gives us perfect cam shaft gear centers. This babbitt boring fixture is much heavier than any other on the market, and on account of being bolted to the crank case end of the motor block further increases its rigidness. Power driven head being in a straight line with it, prevents any side thrust due to the weight of an electric drill or hand operated.

See Pages 8 - 9

No. 3]]

3 As an Align-Reaming Machine

It is the only power operated machine built for this purpose, for Ford motors. The main bearing reamer is placed in position with the pilots in the bearings and the caps are drawn down tight, the power applied and in 3½ minutes, the keen cutting, spiral fluted reamer has produced a highly polished set of bearings which are in absolutely perfect alignment. This feature of the K. R. W. process insures greater accuracy than by any other process known, and is the same as used by Lincoln, Pierce-Arrow, Packard and all other good cars. The K. R. W. process align-reams one thousandth of an inch larger than the crankshaft.

See Pages 10 - 11

No. 4

4 As a Running-In Machine

It does all that is necessary. Wilsonized bearings are fitted so perfectly during the align-boring and reaming process that a crankshaft, with all bearing caps tightened down, can easily be turned with one hand, therefore running-in is another superfluous operation and wholly unnecessary. This feature has been built into the K. R. W. machine only for the purpose of checking up on connecting rod fit and alignment. To attempt to run-in or burn-in bearings which are already reamed one-thousandth of an inch larger than the shaft is a waste of time and money for there is only a few high spots on the crank shaft which make a metal to metal contact with the babbitt and these do not generate enough heat to melt it, because with only a slight amount of friction the heat generated is quickly absorbed into the cylinder block.

Every new or rebuilt motor must go thru the limbering up period and it is at this time that bearings in every motor are finally fitted. A condition over which no man has any control.

See Page 15

We

Price $365

Or Easy Pa

$127.00 With Orde

$43.00 Each, Inclu

See Page 4fo

.Combination Machine

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W20

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No. 5

5-6 As a Motor Stand

The two position motor bench feature is one of the GREATEST IMPROVEMENTS EVER MADE in garage equipment. It is difficult to imagine how many thousand steps this important feature of the K. R. W. combination machine will save your mechanic on each motor, over other makes of equipment, where each operation is done on a separate machine. When I say that a Ford motor can be re-manufactured by the K. R. W. process in one-half, or even one-third, of the time required by any other process, I mean it, and will prove it:

No time is lost fastening or unfastening the motor block and moving from one machine to another for the various operations, and no physical effort is required of the mechanic to use up his ambition and energy doing such useless operations as having to lift and carry the motor block several times throughout the process of re-manufacturing the motor. From the beginning of the K. R. Wilson process to the final assembly the motor block remains on the machine, and in such comfortable positions that it will enable a mechanic to do his best, because he is not tired out by inconvenient positions.

Fig. 1. The re-babbitting operation, then the "sprues" are cut off, bearings filed smooth, oil holes drilled, and bearings "peined." The babbitt boring frame is then bolted on in position (see Page 8) and the bearings are bored out as shown in Fig. 2. The table is again thrown back in same position as Fig. 1, boring frame removed and main bearing reamer placed in position, then align reamed, as shown in Fig. 3. Again thrown back to position as shown in Fig. 1 and the "fillets" are cut and crankshaft installed as shown in Fig. 6. Then again tipped back to the bed of machine and fastened as in Fig. 4, while the valves may be ground and assembled, and the pistons and connecting rods attached as shown in Fig. 5.

The K. R. W. machine, being a complete shop-in-itself, saves valuable floor space. It takes up only 3x4 feet and requires no foundation, therefore, portable if necessary to conserve space.

No. 6

7 As a Cylinder Boring Machine

It is in a class by itself, and is unequaled at any price for accuracy, ease of set up, and labor cost of boring cylinders. Takes an average time of 1¾ minutes to "set-up" to rebore each cylinder and start the machine. From then on it requires no attention and when it reaches the end of the cut, STOPS AUTOMATICALLY. During the time the cylinder is being bored (about 8½ minutes) the mechanic can be fitting and testing pistons and connecting rods, grinding valves, etc., and many other odd jobs, therefore the actual labor cost for boring all four cylinders on a Ford block is 7 to 10 minutes time. Profitable! Cutters cost only 50c each and are guaranteed to bore at least 50 holes. They are instantly adjustable to bore any oversize. All operations are so simple that the ordinary garageman will get perfect results.

It is the only cylinder boring machine made with a permanent, adjustable guide on each end of the cylinder to insure a perfectly straight hole that is absolutely square with the crankshaft and free from taper.

See Pages 16 - 17 - 18 - 19

No. 7

Operates With ¾ H. P. Motor

Takes Up 8 Square Feet

No Special Foundation Necessary

Can Be Operated By Any Ordinary Mechanic

Costs Only One-Third As Much As Any Other Power-Operated Equipment Made To Do Similar Operations

See Page 61

For Complete K. R. W. Repair Shop Layout. It Will Save You $2500.00

Challenge!

To Any and All Manufacturers of Ford Service Station Equipment:

That a Ford Motor can be RE-MANUFACTURED with a greater degree of accuracy, precision and alignment with a K. R. W. Combination Machine at a 50% less labor cost, than with any other equipment or combination of equipment now on the market, regardless of make or price.

K. R. W. Special Arbor Press

A Sensible, Sensitive Press

W-1 Price

$27.50

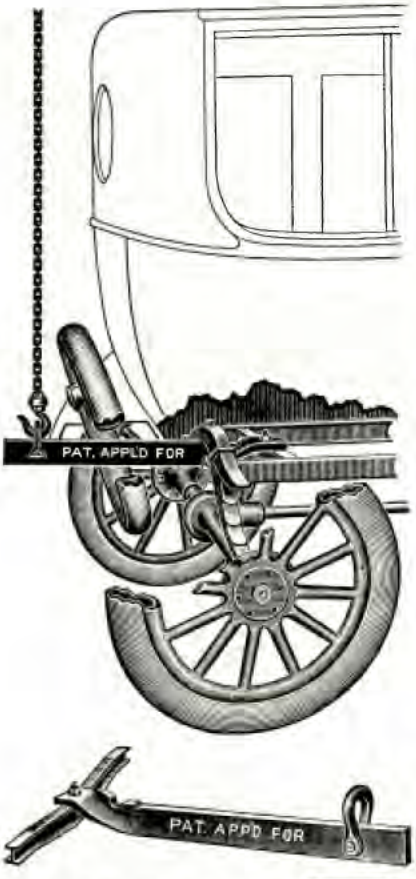
Shipping Weight, 140 Lbs.

A necessity in every Ford repair shop for pressing in piston, transmission, steering gear bushings and a hundred other uses. A sensitive press must be used, otherwise a large amount of work will be spoiled by attempting to do it on a high power press. Piston bushings, for example, must go in slowly and with extreme care to prevent distorting the piston or cracking the wrist pin bosses. Bushings pressed in with an arbor press are not battered over on the edges, consequently will ream more accurately than those which are "walloped in with a hammer." This press will handle all Ford work as mentioned above, except rear axle shaft.

It is an oversize press in every particular. Throat is extra deep, taking work up to 13 in. diameter. Ram is 1½x17 in., largest arbor is 1⅝, height 22½ in. Takes up space 8x 20 in. May be conveniently located on the end of a lathe or bench. The saving of material by using this press will pay for it quickly.

West's Rear End Lifter

For Ford Cars



W-23 Price

$8.50

Shipping Weight, 25 Lbs.

The WEST LIFTER is the simplest and most efficient rear-end lifter ever invented.

In connection with a chain hoist, the lifter can be placed in position and the rear end lifted in forty seconds. No chance to mar the finish on enclosed jobs, as the lifting bar is long enough for necessary clearance. By placing an old axle shaft under the frame and within the notch near cross bar, as shown in cut, the car may be raised for removing or replacing the rear spring with the utmost ease.

It is strongly made from heavy forgings and malleable castings, and worth its cost on a week's work.

This Lifter Also Fits All of the New 1926 Models

That's good news. And users say — "It fits them better and operates easier than any other rear end lifter they have ever seen."

GEORGE W. WAYMAN, WALTON, KY.—(FORD AGENT)—We find that the Wilson Process is satisfactory in every respect and we can turn out our work better and faster than ever before. I would not be without your machine at three times the cost, as it pays for itself in a short time. Sept. 29, 1923.

K. R. W. Improved Motor Dollie

W-37 Price $17.50

Shipping Weight, 92 Lbs.

The improved K. R. W. motor dollie has been made to fill a long-felt need for a real substantial job which could be sold at a fair price. Here it is and I am sure that after you look over the picture no apologies need be made for it. It is just the right height for assembling or dis-assembling a motor. Nothing in the way to prevent using speed wrenches, etc. Frame is made of 6-inch channell steel, 2-inch angles for the ends, with large, heavy duty castors to make it roll easy over rough floors. Heavy semi-steel castings are used for trimmings. This dollie holds motors with broken crank-case arms as well as any others, for it supports the motor from the crank-case. This feature will be found a big advantage.

At this low price you can well afford several of them to store your motors on while waiting to be rebuilt or installed in the cars. In some garages it is more convenient to remove the motor outside of the repair shop then wheel it in where you can work to the greatest advantage. Shipped knocked-down and bundled, but not crated.

K. R. W. Motor Lifting Hooks

W-2 Price $5.50

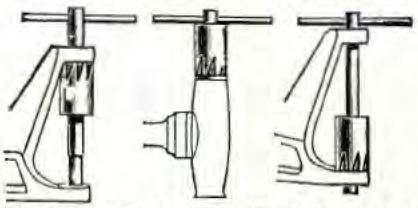
Shipping Weight, 10 Lbs.

For lifting the motor from the chassis and conveying it to and from the motor truck. In attaching the hook, the arm with the two prongs is placed around cylinder No. 4, the other arm falling against the block just above the valve covers. With the hook in this position, the motor will be properly balanced. The ring may then be placed in the hook on a chain fall and the motor easily lifted clear of the chassis. These lifting hooks are made from hand forged steel (not cast). You will note that the links, rings and eyes are welded closed, giving you a motor hook that is much stronger and safer than any other kind.

GLOVER JOHN AUTO COMPANY, ALICE, TEXAS (FORD AGENTS)—With reference to the K. R. Wilson Combination Machine, we are pleased to advise you that we have found this machine very simple, and can be operated by the average good mechanic. We have turned out several complete jobs on this machine and every job has been O. K. We are now able to turn out first-class work and would not do without our machine. Aug. 9, 1922.

Tools To Make Front Axle Jobs Pay Profits

Combination End Mill and Arbor



W-18

Price **$5.00**

With Brace in Place of "T" Handle, $6.00.

The biggest little tool ever made for Ford shops. Faces off the axle forging as well as the spindle body bushings, thereby securing new parallel surfaces that will stay tight as long as the original job from the Ford factory. The old method of filing these surfaces to fit is impractical and unsatisfactory. The surfaces are not parallel. The pressure and wear is localized on the high points which soon wear off and the spindle bodies become loose. This operation requires only a few minutes and you are always sure of getting a perfect job that will stand up in service.

Improved Spindle Reamer

W-3 Price **$3.50**

At last: A real spindle bushing reamer with a pilot on each end and ground to the proper size to fit Ford spindle bolts perfectly. This reamer is made for real service and is guaranteed to completely satisfy. The majority of spindle reamers on the market are built down to a price with little or no regard for quality or accuracy—therefore are expensive at any price.

Combination Spindle Body and Arm Bushing Reamer

W-25

Price **$2.00**

Similar to the other reamers except for being made of the same high grade steel as our other reamers. We recommend, however, W-3 as far superior to this one.

Spindle Body Bushing Extractor

Z-88

Price **$1.50**

Shipping Weight, 1 Lb.

A well made tool that will pay you big profits on time saved over any other method.

To Operate—Screw the tool into the bushing the same as you would a corkscrew. The brass being soft it is an easy matter to screw the tool in a few threads, then the end of the tool will project through the spindle about 1¼ inches. Strike this end with a hammer and out comes the bushing. Some speed, you will say.

Steering Arm Bushing Press

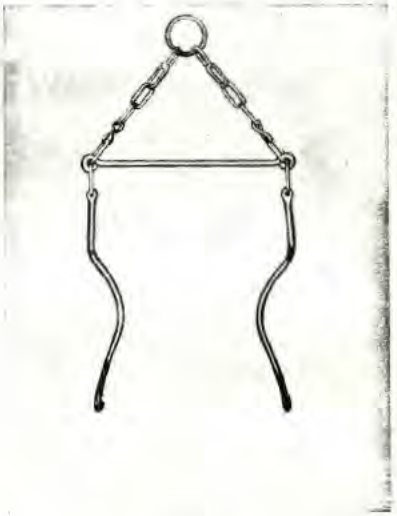
Z-89 Price **$2.85**

Shipping Weight, 4 Lbs.

You certainly save time by using this tool to remove the old and replace the new bushing, without damage to the steering arm or bushings. Screw and pilot end made of high grade chrome nickel steel, heat treated. Will give real service.

K. R. W. "Improved" Front End Lifter

For the New Models with Aprons



W-24

Price **$6.00**

The K. R. W. Improved Front End Lifter is especially designed for the "NEW MODELS" with the apron under the radiator. The projecting lugs on this lifter fit in the front frame member where it joins on the side frame members. It also fits all the old models.

NOTE—There is plenty of clearance in front of the apron, on the sides of the lamps and on top of the radiator, therefore little chance to mar the finish. These lifters are all hand forged. All the links and rings are welded-closed. You cannot afford to use old style lifters or ropes which mar the finish on the new models when a lifter that fits all models can be purchased at such a low price.

Front Spring Perch Puller

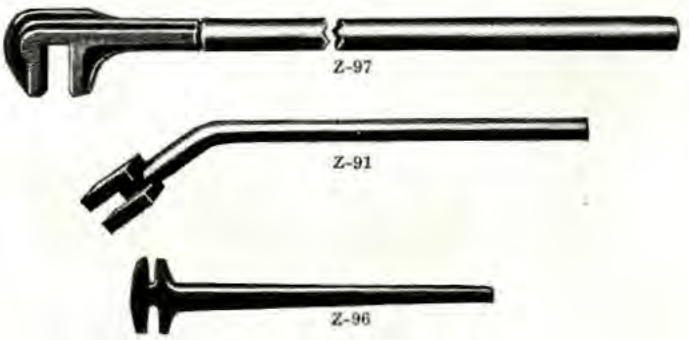
Z-94 Price **$4.75**

Shipping Weight, 6 Lbs.

This tool was designed to enable the mechanic to remove the perch without hammering the threads or removing the front axle.

To operate, slip the tool on the front axle near the center of the I beam. Slide it along until directly under the perch screw. The body of the tool is of drop forged chrome nickel steel. The screw of chrome nickel steel is given a double heat treatment. There is a ⅝" hole through the large end of screw which enables the mechanic to use a bar or an old axle shaft in forcing out the perch. Very often they are rusted in, so that it is a difficult matter to get sufficient leverage with a wrench. Absolutely guaranteed.

Bending Irons



Z-91—Price $5.50

1. Especially adapted for straightening front axles. The head of the tool is made of heavy cast steel; handle is made of a long piece of steel pipe. Shipping Weight, 20 Pounds

Z-97—Price $2.40

2. Bending iron for straightening Ford pedals. Made of heavy cast steel. Shipping Weight, 5 Pounds

Z-96—Price $2.50

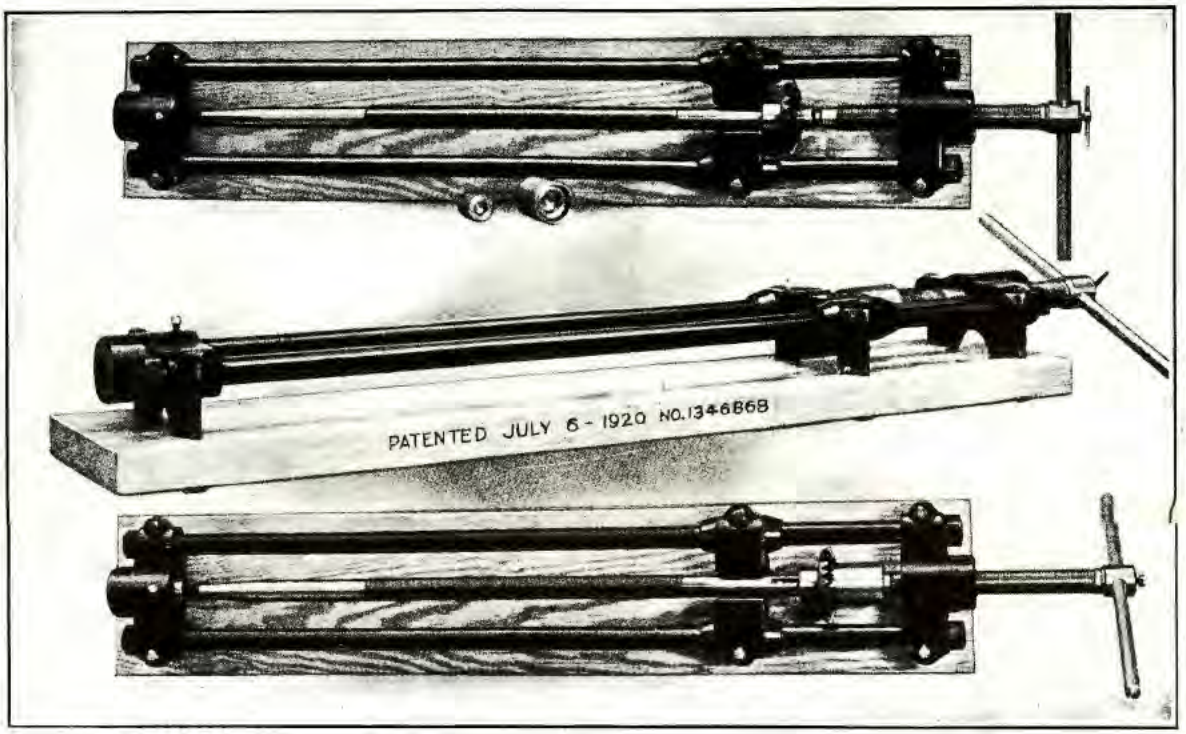
3. Bending iron for straightening fender irons, lamp brackets, connecting rods. Heavy cast steel. Shipping Weight, 5½ Pounds

K. R. W. Equipped Shops Mean Better Service, More Business, Real Profits

The Improved K. R. W. Rear Axle Pinion Gear Press

Takes 'em Off
Puts 'em On *Quick*

W-11 Price **$23.00**



Removes Axle Shaft Drive Gear — No Matter How Tight

This press is designed for just one purpose, taking off and putting on shaft drive gears. With a leverage of 168 to 1 the power is tremendous. No matter how tight, it will get them quickly and neatly.

It is always ready for the job, eliminating time wasted jigging up for this job with makeshift equipment, and the damage to parts by pounding the gears with a hammer.

This improved press has many features not found in original design. It is rigidly bolted to the bench or a plank with six bolts and having six legs which distribute the strain evenly make "buckling" impossible. It is equally adaptable to Fords, Overland 4, Chevrolet 490 and is indispensable to the well-equipped shop.

Shipping Weight, Crated, 60 Lbs.

K. R. W. Pinion Gear Puller

W-40 Price **$5.00**

"Made of Steel"

The K. R. W. PINION GEAR PULLER is a tool designed to remove the FORD Drive Shaft Pinion Gear. This gear is usually very difficult to remove and a large variety of pullers have been made for that purpose, but the majority of them were made from materials not entirely suited to this purpose and did not stand up for more than a very few jobs. Knowing of the necessity for a real, high grade tool for this purpose, we have built this puller from high grade electric furnace STEEL CASTINGS which are accurately machined and we do not hesitate to claim it will outlast a half dozen of any other make now on the market.

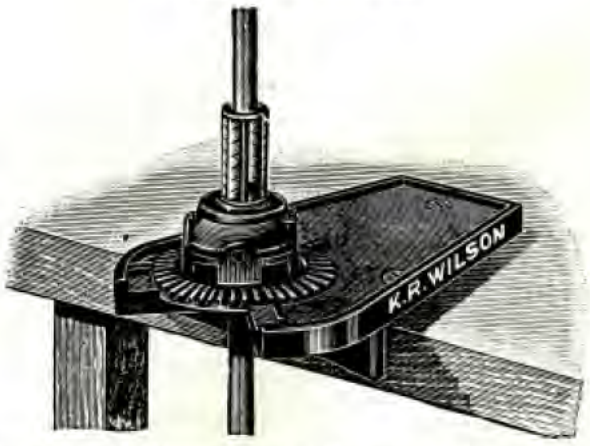
The UNIT consists of two steel castings with a collar to pull them into place, and a set screw which when turned down on the end of the shaft removes the gear. The collar holding the two halves together is octagon shape, which permits the mechanic to clamp this in a vise or large wrench.

SPECIFICATIONS—Dimensions, 4 inches square; Net Weight 4 pounds; Shipping Weight 5 pounds.

Differential Holding Plate

W-34 Price **$4.50**

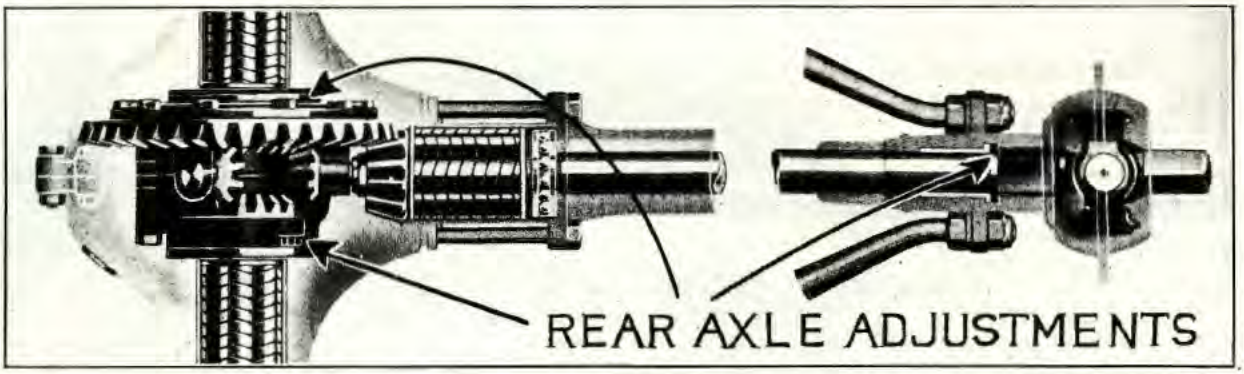
Shipping Weight, 16 Lbs.



For QUICK and CONVENIENT rear axle overhauling, the differential assembly is always locked on the 3 lugs or pins, no matter which side is down. The plate is made of grey iron and designed to hang over the top of the bench, instead of having to cut notches for it. It is securely fastened with three bolts.

A K. R. W. Equipped Shop Gets the Business!

How Many Adjustments In The Rear Axle?

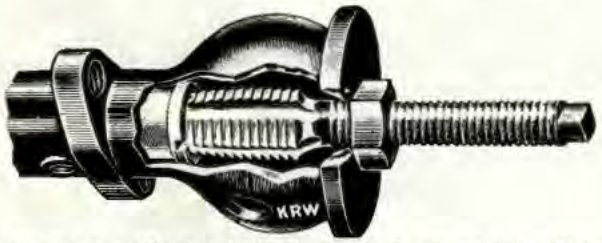


Ask the average repairman that question and what will he say? NONE, of course. Therefore when a Ford owner gets his real axle overhauled, that repairman pays no attention to these two very important adjustments. Look at the picture. You will see that the propeller shaft babbitt bushing serves a very definite purpose and combines a "thrust-bearing" which contacts with a corresponding flange on the universal joint. This prevents the propeller shaft from sliding downward by its own weight and the pinion gear from meshing too tight with the ring gear, or the end of the shaft from striking against the differential housing or spider which would cause a noisy and short lived job. No other bearing on the gear gets so much wear from twisting, wrenching and other strains, due to its location directly behind the universal joint and probably no other bushing is neglected so much on account of the lack of tools and equipment for replacing it. Slipping clutches, chattering brake bands can often be traced to this point.

The BABBITT THRUST WASHERS are equally important. They vary in thickness from .185 to .202 thousandths, and if it happens that you get two thick ones on the same job, you will notice the propeller shaft and axle assembly will turn hard after the housings have been bolted together. And when the axle is put in service this tightness will prevent proper lubrication. Friction will do the rest. I should say—UN-DO. These washers will heat up, soften and squeeze out and the job will become loose or looser than before it was overhauled. It is better to assemble them a little too loose and prevent friction. SUGGESTION—"Mike" every washer.

Drive Shaft Bushing Remover

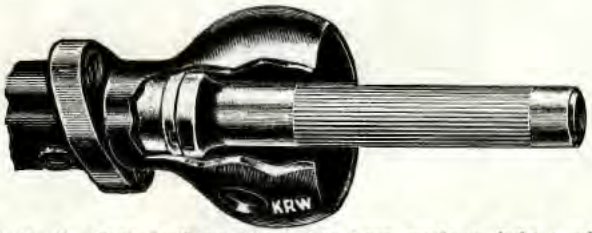
W-44 Price $3.50 Shipping Weight, 5 Lbs.



This extractor is without a doubt the quickest and most effective means ever devised for removing the Babbitt Drive Shaft Bushings. Simply screw in the tap which is made with a special "buttress thread," then place the iron plate in position and screw down the large nut with an S wrench, and out comes the old bushing quickly and easily.

Drive Shaft Front Bushing Driver

W-42 Price $2.00 Shipping Weight, 4 Lbs.



The K. R. W. front bushing driver has been made to help mechanics do better work. It drives that babbitt bushing squarely into place without marring the end of the flange, which must fit accurately against the flange provided on the universal joint. Often otherwise good jobs are spoiled for the lack of this tool because something else of a makeshift driver must be provided and the bushing is "jimmied up" and damaged.

Wheel Puller

Price $2.00 Z-86

Shipping Weight, 6 Lbs.

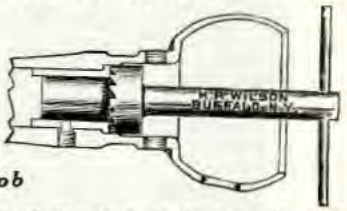
This wheel puller has been designed and made for the man who wants a good one. It is a high grade job in every respect and worth much more than we ask for it. Guaranteed to pull off any wheel that any other wheel puller can pull. Point on end of screw has been improved since this cut was made.

When a wheel puller of this quality and design can be purchased at such a low price, I can see no excuse for a mechanic using the favorite "sledge hammer" method, which invariably batters up the end of the shaft, often damaging it so bad that the nut cannot be screwed on without a lot of trouble and delay, and, all this costs you real money, looks bad—is bad.

Propeller Shaft End Mill

W-17 Fords $5.00

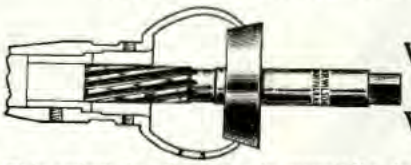
W-22 Trucks $6.00



Often Saves Its Cost On One Job

K. R. W. was the first manufacturer of garage tools to recognize the importance of this bushing and put out tools to replace it.. And today you will find that our original design is superior to any other imitations yet made. Very often hours are wasted trying to get the universal joint pin into place when maybe only half of the pin hole in the propeller shaft is exposed, because the flange on the babbitt bushing is too long and must be faced off squarely and accurately before the universal joint can be fitted into place. The K. R. W. end mill is a high grade tool in every way and will make real profits on the job it is intended for.

Propeller Shaft Reamer and Jig



W-16 Fords $6.00

W-21 Trucks $7.00

This spiral fluted reamer is especially designed with a long taper point to be self centering in the babbitt bushing. The rear end is supported with an accurate jig which holds it in alignment. Thereby making a simple operation out of one which usually causes considerable trouble with ordinary reamers. A spiral fluted reamer for this operation is necessary on account of the straight oil groove cast in this bushing.

Good Mechanics Have Special Tools for Every Important Operation. That's What Makes Them Good.

K. R. W. *"Self Adjusting"* Quick Service Jack

For Standard or Balloon Tires, Front or Rear Axles.
For All Light Cars Like Ford, Chevrolet, Star, Overland, Etc.

W-36 Price $8.00 Shipping Weight, 38 Lbs.

When Not In Use, Requires Floor Space 20 x 9 Inches As Shown

The K. R. W. "Quick Service" Jack is different. It has been designed especially for Ford service stations and I believe it incorporates more valuable features than any other jack on the market—at any price.

It is of sturdy construction and will stand all the abuse that jacks of this sort get. All castings are made of semi-steel and of liberal proportions.

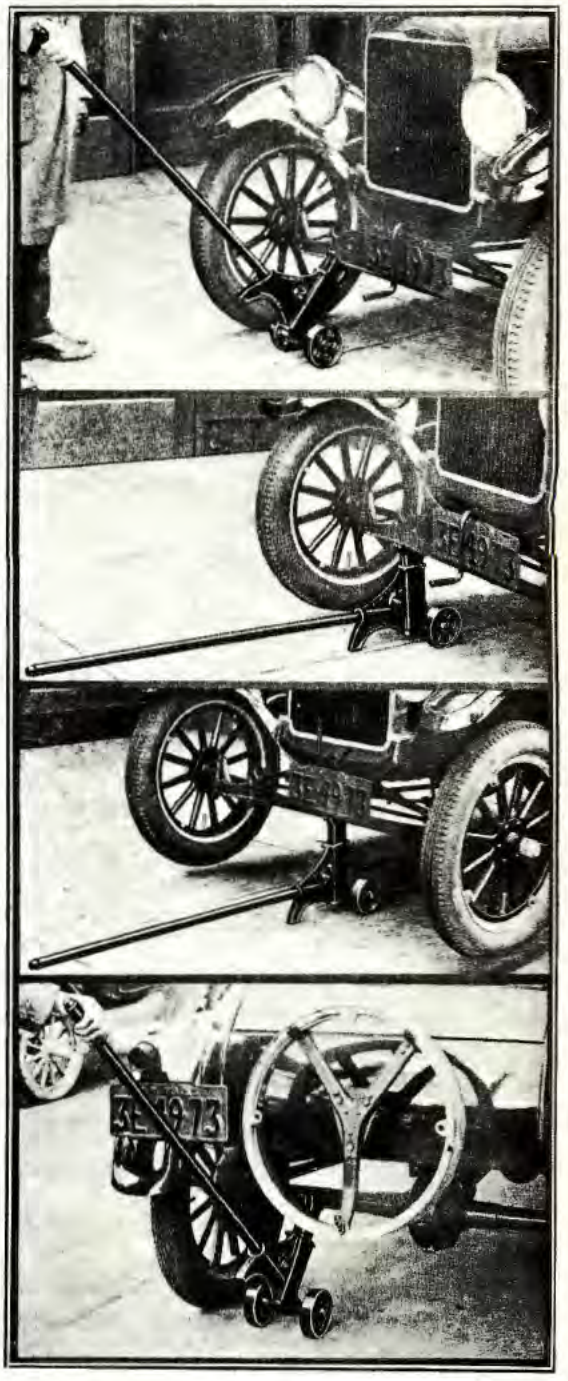
The CENTER OF GRAVITY is 4 inches back from the axle and 8 inches ahead of the floor leg and with two 5½ inch diameter x 1⅜ inch faced wheels, spaced 8¾ inches apart (outside to outside) forms a tripod that cannot easily be tipped over. This design eliminates the most objectionable feature of other light model jacks.

LONG HANDLE made from one-inch steel pipe, measures 55 inches high when in a standing position. Gives plenty of leverage to lift a wheel with one hand, and the entire front end of the car with a little more effort.

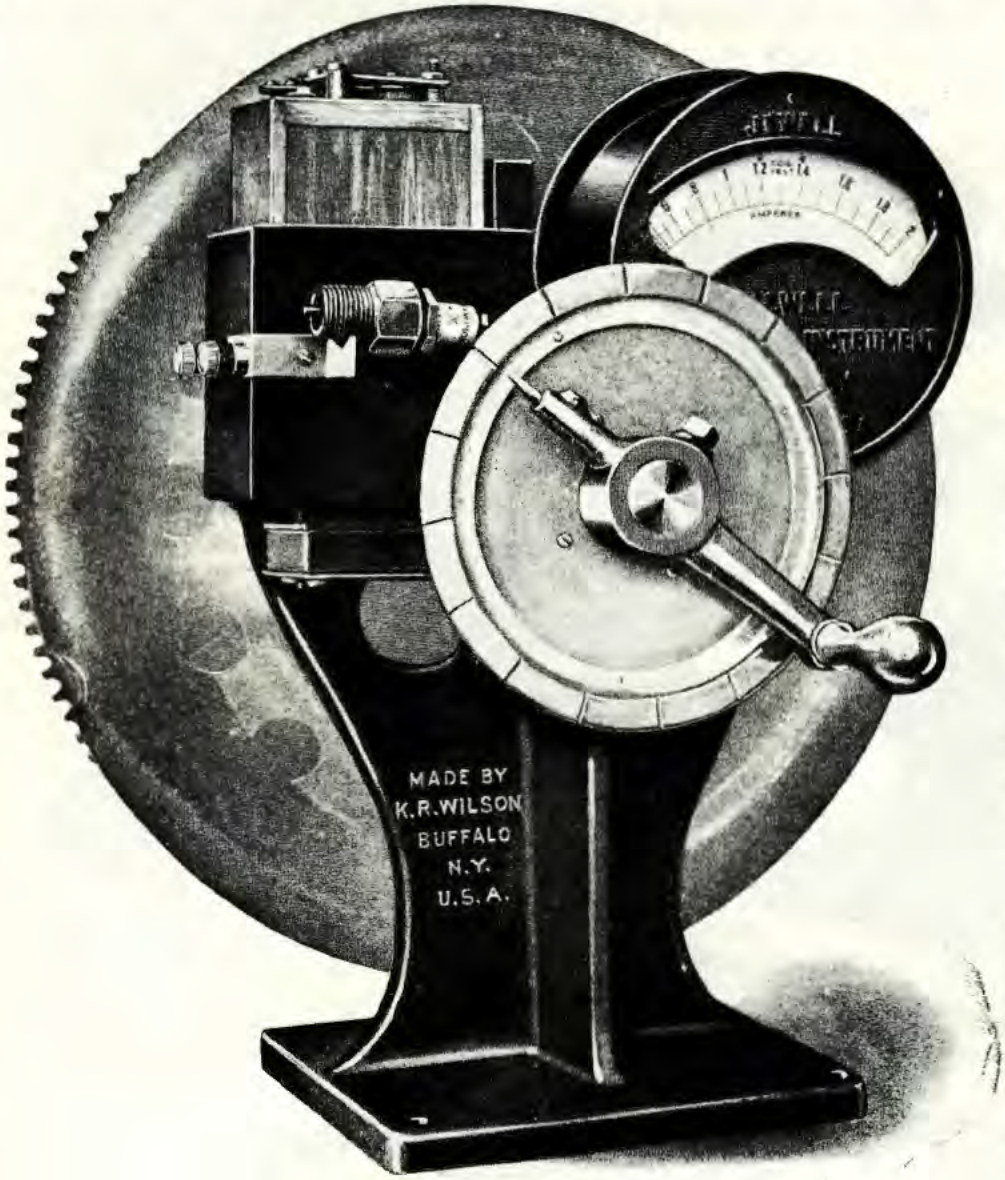
AUTOMATIC ADJUSTMENT for standard balloon tires (inflated or deflated) front or rear axles, a new idea in jack construction. The sliding head is mounted on a "pull-coil-spring" of light tension and is always up-in-position unless forced down by contact with the axle.

TO OPERATE—Raise the handle to a 45-degree angle and roll the jack under the axle. By pressing down on the button in the end of the handle, this will release the ratchet and allow the sliding head to adjust itself to the correct height, then lock automatically. Press down on the handle and the car is raised.

No other jack is like it and none compares with it. ORDER ONE TODAY and I know you will use no other.



K. R. W. Magneto Type Magneto, Coil Unit, Spark Plug Tester



W-46

Price $39.00

Shipping Weight, 60 Lbs.

Complete as shown except Ford parts—Flywheel and Field which you can purchase at wholesale prices and save transportation on these heavy items or you can use same parts taken from a junk motor.

This Type of Machine Was Originated by the Ford Motor Company Years Ago

In bringing out the new K. R. W. Combination Coil and Magneto Tester we do not claim any new invention or radical changes in equipment or operation over our competitors.

The K. R. W. Tester was designed to enable the operator to turn the crank with one hand and make coil adjustments with the other, an operation saving considerable time over other makes. The workmanship and materials are of the very best. The meter is a very high grade, hand calibrated instrument especially designed for this job, and is made by the Jewell Electric Instrument Co.

To Test Coil Units

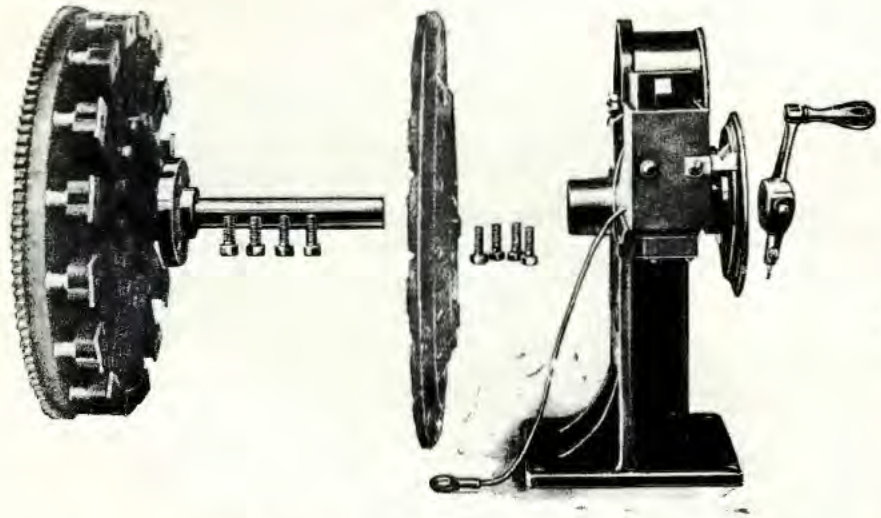
Place same in position as shown. Turn the crank about 160 RPM. Adjust vibrator spring bridge until the meter shows a steady flow of current thru the coil of 1.3 amperes and a good spark jumps off the pointer on the opposite end of the handle to the insulated ring. One spark for each 1-16th revolution.

To Test Magneto in a Car

Remove the coil unit from the test stand, attach one extension wire to magneto terminal on transmission case, the other should be grounded. With current flowing thru the special impedance coil (built into the machine) the meter should register 0.8 or more amperes, at a moderate engine speed.

To Test Spark Plugs

Lay the spark plug on the brackets as shown in cut. Place a perfectly adjusted spark coil unit in position. Then turn the crank at 160 RPM. If spark plug is OK it will spark between the points and no spark will be seen coming off the pointer on opposite end of crank. If defective the spark plug will not spark, and sparks will flow regularly from the pointer to ground ring.



Furnish Your Own Magneto and Coil

That's one of the ways we save you money. As a Ford agent you get 40% discount on these parts. If you use new ones. Maybe you have an old junked motor with a good magneto and coil, then it's most all profit.

15 Minutes To Assemble

We ship the machine completely assembled and wired except the fly-wheel and coil assembly. You put coil in place, put in 4 cap screws, then solder one pig-tail connection to coil terminal, then place hub or shaft into fly-wheel, put in 4 cap screws, slide the shaft into position and attach the crank. The machine is now ready to operate. All this takes but 15 minutes or less. You have not only saved the profit on the parts used, but the transportation on this heavy material you already have in stock.

Assemble It Yourself and Save $14.00 Over What You Would Pay for Complete Machine

Constant Voltage and Uniform Speed are Absolutely Necessary to Make Perfect Tests and Adjustments of Ford Coil Units

W-49 Price $50.00

Including Quarter Horse Power General Electric 60 Cycle—110 or 220 Volt Motor

And all other fittings as shown except Ford parts —Flywheel and Field which you can purchase at wholesale prices and save transportation on these heavy items or you can use same parts taken from a junk Motor, Magneto and Field easily assembled in 8 to 10 minutes, ready to operate.

MOTORS

For Other Kinds of Electric Current. Extra Cost for 25 CYCLE—$2.00 and DIRECT CURRENT 32—110—220 Volt $5.00 Extra

This Outfit Tests—Coil Units, Spark Plugs and Magnetos in the Car

This Motor-Driven Outfit Will Pay Big Profits!

Your Customers Will Gladly Pay $1.00 or More To Have Their Coil Units Accurately Adjusted BECAUSE—

That is the secret of a smooth running motor. Thousands of cars lack power, speed and hill climbing ability and many of them find their way to the junk heap because the coil units are neglected.

The car owner isn't expected to know the importance of perfect adjustment. He appreciates a smooth running motor and is willing to pay for it to the garageman who will suggest a "tune-up" now and then which will invariably give old Faithful new power and pep.

Poorly adjusted coil units cause uneven firing, that means back lash on the gears and constant strain and pounding on all the wearing parts. While the same motor perfectly timed, tuned-up and adjusted will deliver a smooth, even flow of power without this backlash and strain which so quickly ruins otherwise perfectly good cars.

A Tune-Up Pays for Itself

On the saving of gasoline alone within 200 miles. To say nothing of the saving of wear and strain on other parts, and the satisfaction obtained from having a smooth running, powerful motor that will take you almost anywhere on high, if all 4 cylinders are hitting regularly.

W. E. REYNOLDS GARAGE, OAKFIELD, WIS. (FORD AGENT)—I wish to say that your machine has done every job it was designed to do and in every case the work has been a duplicate to a factory job. Oct. 1, 1923.

DEER PATH GARAGE, LAKE FOREST, ILL. (FORD AGENTS)—The K. R. Wilson Combination Machine will do everything claimed by Mr. Wilson and all you expect. The work is first class and accurate. Aug. 7, 1922.

Constant Voltage Absolutely Necessary to Obtain Satisfactory Results

It has been proven beyond a question of doubt that it is practically impossible to turn the crank of a hand operated coil tester at exactly the same speed while adjusting and testing all 4 coil units, and if the speed varies then, of course, the voltage varies also. So that when the coil unit is adjusted to draw a certain amount of current, all four units may vary when supplied with exactly the same voltage, as would be the case when operating in the car either from battery or magneto current.

A motor driven outfit supplies constant speed and voltage consequently duplicates the conditions under which these coil units must operate when used in the car.

My Price Lower Than You Would Pay for a Hand Operated Outfit of Any Other Make

We buy motors in large quantities to use on our generator test stands, engine washing machines, coil unit testers and combination machines, therefore we are able to obtain rather low prices. And since we have discovered the necessity for a constant voltage, power operated outfit, we have decided to put it out at a price so low there will be no chance for competition. In fact lower than you would pay for a hand operated outfit of any other make.

SEND US YOUR ORDER TODAY, and help make FORDS run better. Don't forget to tell us the kind of current you have.

ECKENHOFF'S AUTOMOTIVE SERVICE, EASTON, MD. I have been using your Combination Machine for 2½ years and have had no trouble with it. By using your equipment there is no chance of throwing your crank shaft out of line. Oct. 1, 1923.

HORACE G. FOWLER, KEANSBURG, N. J.—In reference to your machinery I wish to say that the results are everything to be desired. I find that motors are better in every way and there is great saving in time. Oct. 1, 1923.

B-W TESTER

Operates on Alternating Current from Your Lighting Line Thru a Special Built-in Transformer

TESTS { Ford Coil Units
Single & Double Contact Lamps
Spark Plugs

We consider this coil tester superior to any coil tester on the market regardless of style or price. All that is necessary in a coil tester is to provide an accurate method of supplying alternate current and adjust all four coils to draw the same amount. This being multiplied by the secondary winding in the spark coil, generates the spark at the spark plug so that when a set of spark coils are supplied with a greater or less amount of current, the coils having been synchronized in their adjustment will deliver approximately the same hot spark on each spark plug, resulting in a smoother running motor so far as ignition is concerned.

R-76

Price List

Type A No. 1—60 cycle, 110 volt	$12.75
Type A No. 2—60 cycle, 220 volt	12.75
Type A No. 3—25 cycle, 110 volt	12.75
Type D (Direct Current)	10.00

The B-W Coil Tester is Furnished in Two Types

The Case is of Hard Wood, Satin Wax Finish,

on which is mounted an accurate low reading Ammeter, coil guides with contacts and spark gap. It also is equipped for testing spark plugs and double and single contact lamps. It is fitted with a high grade indicating toggle switch. All fittings are of highly polished nickel. To replace or re-adjust contact points on a Ford Coil Unit, an Ammeter registering the correct current draw is necessary as the unit must give a hot spark with a current draw of not more than 1½ amperes, because the Ford Magneto will not generate more than 1½ amperes at low speed. Therefore, if the coil is drawing more than 1½ amperes, the ignition is faulty and the car will not run smoothly at low speed.

A Knowledge of Electricity is Not Necessary

to properly use the B-W Tester. It is simple to use and easily understood. Full and complete instruction furnished with each instrument.

TYPE A (For Alternating Current)

is equipped with transformer, Ammeter and a cord with a standard plug to fit in a lamp socket. This type is also equipped with two terminals which can be used for Ford Ignition in place of Battery or Magneto. This connection will create a hot spark and insure easy starting when motor is stiff and cold. It can also be applied for bench testing where low voltage is required by connecting a lamp in series. It also provides a means for testing 6, 9 and 12 volt single and double contact lamp bulbs as indicated by the switch in the end of the instrument.

TYPE D (For Direct Current)

is equipped only with direct current Ammeter with cord and clips for conveniently connecting dry cells or a 6 volt storage battery in series. This tester is fully guaranteed and we know it will give you complete satisfaction.

K. R.W. "Battery Type" Coil Unit, Lamp Bulb, Spark Plug Tester

W-35 Price $8.50

Shipping Weight, 3 Lbs.

The K. R. W. "Battery Type" Tester is a high grade instrument, built by experts, and will do everything we claim for it. In fact it will test Ford coil units, spark plugs, double and single contact lamp bulbs, just as accurately as the most expensive outfits made. It is necessary, however, to attach it to a storage battery or set of dry cells as a source of current.

EQUIP YOUR SERVICE CARS with one of these testers and let your mechanics TUNE UP the "cripples" out on the road instead of towing them in.

REMEMBER—No matter what kind of current is used—if your Ford coil units are adjusted to draw exactly the same amount of current—they will also run uniformly on Magneto current whether the voltage is higher or lower.

RIVER FALLS MOTOR CO., RIVER FALLS, WIS.—(FORD AGENT)—We have built up a very good reputation for repair work and a large share of the credit is due to the Wilson equipment we have in our shop. Oct. 4, 1923.

KELCHNER'S GARAGE, ROCKVILLE, MD. (FORD AGENTS) The machine we bought of K. R. Wilson of your city has given us perfect satisfaction, and is operated by any of the men in our shop. It needs no experienced hands. I find it saves lots of time and labor and takes only one man's time. Aug.11, 1922.

"Pioneer" Electric Drills

Made by the Louisville Electric Mfg. Co.

R-74

Price $49.50

"Full Ball Bearing"

½-Inch Capacity in Steel

Speed, 500 R. P. M.
Weight, 14½ Lbs.
Cycles, 25 to 60.
Amperes, 3.5.
Volts, 110.
Direct or Alternating.

NOTE: All motors in these drills are universal wound and will operate successfully on either alternating or direct current.

The SUS is a medium duty ½" drill which was developed to meet the demand of the trade for a moderate priced drill for such service as garage and other service where the work might be severe but not constant, although this drill will give a good account of itself in any type of service within its drilling range. It is *ball bearing* with wide faced husky gears and is not excelled in power or durability by any other medium priced drill on the market. It is the only *ball bearing* drill in the world of equal capacity selling for less than $50.00. This drill is deservedly popular and has long been a source of satisfaction to users.

"Pioneer" Bench Grinders

Price $38.00

Shipping Weight, 50 Lbs.

¼ H. P. G. E. Motor

Complete with 2 Grinding Wheels, Wheel Guards, Adjustable Tool Rests, 10-ft. Rubber Covered Cable, with Socket Attachment and a Trouble Proof Switch.

A bench type grinder is a real necessity in any Ford service station and is inexpensive. It is one of the best improvements you can make and will save its cost in many ways. The "Pioneer" is well made, has extra long bearings and accurately ground shafts. Lubrication is guaranteed by the addition of a wick and reservoir oiling system. Motors are totally enclosed to keep out abrasive dust insuring long life with little or no attention. Tool rests are adjustable. I can personally recommend this grinder as greater value for the money, than any other.

NOTE: These grinders cannot be supplied for universal current. Price given is for 25 or 60-cycle alternating 110 or 220 volt.

Direct current, $4.00 net extra. In ordering be sure to specify correct current, voltage and cycles.

MIDDLESEX GARAGE, LOWELL, MASS.—Please be advised we are using the Wilson Machine successfully, and we find it a great time saver, as well as doing better work. We have received a lot of new business as a result of it and will gladly recommend it to you. Aug. 10, 1922.

NORTHWESTERN MOTOR SALES CO., VIRGINIA, MINN. (FORD AGENTS)—We want to say that our shop has turned out what we believe to be as near perfect a rebuilt motor as it is possible to make, and to date the ones having seen the hardest service ar still performing without the slightest sign of trouble. *We are more than pleased with the efficiency of this machine.* Oct. 11, 1923.

GASOW MOTOR COMPANY, BEAUMONT, TEXAS (FORD AGENTS)—We have had our K. R. W. Combination Machine in constant operation for about nine months. The writer has been in close touch with machinery of this nature for the past 8 years with the FORD MOTOR CO., and Dealers in Detroit and vicinity and in justice to Mr. Wilson, will say that this machine is an excellent investment to any garage that will handle it properly. Aug. 9, 1922.

The K. R. W. Growler

W-47

Price $10.00

Any cycle or voltage—cannot be used on direct current.

A great many people misunderstand the use of a growler, and have purchased them without knowledge of how and when to use them.

A GROWLER IS UNNECESSARY and OF NO VALUE except to those who wish to test and rewind armatures. The majority of Ford dealers and repairmen find it cheaper and more satisfactory to exchange burned out or shorted armatures for repaired ones with firms who make a specialty of that work and their prices are positively lower than it will cost to do it yourself in small quantities. We have them to sell if you want them. Be sure to give cycle of current when ordering. See page 49 for valuable information on Ford generator repairing.

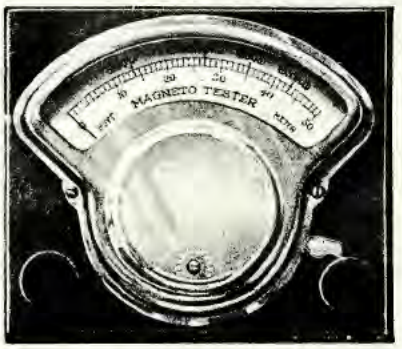
K. R. W. Growler and Armature Coil Tester

W-53

Price $20.00

An instrument for re-winders—meter readings show exact condition of each armature coil. Locates quickly and accurately incorrect winding, open circuits in coil, short circuits in coils or commutator bars, grounds, and reversed connections to the commutator bars.

Hoyt Magneto Tester



W-9

Price $15.00

This magneto tester will save you a great many hours looking for trouble with spark plugs, coils, carburetor, timer and wiring, which is directly due a great many times to a weak or partially "shorted" magneto. Ford magnetos are seldom suspected of causing trouble but now and then loss of power, hard starting, back firing, etc., can be directly traced to this point—if you have the proper instruments to do it with. Hoyt instruments are of the highest quality and guaranteed to give complete satisfaction.

Hoyt Battery Cell Tester

R-66

Price $10.00

Shipping Weight, 2 Lbs.

Steel prods are spaced so as to reach from positive to negative terminal of battery cell and are RIGIDLY ATTACHED to handle. Resistance metal is of special alloy—not affected by heat. Wires leading from resistance unit to meter are rubber covered and of uniform resistance, so as to give accurate reading.

Meter is type 506, moving coil, with improved pointer construction, reading 100-0-100 amperes and 2-0-2 volts. It can be removed from brackets readily and used as a pocket meter.

The location of the meter with reference to the prods is such that it is easy to make readings quickly and accurately at any angle.

The Improved K. R. W. "Combined" Generator Test Stand

Armature Lathe (Motor Driven) and Mica-Under Cutter

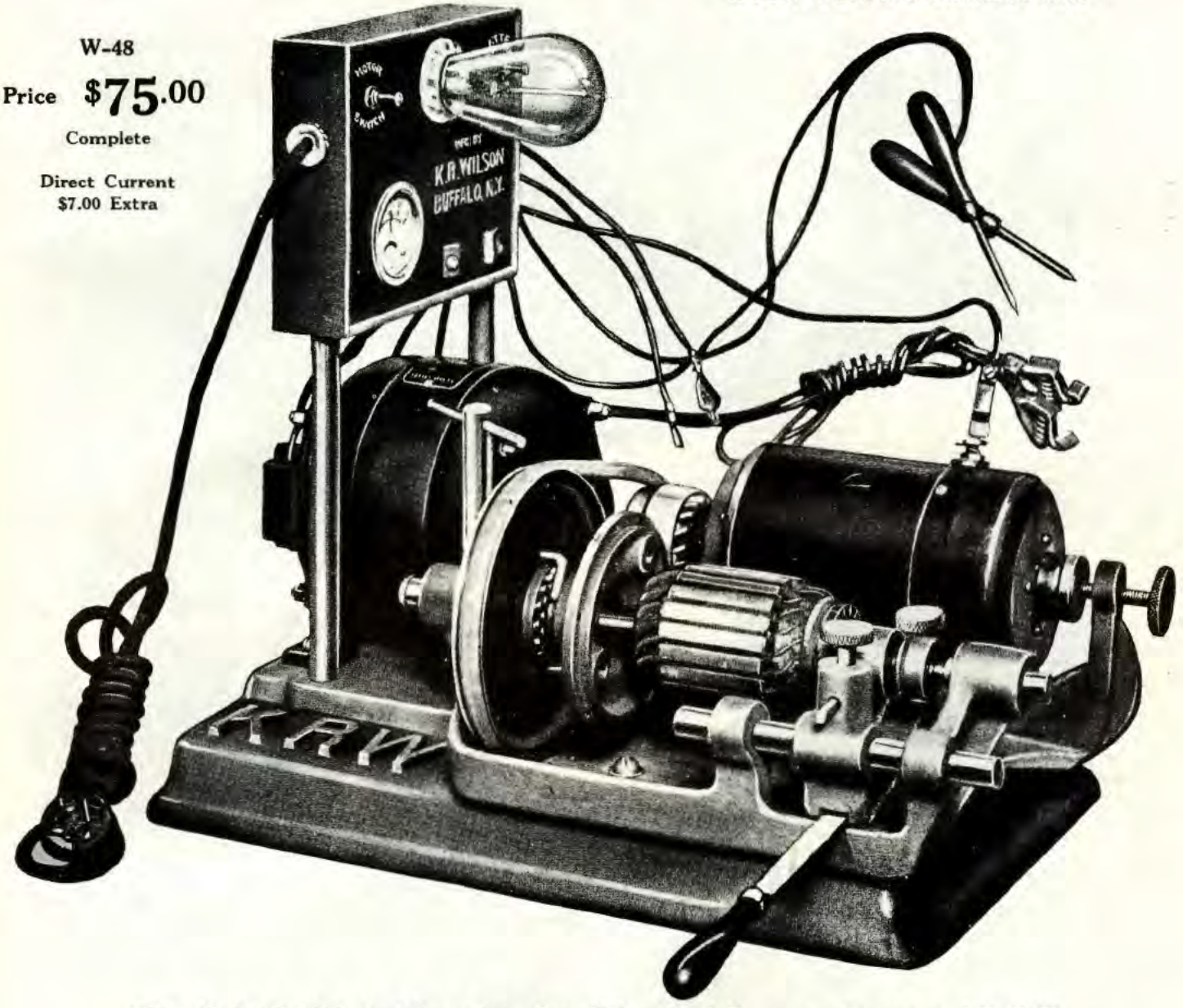
A Built-In Job at a Reasonable Price

W-48

Price $75.00

Complete

Direct Current
$7.00 Extra



"The K. R. W. Will Do More Than Any Other Ford Generator Test Stand Built!"

Generator Head, Pinion or Bearings Are Not Removed

The Armature can be removed from the generator, the pressed steel pulley clamped right over the pinion gear, armature inserted in the lathe, commutator under-cut, turned and polished in less than 5 minutes—a saving of at least 40 minutes over any other method, besides eliminating the necessity for pulling off pinion gears, and the danger of damaging the shaft and bearings, which also have to be replaced again.

The BED is one piece gray iron casting, strongly ribbed to give it stiffness. Raised surfaces are planed off to make a perfectly flat surface on which to mount the motor, generator bracket and lathe accurately and in perfect alignment.

The INSTRUMENT PANEL is a one-piece aluminum casting (non-magnetic and thoroughly protects the instruments, wiring, etc. This is supported by two pieces of ¾-inch rolled steel, which makes a very rigid construction. The base is also fitted with four soft rubber legs to eliminate practically all the noise.

The Machine is equipped with a ¼ H. P. GENERAL ELECTRIC Split Phase MOTOR, STANDARD GAUGE CO. AMMETER, TEST LAMP, TEST POINTS for high voltage, CONTROL SWITCHES for motor and battery current, CORD and PLUG for attaching to lighting socket, as well as BATTERY LINES which are also equipped with MUELLER SNAP TERMINALS. Cut-out is not furnished, but a BRACKET is provided on which to mount same for testing purposes when necessary. This machine is sold regularly without growler, which is unnecessary, but for those who want it see page 47.

The K. R. W. test stand is a high grade job in every way and could not be made any better, even if you were willing to pay four times as much for it. RECENT IMPROVEMENTS have been made which are not shown in these pictures and further contribute to its value.

DON'T LET MY LOW PRICE SCARE YOU. Just put this machine alongside of any other make and compare it closely—item for item, material, workmanship and design. If YOU don't think it is far superior to any of the others, just box it up and return it.

The Improved K. R. W. Ford Generator Test Stand is in a class by itself and combines ALL the testing features of other competitive makes PLUS the ARMATURE LATHE and MICA-UNDERCUTTER, which alone is worth more to YOU than all the other testing features combined.

Thousands of armatures are being discarded daily by the "Growler" test method because they show grounds or short circuited coils. Seven out of every ten of these armatures will test out O. K. as soon as the commutator is undercut and turned down to clean mica insulation. TRY IT YOURSELF. It will cost you less to do this operation on the K. R. W. Lathe than it does to remove the pinion gear and ball bearings and replace them on a new or re-wound armature. It will also save the customer $3.00 or more—the customary charge for exchanges—and which in most cases is no better than his own, after it is so repaired.

Fully Guaranteed

I guarantee this machine to make every test that is useful and necessary on Ford generators, and will repair or replace any part proving defective within one year F. O. B. my factory.

Pays for Itself

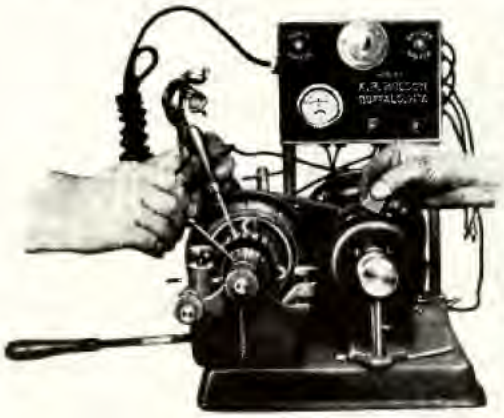
In a few months in the average shop on the savings of labor and defective armatures, and it enables you to render real, conscientious service to your trade—the kind you would want for yourself.

Important

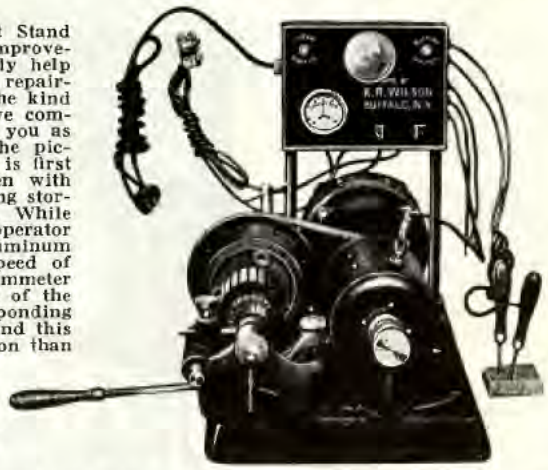
Be sure to give cycle and voltage of your electric current when ordering, otherwise you will delay shipment until we write you.

K. R. W. Combined Generator Test Stand Is A Big Time Saver

REDEEMS ABOUT 7 OF 10 ARMATURES | **NO PULLING OFF OF DRIVE GEAR PINIONS** | **NO PULLING OR BREAKING OF BALL RACES** | **NO DAMAGED ARMATURE SHAFT CENTERS** | **NO WASTE OF TIME RE-ASSEMBLING** | **REAL PROFITS ARE MADE ON EVERY OPERATION**



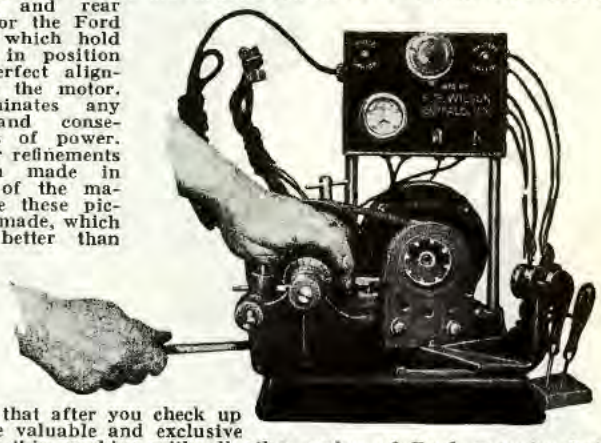
In the new K. R. W. Generator Test Stand I have incorporated several new improvements and refinements, which not only help to speed up production, but enable the repairman to turn out much better work—the kind that satisfies. In these pictures I have combined one or more operations to give you as much information as possible. In the picture on the RIGHT, a Ford generator is first tested as a generator by being driven with the motor; then as a motor by allowing storage battery current to flow through it. While this operation is taking place, the operator should grasp hold of the polished aluminum pulley and "brake" it. With the speed of the generator greatly reduced, the ammeter will "flicker" on each and every one of the short or grounded coils as the corresponding armature segments pass the brushes, and this gives you a great deal more information than any growler can possibly give. This picture also shows the method of supporting the Ford generator squarely against the supporting bracket and in perfect alignment with the combined pulley and universal joint. Also shows an end view of the armature lathe and the various adjustments which make this operation simple and easy.



Another valuable feature. The generator can be instantly turned, even while running, to bring the negative or positive brush "on top" for convenience and inspection. Very often Ford generators "quit" because the brushes are stuck in the brush holder by dust worn off of them, and when a generator fails to "motorize" with battery current applied, this inspection should be made. Maybe it will cure all the trouble. The next view shows testing for shorts and grounds with the "Prods" using 110 volt current. Similar tests can be made on starter armatures, magneto field coils, and other electrical apparatus where circuits must be traced.

The picture shows a plan view of the entire machine, and the simplicity of it. From the picture you can easily appreciate all those savings I have mentioned at the top of the page, because practically every other test has been made before we reach this point, and when defective coils are found, the next operation is to undercut the mica on the commutator, then turn and polish it. Experience has proven that about 7 of every 10 Armatures which have been discarded by the "Growler" test will come out perfect after being undercut and turned. And, in designing the lathe, so that the drive pulley can be clamped right over the pinion gear, it is unnecessary and a superfluous operation to pull it off—an operation which quite often damages the shaft centers beyond repair. It also eliminates pulling off the ball bearings and consequent breakage of the ball races—to say nothing of the time which must be wasted to put all these parts back again. This operation alone is worth more than anything else to those interested in this kind of repair work.

This picture shows how easy it is to undercut the mica. A special thin pointed tool is used for this purpose and when the handle is moved to the left the cutter "planes" out the mica insulation between the copper commutator bars. This operation requires less than one minute, and it so simple that anyone can do it. The other view shows the front and rear supports for the Ford generator, which hold it rigidly in position and in perfect alignment with the motor. This eliminates any binding and consequent loss of power. Some other refinements have been made in this part of the machine since these pictures were made, which make it better than ever.



I am sure that after you check up ALL of the valuable and exclusive features of this machine with all other makes of Ford generator test stands, you will say it is FAR OUT IN FRONT, regardless of the fact that my price is much lower.

All You Need To Know About the Ford Starting and Lighting System

Price $2.00 Postpaid

You don't need to hire an "EXPERT" at a high salary to repair Ford electrical systems. This book gives all information in caring for and repairing the F. A. Ford Standard Electrical Systems with which Ford cars are now equipped. 150 pages, and 47 illustrations treat on all phases of care, repair and operation of this equipment. It is written and illustrated so plain that any mechaine can understand it. He can learn as much from this wonderful book, and a few day's practice as he could get from a three-months' course in an electrical school. FULLY GUARANTEED. If you do not think it is $2.00 well invested, return it and I will refund your money.—K. R. WILSON.

Bendix Head and Generator Gear Puller

Price $2.70 Z-87

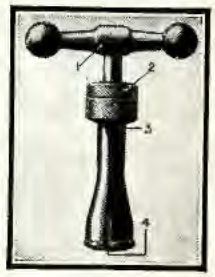
Shipping Weight, 2 Lbs.

I do not mean to infer (in another place on this page) that generator gears do not have to be removed, for sometimes armatures are actually burned out or otherwise damaged to such an extent that they must be rewound, etc. This makes it necessary to have a puller for this purpose, and here it is. I'll say, the best little puller you have ever seen, well made and worth much more than I ask for it. Can also be used in a great many other places. Has special center that will not ruin armature shafts.

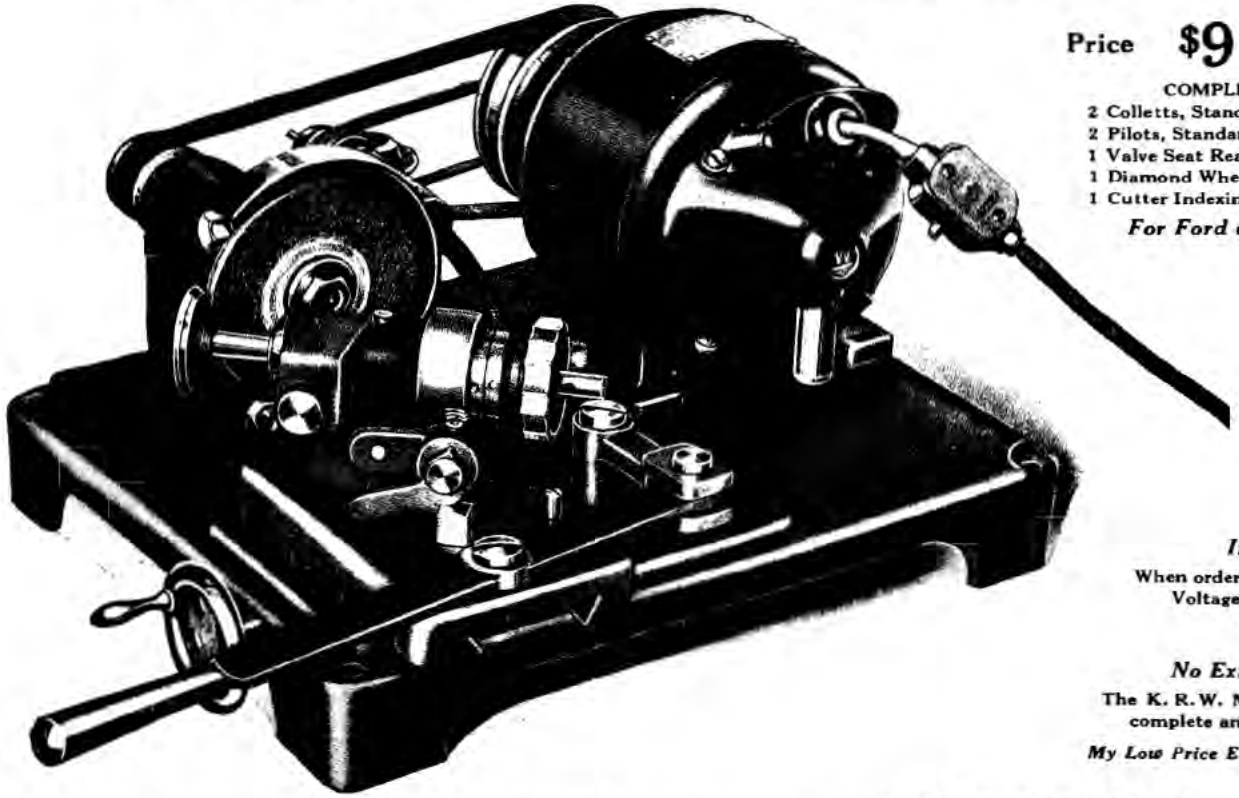
Ford Generator Race Puller

Price $3.45 Z-93

It may not be worth its weight in gold, but I know a lot of dealers who have bushels of Part No. 5125 brush end brackets under the bench which have been discarded at the expense of the customer because they could not afford to invest $3.45 for a puller to take the races out. Are you guilty? Shipping weight, 2 lbs.



The K. R. W. "Ford Special" Valve Refacing Machine



Price $97.50 R-72

COMPLETE WITH
2 Colletts, Standard and Oversize
2 Pilots, Standard and Oversize
1 Valve Seat Reamer
1 Diamond Wheel Dressing Tool
1 Cutter Indexing Sharpening Fixture

For Ford and Fordson

Equipped with ¼ H. P., 60 Cycle, 110 Volt Motor. Other Voltages and Cycles can be had. Direct Current $4.00 Net Extra.

Important

When ordering, be sure to specify Voltage, Phase and Cycle of Motor.

No Extras To Buy!

The K. R. W. Machine comes to you complete and ready to operate.

My Low Price Eliminates Competition!

Has been brought out to satisfy an enormous demand from Ford dealers and service stations who want a high class valve grinding machine at something like a reasonable price.

The K. R. W. machine is designed especially for Ford and Fordson work and includes colletts and pilots for both standard and oversize valves. A 1¾ inch valve seater is also supplied, which fits both Ford and Fordson valve seats. The grinder is equipped with an indexing attachment for sharpening this cutter, as shown in lower picture. THE GRINDER HEAD IS FULL BALL BEARING and the spindle of liberal proportions so that it will stay accurate and turn out only first-class work—free from chatter marks.

Steel Valves Are Coming

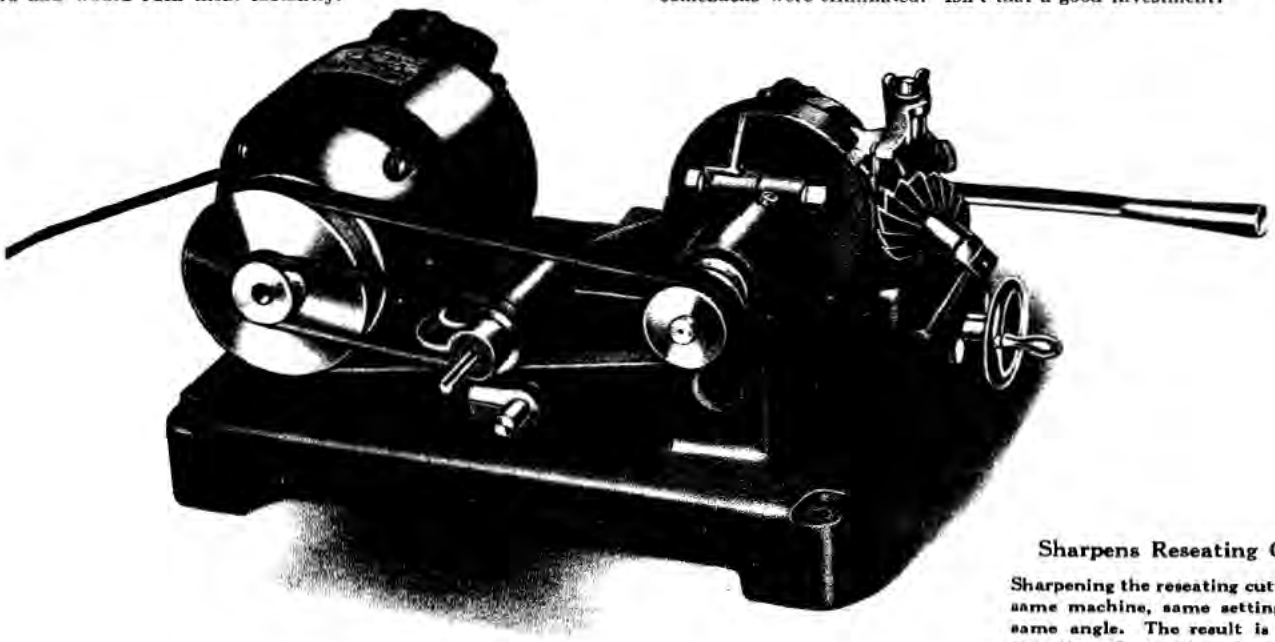
They are being used in the Fordson now, and have overcome the trouble of valve stems stretching and burning off. Steel valves must be ground, for they are much harder than the cutters of ordinary valve seaters and facers and would ruin them instantly.

Are You Wasting 300% of Your Labor?

on valve grinding jobs? I am quite sure you are, unless you have some good grinding machine to assist you. EVERY VALVE SHOULD BE REFACED, for a large number of them are warped, burned, pitted, and grooved, and the time wasted trying to grind them in, is a big item, and one of the chief complaints from Ford dealers that they can't make any money on valve grind jobs.

A Ford or Fordson valve can be accurately ground to a highly polished finish in less than one minute, regardless of its previous condition. That operation should be performed on both new and used valves if you want to save time and make money, for the valves are then so nearly perfect that very little grinding is necessary. To spend more than 20 minutes on these operations of a valve grind job is a gross waste of time.

Use a valve grinder, then all jobs can be produced at the same labor cost and your FLAT RATE PRICES will show you real profits. Figure it out for yourself. Suppose you save 32 minutes on each job, 300 jobs per year and your grinder is paid for. Every job was a good one, comebacks were eliminated. Isn't that a good investment?

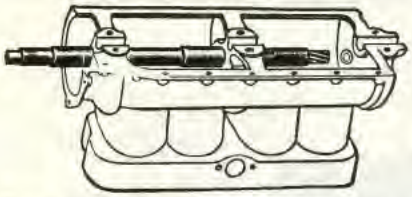


Sharpens Reseating Cutter

Sharpening the reseating cutter on the same machine, same setting, insures same angle. The result is a perfect "seat" in the block and on the valve.

Make Your Valve Grinding Jobs Satisfy Customers, and Pay Larger Profits

Cam Shaft Aligning Reamer



W-13

Price $12.00

Shipping Weight, 12 Lbs.

For Align-Reaming Rear Cam Shaft Bearings—Absolutely Necessary for Results

Rear cam shaft bearing must be reamed in perfect alignment with the front and center bearings, otherwise the cam shaft gears will knock at every revolution and create a disagreeable noise. It is impossible to ream this bushing with an ordinary type reamer, because this bushing is driven in with a hammer and usually battered over on the outer end, so that an ordinary reamer is deflected out of alignment before it actually starts cutting, with the result that when reamed in this way the cam shaft has to be driven into position when being assembled. The K. R. W. Aligning reamer just fits the cages for the front and center bearings and accurately reams the rear bearing in perfect alignment.

Cam Shaft Reamer and Jig

For Front and Center Bearings

W-7 Price $6.50

Reamer and Jig Complete

W-7B Price $4.00

Reamer Only

The front and center cam shaft bearings are seldom properly fitted, because heretofore no special tools have been available for this purpose. On account of the special design of these bearings it is necessary to hold both halves of each bearing in exact relation to each other while reaming, therefore we have provided a special fixture which applies equal pressure on all sides and prevents shifting. The bearing is then reamed with a special spiral fluted reamer having a pilot that just fits the unreamed bushing—spiral flutes prevent chatter.

Improved Valve Seater and Facer

W-6—Pair

Price $15.00

Built for Extraordinary Service

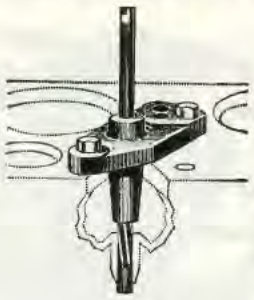
Cutting blades are inserted high speed steel spirally set to cut with a shearing motion. The facer is especially designed to be clamped in a vise and the valve turned with a wrench. We recommend trueing up all valves whether they are new or old, as some of them are badly warped. The use of these tools reduces the grinding operation of 8 valves to about 6 minutes. The valve seater is now made concave (altho not shown in cut), to reseat valves on a curved surface according to the present practice of the Ford factory. This tool is designed and built for real service and well worth the price.

K. R. W. Main Bearing Align-Reamer

W-19 Price $28.00 **Shipping Weight, 11 Lbs.**

The latest improved K. R. W. main bearing and connecting rod align reamer and spotting-in bar. A new steel has been perfected that stands up. Use in new babbitt only. Our old reamers exchanged at $14.00 each.

Oversize Valve Stem Reamer and Guide



W-5 Price $4.00

Worn valve guides suck in air and allow motors to skip at low speeds. Idling is impossible. With this improved reamer and guide it is a matter of ten or fifteen minutes to accurately ream out the guides for 1-64 oversize valves. On account of the small diameter of this reamer we have made the guide extra long, thereby preventing any possible twisting or reaming a crooked hole. The pilot automatically locates the reamer in position before permanent guide is fastened. The spiral flutes cut freely with a very smooth finish.

Oversize Push Rod Reamer

W-4 Price $3.50

Push rod guides wear out of round and become loose and noisy. With every "re-manufactured" job new oversize pushrods should be installed, the work of only a few minutes. Guides are reamed 1-64th oversize. This operation assists in making a motor good as new. The pilot on this reamer is the same as the standard push rod, insuring a straight hole.

"Dreadnought" Special Babbitt File

R-65

This special babbitt file will save considerable time and labor on finishing babbitt bearings, cuts with a shearing motion, leaving a neat looking job. They cost more money but service considered cost much less.

10"—$1.00 12"—$1.25 14"—$1.50 Postage additional

Athol Machinists' Vises

Made from Semi-Steel Castings with Tool Steel Jaws

ATHOL VISES need no introduction. They are made for service and are the result of 40 years' experience making high grade vises. No details in material, workmanship or engineering skill have been omitted.

CASTINGS ARE SEMI-STEEL having a tensile strength of 35,000 lbs. SCREWS are made from selected steel and are turned with a buttress thread which has more strength than any other type the screw ball is welded on. THE NUT is malleable iron and easily replaced if worn. TOOL STEEL JAWS—tool steel plates are welded direct to the faces of the semi-steel jaw castings, eliminating screws, studs, etc., which are always bothersome.

SWIVEL BASE VISES are made with a corrugated runway and a corrugated clamp bolt head which gives a positive lock in any position of the full swing of the circle. Only a slight pressure of 2 fingers is necessary to securely lock it.

It is our opinion that no better vise is built.

These Prices Are 25% Lower Than Regular List

Prices

Stationery Type

3½"	Wt. 30 Lbs.	$ 8.45
4 "	Wt. 42 Lbs.	9.56
4½"	Wt. 58 Lbs.	11.65

Swivel Type

3½"	Wt. 34 Lbs.	11.25
4 "	Wt. 50 Lbs.	12.75
4½"	Wt. 70 Lbs.	15.00

F. O. B. Our Stock
Arcade, N. Y.

R-71

The K. R. W. Electric Dynamometer

A Machine for Accurately Testing the Horse Power and Efficiency of Ford Motors

Price $725.00 W-55

Complete with Motor-Generator, Instrument Board, Instrument Tachometer, Hose Connections and Resistance Plates.

Built To Order Only, Delivery About Six Weeks After Receipt of Order.

Terms: 50% Cash With Order, Balance SB/BL.

3300 R. P. M. Without Vibration! *Purr - r - r - r - r - r* —

"That's Easy"

Rebuilding Ford motors that will turn up a speed of 2,500, 2,800 and up to 3,300 R. P. M. with so little vibration at any speed that a lead pencil can be balanced with its metal cap end on a cylinder head bolt is some record, and I know you can do it too, if you practice what you have read in this book thus far. It is only a matter of correct alignment, proper balance, and elimination of friction. There is no secret about it—just a determination to do it, is all that is necessary.

The K. R. W. "Ford Special" Dynamometer will help you get these results. Every motor will tell its own story, and when put on this testing machine every detail of adjustment can easily be checked up. The results are instantly noted by the change in HP and speed, etc. It also has a tendency of creating greater interest amongst your mechanics —each one strives to turn out a better and more powerful job than the previous one—and you soon strike an average of high efficiency. Your motors will come thru production so nearly alike that they will seldom vary over one-half hourse power.

An Electric Dynamometer is simple to use and easily understood by anyone, and is far more accurate than any other type of dynamometer or motor testing device made.

A Ford Engine can be mounted on the machine and connected up ready to run in 8 minutes. It is then started by hand or with the electric starter (if it has one). The switch is thrown in and the Rheostat is turned gradually to the left to build up the resistance or "load" until the Tachometer shows that the speed of the engine is decreasing. It is then re-adjusted to hold a maximum load at a constant speed. The volt and ampere meters tell the story accurately. Volts times Amperes times Efficiency equals Watts divided by 746 Watts equals Net Horse Power.

Ford engines develop their greatest horse power at 1,500 to 1,600 R. P. M., and have the greatest pulling torque at about 900 R. P. M.

Ford owners will gladly pay you $10.00 extra for a dynamometer-tested engine. It is worth it, and then some. If an engine fails to pull a certain load you know something is wrong and correct it, so that the customer always gets a perfect job.

Any dealer or repair shop who takes interest enough in the quality of work he turns out to install a dynamometer will be repaid by a volume of work so large he cannot handle it. Ford owners want something better than they are getting, and are willing to go almost anywhere, and pay almost any price, to get it. ARE YOU THE MAN THEY ARE HUNTING FOR?

The Motor Generator

is a very high grade, ball bearing job, wound for 220 volts, direct current. It is rated at 15 H. P. normal capacity, and is guaranteed to stand a 50% overload momentarily, and a 25% overload two hours, with very little temperature rise. It has been especially designed for this job. Its windings and insulations are the very best obtainable. It is equipped with commutating poles, which prevent sparking at the brushes. This feature insures against commutator troubles. The armature is also equipped with a large fan which keeps the machine cool and well ventilated at all times. In locations where 220 volt, D. C. current is available, same can be connected direct to the double throw switch we have provided, and the machine will run as a motor to "limber-in" Ford engines before operating under their own power and expansion. A valuable feature, but not necessary.

The Instrument Board

Is a large slate panel measuring 28x28 inches square, and is supported on two 2-inch pipe posts, or angles (which ever you prefer). It is equipped with two very accurate "Jewel Meters" of "wide range," (capacity 0 to 300 volts, 0 to 200 amperes), a Hoyt Ford Magneto Tester, Regulating Rheostat, Tachometer, and a Double Pole, Double Throw Switch.

The Base

of the K. R. W. Dynamometer is a one-piece casting weighing approximately 1,400 lbs. without motor supports, and is well ribbed for strength. It is purposely made hollow, and is never bolted to the floor. This makes a sound box of it, that greatly amplifies any noises within the engine, while it is operating, so they can be accurately located and corrected.

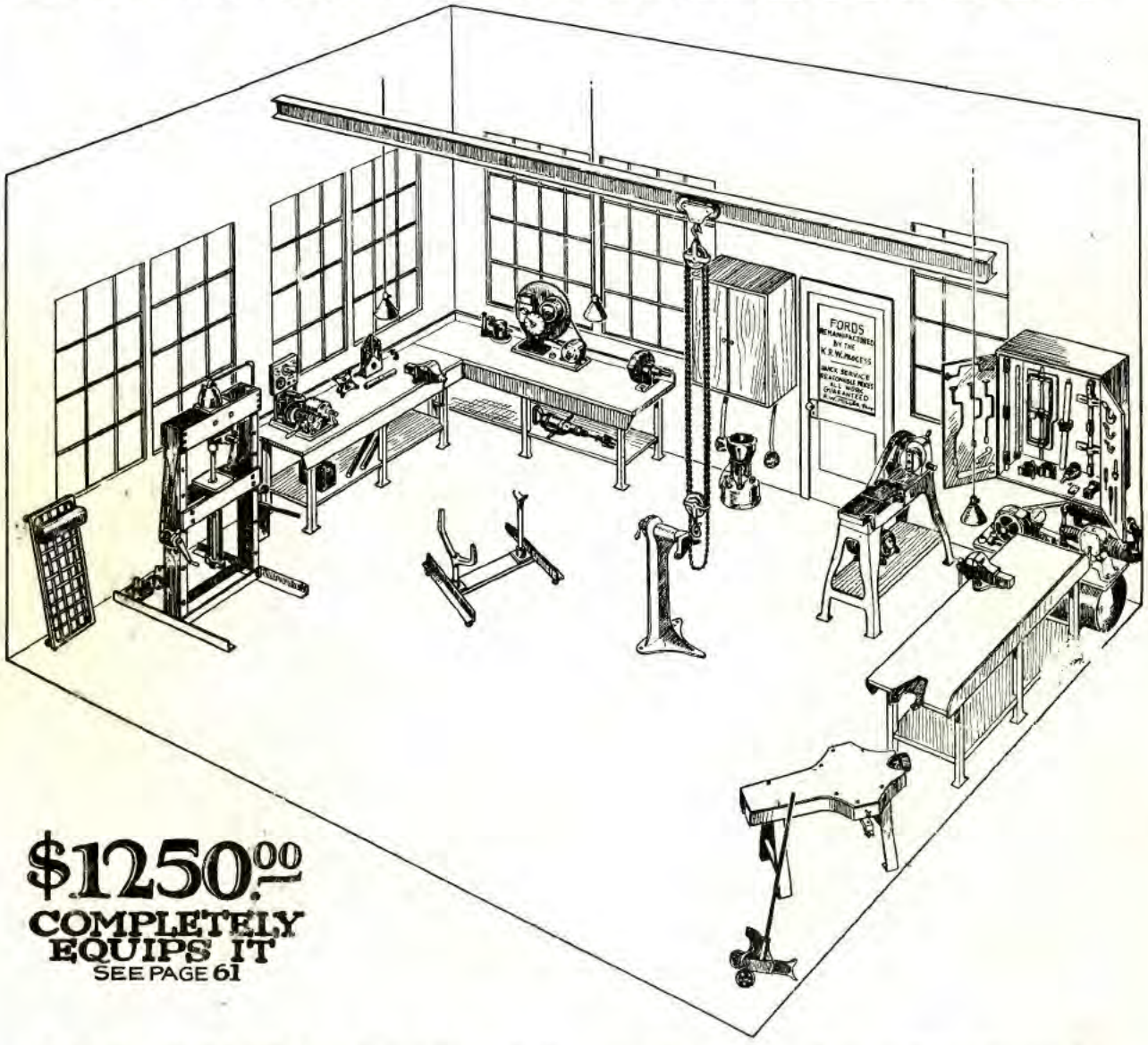
Other Accessories

Water connections, resistance plates, wires, cables, etc., are furnished. I do not supply the hose or barrel, as these are easily obtainable anywhere.

You Would Be Surprised

If you tested out a dozen engines in the same condition and with the same adjustments as they are running in everyday use. You will find three-fourths of them are capable of delivering only one-third to one-half of the horse power they should, on account of the condition they are in. Correct valve timing probably means more in the way of extra horse power and smooth operation to a Ford engine than anything else. Hundreds of students at the K. R. W. Training School (expert mechanics) simply couldn't believe what they saw, and dozens of engines were tested before they were finally convinced. See Page 22.

The K·R·W· MODEL REPAIRSHOP



$1250.00
COMPLETELY EQUIPS IT
SEE PAGE 61

THE K. R. W. "Model" Repair Shop is the result of several years experience outfitting Ford Service Stations for *efficient, satisfactory service—at a profit.* This new layout surpasses anything previously attempted and requires a floor space of only 18x18 feet square. Each and every tool is located in the most convenient position to conserve human energy and prevent waste of time. This shop has a capacity to re-manufacture two to three complete motors per day, and by the addition of only two or three motor stands and dollies to relieve the K. R. W. Combination Machine of certain assembly operations, would easily have a capacity of five to eight motors per day, which is great enough for even the largest repair shops in the country. Also has sufficient capacity for the average amount of front and rear ends, and electrical work.

K. R. WILSON, 10-16 LOCK STREET, BUFFALO, N. Y.
FACTORY AT ARCADE, N. Y.