
OFFICE - 10-16 LOCK STREET, BUFFALO, N.Y. U.S.A. FACTORY - ARCADE, N.Y.
On May 2, 1921, the first K. R. Wilson combination machine was demonstrated to an excited crowd at Scranton, Pennsylvania. Twenty-two machines were sold before the machine was returned to the factory. A few days later, another demonstration in New York City 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 and in the trade papers and magazines, 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 claims made, because the process differed slightly from their methods. 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, as 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 as the K. R. Wilson combination machine had cost! It was not that the K. R. Wilson combination machine was not as good as the others, but that the claims were made that it was. I was then faced with the fact that I had to either honor my claim or admit my machines were not up to their standards.

During May, 1921, I found it necessary to further increase my manufacturing facilities and I built a fireproof 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 employees and, during 1925, the ever increasing volume of business had made it necessary to add two more buildings with several thousand square feet of floor space.

Physical expansion of the plant has enabled me to keep pace with the business needs of our customers, in the hands of Ford dealers and service stations, and have given them my best machine which up to this time has never been equalled for speed, quality and work. My low prices have saved Ford dealers thousands of dollars for equipment required in black and every service station, and I have given them a machine which up to this time has never been equalled for speed, quality and work.

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 the competition. I have been absolutely correct in every statement I have ever made for the K. R. Wilson combination machine, and I will let you be the judge as to whether my determination-to-win has been successful.

Now considering the fact that this business was started without capital, and from a point of absolute obscurity, a mere one-man organization in 1915 to 1919, and only possible with the backing of the K. R. Wilson combination machine, K. R. Wilson has been able to build his largest and best equipped plant in the world for the exclusive manufacture of tools and repair equipment—a plant so complete and so efficient that I make all the profits from the raw material to the finished product and pass on to the customers by way of low prices, who get their money's worth for the money they pay and are satisfied with the result. I have never been "boycotted" by a competitor. I have no other dealers who are not satisfied with a reasonable margin of profit, and I claim there will be only such lines as pay them their real worth. It is a pleasure to me to be able to say that I still have a very large number of customers who, in the past, 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 and the Ford motor cars. You have been through from cover to cover, so I 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.

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 babbit 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
1.00 = 1/1000 Inches or 1,000
.50 = 1/2000 Inches or ½
.25 = 1/4000 Inches or ¼
.125 = 1/8000 Inches or 1/8
.0625 = 1/16000 Inches or 1/16
.03125 = 1/32000 Inches or 1/32
.015625 = 1/64000 Inches or 1/64
.00625 = 1/128000 Inches or 1/128

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 2½, 2½, 2½, or 2½. 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 (one dollar bill) then the quarter divisions or 25 pieces, then the number of thousandths on the thimble from the zero line 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 clockwise it will decrease and counterclockwise it will increase the number of thousandths.

EXAMPLE—First spindle shows $2.64; second spindle $1.26, third, $2.24, or the same amount in thousandths of an inch.

How much is 9/10 of an inch in thousandths? Answer, if 9/10 of a ten dollar bill is $9.00 then 9/10 of a ten dollar bill is 9 x $25 or $225 and 0.009 x 1000 or 9 thousandths.

1. In fact, if you follow the R. W. Process you will find it cheaper to rebabbit every block, then bore out and align the bearings and bearing caps simultaneously than to attempt to use any other method.

Rebabbit Every Motor Block

The Old Babbit 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 babbit 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 lubricate 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 drain tank. I have often found two to four tablespoonsfuls 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 level. 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 lining gears have "worn in."

Rebabbit Every Motor Block

then bore out and align 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 R. W. Process you will find it cheaper to rebabbit 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 Babitted

Main Bearing Caps

<table>
<thead>
<tr>
<th>Cap Description</th>
<th>Cap Number</th>
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<tr>
<td>3031 B Rear Bearing Cap</td>
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<tr>
<td>3032 B Front Bearing Cap</td>
<td>3032</td>
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<tr>
<td>3033 B Center Bearing Cap</td>
<td>3033</td>
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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 R. W. Combustion Machine becoming so popular there has been little or no demand on the Ford Motor Co. for rough babitted 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.)

5
Rebabbitting 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

Rebabbit Every Block

It is cheaper to rebabbit every block with the perfected K. R. W. babbitting 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 Babbit

And follow these directions closely, otherwise the rebabbit 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 Babbit

| 96 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 PIGEON (Babbitting 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 babbit 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. If it, however, necessary to have sufficient heat to bring the tin and antimony to complete liquifaction and the National Lead Co. says this starts at 765 degrees Fah. Therefore it is necessary to raise this temperature by at least 350 to 390 degrees to overcome the loss of heat while transferring the melted babbit from the melting pot to the babbitting jig. On account of the thin bearings used in a Ford motor, the babbit 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 babbit until it would just char a pine stick is OK for a lead base babbit, 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 babbit cherry red, then pour it quickly and with force enough to drive out the cold air and gases so that the bearing can completely fill. Ford babbit 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 oxidize soon after passing the 400 degree point and quantities of oxides will form on the surface of the babbit which you naturally skim off. This effects the mixture to a very large degree and often more babbit is wasted than is used for pouring bearings. If the babbit is heated quickly to a cherry red color, then poured quickly into a cold block, using a cold babbiting 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 babbit. Many mechanics who have had trouble pouring perfect bearings either try to avoid rebabbiting operations entirely or else go out and purchase other brands of babbit 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 babbit and get it HOT.

Read—What Ford Motor Company Service Bulletin Says!

Better bearings can be poured at room temperature if babbit 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 babbit metal.

See Page 8 for a Real Babbitting Melter
Important Information — The Answer to Your Rebabbitting Problems

The K. R. W. Rebabbitting Fixture

Is designed after the "Original" style of rebabbitting 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 "bullet" on the end of each bearing, which prevents waste of babbit and eliminates about 90% of the hand scraping operations. The cut-off blocks prevent the babbit from dripping on the mandrel and are made 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 surplus squarely with the cast iron surface of the bearing.

Thousands of Ford agents and operators have been fooled, believing that the new Bullet-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 rebabbit 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 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 babbit in through two large openings in the cast iron surface, as shown in the picture of Fig. 4, and it must shoot through four small slots 1/8 in. wide, which reduces the volume about 28 to 1. This air and gas comes up through these slots and two or three inches of babbit, while it is going in with such force. The "prettiest looking" bearing you get is due to the babbit fixture getting hot, as it absorbs the heat from the large quantity of hot babbit poured 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.

I do not claim originality or any great improvements for this fixture. But I have proven beyond a question of doubt, that to secure rebabbitting bearings of a uniform texture and hardness it is absolutely necessary to cast all three of them under identical same conditions. The chief chemist of the National Lead Co. says that it is necessary to "etch" 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. The amount of the Ford Babbit being very thin, it is necessary to have the babbit thoroughly melted and well above the liquidation point, then pour it quickly on the mandrel; and the real force, from both sides of the fixture to insure filling the bearing completely and driving out the air and gases, which cause bubbles, blow holes and coldspots. By using a fixture of this type the heat from one bearing cannot possibly affect the next one. So that all three bearings are cast just alike, as if we used three separate jigs for that purpose.

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 peened 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 reseismic are doing something just as bad when they fail to fit the back of the bearing first.

Ford babbit cannot be further compressed by burning-in or burnishing operations, if it has been properly peened 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 babbit 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 he was unable to pour good bearings with my babbitting jig. So he purchased one of the new Bullet-Mold-Type of rebabbitting fixtures and was getting "daundy" bearings. A few weeks later he wrote again that he was now pouring as well as ever.
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 throughout 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 too much or 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 V. 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. The diameter 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, 50 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 a 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 oxidizing 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 rebabbitted bearings.

F. E. MACCOLLUM, 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.

Rebabbed 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 loose bearings 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 you the same results. The body of this tool is accurately machined, back 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 the right tool with 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.
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 rebabbitted 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 rebabbit 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 burning or limbering-in, although a "spotted-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.

The bearings and bearing caps are bored-out simultaneously to approximately 1.342 or just large enough to receive the pilots of the main bearing reamer. This leaves 1.5 to .3 thousandths of metal to be align-reamed in finishing the bearings. The pilots of the reamer automatically align the main bearing caps while the block is bored down for the final finishing operation. This prevents any possible shifting of the caps, and it will be found 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
The K.R.W. Process Is Simple and Easy To Understand

Up to this operation it has not been necessary to consider the crank or main bearing journals, but it has been necessary to have them turned accurately 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 nickels, bent things, and a little extra money—use each bearing. IF AN OLD ONE—for bends, twists, cracks, bent flanges, out-of-roundness, and undersized pilots—use R. V. R. But the process is customary to "nicks" the bearings first as this often eliminates some of the out-of-roundness.

If a new crank shaft checks perfect in every way as above described and each main bearing measures exactly 1.218 (standard size). Then it is simply a matter of the crank reamer to fastening down the main bearing caps and align reaming them. BUT, if there is some variation in the diameter of these three main bearings it is taken care of by adjusting the main bearing caps with Ford shims to bring out only the largest size. In other words, only the maximum size is 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 in trying to determine the difference in diameter. If these three main bearings is worth taking care of when you consider the long life you are promised, how much job your 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 crank shafts.

Fig.1 represents the underside diameter of the 4 crank pin bearings which your micrometer would measure as 1.212, 1.213, 1.214, 1.215 when measured at their correct position. It amounts to .003, .004, .005, .006. But being just crank pin bearings the variation does not harm as each connecting rod is able to be adjusted in the bearing to take care of the out-of-roundness, and if found to be out-of-round on any bearing more than .005 should be thrown away as unserviceable. For that man does not want his engine to "luff," so he must have the center of the cylinder uniform to the limit of .005. So that 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 work from junk yards and second hand have no. 2. 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 skeptical that a single revolving of an out-of-round crank shaft will make the babbit lining as large as its largest diameter, and after that the eccentric or crank pin bearing will rub like a rotary pump and squeeze most of the oil out of the bearing, so that an unbroken babbit 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 the obstacle, and I am sure you will find it cheaper in the long run to install a new shaft to replace an old one that is worn more than .005 on anywhere and take 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 solve the case if necessary. Then when a job is turned out, your customer is satisfied and he will be satisfied with your work 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 .005 out-of-round then you will seldom find a main bearing on a serviceable shaft that is worn more than .006 thousandth of an inch, which is much less than this amount. In this diagram I have shown an average with crank pins being worn more than .005 out-of-round. Then we will find the maximum bearing on a serviceable shaft that is worn more than .006 thousandth of an inch. And that is about the amount. In other words, the maximum amount of wear that is found in the bearing is .001 at the center, .002, .003, .004, .005, .006. We now have the reamer align in position with the pilots in the align bored bearings. It is a hard job, but it is the only way to check the thickness of the bearing cap. (A standard Ford shim measures .0025. Therefore, for every 1.000 in. of main bearing cap only half that amount or .00125 at the center of it. We are still "out" by .001 that is easy: by tightening up the main bearing bolts only one cap will be lifted to equalize the bearing by half an inch of any one of them, which allows the bearing to be pulled down a little tighter. We will not have to lift the caps on the main bearing bolts to bring them all up to the same size. The CENTER BEARING requires two shims—one on each side of it, this raises the cap .0025 or .005 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 operation is started and in 3½ minutes the bearings have been seated to a mirror finish and all 3 in perfect alignment, then the "shims" are cut away and the crank shaft to drop down into place and the caps are likewise fitted. If the "shims" are properly trimmed so that they do not serve as a brake in the corners of the 3 main bearings with all caps the final shims will be of such thickness that the crank shaft easily with one hand and with only one main bearing tightened at a time you should "feel" just the right amount of friction by holding the opposite end of the crankshaft you can feel no looseness, nothing more than the "springing" of the crank shaft itself. After a crank shaft has been revolved a few times by hand, a casual 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 one the 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 oil habit.

Fig. 3 has been drawn to clarify your understanding of the whole process. Referring to Fig. 4 it is not that the crank shaft is straight, it is that the bearing caps are shown as flat on the front and rear bearing and the center one will hang in mid-air, unless pulled down into the bearing with the shims as shown in Fig. 4 and this is why the center main bearing is entirely out of alignment. YES, in this case ¾% of .001. Well, that's not so bad as it sounds, when we step to think that a human hair measures .001023 inch. So you see, when you have a one-seventh of the thickness of a human hair out of alignment. NOT BAD? I'll say, and we know what it will do with a lot more than that. Oh, another 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. To show you the correct method and what happens if you fail to follow your instructions, I refer you to page 12 you will notice that the oil grooves are cast in the babbit, but not the entire length of the bearing. This forms an "oil trough" or reservoir and is intended to distribute the oil uniformly to the oil passage of the engine. It is customary practice amongst mechanics to file off the ends of this groove 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 babbit 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 component part of the lubrication system.

To alter it means to start trouble. Now refer to Fig. 5 then turn this book upside down in one word. The main bearings on page 12 you will notice that the oil grooves are cast in the babbit, but not the entire length of the bearing. This forms an "oil trough" or reservoir and is intended to distribute the oil uniformly to the oil passage of the engine. It is customary practice amongst mechanics to file off the ends of this groove 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 babbit 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 component part of the lubrication system.
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.

Align Reamed Bearings Are Superior

In every way 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 NOVICE, but this requires an expert with years of experience, and would require 10 to 25 times longer 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 cause trouble.

BEARINGS CANNOT BE ACCURATELY FITTED BY THE BURNING-IN PROCESS because as soon as the babbit is friction melted so it will solidify enough to conform itself to the shape of the bearing, then it is too soft to resist the twisting strains put upon it by the enormous power required to turn it, and on account of so many bends in the shaft the main bearing is often found out of parallel with 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 dealing in this subject. Manufacturers of this kind of equipment have discarded the words "burn-in" from their vocabulary 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 boring caps together to get perfect alignment, absolutely round bearings, correct gear center, and exactly the same clearance and friction surface (metal to metal contact) in proportion to the size of each bearing, then they cannot be burnished satisfactorily. But all this calls for considerable skill and careful fitting of the bearings up to this point to insure exact 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 babbit, 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 babbit does not soften. Therefore, the burning action of the crank shaft is resisted by those bearings not so hot and is thrown out of alignment in those which do. The majority of these machines when using this process to "burn-in" the bearings, rather than "burnishing" the bearings, because they bore out the bearings several thousandths smaller than the crank shaft, then lube it to "finish" main bearing caps to force the crank shaft down into place as fast as they can melt the babbit and make it squeeze in and out of shape to fill 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 hard scraper. "Mike" the crank pin rod and place it and place caps on cap and place them 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 shafts are finished, the 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 Filletting 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 babbit 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 affecting 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—abrasion of cotter pins, hammer marks, punch marks, bent rods, drilled pistons, and many pinion pinion 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 quick and easy. The W-G Quick Detachable Main Bearing Bolt can be inserted and tightened in three seconds.

To OPERATE—Simply slip the bolt into position (as shown in cut at extreme left) then insert the forked set body. 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. They can be used on any engine and the hex nut 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


LARGEST BLADE APPROX 3 1/2 IN.

A set of good bearing scrapers is necessary equipment for good mechanics. Crank shaft and connecting rod bearing “fit” 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. Hone ground on all three sides for easy resharpeming. 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)


A few months ago the service department sent out rough main bearing caps with so much babbling in them that it was necessary to use 1/16 to 3/16-inch slims 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 babbling bearings exactly alike, and perfect alignment is assured. By eliminating the adjustment 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 diameter and threw the main bearing reamer out of adjustment. Of course the mechanic blamed the machine. These improvements prevent 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 piling, 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" babbling 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 stating what 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 thirteen ton truck. But now that matter is practically settled I am going rich ahead and get foiled and jiggered up for production and should be able to start deliveries about April 1, 1928. 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 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 peening the bearing to make it fit tightly against the cylinder casting. This operation eliminates the necessity of friction-melting the babbit so it can be forced down tight in the bearing. Having aligned-bored, and aligned-reamed some one thousand 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 on only the high spots on the babbit, 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 pull enormous strains on crank shaft and bearings.

Do You Still Think This Operation Is Necessary?

After reading pages 4-5-6-7-9-18-11, 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 directed at mechanics who waste more grief on "overhaul" jobs than all other troubles combined. Read on—through pages 23-24-25-26-27-from all viewpoints, it is 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 a small 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, on a wooden block, piece 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 33/4 inches or 3.750. If you select a piston that measures (with your micrometer) 3.780 then it is just .030 oversize, or 3.770, that’s just .020 oversize, etc., and to this amount should be added enough for clearance as instructed in the next column.

Ford Platen 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 platen 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 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 dose 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

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 those pistons if a PERFECT job is to be expected.

I have been informed that .010 and possibly .015 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 bore the cylinder. Then set the special micrometer (Fig. 1) at just one-half that amount. For example:

If the piston measures 3.785 plus .008 clearance equals 3.773 .020 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 size. 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 "dialing" screw as shown in Fig. 3.

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 knocking in, filling 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 you 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 pull the piston rings 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 line 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 height spots appear. A piston must fit freely 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.
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 end of the plugs. The plugs are shaped to fit 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 inserted through the opening to guide the boring bar, which is then forced forward until the cutter head is about 1/8-inch from the bottom end of the cylinder. 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 an 18-inch crescent wrench, on the square end of the boring bar. This operation, an exclusive feature on the R. B. W. Combination Machine, inures 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 occurrence 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. If the builder requires absolutely no attention and stops automatically, unless stopped by operator.

The boring bar is very rigid and is made from 1/16-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 reborning (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.

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

All manufacturers of cylinder reboring and regrinding equipment make wonderful claims for accuracy, including R. B. W., but try the job 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. B. W. Wilson machine will not vary 1/16th. To build this 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.

"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 oversized 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 38). 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 10) and will give much better service and fit the cylinder better than if altered by turning or filing.

The Finished Surface

of a cylinder bored with this machine is the same color of the iron instead of being brightly polished by the cutters. The cylinder walls and filling up the pores of the iron as is done with most other oversize grind- ers. The K. R. W. Boring tool actually cuts the metal away so smoothly instead of scratching it, that these pores are not closed. This leaves the finest finish of a bearing surface. When the motor is first started the intense heat created by light 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

Take an average time of 1½ 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 dull 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 tested one 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 B. F. M. S to 7 H. P. more. These pistons are made from light gauge press steel stampings and are ground to extremely accurate measurements. Therefore it is necessary to bore the cylinders accurately to fit them in and with at least .004 clearance. It is impossible to do any fitting on the pistons by turning, grinding, fitting 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 should be made to fit on .025 and .031 Oversize 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 these 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 fill the bill.

I Claim

That the K. R. W. Machine will bore cylinders 50% more accurately, 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 boring 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 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, rammers, 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 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 "casing strain," a common occurrence 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 "nail" the thickness of the "web" between each pair of cylinders, then rebore them with any other make of cylinder boring machine (no exceptions). Then take them again and you will now find that the cylinders 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 Squeak, Squawk and Groan?

That's just another one of those questions that will make you say; "Yes, 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 ramming machines) squeal, squawk 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 2 1/2 times thicker and cools off slowly and the iron is much softer.

Brinell Hardness Tests

which I have recently made of four different cylinder blocks showed an average of 175 Brinell hardness on the center web and 190 Brinell 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 rammer 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, 206 to 1. See opposite page, also pages 20-25.
The K. R. Wilson Cylinder Hone
For Polishing Reamed, Rebored and Reground Cylinders

Price $15.00 W-51
Delivered

Hones collapsed to enter Cylinder

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 counter

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.

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 has 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 make

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

Ford Size Only

Hones expanded after being inserted

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 before honing 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 "chillis" 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 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 Holts. Can also supply hoists up to 40,000 lbs. capacity. If interested, write for prices.

<table>
<thead>
<tr>
<th>Capacity</th>
<th>Price</th>
<th>Shipping Weight</th>
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<tr>
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<td>$14.50</td>
<td>41 Lbs. Boxed</td>
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<td>1 Ton</td>
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<tr>
<td>2 Tons</td>
<td>29.50</td>
<td>100 Lbs. Boxed</td>
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</table>

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 bores, 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 thousands of you get an "oil pump." 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 rebrush 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 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; hurrett 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, 1 3/8" 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
Valve Timing Is Very Important

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

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 ex-
haust it again at exactly the right time.

Read—December 1924 Ford Service Bulle-
tin 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 sepa-
ratey 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 EX-
HAUST VALVES may open before the force of the ex-
plosion 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.

INLET VALVE CLOSES EXHAUST VALVE OPENS

Try It Yourself

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 bowl, carburetor,
clean and adjust the spark plugs, test and adjust the coil units.
Now notice the difference.

Your customer won't believe it is the same car. He will "wax"
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

I CAN STRAIGHTEN A FORD CRANKSHAFT.

Oh, where have I heard that expression before? Seems that about 8 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 regrind 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 of easy reading. Do you think you can test a shaft, then remove it to the straightening press (even though it may be handy or get that "kink" spot directly under the ram) and straighten it? 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 prove 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 rotate 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, 90° 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 gives all guarantees, and at least 75% of all 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 proper 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 while the motor is in operation and no harm can result.

In your younger days no doubt you have owned a toy gyroscope— 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 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? Of moving the hub? Took a lot of strength, didn't it? Yet that wheel weighed only 1'2 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 the pressure exerted by the gyroscopic forces of 13 lbs. of fly-wheel running at 1800 to 3500 R. P. M. in comparison with those gyroscopic forces of a bicycle wheel could be at least from 900 to 2000 lbs. Does this mean 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 crystallization 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 crystallized 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 Idling?

(Hitting on All Four Cylinders)

TRY IT YOURSELF. I know you can't. Why? Because the fly-wheel gyroscopic forces hold 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 stabilizing 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 safe bet that if all four main bearings are put in perfect alignment it will cure the trouble. Power used with 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 herefore very little thought has ever been given to the alignment of crankcases. K. R. Wilson (himself) discovered it accidently. It happened this way: We had been selling a large number of K. R. W. Crankcases and had not 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 what it was. After a while we noticed that it would relieve the trouble if the fault of the operation was 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
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 use a center main bearing to be inserted in the motor without additional bearings. Many other improvements have been made that help to make this motor 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 double your power impulses without deflection.

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 and play?
2. What relation does the rear main bearing cap have to an oil pump in No. 1 cylinder in a new or rebuilt motor?
3. What is the cause of an oil pump failure?

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 so to 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 automobile use three crank shaft main bearings, it is hard to understand why Mr. Ford ever thought of putting his "thrust" bearing on the rear end. But when you use a little of that uncommon 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 of the crankshaft (when the motor is being loaded) it is only one-half the length of this bearing and might vary the air gap only 0.002 to 0.003. If Ford used the center main bearing for a "thrust bearing"
**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.

Based 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 crystalizes 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-gyroscope 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 mis-alignment 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.

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.

Note Extra Heavy Construction
More of the MYSTERIES Unravelled

The "Limbering-Up" Period

In all new or re-built motors we have the limbering-up period to contend with, that we are actually confronted with an abnormal condition, during which time the motor is trying to force 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. We are told, when it has lasted our normal temperature may be doubled or more. It is perfectly reasonable to expect the pistons to expand twice as much each 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 pistons, as we start and then to heat them up they expand and become tighter, causing more friction and heat, which calls for more gasoline to "burp-over." The oil being splashed up into the cylinders becomes hot and dips 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 that we get this abnormal condition, and that it is not preventable. So that when we reduce this argument in terms of certain figures, we find that the abnormal conditions the temperature frequently rises to more than 500 degrees, and much exceed even this figure to soften or melt theabbit— which it often does when burning out. Furthermore, we will see that the expansion in diameter of a Ford crankshaft at 500 degrees will be 0.006, and the same expansion applied to the length of the crankshaft would exceed one hundred thousandth, 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.

The connecting rod is pushed forward by the accumulated expansion of the crankshaft, and if the expansion is not constant or even more, as in the case of cast iron, the piston will be too long, or the connecting rod too short. If the expansion and the piston are both too long, the connecting rod will be too short and the piston will be too long. If the expansion and the piston are both too short, the connecting rod will be too long and the piston will be too short.

The oil being splashed up into the cylinders becomes hot and dips 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 what happens to No. 1 connecting rod and piston under such conditions.

Fig. 7

A COCKED PISTON

Jim Brown just had his little Ford roadster "overhauled" at the Quick Service Garage. The bearings were burned-in, new pistons and rings were fitted, and the motor was reconnected. He then started it, and saw how she would run. It was not until Jim could look at her, but, being a good athlete and powerful enough to raise the car off the ground, he finally broke loose and the motor commenced to jump. So Jim pined in and started for home.

Was she stiff? Pll say so. With the spark and throttle wide open he could get out of it about 15 miles an hour, and even then, when it went, it would squat and groan and finally stop. He hadn't been driving more than a half hour 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 new ring. Jim claimed that he could now enjoy it. He did, for a few days and then it all of a sudden started to do a new trick, a "new smell" and upon inspection found that No. 1 piston had badly scored the cylinder. The cylinder was dry. Jim sat down after this experience and gave his O.K. Car to the one that he built. He never stepped on it again. Why? No, they did not, because the other pistons were lubricating satisfactorily.

Now, a True Story To Prove It

Piston Slaps

REMEMBER BILL JONES' 1911 TOURING CAR?—Yes, the one with the flat top pistons. He has run that old "buggy" 150,000 miles in 15 years, and never overheated it. She's running fine too. You just ought to see how loose these pistons are. Yes sir, I'm sure glad to put a 10-piece pin down between them and the cylinders. But she don't pump any oil into the cylinders. Well informed men claim that it was Bill Wilson, who boldly challenged their statements and exposed the truth in my 1912 book of "Innovations." This is true, sir. I have saved Ford owners and dealers MILLIONS. Read why genuine Ford rings are better than any others regardless of price.
Valuable Information—How To Fit Piston Rings!

Piston Slaps

And now that you have read my little story about Bill Jones' old touring car, you have the same experience with old cars that were badly worn in the cylinder. Some of these old cars will piston slap and pump oil, while others worn equally as much, run quietly and give no trouble whatever. Therefore, I am going to tell you there is no such animal as a piston slap. It is true, you hear a noise when you are driving and they really believe there is such a thing, but when pistons are fitted up right and with the crankshaft, even though the clearance is up to ten thousandths or more, providing the cylinder wall is straight and the piston slap will be heard. The fact remains that you have been hearing noises which you had gained "piston slaps," but by careful examination these troubles can be located or at least the combination of the piston rings, connecting rod pin bore, bent connecting rods, and cylinders out of true with the crankshaft. If these symptoms are present, the connecting rod nut on the piston, sometimes with sufficient pressure as to force the pistons off the straight cylinder wall, but it was not the piston which slipped 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, or connecting rod, or bent or twisted connecting rod. With all these troubles eliminated, and piston rod assembly again installed, it should check perfect; if not, no piston slap will be heard. ON REBUILD JOBS, make these tests as you go along—PREVENT these troubles by close inspection. Use only genuine precision and you will soon forget that you ever saw an oil pump 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 machine in a thousand knows, but they all have their "guesses." So let's reason it out, too.

Xerox Machine Co., Ltd. has been putting this groove around on their piston, oil pumps, and burnt pistons were common, but during the past months the percentage has dropped to a very low figure, and one of the most common complaints now heard from Ford owners is "the machine is running hot." This, of course, will not happen in any of the above cases.

Yes, this is a common statement and in fact, we have heard it from many sources. Well, the fact remains that there is a certain amount of condensation of gasoline and moisture which dilutes the lubricant, and it is actually consumed. Therefore, the lubricant, even if it is perfectly clean, and burned cylinders have been eliminated or prevented.

Why Do Some Mechanics Drill Pistons?

Just ask one of them, they think you 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 piston should be drilled, don't you think, FORD MOTOR COMPANY would do it quicker and better than any other company. So if there is no possible forgetting that the piston has been drilled, since you don't have to worry about the detection of the crankshaft. The oil is splashed against the right hand cylinder wall, where the centrifuval force puts it, while the left wall receives none.

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.

Piston Rings

Piston Rings Open and Close

This picture shows how a piston ring must open and close from 1/16" to bottom of stroke in a tapered cylinder. My advice is, test your cylinder first, then you will find that just how much taper must be figured. For example, Xerox Machine Co., Ltd. shows a two (2,000) thousandths taper in the center of it, that is the point where the piston ring will come in line with the cylinder wall. The rings finally come together and prevent further contraction. Thus, nothing else can happen but to force the ring off the pisto- lint and some of the cylinder at the same rate—see the figures. The lathe is "too soft" and worn out. A cylinder indicating a dead spot, such as shown in this gauge test, would show that the cylinder had been drilled excessively and prove my theory. See article on fitting pistons and rings in trucks next page.

How To Fit Piston Rings In New or Reboxed Jobs

After having watched thousands of new and reboxed piston rings, I am convinced that not more than one out of a hundred knows how to fit it correctly. A cylinder is bored and the inside which is to be fitted with the new rings must be true. This is a simple job, but it is done with a feeler gauge or a dummy ring, and the ring will fit. This is a simple job, but it is done with a feeler gauge or a dummy ring, and the ring will fit.
Why Genuine Ford Piston Rings Are Better Than Any Other

Just take a look at this picture and you will immediately understand why a Ford piston ring is better than any other for the following reasons:

1. A Ford piston ring is tapered 0.001 all the way around. It forms a "line contact" against the cylinder and requires much less ring pressure for a given ring and cylinder wall contact. This means more heat is transferred to the engine and reduces wear. It also means more friction and wear. It reduces the burning and scuffing of the cylinder wall. This causes the cylinder walls to wear out in a more shorter period of time than genuine FORD rings are used.

Lapping In Pistons

Whenever you see a garage man lapping in pistons in a newly colored or resurfaced cylinder, you can make your mind he has a whole lot to learn. Abrasives are in the pores of the rings and can not be removed. If the piston is worn or has a burr on it, nothing is removed, because there must be room enough to take care of all the expansion from the lowest temperature of the cylinder to the hottest. If you don't provide it, the piston will not seal on the ring. It will fall into the bore and seize up. It is much better to have the lapped ring or rings of oil, which usually turn into grease within a few minutes when starting a new engine. This is an important point in this respect. Again, I repeat, with correct alignment of pistons, proper clearance of connecting rod between piston and cylinder, and piston wall clearance even up to 0.010 in a straight cylinder, you could not make them slip or pump oil. So why spend a lot of 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 inasmuch as this method of re-finishing cylinders is passing so fast that it will soon become "ancient history". I should think it would be a good idea to pass it on to the "broad world" and get it out of business.

Before you jump too much in any of the headings on page 19, I will give you a better understanding of why the honing process failed.

During the past two or three years, hundreds of "bone" makers have sprung up and each one tried to "out-do" the other fellow. First it was three, then four, and finally six. Some were long and others were short. Some cooled, others fine, same bush course, and fine.

Now let's reason it out: The Ford ring does not allow the oil to pass down the tapered edge and the velocity of the piston coming up forces some of the oil past the line contact of the ring and cylinder, thereby further reducing the friction and ring, and improves lubrication. This is why there is no taper whatever receives very little lubrication, consequently much more friction and wear takes place between the piston ring and cylinder wall. This causes the cylinder walls to wear out in a very short period of time than genuine FORD rings are used.

Piston Ring Friction

Here's some more food for thought. In a long time, it even occurred to you that an ordinary set of piston rings (not Ford) produce much less friction than a forged one? You may be right, but then the tension assembly may appear to be a little exaggerated. At first, these figures were obtained by using a ring of diameter x 3.1416 circumference, 1/3 in. width, x 12 x 3.354 square inches of friction surface in contact with the cylinder wall. Now apply the same formula to 15 brake shoes and you will get very near to the same figures.

My object of this discussion is to show you why genuine Ford rings are better than any others for Ford, and now to prove all my statements about piston rings I need only refer you to the new Ford press section where they are tested at the pressure and concentric piston rings. Students at the last section of the K. C. W. Training School build up a motor with these steel pistons and tight 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 exceeded 100% perfect, after just 5 minutes running on the dynamometer. This same test was repeated about 5,000 times and 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 ask yourself: Why Genuine Ford Piston Rings Are Better Than Any Other?

Something Worth Thinking About

Buy your equipment from responsible manufacturers who depend on your 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 genuine Ford. 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 pumps, and scored cylinders will develop. A "cocked" piston squelches 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 pumps. 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.

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 .005 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.

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.
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.W. Wilson is the only manufacturer of Ford service station equipment in the business today who offers “real service” on sharpening 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 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 “burned up” or worn to such an extent that absolute accuracy could not be had by local reamers. This is coming 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.

The K.R.W. Reaming Machine comprises a special jig which holds the three transmission drums of 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 “slimy edge” and to leave a lightly 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 sides, and the T bolt on top and rear. It’s that easy. Transmission drums reamed by this method will revolve absolutely true (as accurately as when new) without wobble and noise, and it will enable you to make $3.50 profit on every job after paying your mechanic.

You can completely re-manufacture a Ford Transmission, including disassembling and assembling, in less than 30 minutes, and get a perfect job every time.

Pays for itself

The present F O R D schedule for labor cost of overhauling a transmission is $4.00, and on a basis of 300 transmission overhauls a year, figure your labor costs at six cents 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 placed 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 Ineiciency
RESHARPENING. On account of the special design of all K. R. W. 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 rub over the cutting edge. If kept sharp it will always cut freely.

It has always been a K. R. W. 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-rated 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 Prefaid to My Factory at Arcade, N. Y.

<table>
<thead>
<tr>
<th>Price</th>
<th>No. 3 Slow speed</th>
<th>No. 4 Reverse</th>
<th>No. 5 Brake Drum</th>
<th>No. 6 Triple speed</th>
<th>No. 7 Arbor only</th>
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</tr>
</tbody>
</table>

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 arranged 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 'his one will sell itself.'

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 bushes, reverse drum bushing, slow speed drum bushing, driving plate bushing and triple gear bushing.

**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. 2317, heavily constructed of steel casting, which enables the mechanic to remove a full three-quarters of the gear, giving him quick action.

A large number of transmission drums are being pulled 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.

**K. R. W. Driving Plate Bushing Reamer**

W-8 Price $5.00

Shipping Weight, 3 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 to 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, or 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 $1.00, 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 Pay—When Done The K. R. W. Way!
The Complete K.R.W. 
"A Shopper"
Comprising All Necessary
for all the Major Operat...
Combination Machine
bin Itself"

Stay Equipment to Perform
Operations on a Ford Motor

5-6 As a Motor Stand

The two position motor stand 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.
Wilson 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-manufac-
tured by the K. R. Wilson 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
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-lubricating operation, then the
"sprues" are cut off, bearings filed smooth, oil holes
drilled, and bearings "peened." The habbitt 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 to the same position
as Fig. 1, boring frame removed and main bearing
reamer placed in position, then aligned, as shown in
Fig. 3. Again thrown back to position as
shown in Fig. 1, and the "gibs" are cut and crank-
shaft 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 as-
sembled, and the pistons and connecting rods
attached as shown in Fig. 5.

The K. R. Wilson machine, being a complete shop-in-
itsel, saves valuable floor space. It takes up only
334 feet and requires no foundation, therefore, por-
able if necessary to conserve space.

7 As a Cylinder Boring Machine

It is in a class by itself, and is unequaled in any
price for accuracy, ease of set up, and labor cost
of boring cylinders. Takes an average time of 1½
minutes to "set-up" to bore 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 4½ minutes) the
mechanic can be fitting and testing pistons and con-
necting 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

Profitable! Costs $600 each and
are guaranteed to bore at least 50 holes. They are
instantly adjustable to bore any oversize. All opera-
tions are so simple that the ordinary garage man 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 15-17-18-19

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 $2900.00

33

Challenge!

To Any and All Manufacturers of
Ford Service Station
Equipment:

That a Ford Motor can be RE-MANU-
FACTURED 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 pistons, 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 remain more accurately than those which are "sagged 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 2 3/4 in, diameter. Ram is 1 5/8 x 6 7/8 in., largest arbor bar is 1 1/2 in., height 29 1/2 in. Takes up space 8 x 17 x 23 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 change to make 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 removed or replacing the rear spring with the utmost ease.  
It is strongly made from heavy forgings and machineable 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."

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 channel steel, 2-inch angles for the ends, with large, heavy duty casters 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 handled, but not erected.

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 hard 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 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 cork-screw. 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 1½ 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 bushings without damage to the steering arm or bushings. Screw and pilot end made of high grade 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 MOD-ELS" 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 ¾” hole through the large end of screw which enables the mechanic to use a bar of 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.

Z-97—Price $2.40
2. Bending iron for straightening Ford pedals. Made of heavy cast steel.

Z-96—Price $2.50
3. Bending iron for straightening fender irons, lamp brackets, connecting rods. Heavy cast steel.

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

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 16:1 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 jugging up for this job with makeshift equipment, and the damage to parts by pounding the gears with a hammer.

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 gray 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 babbit 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 Babbit Thrust Washers are equally important. They vary in thickness from .165 to .263 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 loosen 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 Babbit Drive Shaft Bushings. Simply screw in the tap which is made with a special "Butterfly," then place the iron plate in position and screw down the large bolt 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 babbit 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 make-shift 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 limi-
tations 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 pro-
per shaft is exposed, because the flange on the babbit bushing is too long and must be faced off squarely and accurately before the un-
iversal 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 babbit 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.

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 1½ inch faced wheels, spaced 8½ 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 1-16ths 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 9.8 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 both on 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 Magneto 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

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 garage man 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. B. 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 AGENT) — 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 3½ 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, 1925.

HORACE G. FOWLER, KEANSBURG, N. J.— In reference to your machine 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, 1925.
B-W TESTER
Operates on Alternating Current from Your Lighting Line Thru a Special Built-in Transformer

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 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.

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.

The B-W Coil Tester is Furnished in Two Types

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 being synchronized in their adjustment will deliver approximately the same hot spark on each spark plug, resulting in a smoother running motor as far as ignition is concerned.

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—then, each car will run uniformly on Magneto current whether the voltage is higher or lower.

RIVER FALLS MOTOR CO., RIVER FALLS, WIS.—FORD AGENTS.—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.

KEELCINER'S GARAGE, ROCKVILLE, MD. (FORD AGENTS) The machine we bought of R. W. 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, 1923.
The K. R. W. Growler

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 this 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

Price $20.00

An instrument for re-winders—meter readings show exact condition of armature after armatures of machines are tested quickly and accurately. Incorrect winding, shorted or open circuit in coils or commutator bars, grounds, and reversed connections to the commutator bars.

Hoyt Magneto Tester

Price $15.00

This magneto tester will save you a great many hours looking for trouble with spark plugs, coil, carburetor, timer and wiring, which is directly due to a great many times to a weak or partially “shorted” magneto. Ford magneto are seldom suspected of causing trouble but new ones lose power, hard starting, back firing, etc. before the defect is 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

Price $10.00

Steel rods are spaced so as to reach from positive to negative terminal of battery cell and are BRIGDLY 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 imprisoned pointer construction, reading 0-0.100 amperes and 2-0-2 volts. It can be read with Ford engines 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 1/4-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 3/4 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.

DONT 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-Under-cutter, 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 under-cut and turned down to clean off 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 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 repairmen to turn out much better work—the kind that satisfies. 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 and off every one of the 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 commutator, thus enabling you to see the connections and get a clear view of the brushes. This picture shows how easy it is to undercut the mica. A special thin pointed tool is used for this purpose and the mica is undercut beneath the commutator bars. This operation requires less than one minute, and it is 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.

**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 it asks for. Can also be used in a great many other places. Has special center that will not ruin armature shafts.

**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 that any mechanic 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.

**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 busheled of Part No. 806 brush and 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 Colletta, 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 1/2 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!

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?

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 seatsers and faces and would ruin them instantly.

Sharpenes Re seating 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 burred 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 casing for the front and center bearings and accurately reams the 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 reamed 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 truing 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 (albeit 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 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 stuck 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 1-4 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 of 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 1-4th oversize. This operation assists in making a motor good as new. The pilot of 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 in 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 hussite thread, which has more strength than any other type the screw hall is welded on.

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

Stationary Type

3½” Wt. 30 Lbs. . . . . . . . 8.45
4” Wt. 55 Lbs. . . . . . 11.65

4½” Wt. 58 Lbs. . . . . 12.55

F. O. B. Our Stock
Arcade, N. Y.
The K. R. W. Electric Dynamometer

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

Price $725.00 W-S-5
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-6L.

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 3,500, 2,800 and up to 3,500 R. P. M. with so little vibration at any speed that a lead pencil can be balanced on 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, and 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 strive 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 horse 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 increasing. It is then readjusted to hold a maximum load at a constant speed. The volts and amperes meters tell the story accurately. Volts times Amperes equals Power divided by 110 equals HP.

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 1 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 300 amperes, a Hayt Ford Magno 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 1,000 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" 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, 1016 LOCK STREET, BUFFALO, N. Y.
FACTORY AT ARCADE, N. Y.