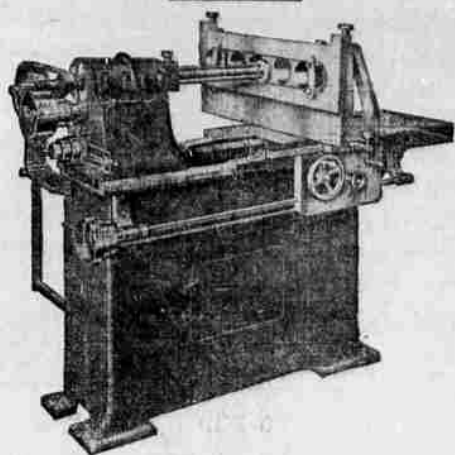


The Machine That Grinds Cylinders

Reproduction of a Delicately Built and Wonderfully Accurate Machine Which R. W. L. Leighton Operates.



Two weeks ago this paper mentioned, in a general way, how the science of cylinder grinding has advanced as the automobile approached its heyday. The random remarks prompted further study and further investigation of the proposition. The Observer interviewed Mr. R. W. Leighton of the Leighton Welding & Machine Works, and he tells us the following about grinding as compared to other methods—a description that every auto owner should read carefully:

"While it is a generally recognized fact among the engineering fraternity that grinding is the only perfect method of finishing the bore of a cylinder, an explanation such as this may benefit other readers who have not given serious thought to the question.

"In the writing of this little story on cylinder grinding, as compared with other methods of re-finishing cylinders, it might be wise to go back to early days in the production of reciprocating engines, when the only known method of finishing the cylinders was by boring, and this method more or less crude.

"There are many methods in use

for finishing and re-finishing cylinders, among them boring and reaming, boring and broaching, boring and lapping, dry grinding, etc.

"I will endeavor to cover the advantages of each of these methods. In doing this it must first be remembered that cylinders are composed of a variable quality of metal—not only variable in quality, but inaccurate to a certain degree in casting, due to the setting of complicated cores, casting thick and thin walls, and hard spots, due to chills, etc. In addition to these difficulties we also have a variable resistance to the cut, due to the construction of the cylinder block—ribbing, water-jacketing, gas ports, etc., being considered. Knowing we have an unknown quality to deal with, it behooves us to think very seriously of the method to be used either in the original finishing of the cylinder wall or in the re-finishing after use.

Boring and Reaming.
"The scale is first removed by boring to bring the cylinder bore to the approximate size, leaving perhaps .01 of an inch to finish. Now in this boring we have encountered resistance

to the cut, and hard spots, as mentioned before, causing the cylinder to be not only out of round, but wavy over its entire surface. This boring process can not be depended upon to bring the cylinder to exact size, consequently there has been developed reamers of very high class design in an effort to overcome this difficulty. But they fail of their purpose, for, as all mechanics of experience know, a reamer will follow a hole, and can in no sense of the word, be depended upon to accurately straighten a hole which has been bored out.

"The action of the reamer is to take its heaviest cut where the resistance, due to ribbing or construction of the block, is greatest, and to crowd the cylinder wall at the hard spots. Where the hard spots occur there will be a projection into the cylinder bore, and where the greatest resistance to the cut occurs there will be a hollow spot. Therefore neither pistons or rings can be properly fitted.

Boring and Broaching.
"While possibly a little better than the first method, it has the same difficulties and disadvantages, inasmuch as the broach will follow the bored hole. While to, perhaps, a less extent than the reamer, still the inaccuracy remains. It has an added disadvantage in that at the point where the hard spots occur a tremendous strain is put upon the cylinder wall. Should the wall at this point be too thin to stand the strain, a crack would result, and a cracked cylinder wall is almost beyond repair.

"This method also has the disadvantages of piston and ring fitting mentioned above.

Boring and Lapping.
"While this method is, perhaps, better than either boring and reaming or boring and broaching, still it has its disadvantages. To do the operation properly requires quite complicated equipment and the services of a man who thoroughly understands just what he is doing.

"In this method the cylinders are bored to within .003 or size. Then the dummy or lapping pistons, are impregnated with an abrasive, either fine emery or carborundum, and the lapping pistons reciprocated and rotated at the same time from end to end of the cylinder bore. This process comparatively straight and round. There are very few mechanics who have the patience and experience to do this properly. And to do this operation properly requires so much time that commercially it could not be considered.

The Proper Method—Internal Grinding.

"Cylinders, after going through certain preliminary operations of milling, drilling, etc., are placed in machines which bore the cylinder walls to within .004 to .006 of an inch finished size. They are then placed on an internal grinding machine constructed for the purpose, and the cylinder walls are finished with a grinding wheel which is predetermined correct for the process—ground to exact size, both straight and round, with-

THE LUCKY GUY!



Alton Jones, retired naval captain paid \$2.75 for a ticket in a race in England. It was on Hummel and Hummel won. Then Jones collected \$25,000, but he still holds his job with an English marine corporation.

in a limit of one-half of one thousandth or less.

"Regardless of thick or thin walls hard spots or ribbing construction, the cylinders, by this method are made straight and round. The reason is that the cutting element, which is the grinding wheel, is composed of many thousands of extremely sharp diamond pointed particles. These remove the necessary metal with a minimum of thrust or pressure against the side walls of the cylinder being ground, and a finish which cannot be obtained in any other way. Perfect results are obtained in the minimum of time.

"The operation of grinding is performed on machines especially built for the purpose and known as internal Grinders. They are furnished ready for the actual operation of grinding the cylinder blocks.

"The machine is constructed of a very heavy base on which is mounted a sliding table, automatically driven back and forth. Upon this table is mounted an adjustable and universal angle plate with parallels which accommodate all makes of cylinder blocks. On the head of the machine is a grinding head in which there is a combination of two, what we will call, spindle sleeves. These sleeves are both machined eccentrically to each other and provided with an adjustment regulating the eccentricity of travel from nothing to a desired amount. Extending from the inner eccentric sleeve is a main or spindle housing, in which is mounted a shaft and bearings. To the front end of this is attached the grinding wheel."

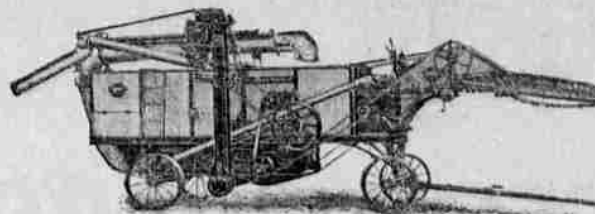
OBSERVER WANT ADS PAY

Harvest Time

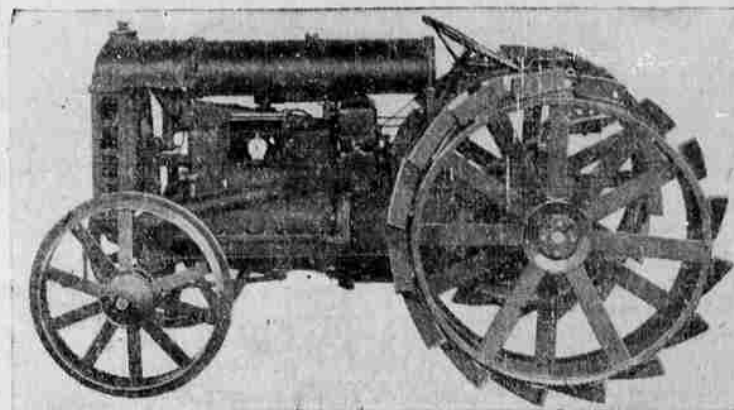
WILL SOON BE HERE. WHAT ABOUT YOUR THRESHING?

WOOD BROS.

INDIVIDUAL THRESHER



FORDSON TRACTOR



COMPLETE THRESHING OUTFIT \$2205.00

Hilton's Garage

LA GRANDE IRON WORKS

MACHINE SHOP AND FOUNDRY

All kinds of machinery, automobiles and tractors repaired, overhauled and rebuilt.

Acetylene welding of all kinds.

Cylinder boring and oversize pistons.

Crankshafts, Pistons and Piston Pins reground.

Give us a trial

D. FITZGERALD, Prop.

The Proper Method—Internal Grinding.

"Cylinders, after going through certain preliminary operations of milling, drilling, etc., are placed in machines which bore the cylinder walls to within .004 to .006 of an inch finished size. They are then placed on an internal grinding machine constructed for the purpose, and the cylinder walls are finished with a grinding wheel which is predetermined correct for the process—ground to exact size, both straight and round, with-

ROAD CONDITIONS IN EASTERN OREGON

Road conditions in Baker, Malheur, Morrow, Umatilla, Union and Walla Walla counties, by R. R. Baldoek, Division Engineer.

From Pendleton 15 miles east, good. From this point to Hilgard, rough mountain road.

From Hilgard to La Grande, under construction, requires careful driving.

La Grande to Hot Lake, paved and macadamized.

Hot Lake to Union, under construction; take foot hill detour; valley road rough and soft.

Hot Lake to Haines, good; no detours but several side turnouts for box culverts and bridges under construction.

Haines to Baker macadam.

Baker to Nelson, county road in good condition, a few rough spots.

Nelson to Huntington, under construction; detour from the Nelson school house to Weatherby; Gate's crossing to Reibers, along old road; Lime to Binders, along old road; some steep pitches; all detours in good condition.

Huntington to Weiser, take ferry at Olds to Idaho side; good county road.

Weiser to Ontario, under construction; keep to Idaho side.

Ontario to Vale, fair; loose gravel two miles out where county is graveling; new bridge open at Vale; saves 1-2 mile.

Vale to Burns, very rough; tourists report cars got through, but with much wear on tires and fenders.

Vale to Ironside, good; detour around construction between Lancaster and Jamieson.

Vale to Unity, reported in excellent condition, either via Bridgeport or other route.

Unity to Baker, reported good.

Baker to Prairie City, reported good.

Baker to Halfway, macadam and dirt roads in good condition.

La Grande to Island City, paved.

Island City to Minam, road counts a few rough spots.

Minam, through Walla Walla canyon to Rock Creek, rough.

Evans to Enterprise, cross O-W tracks at Evans and take old county road along R. R. track; thence up Wado's Gulch over Trout Creek Hill.

Lostine to Enterprise, take road via Evans.

From Lostine east over Lewis Hill, road closed, heavy blasting in rock cuts; road not passable for teams or autos.

Walla Walla to Walla Walla lake, follow new construction east from Walla Walla, follow main traveled road to Lostine, at Lostine follow new macadam east; take hill road to Enterprise where railroad leaves road.

From Walla Walla to two miles east of Lostine, fair; excellent macadam in places; rough over hill to Enterprise, county construction in progress.

Enterprise to Walla Walla Lake, fair; all detours marked.

Pendleton to Washington state line, paved; drive slow around construction.

Pendleton to Boardman in Morrow county, macadam.

Pendleton to Pilot Rock, under construction, fair.

Pilot Rock to Morrow county line, fair at present.

County line to Heppner, fair but rough in places.

Heppner to Ione, dusty, requires slow driving.

Heppner to Lexington, present road under construction, detour over Black Horse road, detour from Lexington to Jordan.

Ione to Gilliam county line, under construction; rough; six miles of new macadam.

World-Wide Co-operation.

One thing we know and that is that when men are able to see their real interests they will see that they can not be secured except by worldwide co-operation.—Sainted McHart Crothers.

More Modest, Perhaps.

Men, of course, are prouder of their college degrees than women; witness the fact that male college graduates of the class of '90 like to sport the figures after their names, and women do not.—Boston Transcript.

Could Fill a Chair All Right.

Full looking and extremely fat boy approaches office manager—"Excuse me, mister, did you advertise for a quick, bright boy to run errands for you?"

On the Greek Stage.

On the Greek stage a drama, or acted story, consisted in a quality of three dramas, raised together a trilogy, and performed consecutively in the course of one day.—Culterize.

Welders of All Metals

THE BEST EQUIPPED IN EAST OREGON

Cylinder Regrinding—Crankshaft Regrinding
Pistons,— Piston Rings,— Piston Pins

Cars and Tractors of All Makes Overhauled

Machine Work of All Kinds

We are equipped and manned by experts for the above work

LEIGHTON'S WELDING AND MACHINE WORKS
R. W. Leighton, Prop.

New Mountain Pass Via Toll Gate Useable

Shorter and less precipitous roads to Walla Walla from the Grande Ronde valley are now available. True, it is not a paved highway, but neither is the Phillips creek grade with its long, steep and dangerous grade, nor the Gordon creek pass over a tortuous and winding wood grade into Elgin. The new road is the product of joint effort by Elgin and Walla Walla, chiefly Elgin, and is now useable. It will no doubt take a year's time to get the best results and to make it just what it should be, but the grade is open. It is reached by going out of Elgin east by as far as the Gordon creek grade to the top of the mountain, but instead of sixing up the grade at the deserted sawmill on Gordon creek, goes north to the old road, and then with easy west and direct route one half mile west of Galway Bros. Ranch, and makes union with the old Toll Gate road on the ridge about five miles east of the Toll Gate. The road is a monument to the enterprise of Elgin business men. Concerning the road, the Elgin Recorder has this to say:

"The gang that went up the Walla Walla trail last week to put the finishing touches on the new highway over the mountains joining Elgin to the rich and populous Plain Empire country of Eastern Washington and Oregon reports that the road is now fully in shape for travel. All the overhanging brush has been done around and beyond Rock hill, a good grade es-

tablished, and everything is in readiness for cars to pass over.

"H. H. Hug, who is something of a mathematician, has figured some of the advantages of the new road over the old one, as regards distance to Elgin and Walla Walla, something like this:

"The complete distance by the new route, as shown by speedometer on cars, is 54 miles.

The distance from Walla Walla Via the new road 54

Pendleton to La Grande 53

La Grande to Elgin 26

Total in miles 118

Via the new road 54

Gain by new route 64

"In other words, the saving in distance by going the new route is more than half."

The Tractor Comes to Stay.

Several Union county orchardists who till large tracts have found that the tractor is the ideal means of power in cultivating orchards. One orchardist told the writer a day or two ago that he has cut his expenses for that department of overhead, almost in two. But the orchard is not the only place where the tractor is proving its value.

On the large sugar and pineapple plantations of Hawaii the mule and the horse which for years pulled the plows and cultivators have about disappeared, and this work is now being done almost exclusively by tractors and motor-driven plows. This innovation has reduced operating expenses considerably, at the same time accomplishing increased and more satisfactory work. Several of the plantations are now manufacturing their own motor fuel. When the delegates to the Press Congress of the World

(Continued on Page Four)

EFFECTIVE JULY 15
A Further Big Reduction of 5% to 18%
on all models of

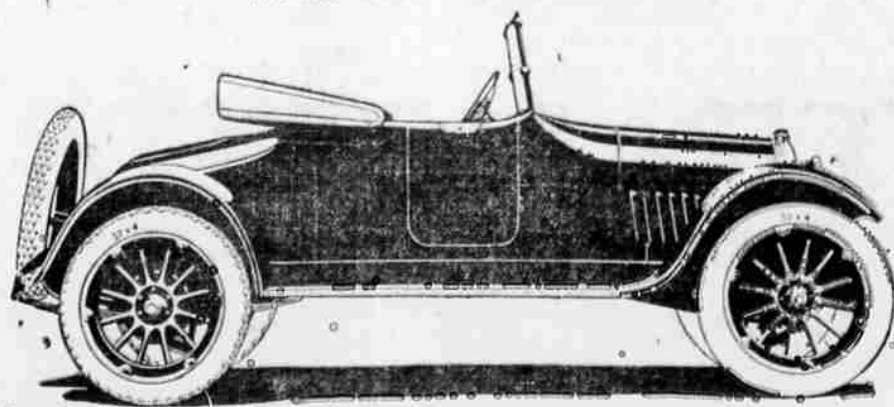


Makes a total
Average Reduction of 24.8%

As Compared With Prices of May 1st, 1921

This is the greatest reduction in a stand ard make automobile of which we have record. Phone us for prices on the model you desire.

WE CAN MAKE IMMEDIATE DELIVERY



INLAND MOTOR COMPANY