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MAKING ENGINES RUN SMOOTHER

By W. A. Warren.

Automobiles are better running today than they were five years ago because they are better balanced. Considerable progress has been made in this direction in the last few years and this is particularly noticeable in the freedom from vibration at definite car speeds. The old story of how a man stated that he did not need a speedometer on his car because at 10 miles an hour, the windshield hummed a none too attractive tune. At 20 miles an hour a shudder of apprehension ran through the entire body and at 25 miles an hour, the driver's false teeth fell out. With an intimate knowledge of the characteristics of the car, a speedometer was entirely superfluous.

Engineers, when trying a new car, run it at gradually accelerating speeds from 2 miles up to 55, 60 or 70 miles an hour, listening for a periodic vibration in the engine. When the engine rises up to such extent that they are not balanced by equal and opposite inertias, vibrations occur. On a scientifically designed engine, these unbalanced forces are very small indeed, and by the use of various devices which are now available to automobile manufacturers, it is possible to cut the vibration to such an extent that on some of the multi-cylinder types of engines, particularly, it is impossible to hear any critical speed in the engine. In other words, there is a critical speed somewhere, but this is of such a period and so slightly out of phase that it is not noticeable, or at least that the critical speed of the engine is at a higher number of rotations per minute than the engine will ever turn over in driving.

As a result has been achieved in a variety of ways. In the first place, crankshafts which are now made of such large diameter that they are exceptionally stiff and rigid, no longer are so apt to bend under the stresses of centrifugal force as they

were during the time when it was customary to make them of smaller diameter. In the old days of automobile design, it was not an unusual thing to find broken crankshafts in an engine. Today, it is a very unusual occurrence because in order to make the crankshaft rigid against bending stresses it is so much over-size as a member for transmitting power that the chance of breakage is practically negligible.

It is not to be assumed, however, that merely large diameter of crankshaft and tremendously husky bearings are sufficient to prevent engine vibration. The forces of vibration are so tremendous that if the crankshaft is not scientifically balanced the great rigidity due to large diameter will not suffice to prevent these vibrations from occurring. Consequently, in laying out a new engine, the engineer is very particular to see that the inertia forces cancel out.

A great many manufacturers put counter weights on their shafts to balance them, and the result is a very smooth running engine. There are balancing machines now on the market which are so arranged that the shaft is spun over and any out of balance indicated on fixed indicators which tell just how much metal has to be taken off the shaft and the particular place at which it must be taken off in order to put the shaft in balance. These balancing machines are fitted with drill presses which can take the metal off the shaft at the desired point and to the desired quantity without removing the shaft from the machine. The shaft is then spun again and the result of removing the metal is noted.

When a crankshaft receives the full impulse of the explosion pressure on the piston, unless it is very rigid indeed, a slight amount of deformation is going to take place. In other words, the shaft will spring slightly. When the exhaust valve opens and the pressure is relieved suddenly, the crankshaft is allowed to spring back into shape. This carries along with it the connecting rods and pistons. This sets up a vibration in the crankshaft corresponding to the natural period of the shaft. If the speed of the engine and the period of the crankshaft are in tune, the shaft keeps getting little punches from the pistons at just the proper moment to tune themselves up with the oscillations in the shaft, due to

the impulse of the piston and the impulse of the shaft trying to spring back to its normal position. If the speed of the engine is increased above this speed or below, the period is broken up and the vibration is checked. This corresponds to what happens in the critical speed of an engine. It is just the speed at which natural vibrations in the shaft and the impulse of the pistons tune themselves so that they build up the excess vibration.

If the crankshaft is stiff enough to resist the twisting stress of an explosion under ordinary conditions, it may not be stiff enough at the critical speed when the natural period of a six cylinder engine is very liable to vibrate at one particular speed, but not above or below that speed.

To damp out these vibrations, the vibration damper was invented. This consists of a little flywheel mounted on the front end of the crankshaft, having the rim separate from the center and connection made between the two by means of a small clutch or brake continually under pressure. The inertia of the flywheel rim naturally causes it to attempt to run at a steady speed and any attempt made by the crankshaft to oscillate is resisted by the flywheel rim. When a crank is deformed by explosion pressure, the inner part of the flywheel slips a little inside the rim and the energy of the return movement as the pressure of the crank is released, is used up in overcoming the friction of the brake or clutch. This means that the natural oscillation is broken up and the crank brought to its normal position after one or two vibrations instead of a great number.

This same effect is being secured on automobile engines today by not using a vibration damper but a belt drive to some of the units such as the generator. The belt acts as a damper in that the generator is a sort of flywheel which has a different period altogether than the crankshaft. Consequently, the two cannot tune up and the belt will slip slightly, acting in the same way as the brake on the vibration damper.

Vibration is also reduced materially by the reduction of the inertia forces. This is done by reducing the weight of the reciprocating parts such as the piston and connecting rods. As the inertia of these parts is directly dependent on the weight of the part, or the mass of the part, anything which can be done to reduce the weight of the parts also reduces the inertia forces and consequently tends to keep down vibration because there

is less tendency to distort the crank shaft. Aluminum pistons, forged aluminum alloy connecting rods and other devices are continually occupying the attention of the experimental engineers.

In assembling the car, great care is taken in all of the factories to employ pistons and connecting rods which weigh exactly the same for each cylinder. These are held within very close limits and inspection is very rigid. In manufacturing the connecting rods, all of the excess metal is removed in practically all of the cars which make any pretense of high grade manufacture. This machining of the connecting rods all over as it is called, has been a material factor in reducing the amount of vibration noticeable in the stock engine.

Another cause of vibration which is not often appreciated is due to poor intake manifolding which gives faulty distribution of the gases. If one cylinder is getting a better supply of gas than another, naturally the explosion from that cylinder is going to be of a different character from that of another cylinder which is getting less gasoline, or perhaps a poorer quality of mixture. Consequently, it is very essential that the intake manifold be so designed as to distribute the gases equally. The combustion chamber volume in each cylinder must be exactly like and one of the advantages of the detachable head engine is that it is possible to insert tools into the combustion chamber of each cylinder and machine them to identical dimensions.

A LINE O' CHEER

By John Kendrick Bangs.

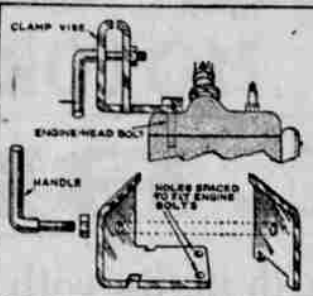
TOLERANCE.

AS WREDS are part of nature's plan
So do I think is weedy man.
The deadly nightshade and the rue
Hold deep within some purpose true.
That in a world of floral love
I know not of—
And so for them that fail and err,
The weeds of human character
I'll judge them not, for deep within
Their outer semblances to sin
May lie some bit of good that we
Too prone to judgments cannot see.
(Copyright.)

AUTOMOBILE VISE IS
USEFUL FOR REPAIRSFound Mighty Convenient While
Touring in Country.Device Shown in Illustration for Holding
Small Parts of Car While
Working on Them—Kept Out
of Sight by Hrod.

Many occasions arise on an automobile tour when a light, fixed vise would be highly convenient. A fixture for holding small parts, while working on them, is shown attached to the engine by the cylinder-head bolts and concealed by the hood.

Two pieces of 3-8 inch machine steel, or iron, are bent and formed as indi-



A Substantial Vise Attached to the
Cylinder Head and Concealed Under
the Engine Hood is Always Ready
for Use When the Motorist Makes
Minor Repairs.

ented, holes being drilled in the end to fit over the cylinder studs. If these studs are of sufficient length, no alteration will be needed, but it will probably be found, in most cases at least, that the studs will be too short and that longer ones must be provided.

The movable section of the vise has two lugs fitting into corresponding slots in the fixed part. The screw is made from any suitable 1/2-inch material, with a bent handle and a 1/2-inch nut behind the movable jaw.—Popular Mechanics Magazine.

That property for sale, lease or rent can easily be disposed of thru the classified advertising columns of the News-Review.

"YOU CAN'T BEAT THE BAND"

By A. T. Lawrence.

It is chronicled in the archives of history where an opposing army of ten thousand troops dispatched a messenger into a camp of Bohemian forces demanding their surrender. The General read the message, turned to one of his men and ordered him to snuff out his life with his own sword, and then another. Then turning to the messenger said, "Go tell your General that I have two thousand such troops under my command." There was no surrender. There was no charge made. It is clearly evident there was some mettle in that little army of two thousand men. The old U. S. has the greatest army of fighters in the world, due principally to their patriotism. But withal there is a big percentage that would be deserters and slackers only for fear of the penalty.

Custom has made fools of us all. A public benefactor is seldom, if ever, appreciated until after death has removed him. Mr. Mansfield said he would rather have one little kind word while living than all the monuments in creation after he was dead.

Is it not possible for us to admire and give support to a bunch of live wires, a body of men who volunteer their services, who give their talents, and spend their hard-earned cash just because of the desire to benefit the community in which they live? I am not drawing a comparison between the Douglas County Concert Band and the two thousand "conquer or die" Bohemian troops, but facts in the case are it takes mettle. It takes desire for service. It takes the progressive spirit to maintain an organization of high spirited men where there is no compensation and in some cases ridicule instead.

Does a county the size of Douglas need a band? Should the county seat of Douglas county support a band for the entertainment and amusement of her 25,000 population of 99 per cent American citizens? Should there be a one mill tax set aside for the full support of the band and not burden twenty-five or thirty public spirited people with the full expense? Should there be a permanent artistic band stand erected in the court yard or in "Roseburg's new public park," with comfortable park seats for the accommodation of

her citizens and visitors? Does the public in general approve of a permanent concert band, trained and disciplined, ready and willing to lead in all civic and public gatherings?

Roseburg, Queen City of the Impiqua! May she awake from her ten years slumber, smile on her loyal subjects, instruct and entertain them and make it seem a place of welcome to her many visitors to the end that thousands of other 100 per cent Americans may come and help to develop the wonderful resources now dormant in Douglas county!

Why not an alliance? Let us make a new chamber of commerce out of the old one. Let us have one to represent the people. Let us make it a helpful institution not only for the merchant and professional men but big enough to embrace the whole county, with a department of interest to every citizen. Let us take on the American Legion and thereby add pep and ginger to the organization. Then because of their willingness and desire to be of service take on the Douglas County Concert Band for the purpose of entertaining and giving the organization a touch of high life. Organize a uniformed marching club, also a young ladies' uniformed drum corps as an auxiliary to the band. Would this alliance spell "PROGRESS?" Aye, Boy!

THE CHEERFUL CHERUB

My heart is like a
phonograph—
No sooner is my last
love gone
Than just to break
the awful pause
I put another record
on.

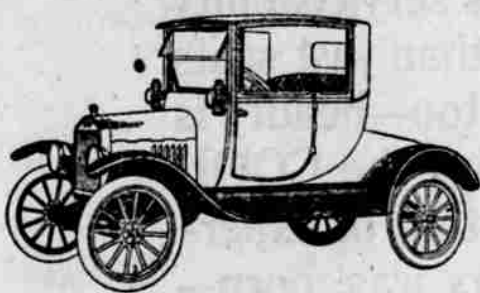


That business or property can easily be disposed of through the columns of the News-Review.

FORD and FORDSON

SOLD BY THE

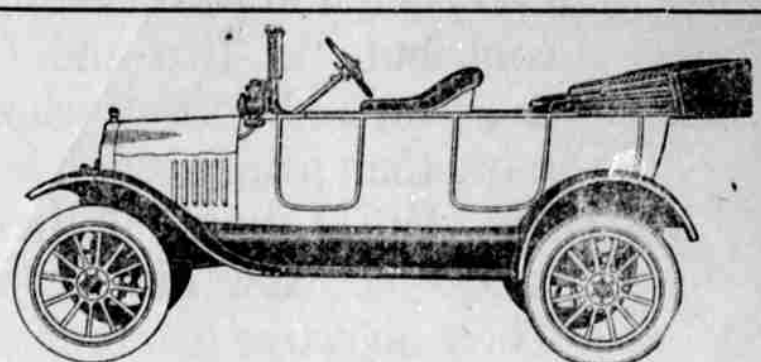
C. A. LOCKWOOD MOTOR CO.



FORD COUPE, \$842.21



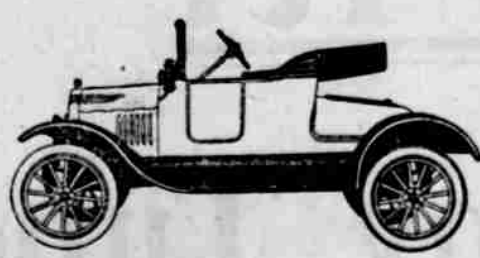
THE FORD SEDAN \$909.90



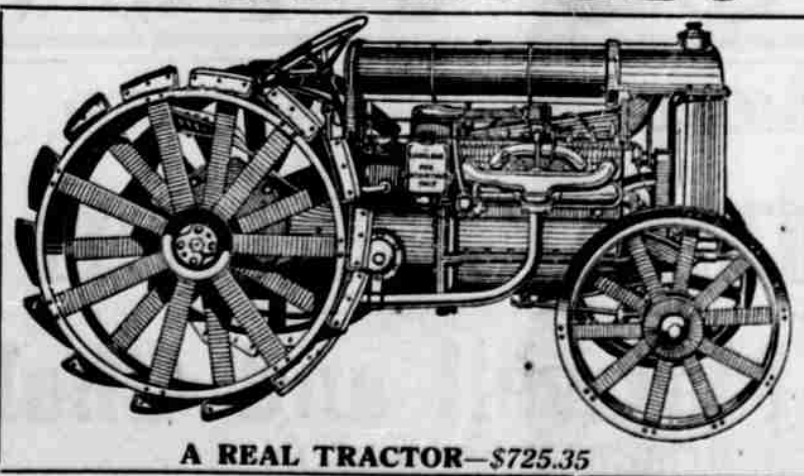
FORD TOURING \$649.58

THEY SPEAK FOR THEMSELVES

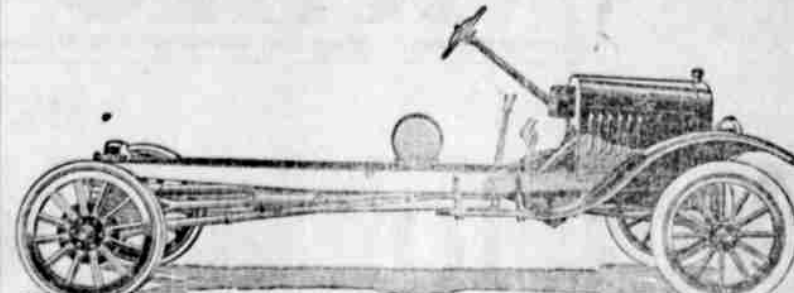
Fordson



FORD ROADSTER \$602.73



A REAL TRACTOR—\$725.35



FORD 1-TON TRUCK \$623.54