Repairmen Should Say —

"WE CAN SAVE YOUR FRONT AXLE"

(Editor's note: The following article on repairing front axles appeared in the June, 1923 issue of FORD OWNER & DEALER.)

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Even with Ford front axles at the reasonable price of $10.00 per each, owners of Ford cars are listening attentively to those repairmen who are telling them "We can save your front axles by repairing them with special equipment and can make your front axles as good as new in both appearance and serviceability."

Installing all new parts is an easy way of fixing Fords-but it is an expensive way for the car owner. And inexpensive repairs are the firm foundation on which the entire Ford structure is built. What is best for the car owner is soon best for the repairman also.

Repairing Ford front axles is a fairly frequent shop operation, because Ford owners often test the strength of the front axle system by joyful bumps with telegraph poles, ordinary automobiles, cats, etc. Being used as a bumper, the front axle often looks the part, and it becomes the job of the repairman to straighten the axle.

Fortunately, Ford front axles are made of Vanadium steel of splendid quality which is heat-treated to give it additional strength and toughness. In fact, this front axle steel is of such super-quality that a Ford front axle can be twisted cold from three to seven times without injury to the metal. Consequently, the ordinary kinks put into a Ford front axle by a collision are a matter of indifference, as far as weakening the axle are concerned.

The Ford front axle is a drop-forging which is subsequently heat-treated and tempered in furnaces where temperature is accurately controlled by pyrometers. This best treatment greatly increases the strength and toughness of the metal, and is an essential part of Ford front axle design.

This toughness of the front axle, as put into the extra quality steel by the heat-treatment, is very important, as it is much better for the front axle to bend, rather than to break. Also the toughness of the front axle is such that the metal never seems to crystalize and snap off, as the rear axle shafts sometimes do.

The heat treatment of the Ford front axle is as important to the axle as is the "tempering" to the blade of a knife. One quickly ruin can a knife blade by heating it--and a front axle can be just as quickly ruined by heating. Listen to this:
"Any heating that will make the axle easier to bend or straighten, will also permanently weaken and impair the strength of the axle."

Also, the repairman shouldn't kid himself that he can retemper the Ford axle again, after once it has been heated. Only the factory has the proper furnaces, proper pyrometers, and the proper knowledge as to how the work should be done. And it takes a furnace big enough to hold the entire axle at one time, as you cannot heat-treat a part of the Ford front axle without removing the temper from adjacent parts.

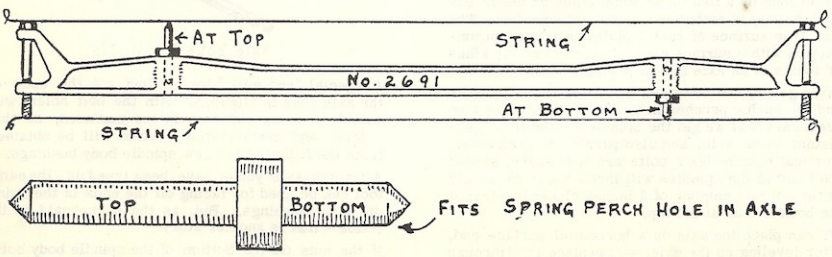
If your parts stock room is burned down, you should send the front axles back to the factory to have the effects of proper heat treatment restored.

Shops not having the proper equipment can send front axles to the nearest Ford Branch to be straightened for a labor charge of $1.50. But this involves a loss of time and money.

Since the spring perch holes in the axles are supposed to be in the same straight line as the holes for the spindle body bolts in the ends of the axle, these holes can be used for checking up the alignment of the front axle as regards both bends and twists.

A plug gauge, for checking the axle alignment is made of round steel bar, which is a neat, slip fit in the holes for the spring perches. One end of the gauge is longer, to reach the string when the gauge is used on top of the axle; while the shorter end is used when the plug gauge is reversed, and used on the lower side of the axle.

The collar can be soldered or fastened in place with a set-screw, this collar simply holding the gauge so that the points of the gauge just touch the



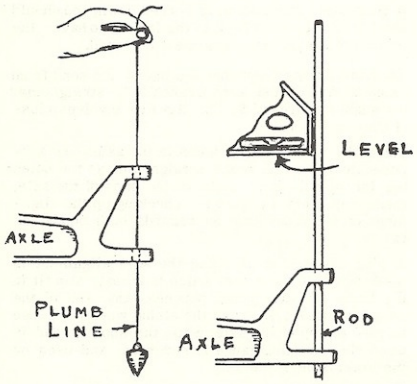
string. The ends of the gauge should be pointed (like lathe centers) so that exact alignment with the string will be more clearly indicated.

A couple of special spindle-body bolts could have Vee-shaped notches filed across the top and bottom ends of the bolts. Then the string could be looped around the bolts at the two ends. Otherwise, the string is simply held across the end of the bolts, to see if the alignment is correct.

The advantage of using the spindle bolt and plug gauge method is that any "twist" is exaggerated and more easily observed and corrected.

Some repairmen omit the spindle body bolts and simply pass the string (fish-line is fine) through the holes in the ends of the axle. As the string passes close to the holes in the bottom of the axles, this gives good results at the bottom. But at the top, where the spring is at some distance above the spring perch holes, this method involves more or less guess-work, unless some form of plug gauge is used.

Some repairmen simply "sight" along the axle to determine whether or not the four holes are in the same straight line. And while a sufficiently experienced man might get fair results by this "squint-eye" method--it is more probable that he might not.

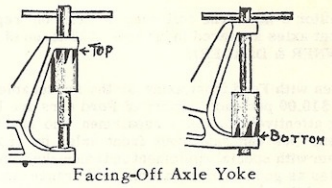


Parallel Spindle Body Bolts

A flat steel plate or a cast iron surface plate, about 5 feet long by a foot or so wide, could be used. But such a plate is rather bulky and inconvenient. The flat, true surface of such a plate can be used, in connection with a surface guage, for detecting any kinks or twists of an axle that is placed upon it.

After getting the holes for the two spindle body bolts and the spring perches in the same plane, it is also necessary that we get the spindle body bolts perpendicular to the axle, and also parallel to each other. Vertical spindle body bolts are necessary, so that the slant of the spindles will throw the front wheels at the correct camber of 3 inches closer together at the bottom than at the top.

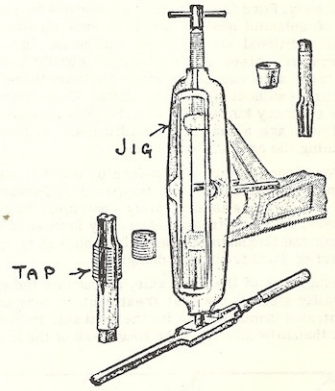
We can place the axle on a horizontal surface and, after leveling up the axle, we can place a rod through the spindle body bolt holes and hold a spirit level against the rod. When the rod is vertical, then the end of the axle is correct. Or a plumb line can be dropped down through the holes in the ends of the axle. Simply measuring across, from one spindle bolt to the other, and making this distance the same at the top and bottom of the bolts will do, if the measuring is done with sufficient accuracy - which is not easy as a small error here is multiplied by the size of the wheel.



Facing-Off Axle Yoke

After a Ford front axle has been in use for some time, wear occurs on the faces of the axle forging where the flanged bronze spindle body bushings rub against the steel. This usually results in uneven wear of the steel and, if new bronze bushings are fitted to these unevenly worn axles, the worn steel will soon cut and tear the bronze bushings.

Since it is very important that these surface should be in true alignment with the belt holes, it is seldom that a really good job of filing can be done. And, as these are inside surfaces, they are very difficult to grind.

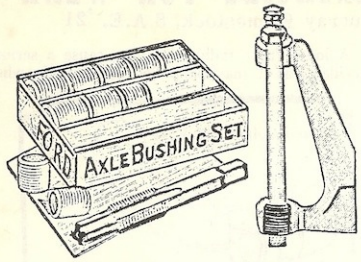


Axle Yoke Repair Jig

A special "end mill," for milling off the ends of the axle yoke in alignment with the bolt holes, will quickly true up and smooth the surfaces; so that quicker and more lasting results will be obtained from the fitting of the new spindle body bushings.

After the axle yokes have been trued up - the same tool can be used for facing off the ends of the spindle body bushings. But, as the spoke said to its felloe - that is another story.

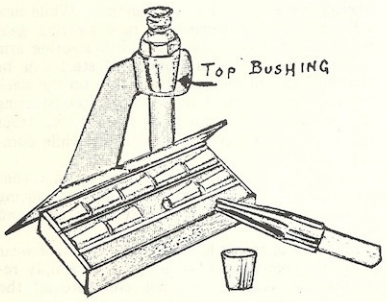
If the nuts on the bottom of the spindle body bolts are kept tight, then the bolt end is "clamped" to



Rethreads Bolt Holes

the axle and no motion of the bolt can occur. With no motion-there is no wear. Consequently, no stripping of the threads.

However, many car owners are very careless about tightening the nuts on the lower ends of the spindle body bolts. As a result the bolts begin to move around in the threads at the bottom of the axle and, eventually, wear out and strip the threads. When this occurs, the front axle may be shipped to one of the Ford Branches, where they will weld the holes up full of metal, drill them out, and tap new threads for a Labor Charge of about $2.00.



Rebushing Axle Yoke

Another excellent repair consists in drilling out the old hole, and cutting anew thread of 5/8 inch diameter into which a special bushing is screwed in place from the under side of the yoke arm.

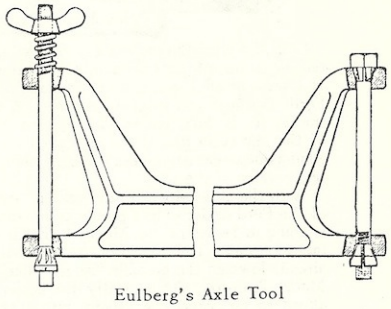
These special bushings are made of steel and their bottom threads graduate into slight over-sizes, so that the bushing will "bind" into place when once installed. This makes a strong and permanent repair and the regular Ford spindle body bolts can be replaced at any time. A combination of reamer and tap, clears out the old threads and cuts the new threads in the bottom of the axle.

If the spindle body bolts are not kept screwed down tightly into the axle, hard service will sometimes cause the spindle bolts to hammer out an enlarge the holes in the top axle yoke. Such looseness and wear, at either top or bottom of axle yoke, is apt to result in loose and defective steering and the "hammering" that occurs from such loose parts will soon result in wearing bushings and other parts out of shape.

But an ingenious repair has been devised to overcome this difficulty, consisting of a taper reamer, and tapered steel bushings. These tapered bushings are pulled down into the hole in the axle yoke by the head of the spindle body bolt, so that the bushing fits both axle and bolt as snugly as a ground glass stopper in a bottle.

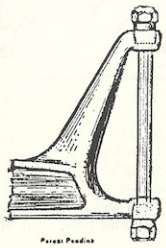
In order to facilitate the installation of these bushings at the top and bottom of the axle ends, a special reamer jig has been devised which holds the reamers in exact alignment. The jig also allows the necessary pressure to be applied by a screw feed, thus making an easy one-man job of the work.

Eulberg's axle tool consists of a cutter mounted on a bolt - with a wing nut on the end of the bolt to regulate the spring tension that is applied to the cutting edges of the tool. The left-hand illustration shows the tool in position, ready for boring out the bevel in the eyes of the axle.



Eulberg's Axle Tool

In the right-hand illustration will be noticed the tapered split bushing under the head of the regular Ford spindle body bolt, while there is a tapered, split, locknut at the lower end of the spindle body bolt. This securely holds any loose bolt from further wabbles, at either top or bottom of the axle.



Little Giant Bolt

The little Giant bolt is a special bolt having a tapered head which is drawn down into the tapered hole reamed in the top of the Ford axle. When the axle fits the bolt loosely at the bottom the lower eye of the Ford axle is also reamed out tapered, and a special tapered nut is fitted to the lower end of the spindle body bolt.

Front Axle Alignments

by Murray Fahnestock, S.A.E. '21

Since the three gears at the top of the steering column are enclosed and work in grease, they wear slowly. But when they do, they must be replaced as no adjustment is provided. The nut, holding the steering gear ball arm to the bottom of the steering post, should be kept tight.

The ball joints, on the ends of steering gear connecting rod, No. 2725-B, may wear and rattle, and while the ball caps may be filed down, many car owners (during the production years) used spring adjusted ball caps that eliminated this source of noise.

A spring loaded ball cap, for the rear end of the front radius rod, was also often used to overcome the noise due to wear at this point.

In 1919, the troublesome ball bearings, used in the front wheels of early Model T Fords, were replaced with Timken roller bearings, eliminating a prolific source of trouble. When lubricating these roller bearings, it is not necessary to pack the front wheel hubs full of grease, just put the grease in the race-ways for the rollers as the chief function of the grease is to prevent rust.

To install front wheels, put a new dust ring with felt washer, into the inner end of the hub so that it is flush with end of hub. The inner cone is a one-thousandth inch fit on the spindle, and it should not be necessary to force the cone on the spindle as the cup is forced into the hub.

The outer cones have right and left hand threads. When placing the cone on the spindle, run it up tightly enough so that the wheel seems to bind. Give the wheel a few turns to be sure that all working parts are in perfect contact. Then back off the cone from 1/4 to 1/2 turn, which should be sufficient to allow the wheel to revolve freely without end-play.

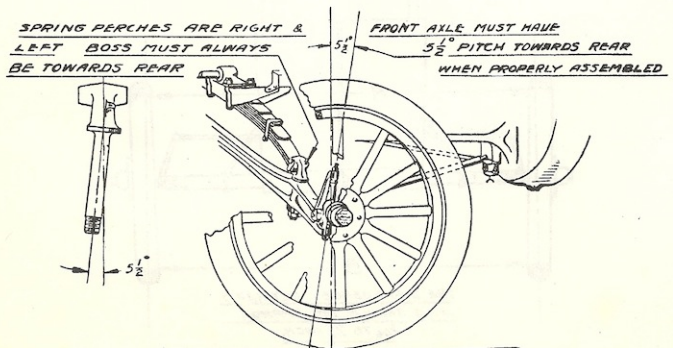
To determine if there is end play in bearings, jack up wheel and insert a cold chisel between axle yoke and spindle body to take up any play in spindle bushings. Grasp opposite spokes and shake wheel. Do not mistake play in spindle body bushings for looseness in wheel bearings.

See if wheel spins easily and quietly. After wheel has been rotated several times and grease is packed, wheel should oscillate and come to rest with valve nearest to ground.

If cone is loose on spindle threads, tightening nut will change adjustment.

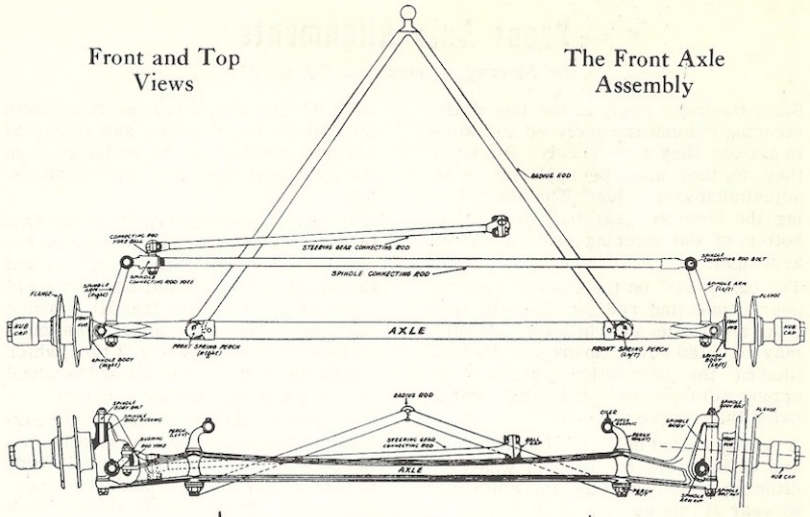
Don't forget cotter pin in nut, and spread ends slightly for easy removal.

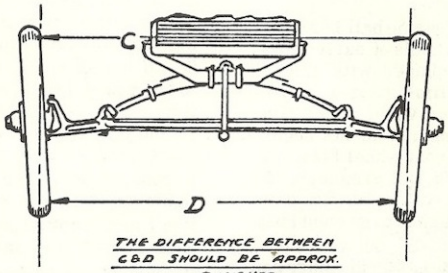
Be careful not to cross the fine threads of the hub cap.



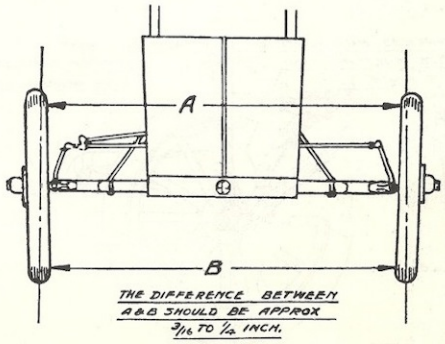
Front and Top Views

The Front Axle Assembly





THE DIFFERENCE BETWEEN C & D SHOULD BE APPROX. 3 INCHES



THE DIFFERENCE BETWEEN A & B SHOULD BE APPROX 3/16 TO 1/4 INCH.