OAKLAND SERVICE SHOP MANUAL

*Section One*

# FRONT AXLE

# FRONT AXLE

Oakland-Pontiac front axles are of the reverse Elliott type, drop forged steel, with an I-beam cross section between the springs and a special torsion resisting design between the springs and wheels to carry the additional twisting load imposed by front wheel brakes. This construction provides the most efficient type of axle, giving low unsprung weight, producing easy riding and long tire life, combined with exceptional strength and durability.

In order to give the best steering and easy handling, the front wheels are set closer together at the bottom than at the top (camber), are closer together at front than at the rear (toe-in) and the king pin slopes outward and forward at the bottom (king pin inclination and caster). Each of these is fully explained in the following paragraphs.

### Camber and King Pin Inclination

In order to assure easy steering it is necessary to have the center line of the king pin

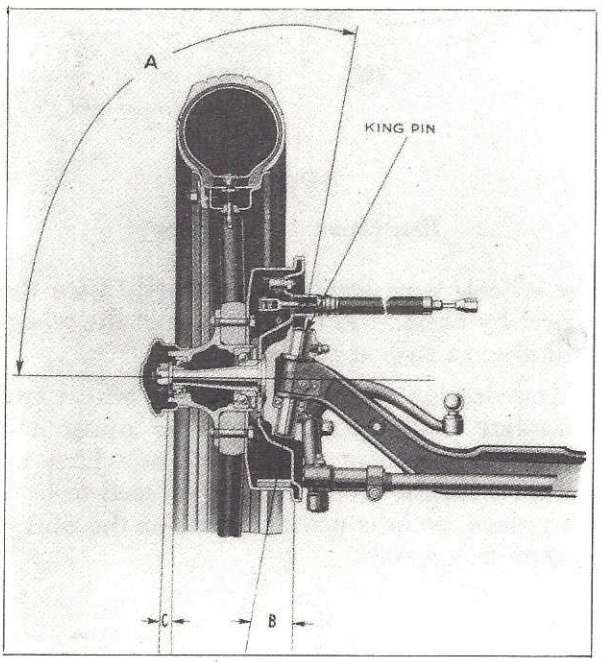


**Illustration 1-1—Cross section showing front wheel spindle and king pin inclination**

intersect the center of the tire at the ground. This produces what is called center-point steering and does away with scuffing and wearing of the tires on the ground when the wheels are turned to one side for a turn. This also reduces the pressure on the king pin bushings, and other parts of the steering gear. To obtain this center-point steering, the axle is designed so that the king pin slopes outward at the bottom (B. illustration 1-1); and the steering knuckle is forged with an angle greater than 90°, measured between the king pin center line and the center line of the wheel spindle (A. illustration 1-1). The combination of these two angles produces a downward inclination of the spindle that gives the wheel a camber amounting to (C. illustration 1-1). Since these angles are forged into the axle and steering knuckle in the original construction, they are not adjustable and do not change unless the axle is struck a very heavy blow as in case of an accident. Where a car has been damaged and hard steering results, these two angles should be carefully checked.

Lack of camber produced by a sagging axle or bent front wheel spindle will cause the tire to wear in spots.

If it is found necessary to straighten an axle back to the proper setting, the work should be done with the axle cold. Never heat the axle to make it easy to straighten, as this will remove important qualities of strength imparted by special heat treatment and forging at the factory.

### Toe In

Due to the fact that an inclined wheel tends to roll in a circle whose center lies in the direction of the inclination of the wheel

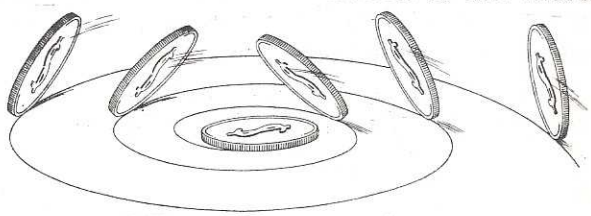

**Illustration 1-2**

at the top, just as a coin rolls around in a circle when dropped on the floor, (Illustration 1-2), it is necessary to give front wheels a slight toe-in or "gather" to assure easy

steering and prevent excessive tire wear. Toe-in should always be checked with the proper gauge, as it cannot be checked accurately with the eye. It is easily adjusted at the front axle tie rod as fully described in the instructions following.

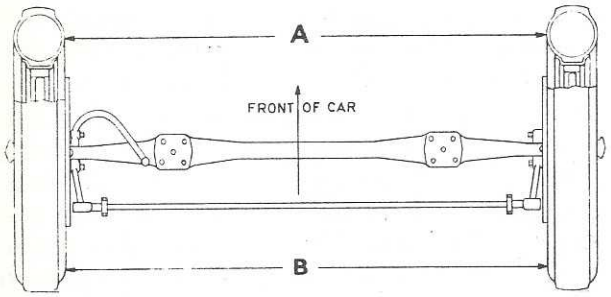


**Illustration 1-3—Toe-in Distance A is always less than B**

## Caster

In order to make a car follow the road easily and prevent wandering, and constant attention to steering, the bottom of the king pin is inclined forward slightly so that the center line of the king pin extended to the ground will strike a point slightly ahead of the point of tire contact. This inclination is known as caster and gives exactly the same results as obtained from casters on a desk, chair or any other furniture. The caster angles should be held to within the specified limits. (Illustration 1-4). Insufficient caster will produce an unstable condition which makes the car feel very uncomfortable to the driver, and causes wandering from one side of the road to the other. Too much caster, on the other hand, has a tendency to produce front wheel wobble and shimmy. If the caster angle of the king pin should become changed due to shock, sagging of the springs, or other causes, it may be corrected by the installation of a shimmy wedge between the spindle and axle "I" beam so as to bring about the correct caster angle.

Any mass in motion must be carefully balanced in order to eliminate vibration. A very few ounces of unbalance in the front wheels will cause a condition of shimmy at high speed. Oakland-Pontiac front wheels are accurately balanced to within very close limits. A balance weight will be found inside the wheel felloe diametrically opposite the valve stem. Tires are also carefully balanced and the correct position of the valve stem in the outer casing is indicated by the word "valve" on the inner edge of the casing. The inner tube should always be assembled in the casing with the valve in this position.

Balance of the front wheels can be easily checked with the wheels on the spindle bearings. Jack the car up and make sure that the wheels turn freely, then slowly turn the wheel by hand. A heavy point of the wheel will always stop at the bottom.

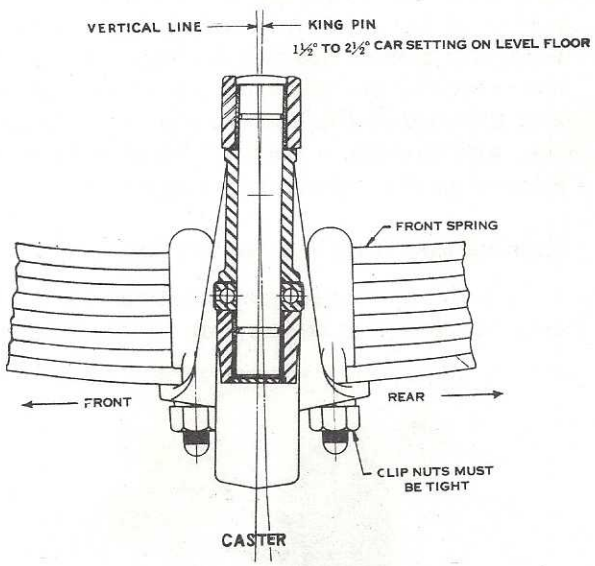


**Illustration 1-4—Caster**

Use ordinary putty to bring the wheel into complete balance. Weigh the putty and make up a lead or solder weight which together with the rivets or screws used to hold it in place, weighs just the same as the putty. Fasten this weight.

## SPECIFICATIONS FRONT AXLE 1930 PONTIAC SIX

| | |
|---|---|
| Type | Reverse Elliott |
| Section | "I" beam |
| Size of Section | 2⅛"x1¾" |
| Material | Droped forged steel |
| Spindle Bearing Diameter | Large 1.1892"—Small .7495 |
| King Pin Diameter | .733" |
| King Pin Length | 5 3/16" |
| Knuckle Bearing | Bushing .735"x 1 15/64" |
| Vertical Trust Bearing | Ball—Nice Brg. Co. No. 5111 |
| Wheel Bearing—Inner | Ball—N. D. No. 909002 |
| Wheel Bearing—Outer | Ball—N. D. No. 909001 |
| King Pin Inclination (B. Illustration 1-1) | 7° |
| Steering Knuckle angle between CL king pin and CL spindle (A. Illustration 1-1) | 99° |
| Toe-in (A. Illustration 1-3) measured on tire 8" from ground | 1/16" to 1/8" |
| Toe-in (A. Illustration 1-3) on tire level with hub | 3/32" to 5/32" |
| Caster Angle (Illustration 1-4) | 1½° to 2°15" |
| Camber (C. Illustration 1-1) | 1½° or ⅜" to ⅝" on the wheel felloe |

## SPECIFICATIONS FRONT AXLE 1930 OAKLAND EIGHT

| | |
|---|---|
| Type | Reverse Elliott |
| Section | "I" beam |
| Size of Section | 2 3/16"x1 7/8" |
| Material | drop forged steel |
| Spindle bearing diameter | Large 1.3116—small .7493 |
| King pin diameter | .860 length 5 5/16" |
| Knuckle bearing | 2 bushings .863x.988x1¼" |
| Vertical thrust bearing | Ball Nice Brg. Co. No. 4984 |
| Wheel bearing—inner | N. D. No. 909024 |
| Wheel bearing—Outer | N. D. No. 909023 |
| King pin inclination (B. Illustration 1-1) | 9½° |
| Steering knuckle angle between CL king pin and CL spindle (A. Illustration 1-1) | 101¼° |
| Toe-in (A. Illustration 103) measured on tire 8" from ground | 1/16" to 1/8" |
| Toe-in (A. Illustration 1-3 on tire level with hub | 3/32" to 5/32" |
| Caster Angle (Ill. 1-4) | 1¾° to 2½° |
| Camber (C. Illustration 1-1) | 1½° to 2° or ⅜" to ⅝" on wheel felloe |

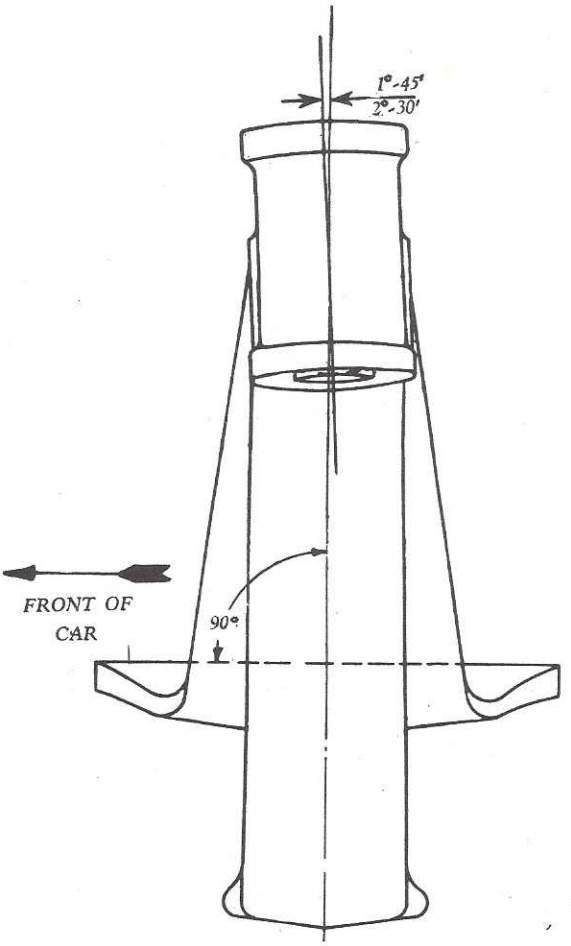


**Illustration 1-5—End View Front Axle 1930 Pontiac Six**

Note that this axle is forged with a slight negative or reverse caster. This is provided because the weight of the car and the shape of the springs tilt the axle backward, giving the correct caster when carrying the load of the car.

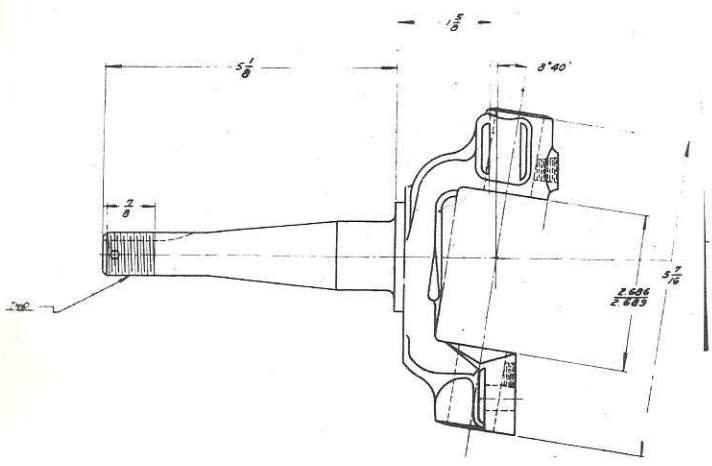

**Illustration 1-7—Steering Knuckle 1930 Pontiac Six**

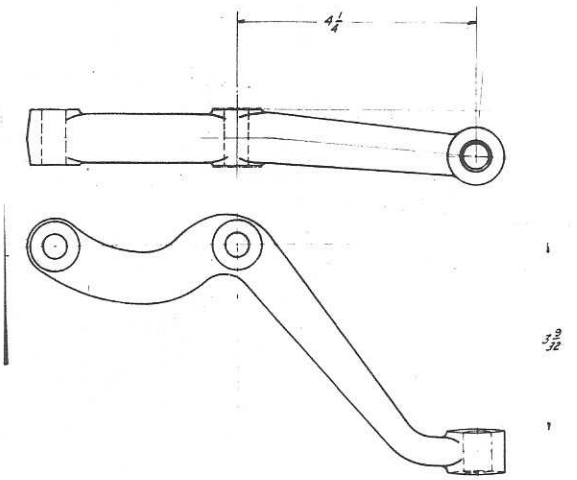

**Illustration 1-8—Steering Arm—1930 Pontiac Six**

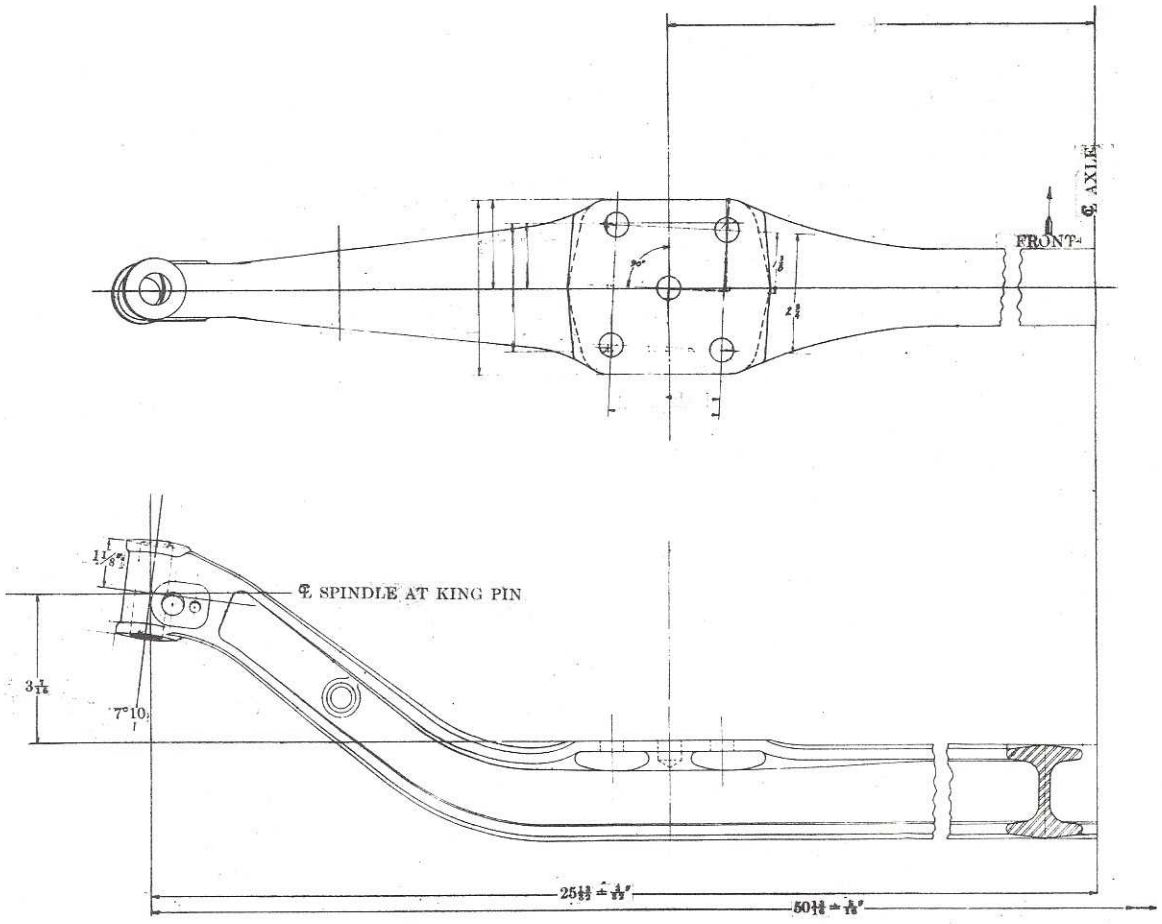


**Illustration 1-6—Front Axle 1930 Pontiac Six**

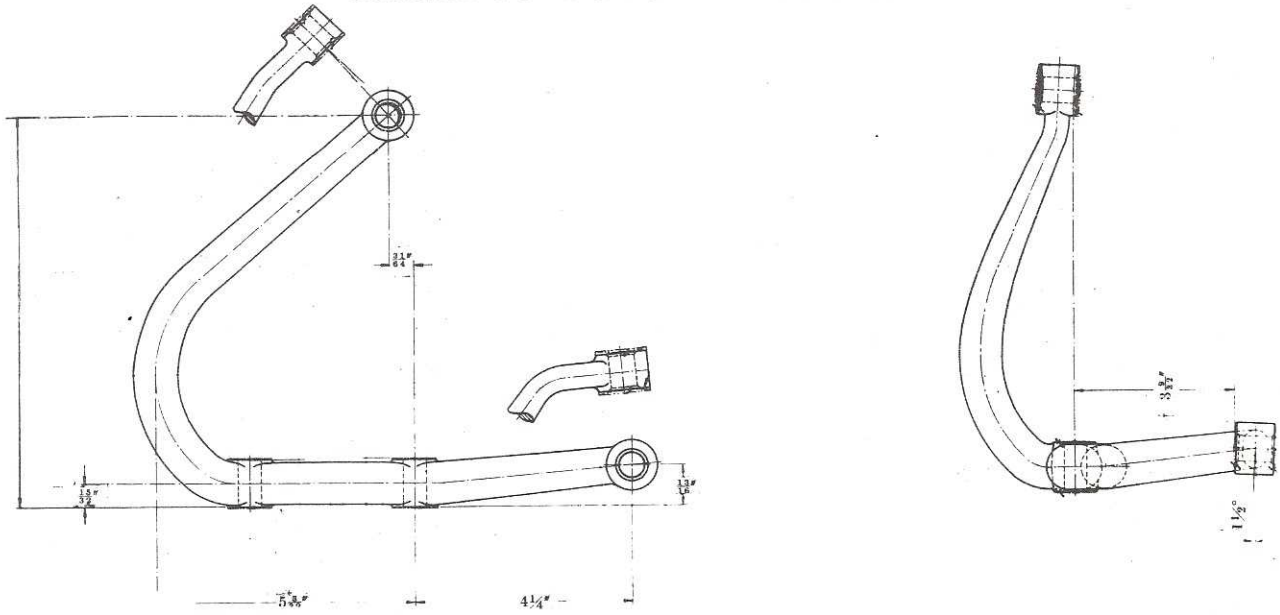

**Illustration 1-9—Steering—Third Arm 1930 Pontiac Six**

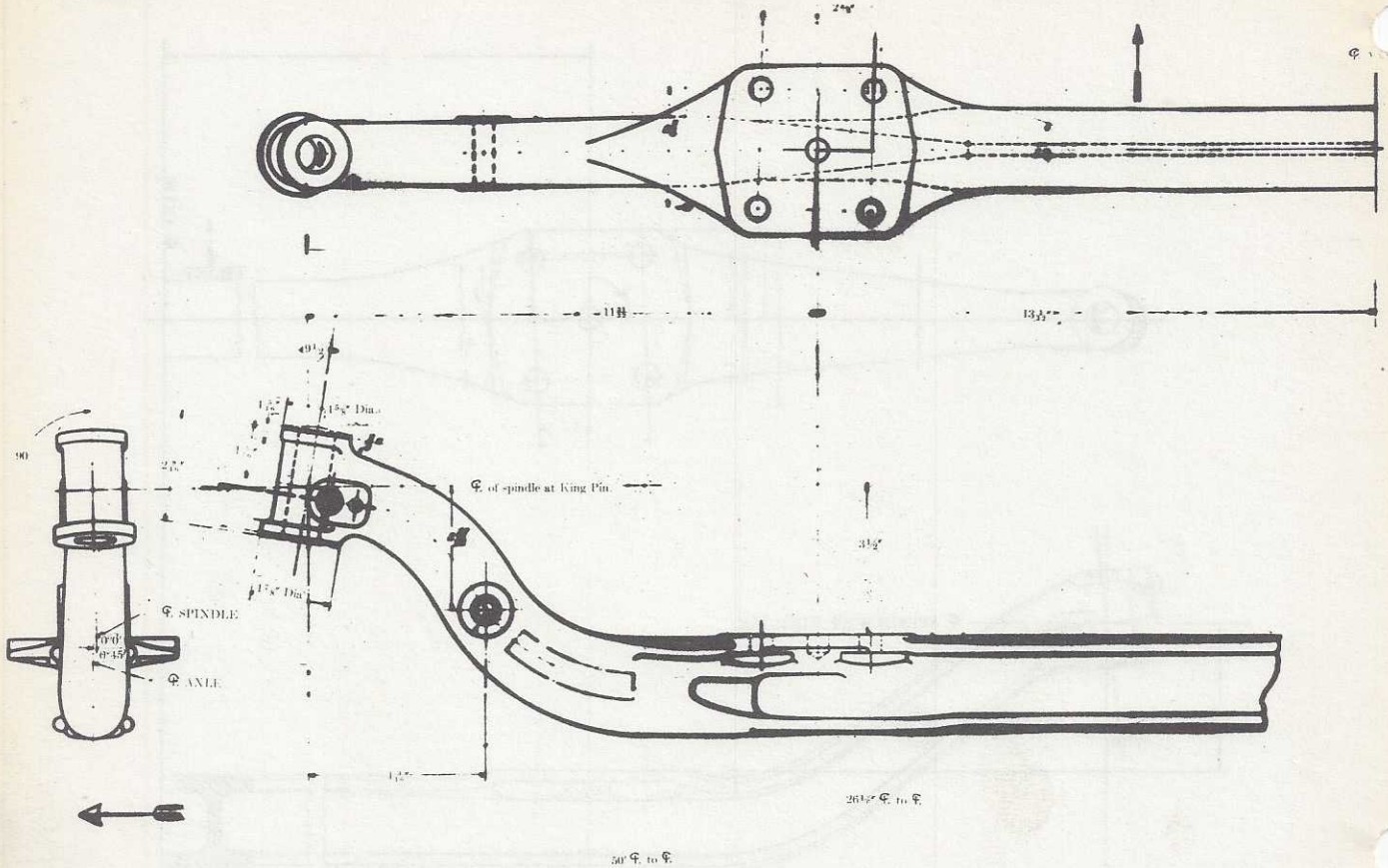


**Illustration 1-10—Front Axle 1930 Oakland Eight**

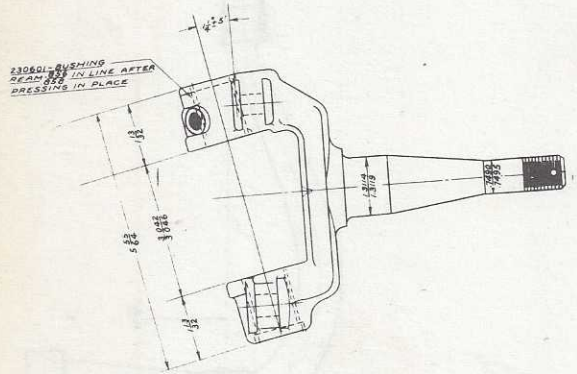


**Illustration 1-11—Steering Knuckle 1930 Oakland Eight**

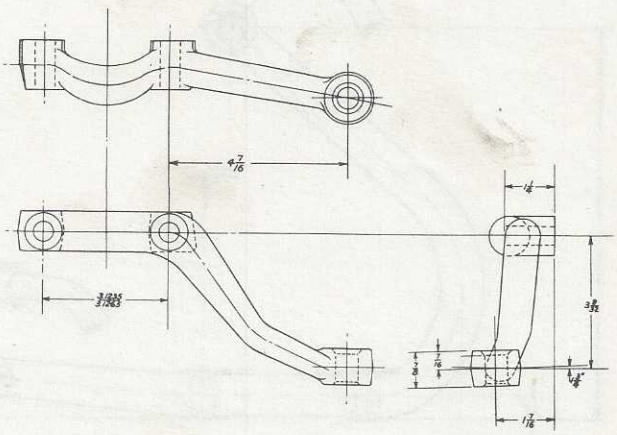

**Illustration 1-13—Steering Arm 1930 Oakland Eight**

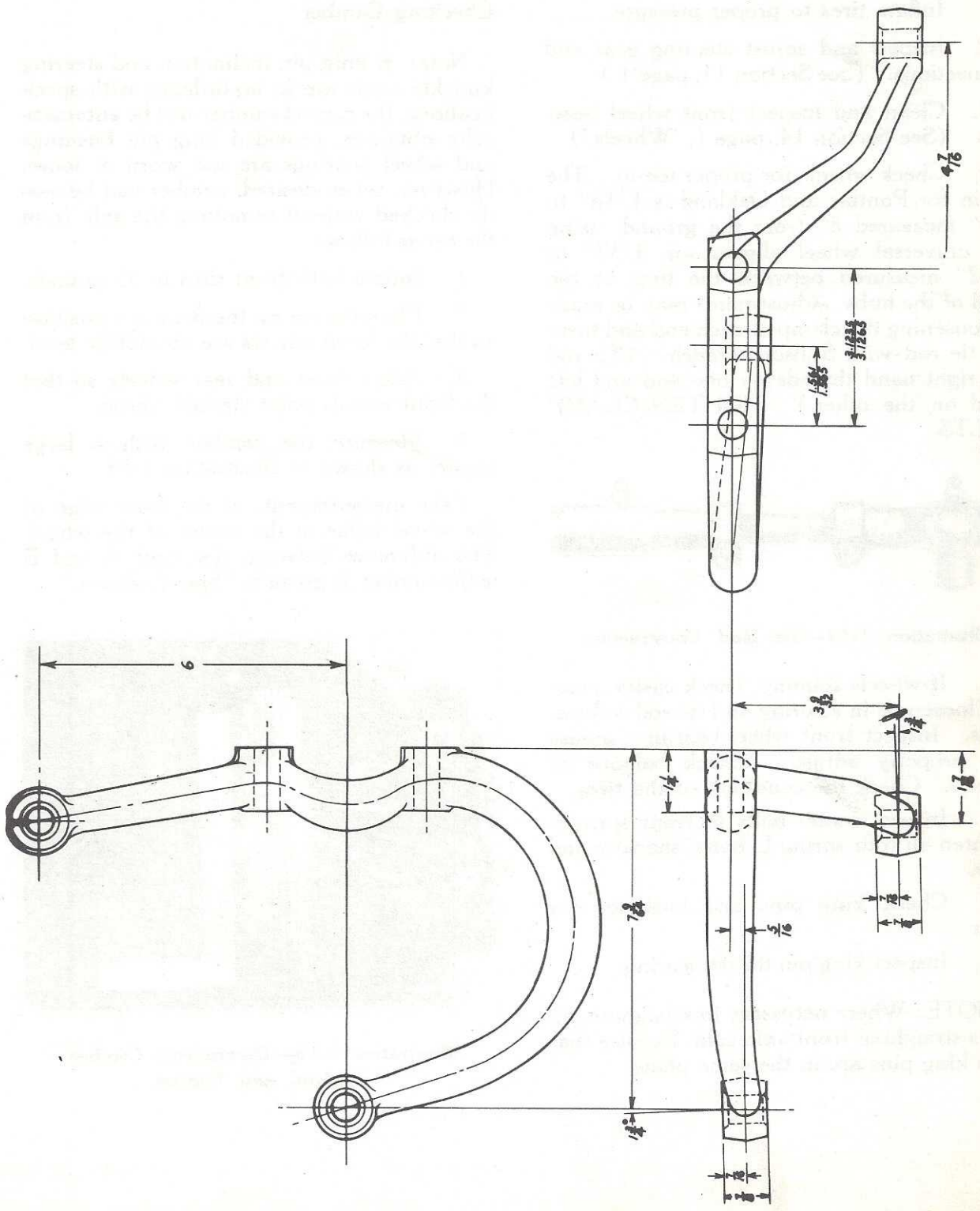


Illustration 1-12—Steering—Third Arm 1930
Oakland Eight

# INSPECTION OF FRONT AXLE

Oakland and Pontiac

1. Inflate tires to proper pressure.

2. Inspect and adjust steering gear and connections. (See Section 11, page 1.)

3. Clean and inspect front wheel bearings. (See Section 14, page 1, 'Wheels.')

4. Check wheels for proper toe-in. The toe-in for Pontiac and Oakland is 1/16" to 1/8" measured 8" from the ground, using the universal wheel aligner, or 3/32" to 5/32" measured between the tires at the level of the hubs. Adjustments may be made by loosening the clamp at each end and turning tie rod with Stillson wrench. (Tie-rod has right hand threads on one end and left hand on the other.) TIGHTEN CLAMP BOLTS.

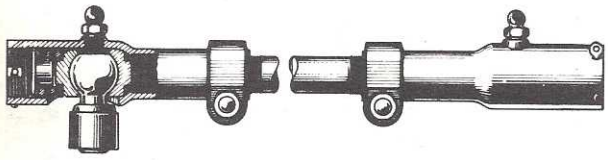

**Illustration 1-14—Tie Rod Construction**

5. If wheels shimmy, check caster, camber, looseness in steering and tie rod connections. Inspect front wheel bearings, grease and properly adjust. Check balance of wheels. Check the condition of the tires.

6. Inspect center bolts in front springs. Tighten all four spring U bolts, shackles and clips.

7. Check king pins and bushings for wear.

8. Inspect king pin thrust bearing.

NOTE: Where necessary to straighten, always straighten front axle cold. Be sure that both king pins are in the same plane.

**Checking Camber**

Note: If king pin inclination and steering knuckle angle are in accordance with specifications, the correct camber will be automatically obtained, provided king pin bushings and wheel bearings are not worn or loose. However, when desired, camber can be easily checked without removing the axle from the car as follows:

1. Inflate both front tires to 35 pounds.

2. Place the car on the floor in a position so that the front wheels are absolutely level.

3. Align front and rear wheels so that the front wheels point straight ahead.

4. Measure the camber with a large square as shown in Illustration 1-15.

Take measurements at the front edge of the wheel felloe at the center of the wheel. The difference between distances A and B is the camber as given in "Specifications."

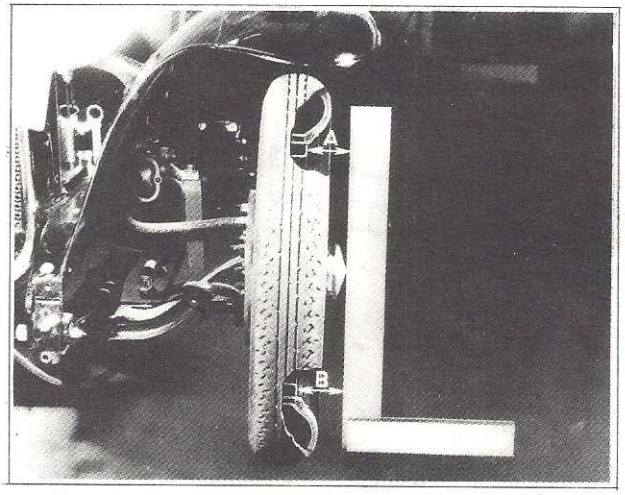

**Illustration 1-15—Determining Camber Oakland and Pontiac**

# OAKLAND-PONTIAC FRONT AXLE TOOLS

### HM—117-B Universal Wheel Aligner

This gauge provides a positive and simple method of checking toe-in on any reasonably smooth, level floor. Before using the gauge, always inspect the following for correct adjustments, eliminating excessive play where found:

Tie rod connections
Steering arms (especially at the brake support flange)
King Pins
Wheel Bearings

Having obtained correct adjustments of the above, check toe-in as follows:

1. Roll the car forward at least six feet so that the front wheels will take their natural position.

2. Place the gauge in the center of the tires (Illustration 1-16) so that the ends of the chains just touch the floor. (A spiral spring inside the gauge presses the ends of the gauge against the tires, holding it in place.)

3. Set the pointers at zero.

4. Roll the car forward until the aligner occupies a position 8" above the floor at the back of the front wheels with the ends of the chains just touching the floor..

5. The reading of the pointers on the scale will give the toe-in. Correct toe-in for each car is given under Specifications, Section 1, page 7.

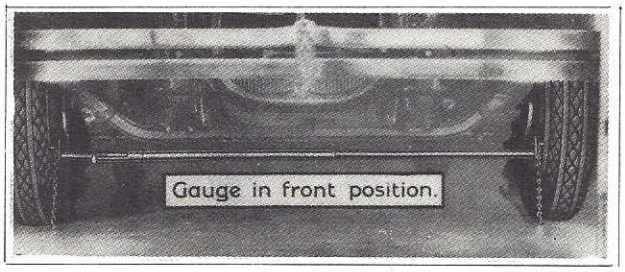


**Illustration 1-16—Checking "Toe-In" of Front Wheels with HM-117-B Wheel Aligner**

Note: Correct toe-in will not overcome excessive tire wear if the front axle or steering arms are bent or out of line.

### Bear Axle Gauge No. 40, for checking caster on all models

Caster is measured with this tool by determining the angle of the line of travel of the end of the wheel spindle between the position when fully turned to the right and fully turned to the left. If the axle has no caster, the spindle will turn in an absolutely level plane. Before attempting to check caster always inspect the king pins and bushings for looseness or wear. Use the tool with the tire resting on the ground, do not jack up the front axle. Proceed as follows:

Place a small center mark made with a center punch or other sharp tool directly above the lathe center in the end of the wheel spindle. Then set the gauge parallel to the front wheel about ½" from the spindle. (Illustrations 1-17 and 1-18). Swing the wheel to each side to make sure that it turns far enough each way to permit the plunger on the axle gauge to engage with the punch mark in the end of the spindle. Then swing the wheel fully to the side toward the left hand plunger and engage the plunger in the punch mark in the wheel spindle. Level the head of the gauge with the spirit level and set the pointer at zero. Hold the gauge so that it does not swing out of position and swing the wheel fully in the opposite direction and then set the 2nd plunger. (Illustration 1-17) so that it engages the punch mark on the spindle. The reading on the scale of the indicator plate gives the caster in degrees, each division indicating one degree.

Since the same tool is used on both right and left sides of the car, the indicator will show correct caster by a pointer reading above the center line on one side and a negative reading below the center line of the other side.

When measuring caster of the left front wheel, correct caster will be indicated by the pointer reading below the center of zero line.

Correct caster of the right front wheel is indicated by the pointer reading above the center or zero line.

Readings on right and left wheels must be the same and agree with specifications given in Section 1, see page 7. If they are not the same, a flat spring or possibly a bent or twisted axle is indicated. If both readings are the same but not in accordance with specifications, correct caster should be obtained by the use of wedges between the spring pad and the bottom of the front spring. These should be installed from either front or back so that correct caster angle is obtained. These wedges may be quickly installed and may be obtained from the factory parts department.

**Illustration 1-17—Checking Caster of Front Wheels with Bear Axle Gauge (1st position)**

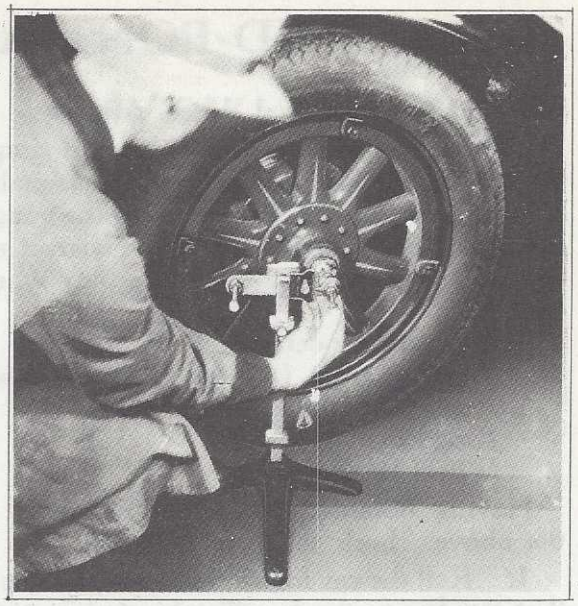

**Illustration 1-18—Checking Caster of Front Wheels with Bear Axle Gauge (Second position)**

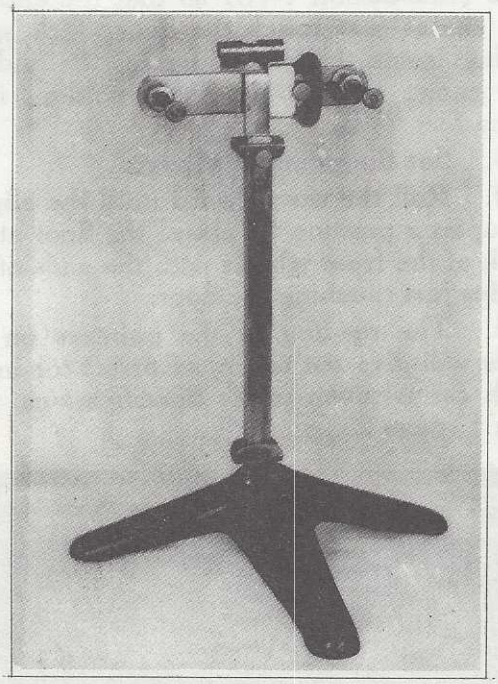

**Illustration 1-19—Bear Axle Gauge for Checking Caster on all Models**

**HM-516 Front Axle King Pin Pitch Checking Fixture, Universal Type for Checking King Pin Inclination on all models.**

This gauge is a shop tool for checking correct alignment of the king pins on front axles on the bench after they have been taken off the car. Use of the tool for measuring king pin inclination is evident from Illustration 1-21. A twisted axle can be easily determined by sighting across the center of the rods when mounted in the king pin bushings.

Note: Lack of camber, produced by a sagging axle or bent front spindle, will cause the tires to wear in spots.

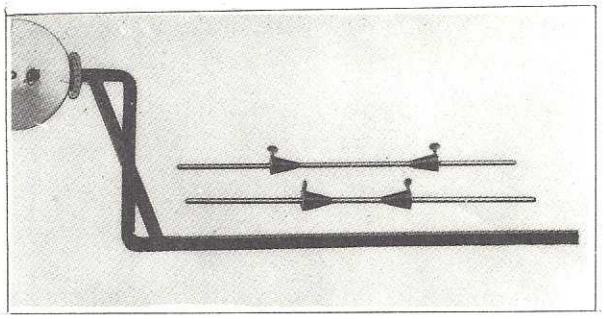

**Illustration 1-20**

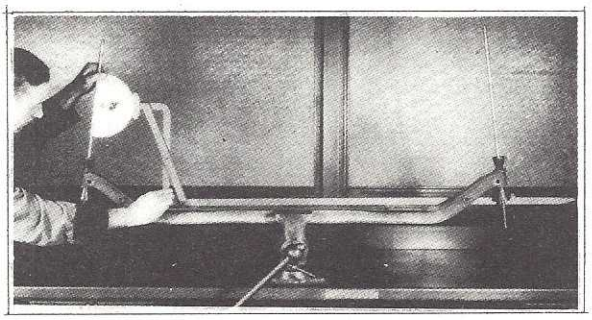

**Illustration 1-21—HM-516 King Pin Pitch Checking Fixture in Operation**

**HM-451 King Pin Bushing Driver, for Oakland Models 6-54, GO-6, AA-6, Oakland Eight. HM-429 for Pontiac Models 1929 and 1930.**

This is a special punch of just the correct size for driving king pin bushings in the steering spindle and will remove and replace these bushings without damage to bushings or steering knuckle. Its use is clearly shown in the illustrations below.

**Illustration 1-22—HM-451 and 429 King Pin Bushing Driver**

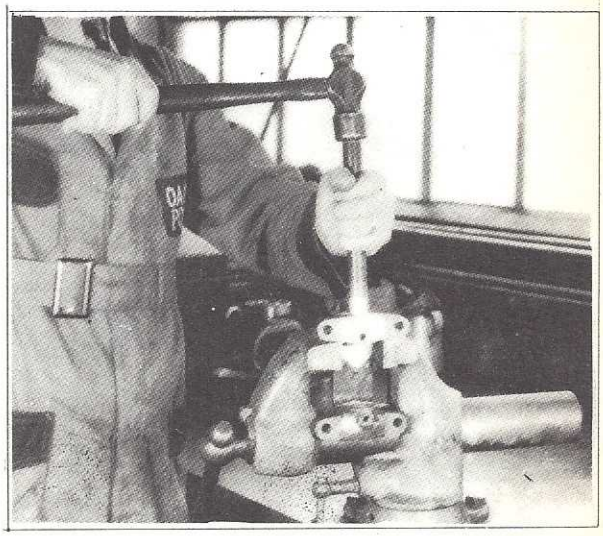

**Illustration 1-23—HM-429 or HM-451 King Pin Bushing Driver in Operation**

**King Pin Bushing Beamers Nos. P.R. 128 Pontiac, O.R. 116 Oakland**

**Reamer Handle HM-430**

These are special reamers designed for line reaming the steering knuckle bushings. The tool in use is shown in Illustration 1-24 below.

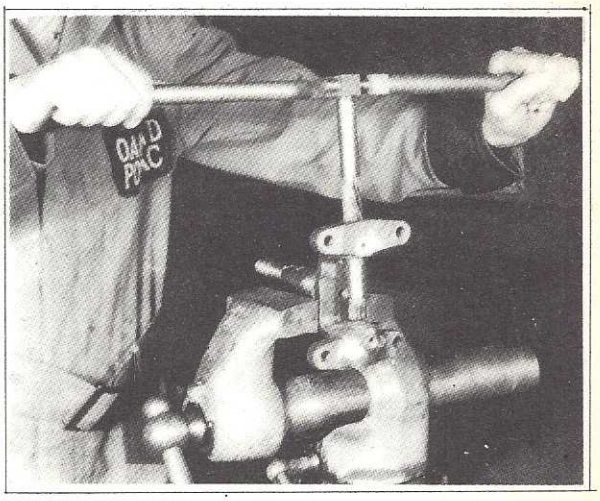

**Illustration 1-24—King Pin Bushing Reamer in Operation**