

REAR AXLE

The rear axle Fig. 1 is the full-floating type designed so that the axle shafts can be removed without disturbing the wheels. The differential drive is of the hypoid type, having a ratio of 4.88 to 1; 8 tooth drive pinion, 39 tooth drive gear.

The axle shafts are splined at the inner end to fit the splines in the differential side gears. The outer ends of the axle shafts are equipped with integral driving flange which bolts to the rear wheel hubs. The wheels are each supported on two taper roller bearings on the axle housing. The bearing races are pressed into the wheel hub and the adjustment of the bearings made by adjusting nuts on end of housing.

A steel cover is used on the rear of the axle housing to permit inspection and flushing of the differential assembly.

It is necessary to use a hypoid gear lubricant. See Lubrication Chart, Page 12. Various types of hypoid lubricants must not be mixed. If the brand is changed it is best to drain and flush the rear axle housing before installing the new lubricant. The rear axle lubricant level should be checked every 1,000 miles. The lubricant should be drained and axle refilled to the bottom level of the filler hole every 6,000 miles.

Removing Rear Axle from Vehicle

To remove the rear axle first raise the rear end of vehicle with a hoist and support frame ahead of rear springs, then remove wheels and disconnect propeller shaft at rear universal joint by removing U-bolts. Disconnect brake line from hose at frame and remove lock clip. Remove spring clips, then remove spring front bolts, the rear axle can then be removed.

Axle Shaft

To remove the axle shaft, No. 29, Fig. 1, the following procedure should be followed:

1. Remove the six cap screws, No. 35 holding driving flange to wheel hub.
2. Remove axle shaft, two flange screws can be used in the threaded holes in the axle flange.

If rear axle shaft is broken, use a piece of stiff wire and make a loop on one end, slide the wire into axle housing and over broken end of shaft for a sufficient distance that when the wire is pulled out, the loop will bind on shaft and remove it from the differential side gear.

To replace axle shaft, reverse of the above operations are necessary, however, care should be taken when installing shaft that the inner oil seal, No. 28 at differential is not damaged.

Removing and Overhauling Differential

Before disassembling differential, it is advisable to determine through inspection the cause of difficulty or failure of the parts.

Drain lubricant from gear carrier housing and then remove gear carrier cover, No. 6, Fig. 1, flushing out unit thoroughly so that the parts can be carefully inspected.

After the inspection if it is determined that the differential should be completely overhauled, the rear axle assembly should be removed from the vehicle and the following procedure followed:

1. Remove axle shaft as covered in the foregoing paragraph.
2. Remove the four bolts No. 38 which hold the two differential side bearing caps No. 36 in position.
3. Using two pry bars, one on each side of the ring gear parallel with the tube of the axle housing, pry out the differential assembly as shown in Fig. 2.
4. Remove the cap screws No. 3, Fig. 1, holding the bevel drive gear No. 22 on the differential case No. 19.
5. Remove the drive gear from the differential case by tapping it lightly with a lead hammer.
6. The differential shaft No. 13 is held in place by a lock pin No. 25, using a small punch, drive out the lock pin to allow the differential shaft to be removed, Fig. 3.
7. Remove differential pinion gears, No. 15 and 24, Fig. 1, care being taken not to lose the pinion thrust washers, No. 16 and 23.
8. Remove axle shaft gears No. 12 and No. 26 and thrust washers No. 11 and 27.
9. Remove universal joint end yoke assembly No. 59 with puller shown in Fig. 4.
10. With a lead hammer drive on end of pinion shaft which will force the pinion into the gear carrier housing.
11. With bearing race removing tool drive out the front pinion shaft bearing cup No. 65 and oil seal No. 61.
12. To remove the drive pinion rear bearing cone use bearing removing tool or press off in an arbor press, Fig. 5.
When replacing the cone, select a sleeve the diameter of the cone, so the rollers or cage will not be damaged.

Wash all parts in suitable cleaning fluid, taking care not to lose any of the shims No. 39, Fig. 1 which adjust the pinion shaft bearing running tolerance.

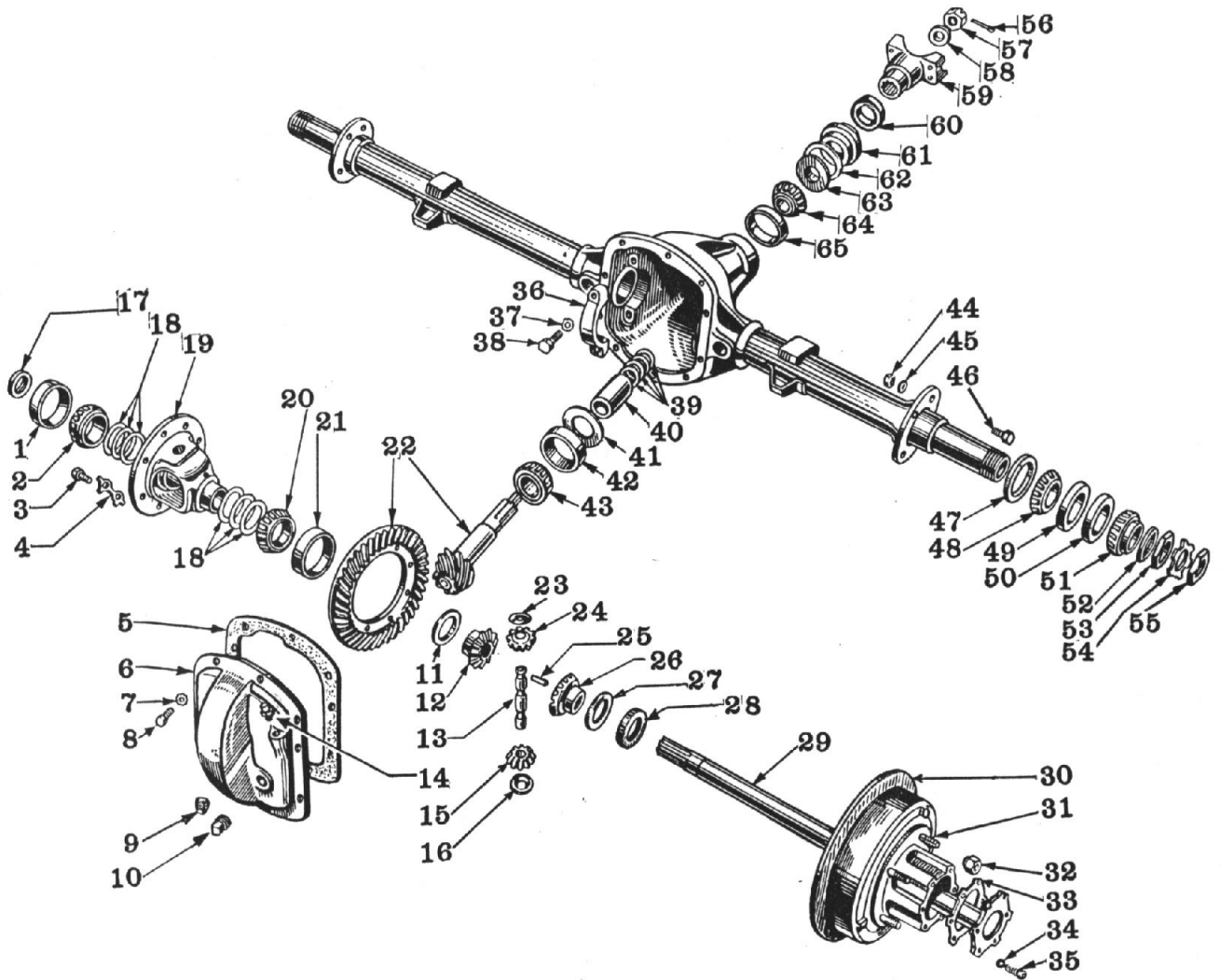


FIG. 1—REAR AXLE ASSEMBLY

Willys Part No.	Ford Part No.	Name	Willys Part No.	Ford Part No.	Name	
1	52881	Differential Bearing Cup	32	A-476	GP-1012	Wheel Hub Bolt Nut—R.H. Thread (Ford GP-1013; Willys A-475 L.H. Thread)
2	52880	Differential Bearing Cone and Rollers				GP-1013; Willys A-475 L.H. Thread)
3	A-871	Hypoid Bevel Drive Gear Screw	33	A-904	GP-4032	Axle Shaft Gasket
4	A-792	Drive Gear Screw Lock Strap	34	5010	34807-S	Rear Axle Drive Shaft Screw Lockwasher
5	A-782	Gear Carrier Cover Gasket	35	A-760	GP-1110	Rear Axle Drive Shaft Screw
6	A-781	Gear Carrier Cover	36	A-784	GP-4224	Differential Bearing Cap
7	52610	Gear Cover Screw Lockwasher	37	636528	34922-S	Differential Bearing Cap Screw
8	51623	Gear Cover Screw				Lockwasher
9	638577	Axle Housing Drain Plug	38	636527	355699-S	Differential Bearing Cap Screw
10	636638	Gear Cover Filler Plug	39	A-803	GP-4659-A	Pinion Bearing Adjusting Shim (Front)
11	A-795	Differential Bevel Side Gear Thrust Washer	40	A-799	GP-4668	Drive Pinion Bearing Spacer
12	A-794	Differential Bevel Side Gear	41	A-800	GP-4660-A	Pinion Bearing Adjusting Shim (Rear)
13	A-798	Differential Bevel Pinion Mate Shaft	42	52877	86H-4616	Drive Pinion Bearing Cup—(Rear)
14	A-870	Differential Vent Plug	43	52876	86H-4621	Drive Pinion Bearing Cone and Rollers—(Rear)
15	A-796	Differential Bevel Pinion Mate	44	636575	34083-S2	Brake Disc Screw Nut
16	A-797	Differential Bevel Pinion Mate Thrust Washer	45	5010	34807-S	Brake Disc Screw Lockwasher
17	A-779	Oil Seal—Carrier End	46	A-903	355578-S	Brake Disc Screw
18	A-784	Differential Adjusting Shims	47	A-864	GP-1177	Hub Oil Seal Assembly
19	A-793	Differential Case	48	52942	GP-1201	Hub Bearing Cone and Rollers
20	52880	Differential Bearing Cone and Rollers	49	52943	GP-1202	Hub Bearing Cup
21	52881	Differential Bearing Cup	50	52943	GP-1202	Hub Bearing Cup
22	A-789	Hypoid Bevel Drive Gear and Pinion Set	51	52942	GP-1201	Hub Bearing Cone and Rollers
23	A-797	Differential Bevel Pinion Mate Thrust Washer	52	A-865	GP-1218	Outer Wheel Bearing Washer
24	A-796	Differential Bevel Pinion Mate	53	A-866	GP-4252	Outer Wheel Bearing Nut
25	636860	Differential Bevel Pinion Mate Shaft Lock Pin	54	A-867	GP-1124	Outer Wheel Bearing Lockwasher
26	A-794	Differential Bevel Side Gear	55	A-866	GP-4252	Outer Wheel Bearing Nut
27	A-795	Differential Bevel Side Gear Thrust Washer	56	636571	357202-S	Drive Pinion Nut Cotter Pin
28	A-779	Oil Seal Carrier End	57	636569	356126-S	Drive Pinion Nut
29	A-901	Rear Axle Shaft—Right (Ford GP-4235; Willys A-902—Left)	58	636570	356504-S	Drive Pinion Nut Washer
30	A-472	Brake Drum	59	A-1445	GP-4842	Universal Joint End Yoke Assembly
31	A-474	Wheel Hub Bolt—R.H. Thread (Ford GP-1108; Willys A-473 L.H. Thread)	60	636568	GP-4666	Universal Joint End Yoke Dust Shield
			61	639265	GP-4676	Pinion Leather Oil Seal
			62	636565	GP-4661	Pinion Leather Oil Seal Gasket
			63	636566	GP-4619	Drive Pinion Oil Slinger
			64	52878	GP-4630	Drive Pinion Bearing Cone and Rollers (Front)
			65	52879	GP-4628	Drive Pinion Bearing Cup (Front)

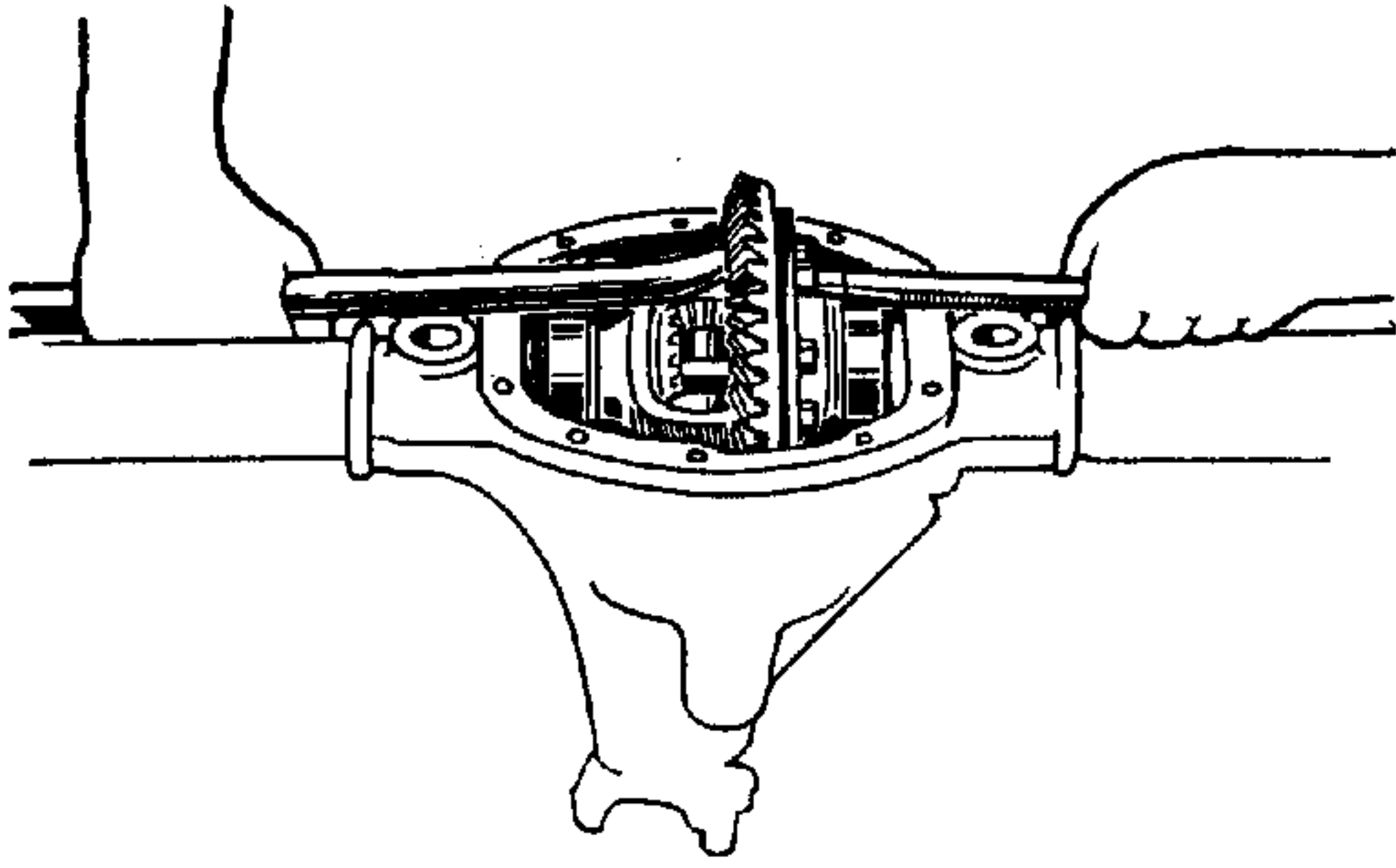


FIG. 2—REMOVING DIFFERENTIAL

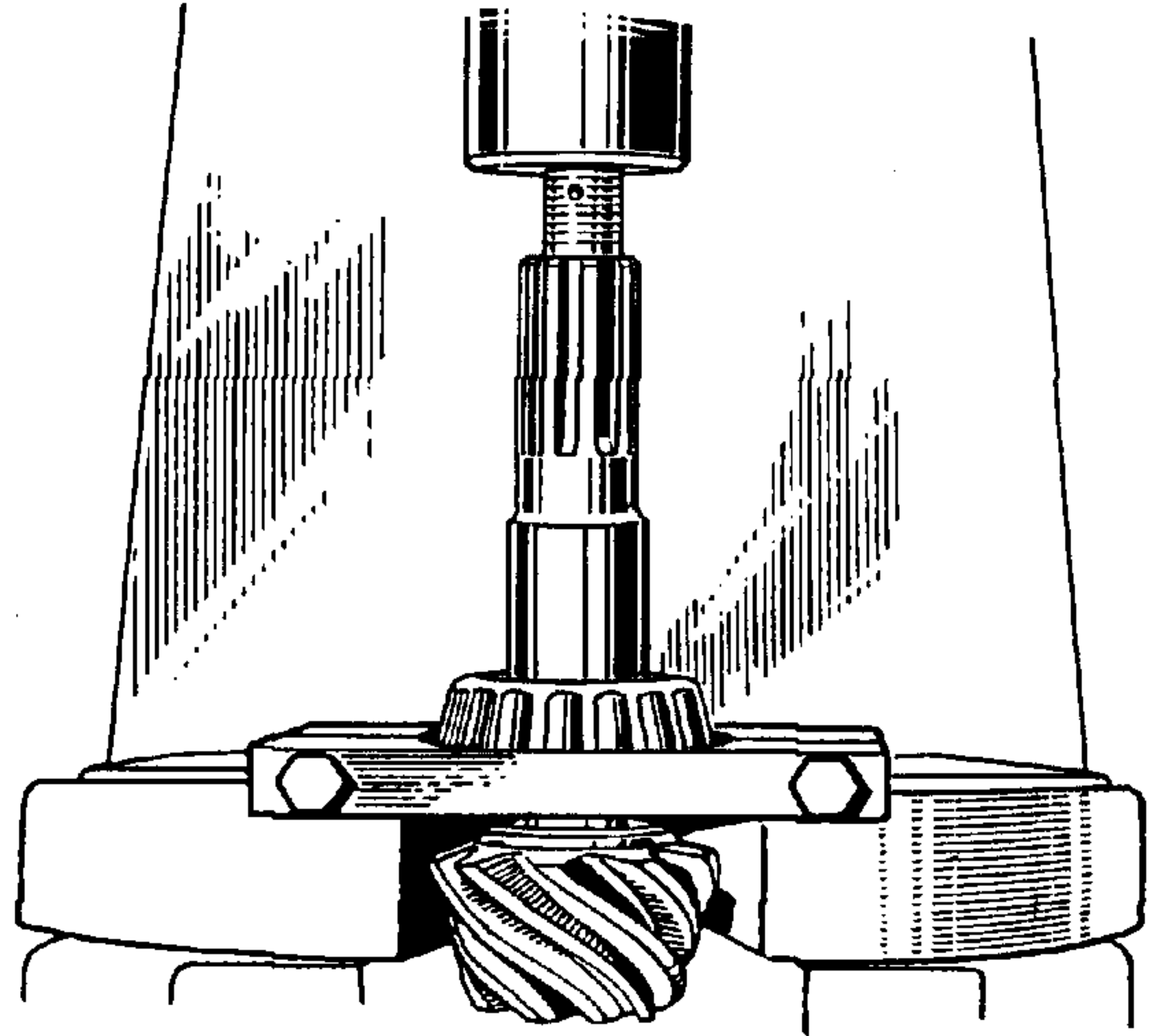


FIG. 5—REMOVING PINION BEARING CONE

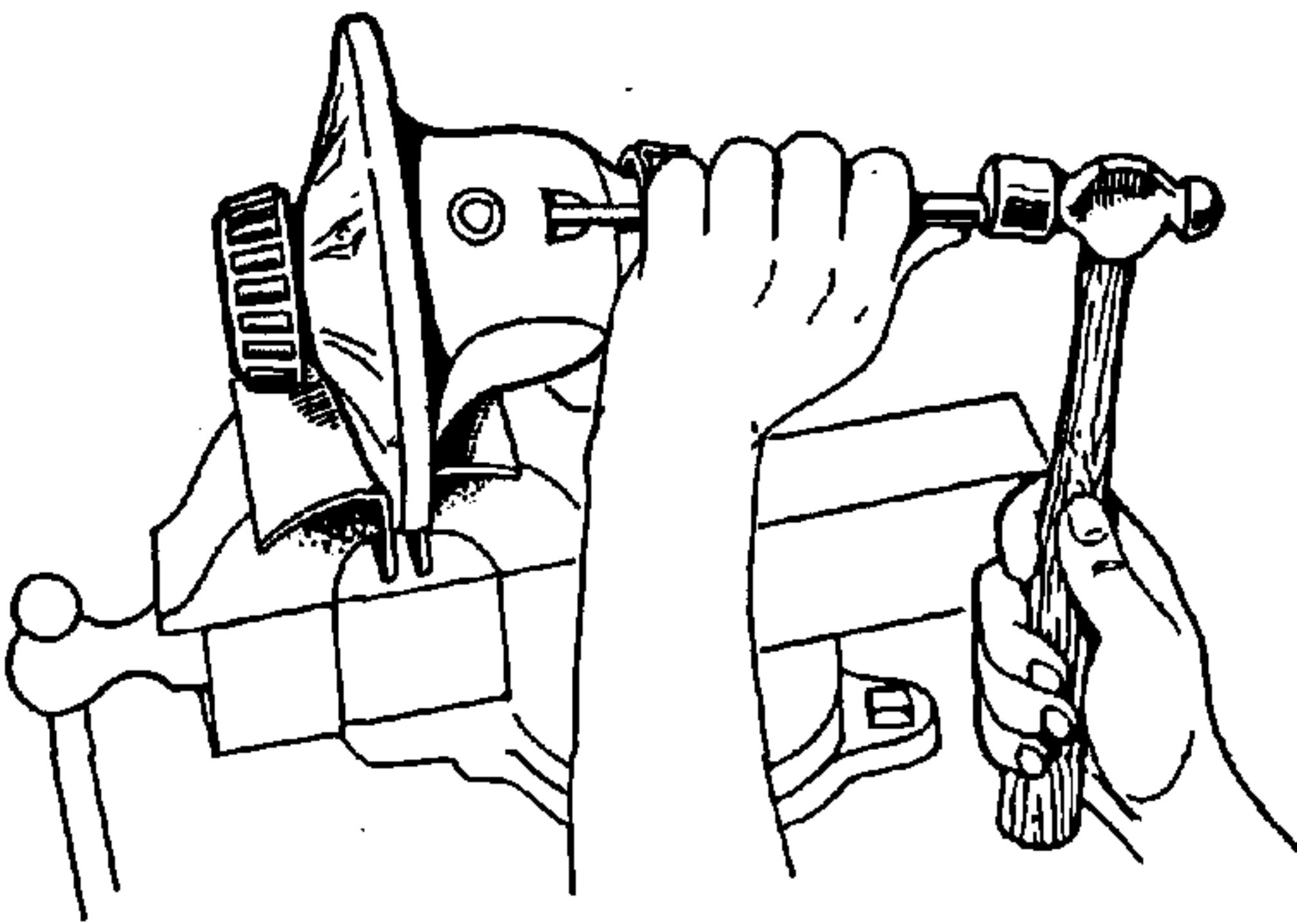


FIG. 3—REMOVING LOCK PIN

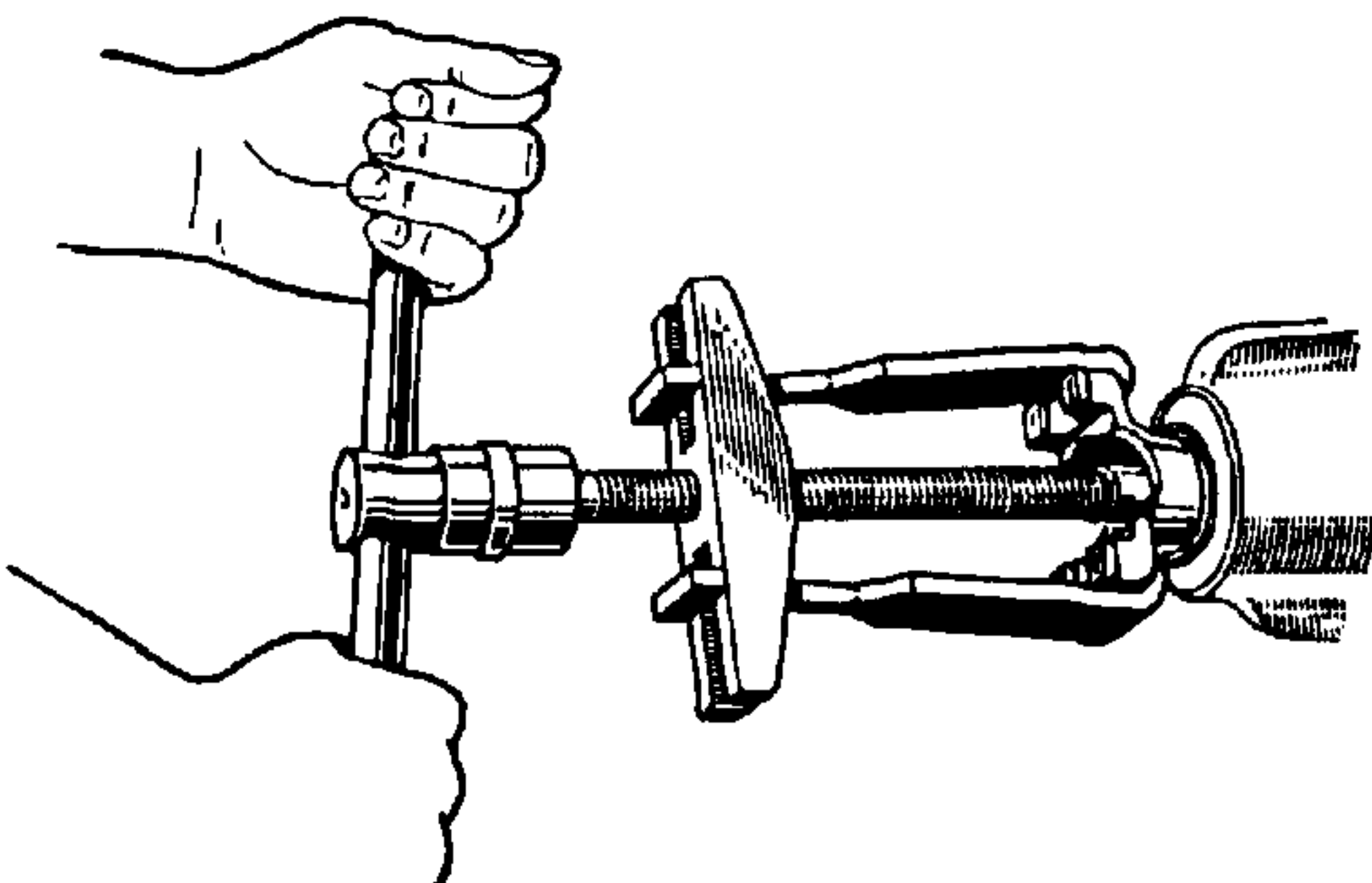


FIG. 4—REMOVING U. J. END YOKE

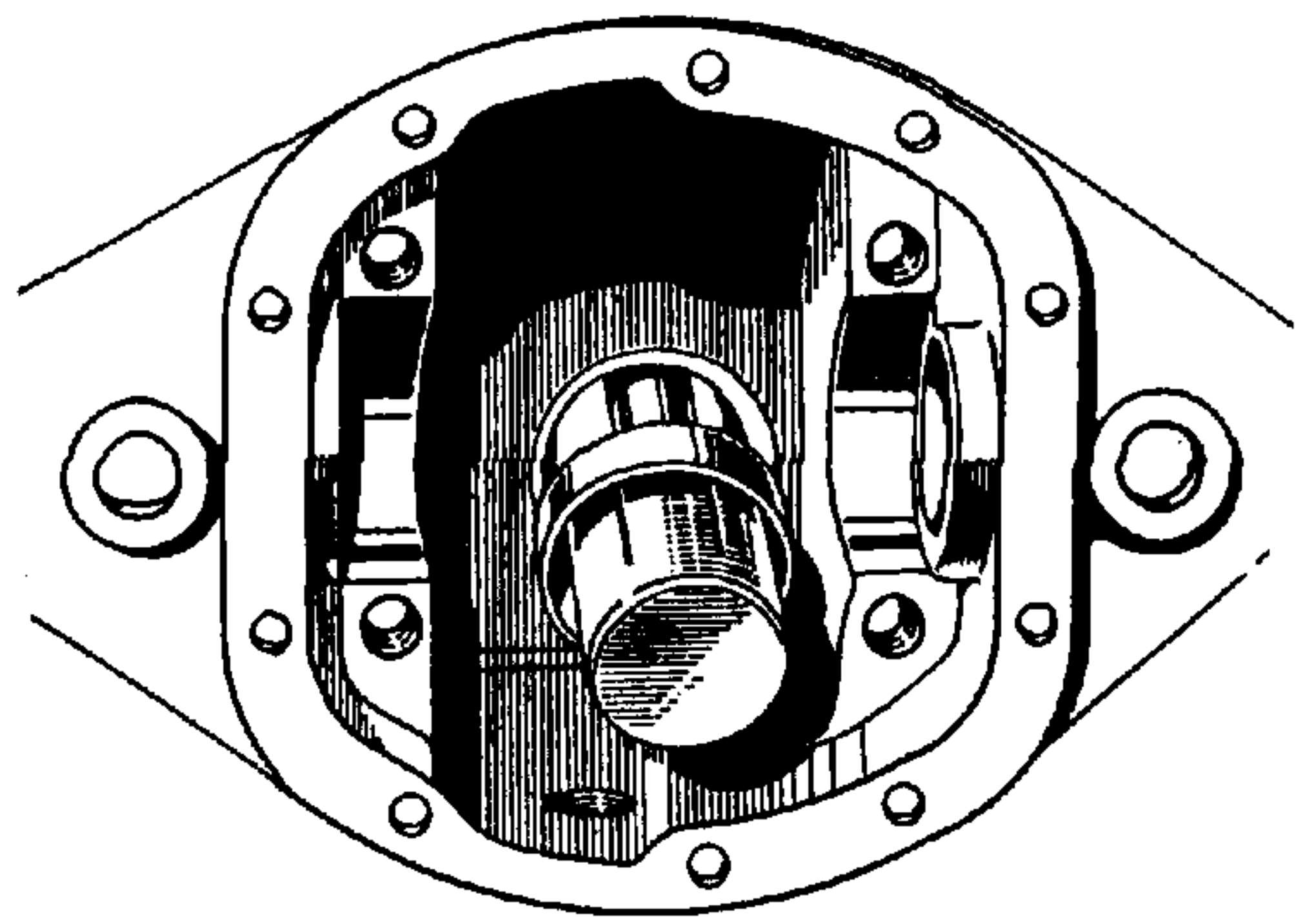


FIG. 6—REMOVING PINION BEARING CUP

Adjusting the Drive Pinion

Before attempting to adjust the ring gear or differential parts the drive pinion should be carefully checked and adjusted. The setting of the pinion is accomplished by the use of shims No. 41, Fig. 1 between the rear bearing cup No. 42 and the housing. These shims are available in thickness of .003", .005" and .010".

If the rear bearing cup is to be replaced or if the pinion setting is to be changed, a suitable tool for removing and installing the drive pinion bearing cup in the differential housing should be used, Fig. 6 and 7.

Adjusting Pinion Bearings

The correct pinion bearing adjustment is obtained by shims between the pinion bearing spacer and the front bearing cone, Fig. 8, until a slight drag is obtained when pinion flange is turned by hand.

Install the pinion and the rear bearing in the housing, place the front bearing in position and then install the propeller shaft flange. This operation can be performed very easily by using a block of wood to support the pinion, Fig. 9. Do not install the pinion oil seal until the pinion setting has been checked with the pinion setting gauge.

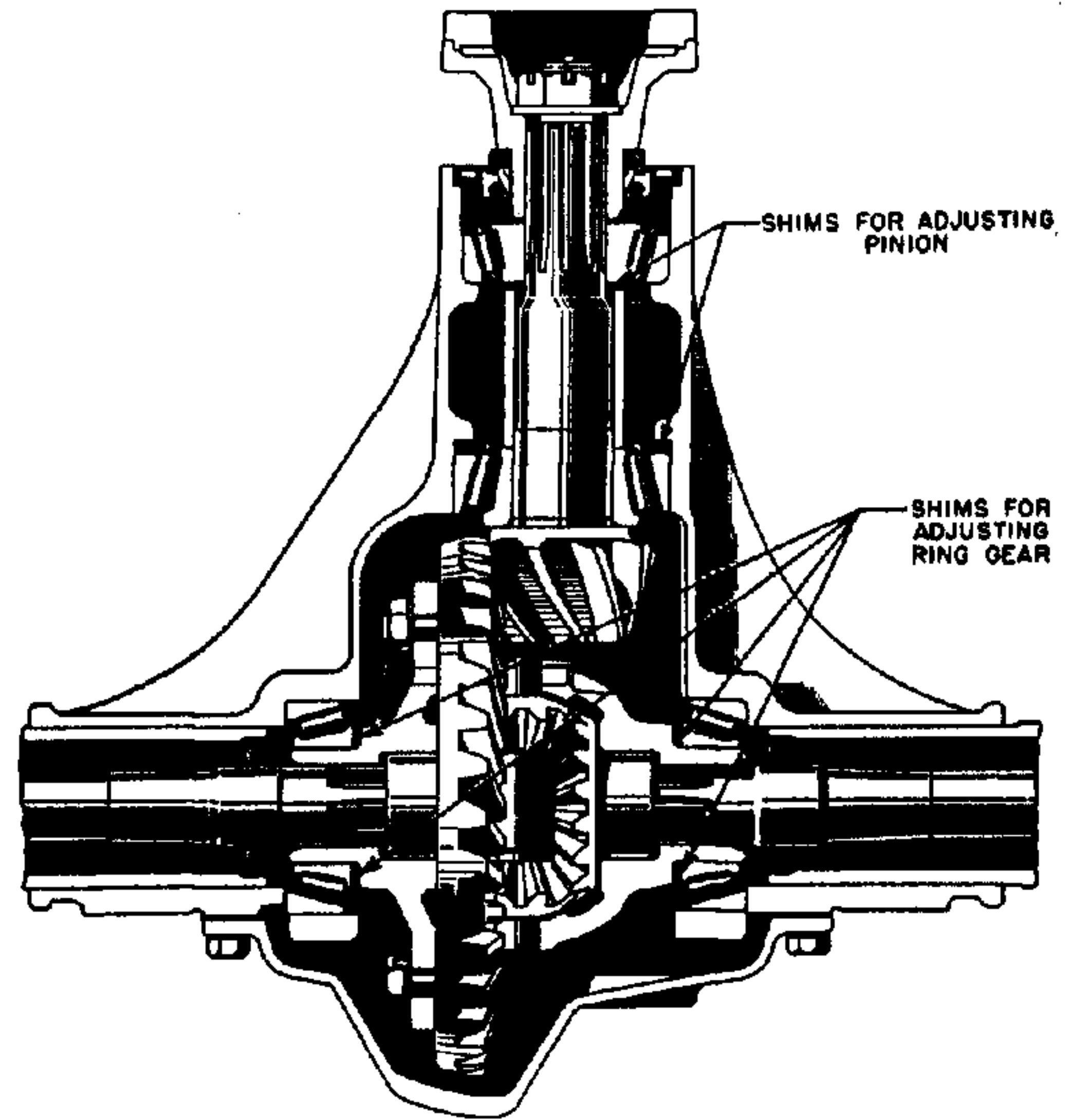


FIG. 8—ADJUSTING SHIMS

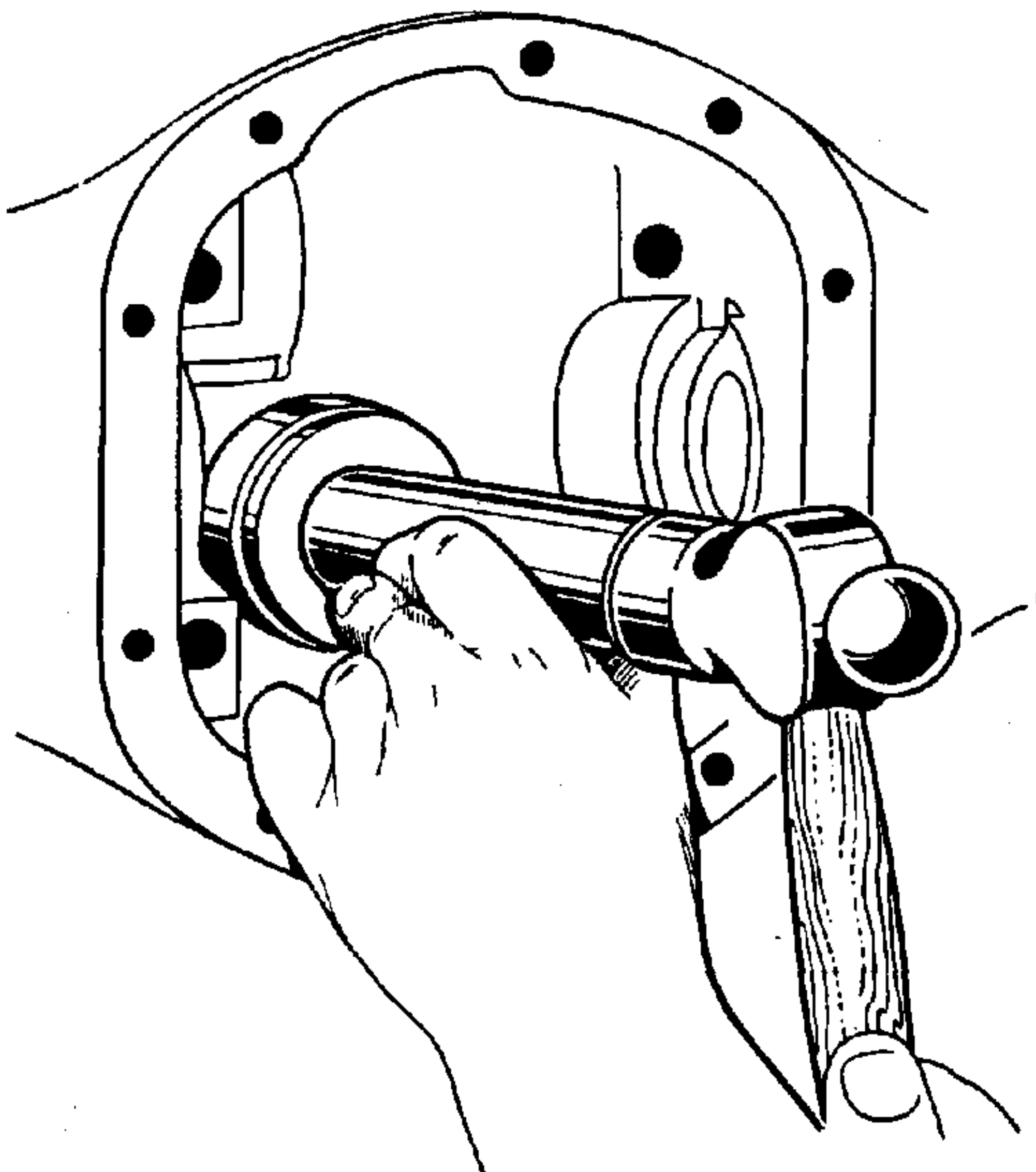


FIG. 7—INSTALLING PINION BEARING CUP

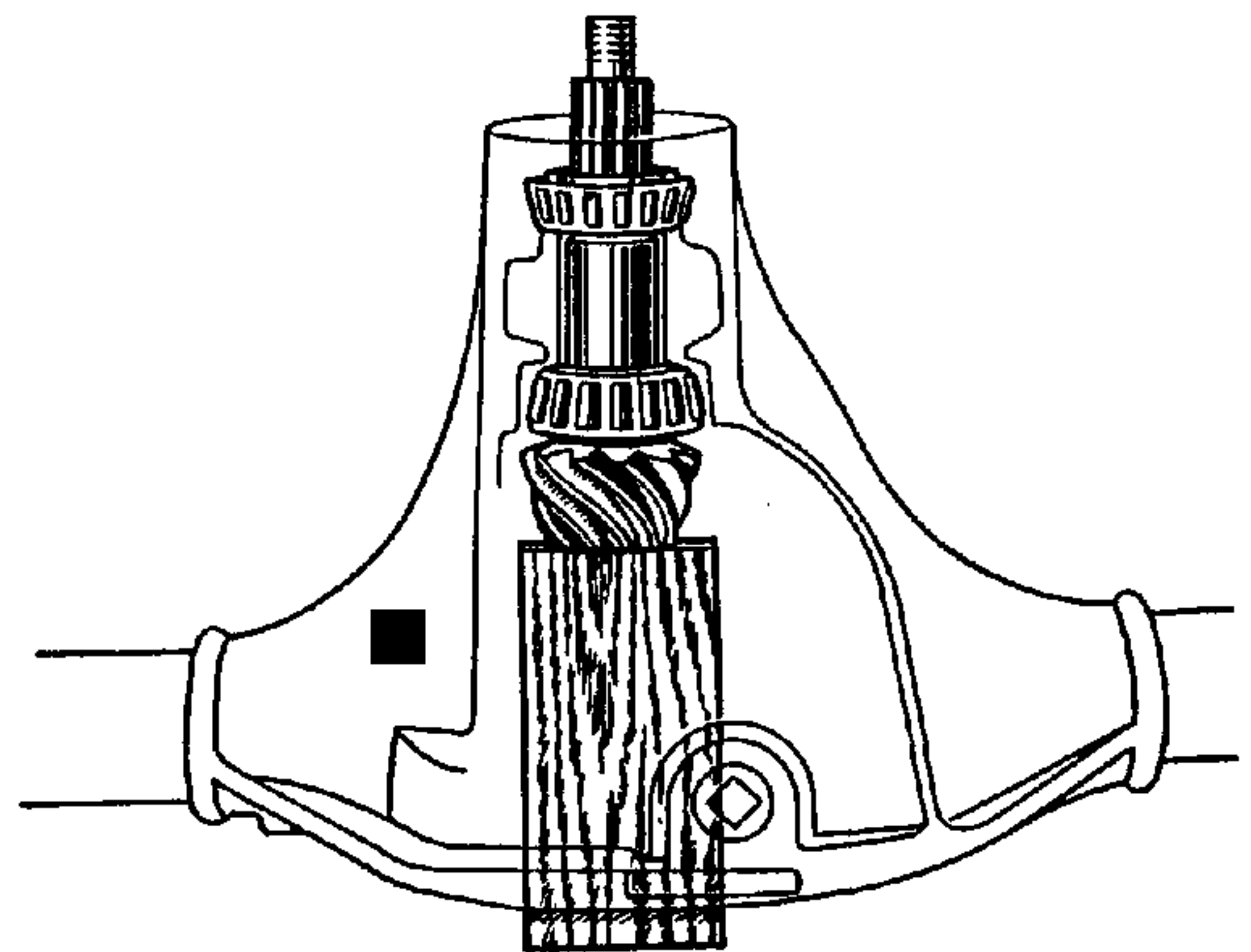


FIG. 9—INSTALLING PINION

Adjusting the Drive Pinion Setting

Proper adjustment of the drive pinion is facilitated by the use of a pinion setting gauge. See Fig. No. 10 and 11. This gauge is fitted with a micrometer for measuring the thickness of the shims required to properly locate the pinion in the differential housing so it will have correct tooth contact with the bevel drive gear.

All axle drive pinions are marked with an electric needle on the back face to show the correct setting. A pinion marked zero will show a reading .719" on the micrometer when properly adjusted. The dimension .719" represents the standard setting from the back face of the pinion to the center line of the differential case bearing. Therefore, a pinion marked +2 is .002" longer than the standard and will show a micrometer reading of .717" when properly adjusted. Likewise a pinion marked -4 is .004" shorter than the standard and will show a micrometer reading of .723" when properly adjusted.

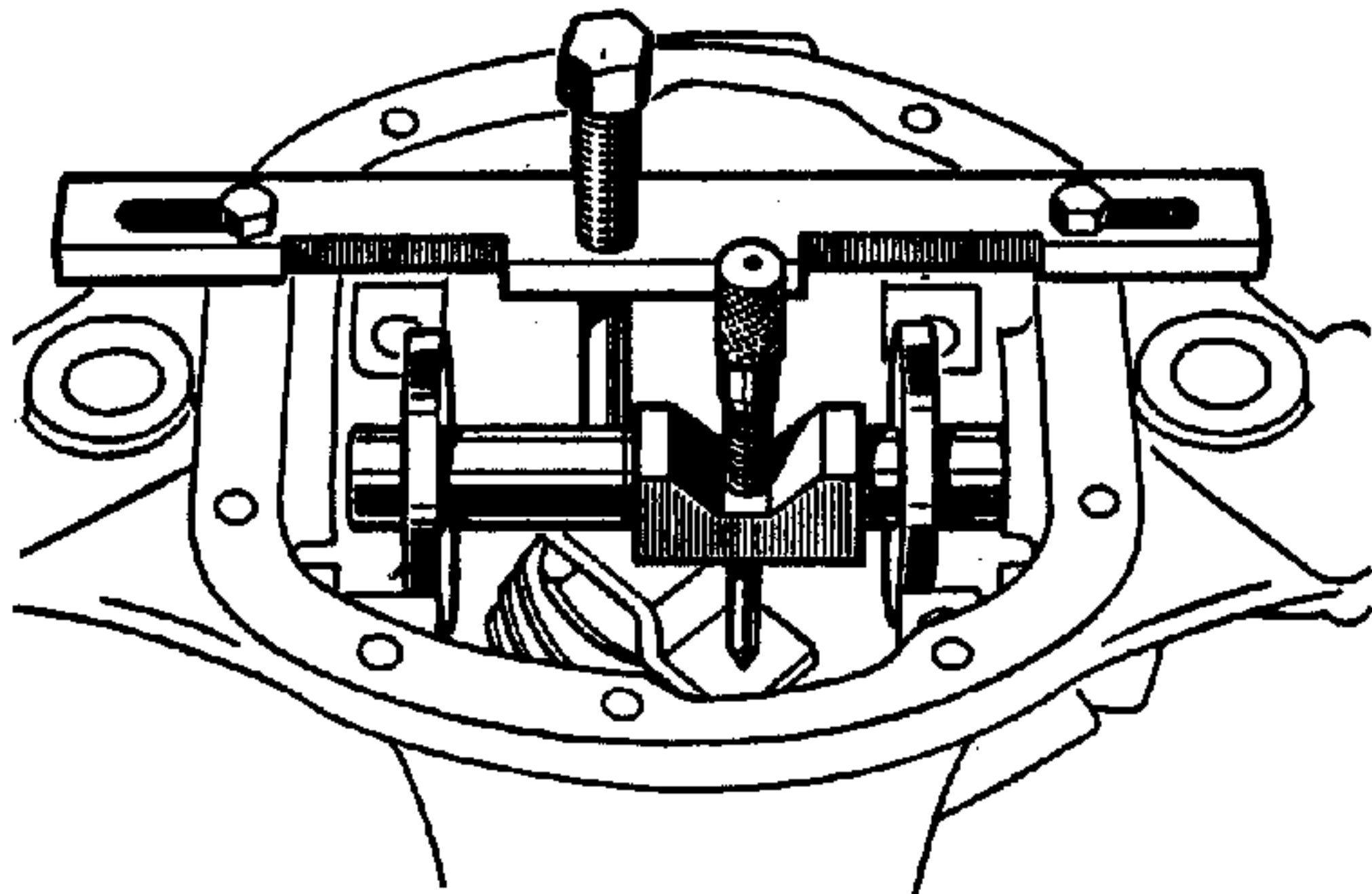


FIG. 10—PINION SETTING GAUGE

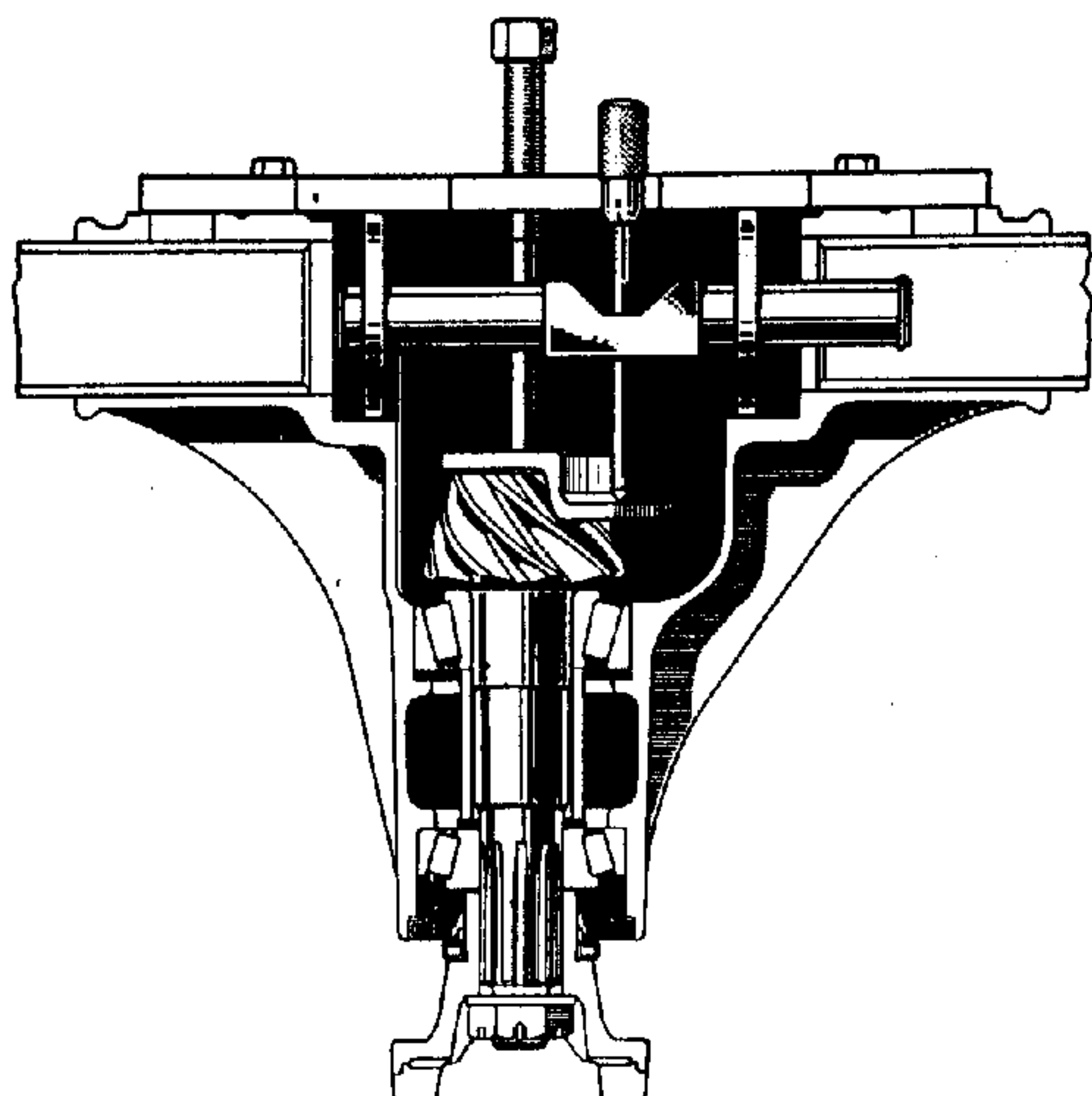


FIG. 11—PINION SETTING GAUGE

Assembling Differential Unit

Carefully examine the surfaces of the differential case and bevel gear to make sure there are no foreign particles or burrs on the two contacting surfaces. Line up the cap screw holes in the bevel gear with those on the differential case and then put it into position on the case by tapping it lightly with a lead hammer. Install the cap screws which hold the bevel gear to the differential case. After the cap screws have been tightened securely, make certain that the cap screw locks are bent around the cap screw heads so there is no possibility of the screws working loose.

The relative assembling position of the internal parts of the differential are shown in Fig. 8. Reassemble the differential pinions, sidegears, thrust washers and shaft in place and install differential shaft lock pin. In order to prevent the lock pin from working out, use a punch to peen over some of the metal of the differential case.

The adjustment of Differential bearings is maintained by the use of Shims between differential case and bearing cones with an .008" pinch fit when assembled in the axle housing.

Remove bearing cones and shims as shown in Fig. 13, reinstall bearing cones without shims, place assembly in Housing with bearing cups and force assembly to one side and check the clearance between bearing cup and case with a feeler gauge as shown in Fig. 12.

After clearance has been determined add .008" this will give thickness of shims required for proper bearing adjustment.

Remove differential bearings and install equal thickness of shims on each side and replace bearings.

Install the differential assembly in the housing. This operation can be facilitated by cocking the bearing cups slightly when the differential is placed in the housing and then tapping them lightly with a lead hammer, see Fig. 14.

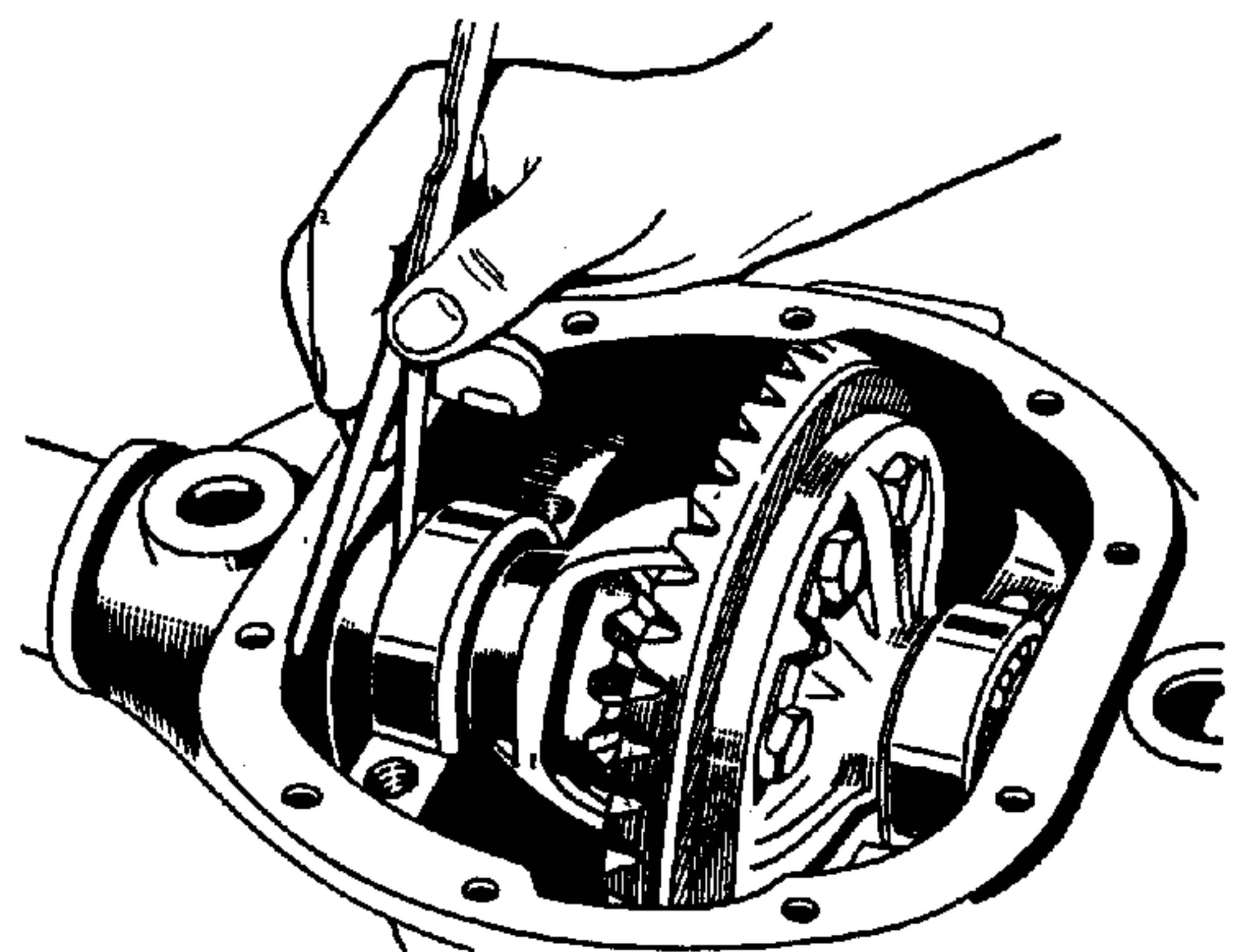


FIG. 12—CHECKING DIFFERENTIAL BEARINGS

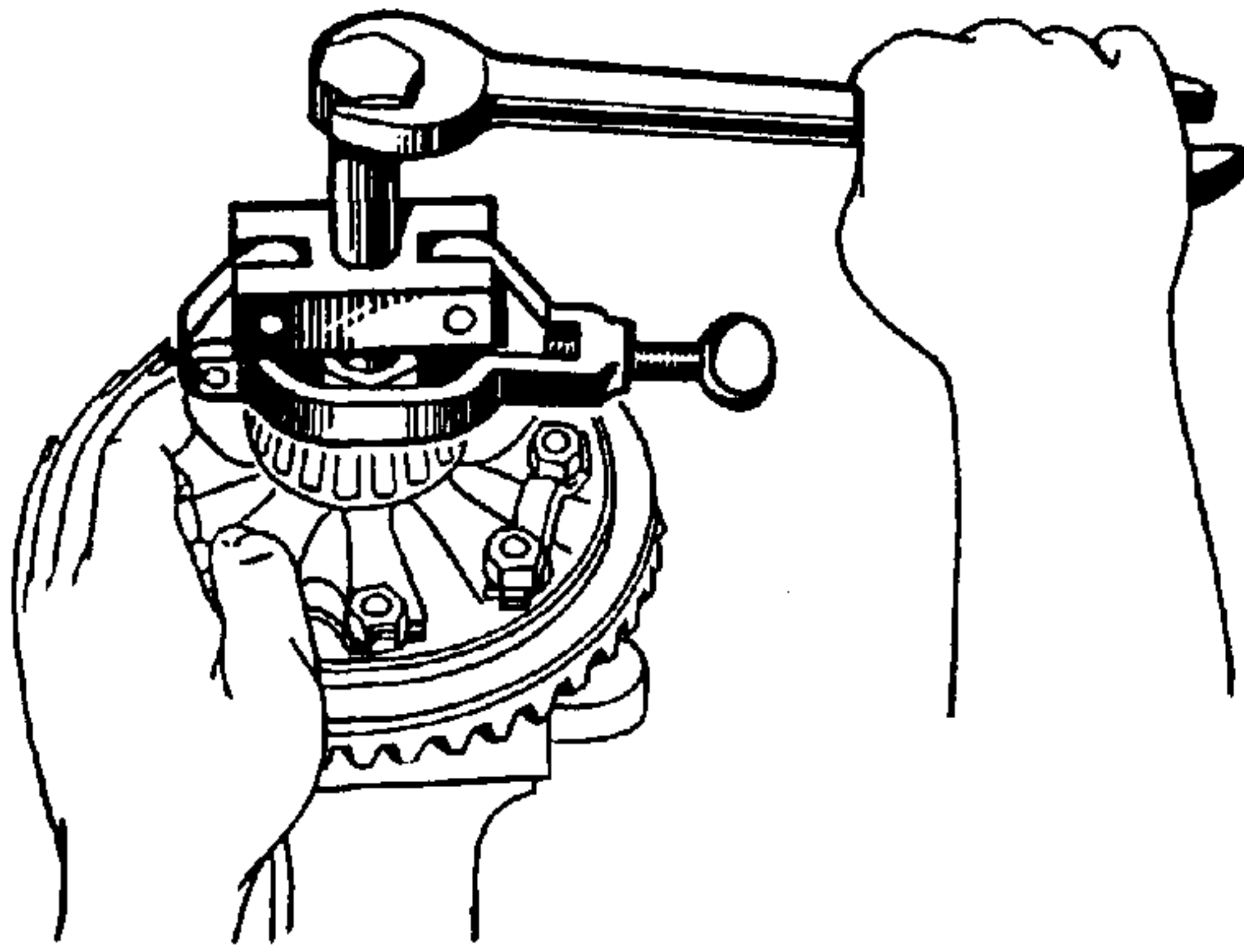


FIG. 13—REMOVING DIFFERENTIAL BEARING CONE

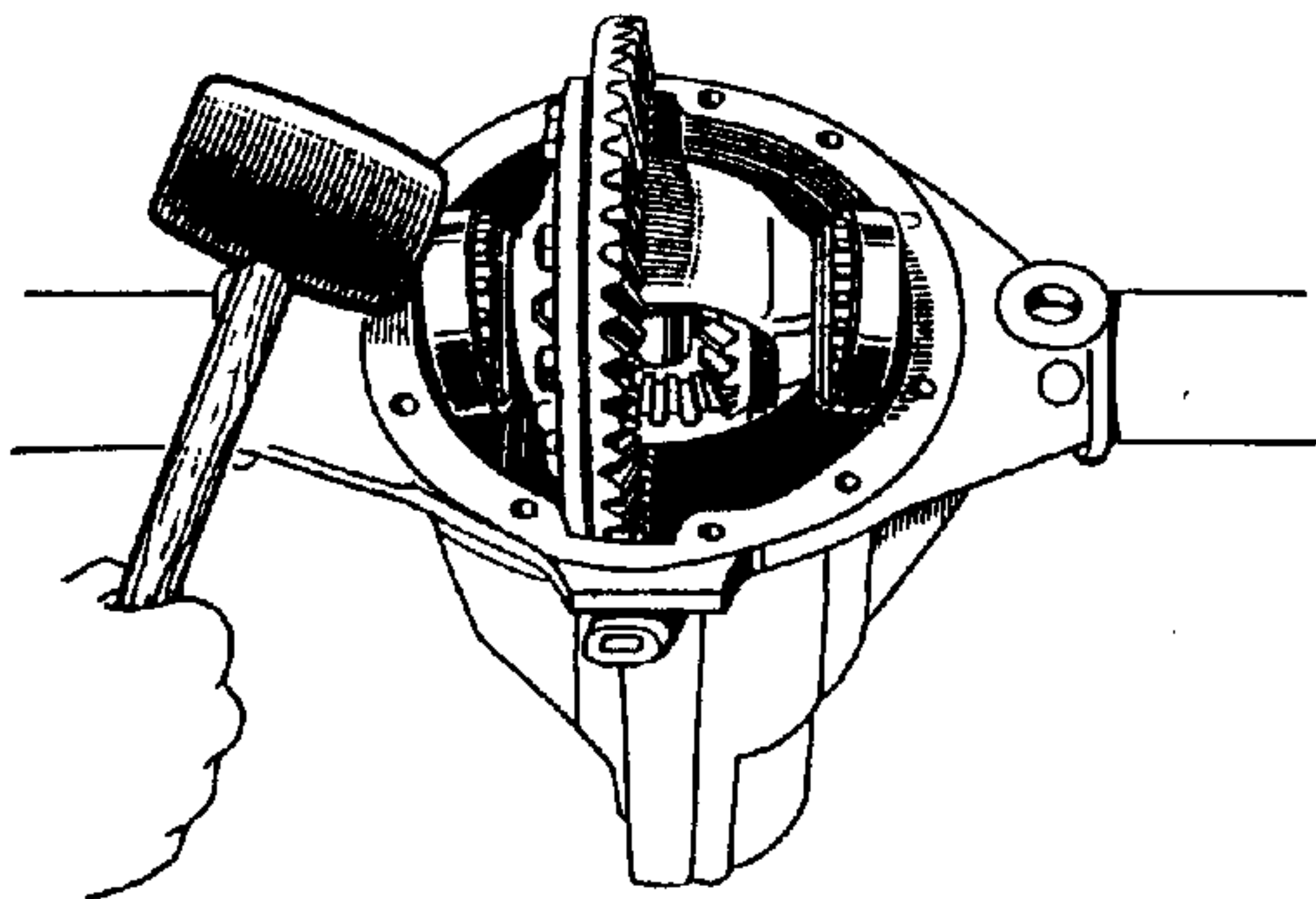


FIG. 14—INSTALLING DIFFERENTIAL

After the bearing cups are firmly in place in the housing, install the differential bearing caps. It is important that the caps be installed in the same position in which they were originally assembled. Each cap should be installed so numeral corresponds with the numeral on the housing. Torque wrench reading, 38-42 ft. lbs.

After securely tightening the differential bearing caps, check the back face of the ring gear for run-out, Fig. 15. Total indicator reading in an excess of .003" indicates a sprung differential case or an improperly installed bevel gear. In either case the assembly must be taken apart and rechecked thoroughly.

Total backlash between the bevel gear and pinion should be within .005" to .007". This can be checked by mounting a dial indicator on the rear axle housing with the button of the indicator against one of the gear teeth, Fig. 16. Moving the ring gear by hand will indicate the amount of backlash.

In the event the backlash is not within the limits mentioned above, it will be necessary to change the shims back of the differential case bearings. Changing the position of a .005" shim from one side to the other will change the amount of backlash approximately .0035"

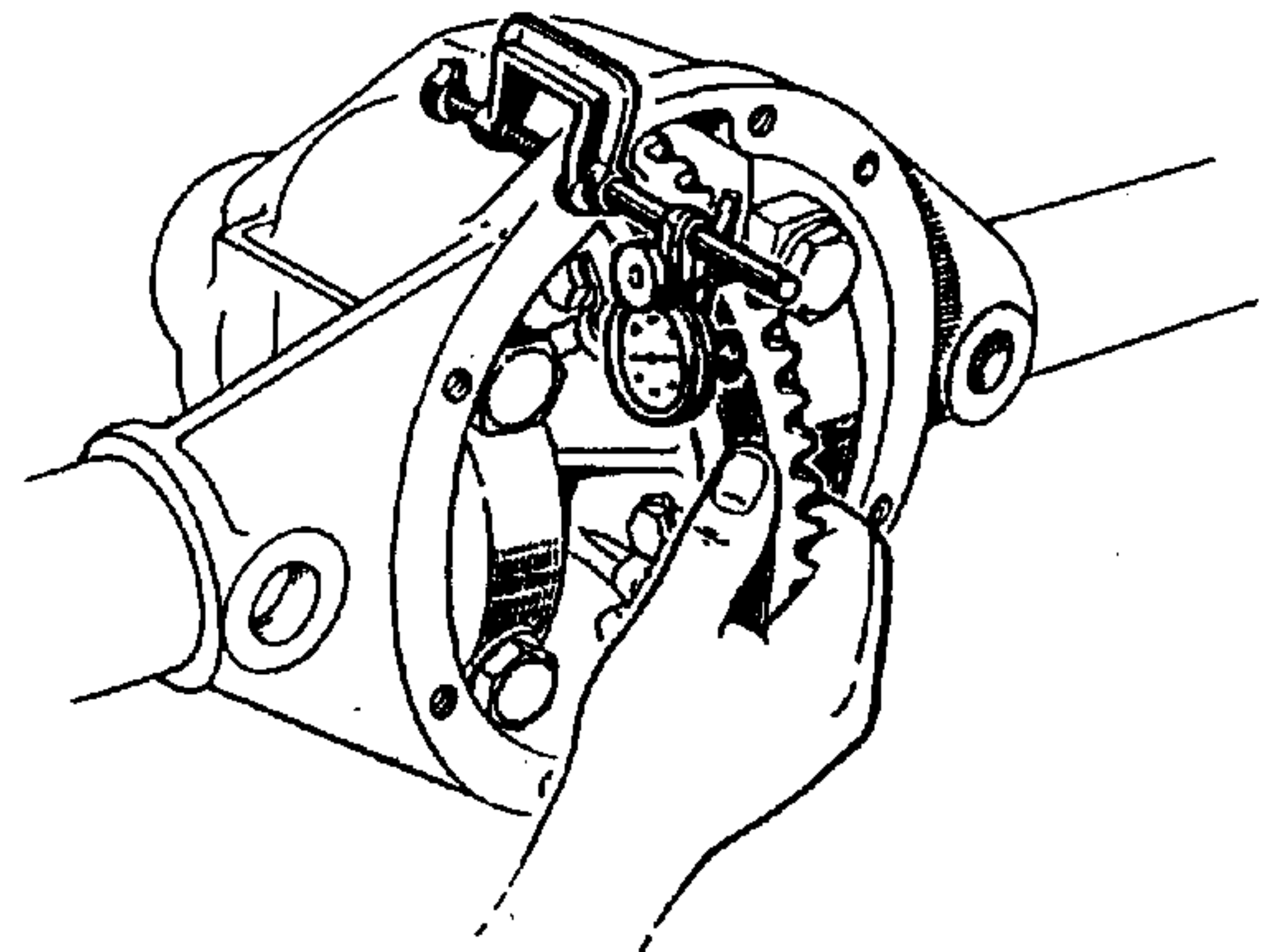


FIG. 15—CHECKING RUNOUT

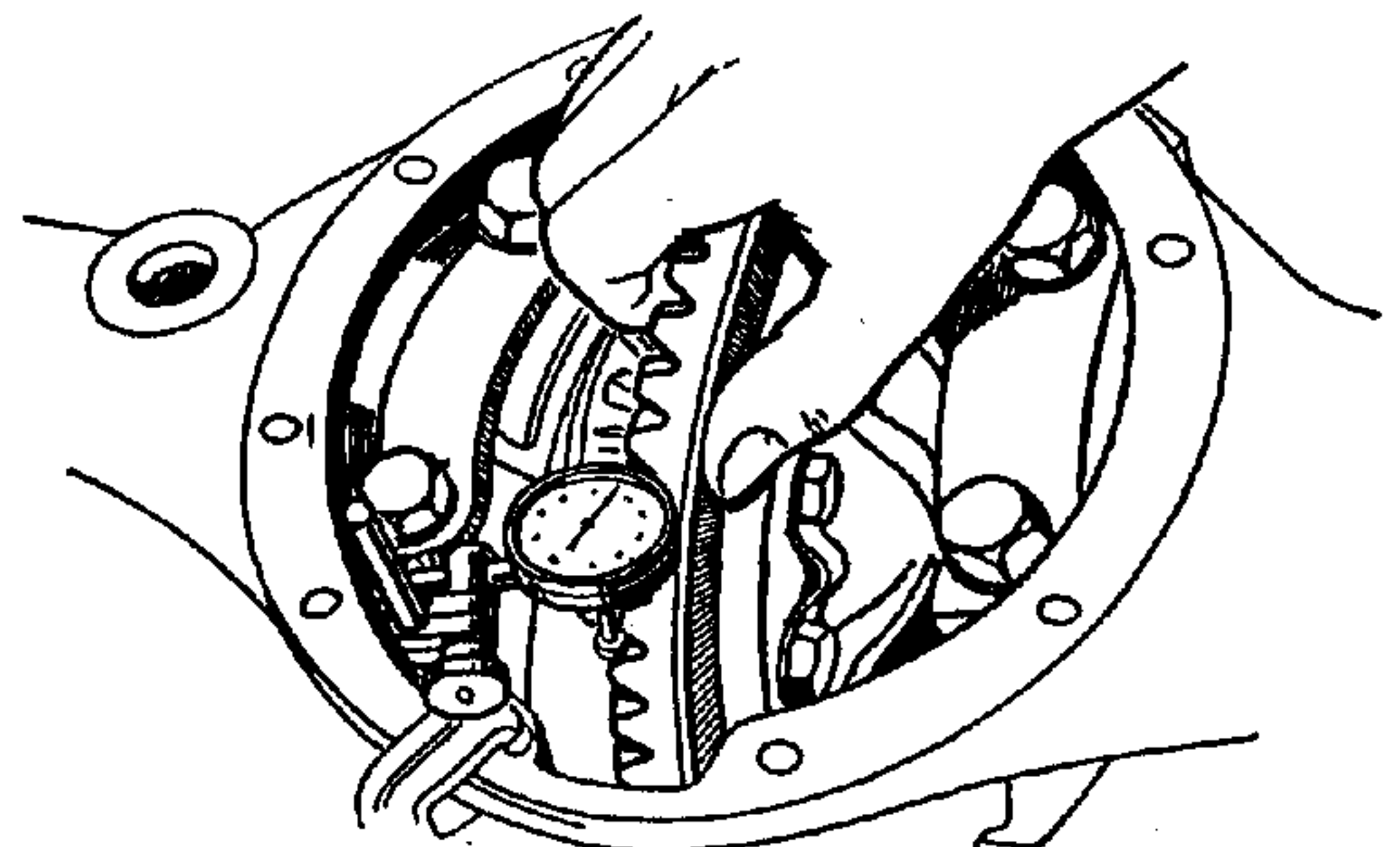


FIG. 16—CHECKING BACK-LASH

In order to assist in determining whether the gears are properly adjusted, paint the bevel gear with red lead or similar substance and turn the bevel gear so the pinion will make an impression on the teeth. Correct procedure to follow in the event of an unsatisfactory tooth contact is shown in Fig. 17.

After the differential has been assembled and adjusted, the pinion shaft oil seal should be installed. Remove universal joint flange and with oil seal replacing tool, Fig. 18 install oil seal. Fig. 19 gives dimensions of oil seal replacing tool. Install universal flange and tighten nut solidly in place, then install cotter pin.

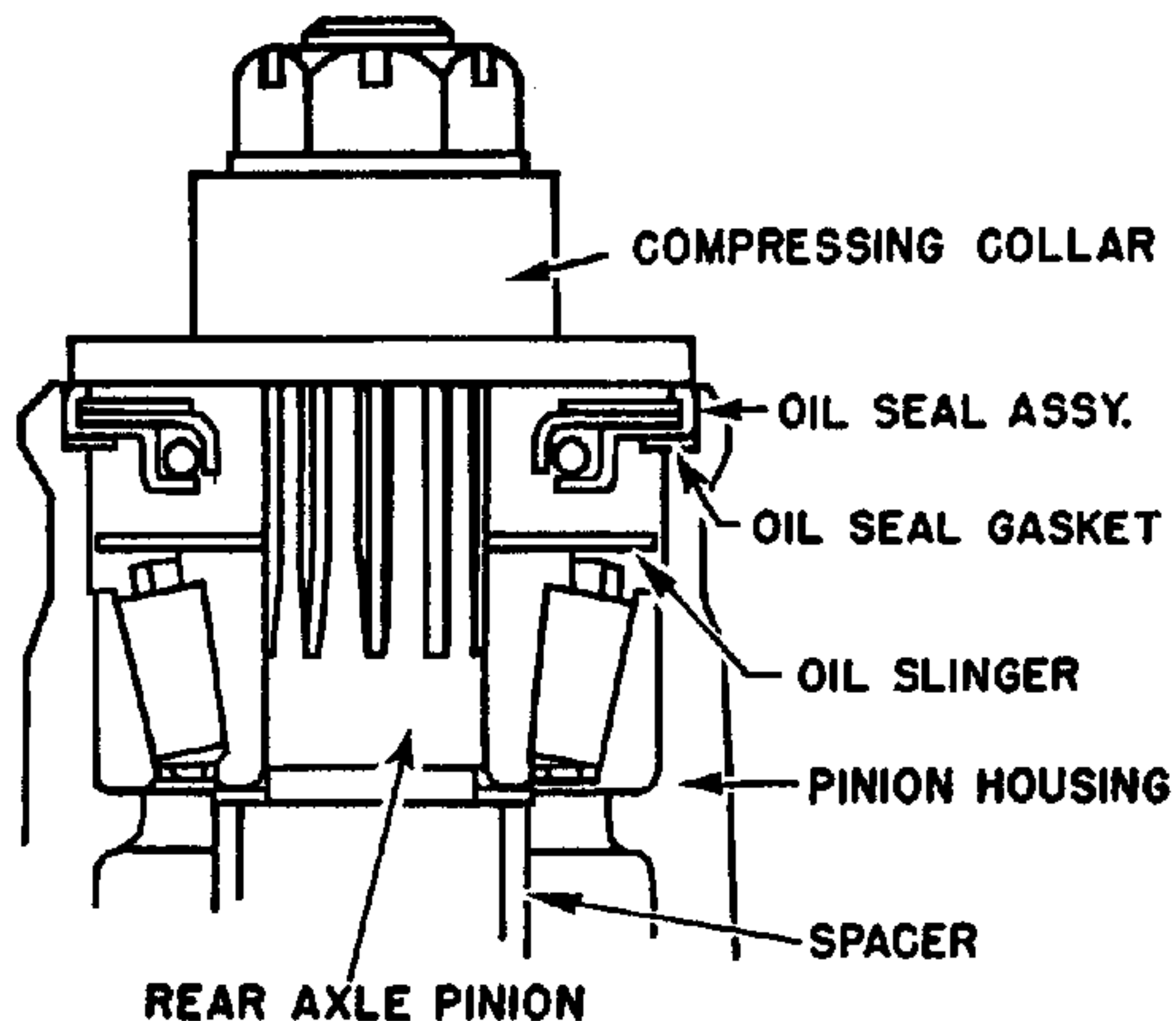
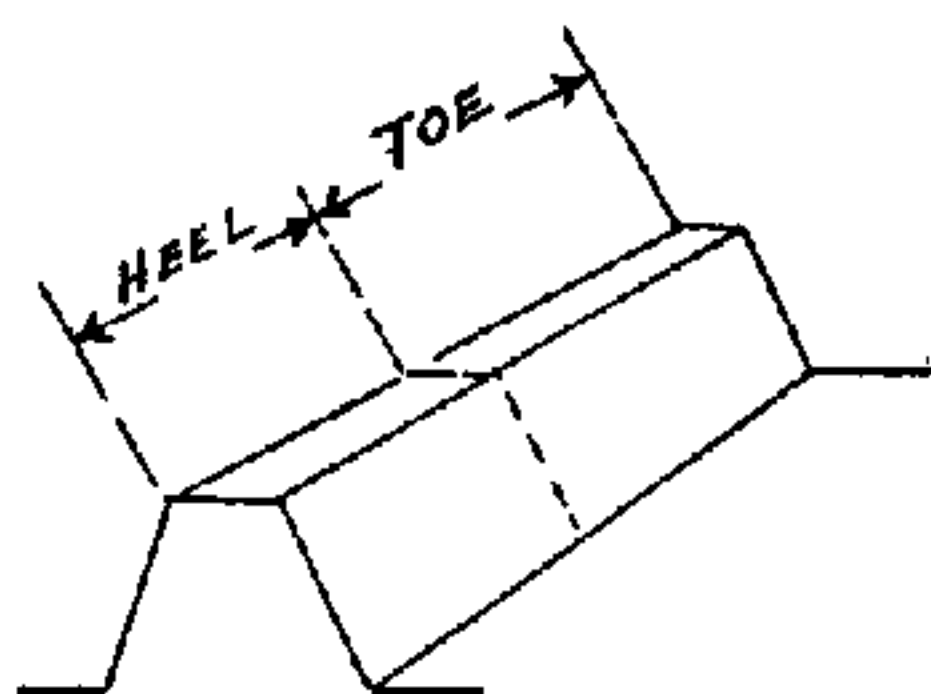
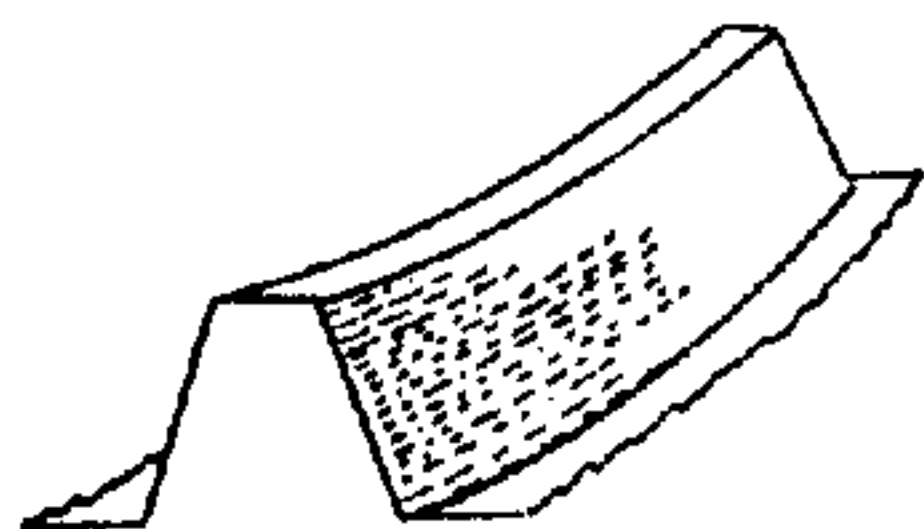
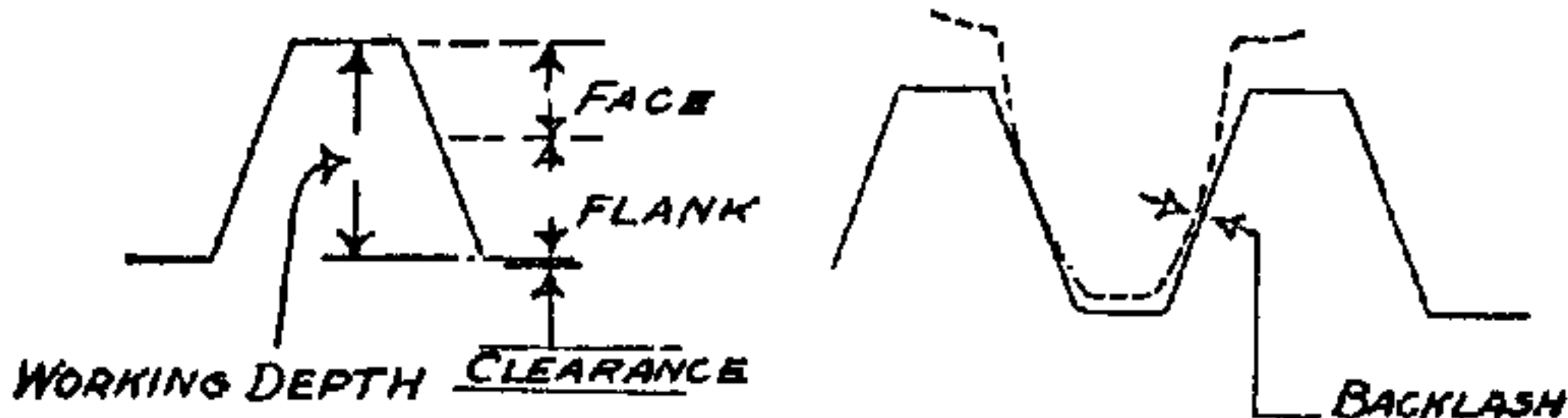


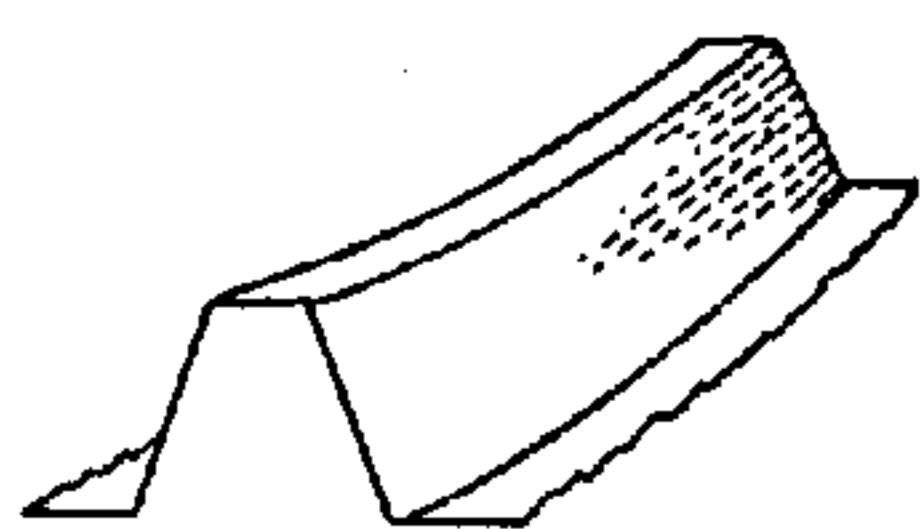
FIG. 18—INSTALLING PINION OIL SEAL



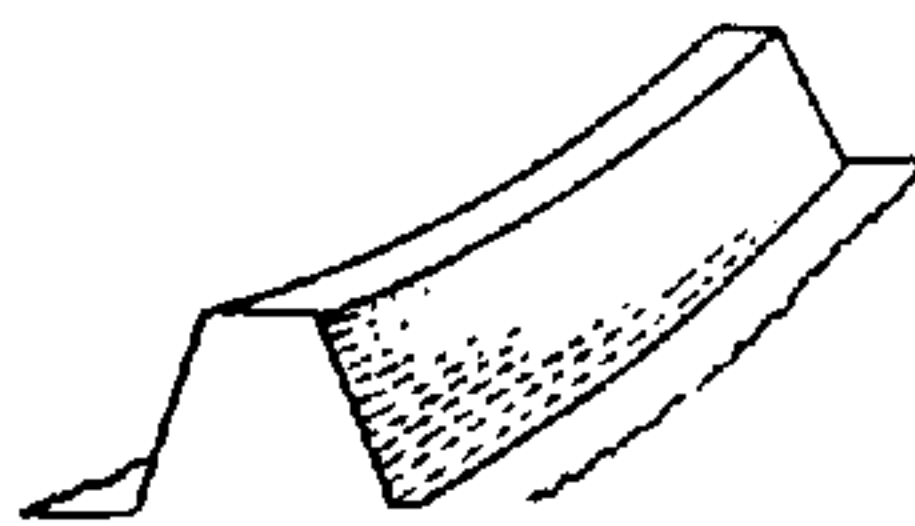
THE HEEL OF GEAR TOOTH IS THE LARGE END, AND THE TOE IS THE SMALL END.



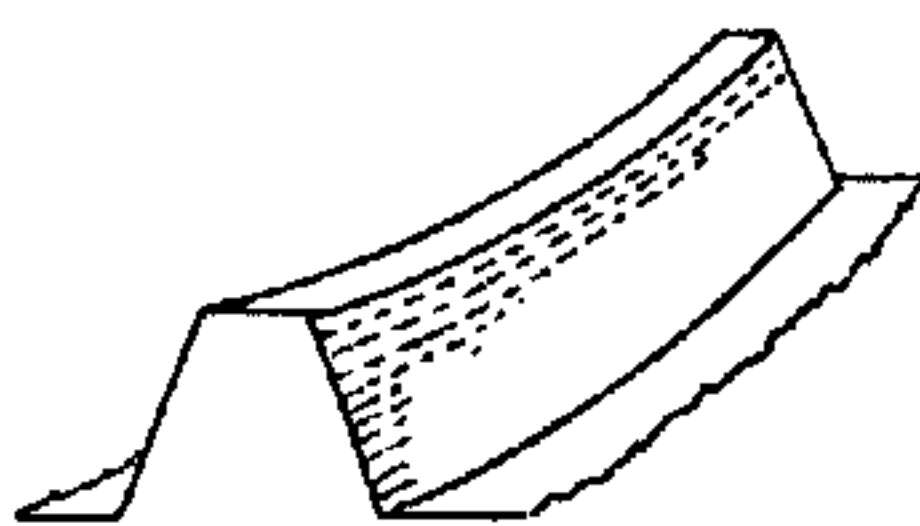
TOO MUCH BACK LASH
MOVE GEAR TOWARD PINION



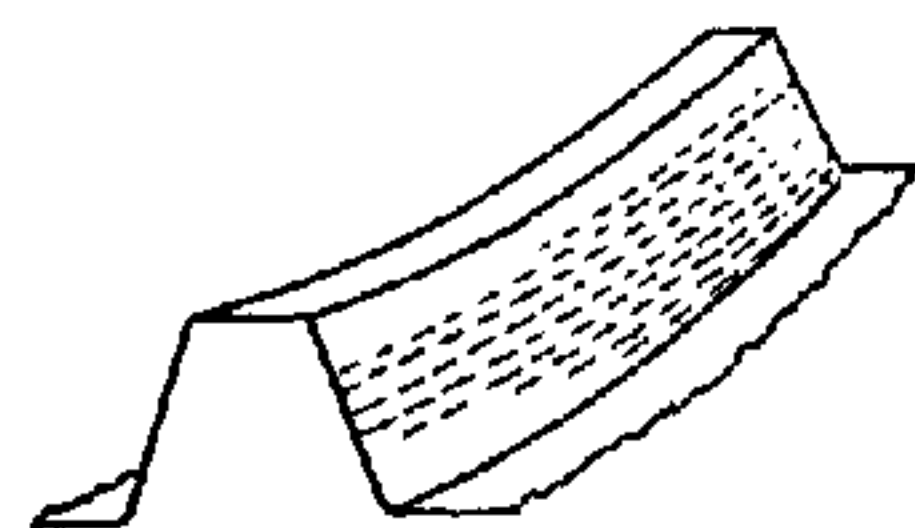
TOO LITTLE BACK LASH
MOVE GEAR AWAY FROM PINION.



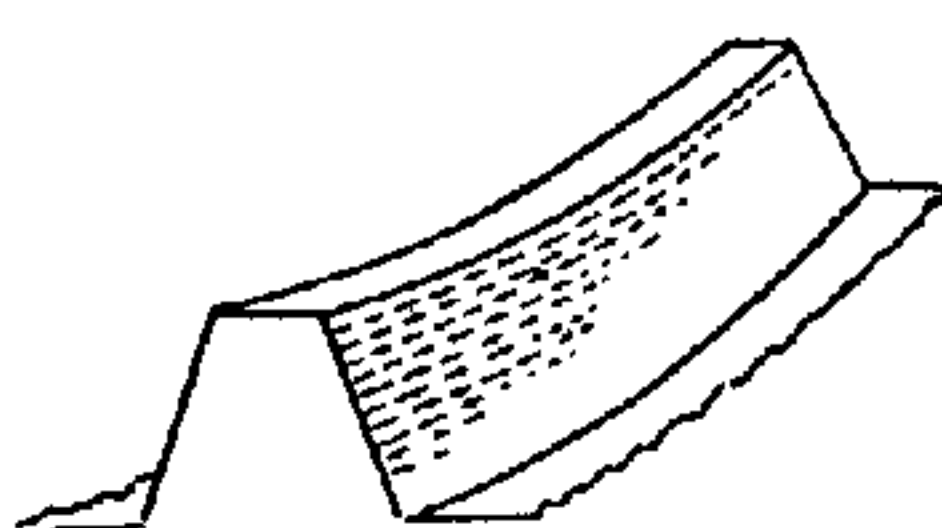
MOVE PINION OUT.



MOVE PINION IN.



CORRECT SETTING



COMPROMISE SETTING

FIG. 17—TOOTH CONTACT

Install axle shafts as instructed under "Axle Shaft" and replace housing cover with new gasket. Fill differential housing with proper amount of hypoid lubricant. See Lubrication Chart, Page 12.

Install axle under vehicle in reverse order of removal, after which bleed the rear brake cylinders to remove any air from the lines, first making certain that there is an ample supply of fluid in the brake master cylinder reservoir. See Section "Brakes" for further instructions.

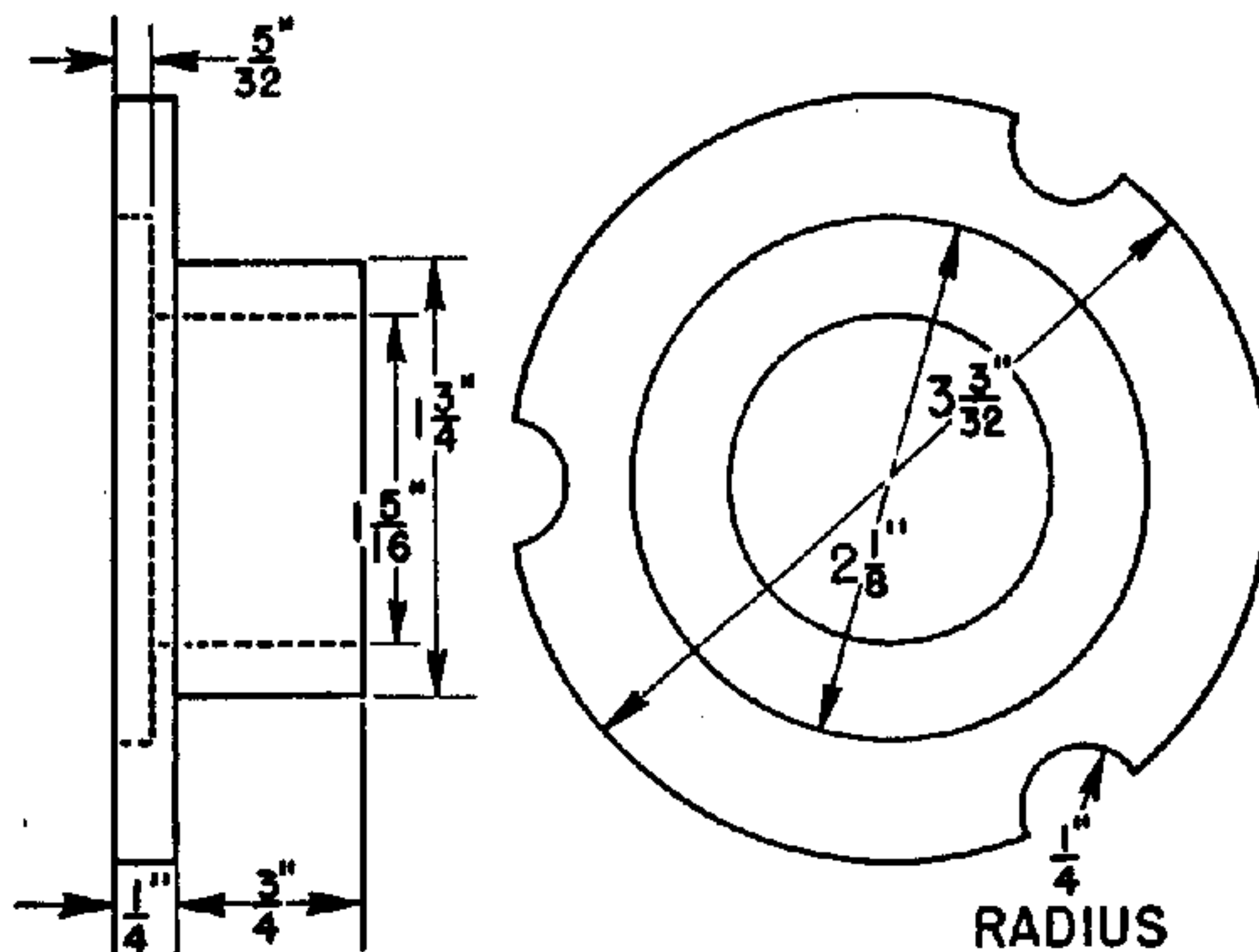


FIG. 19—OIL SEAL COMPRESSING COLLAR

REAR AXLE TROUBLES AND REMEDIES

SYMPTOMS

PROBABLE REMEDY

Axle Noisy on Pull and Coast

- Excessive back lash bevel gear and pinion.....Adjust
- End play pinion shaft.....Adjust
- Worn pinion shaft bearing.....Replace
- Pinion set too deep in ring gear.....Adjust
- Pinion and bevel gear too tight.....Adjust

Axle Noisy on Pull

- Pinion and bevel gear improperly adjusted.....Adjust
- Pinion bearings rough.....Replace
- Pinion bearings loose.....Adjust

Axle Noisy on Coast

- Excessive lash in bevel gear and pinion.....Adjust
- End play in pinion shaft.....Adjust
- Improper tooth contact.....Adjust
- Rough bearings.....Replace

Backlash

- Worn differential pinion gear washers.....Replace
- Excessive lash in bevel gear and pinion.....Adjust
- Worn universal joints.....Replace

Emergency

Should difficulty be experienced with differential or propeller shaft the vehicle may be driven in by removing the rear axle shafts and propeller shaft.

Place front wheel drive lever in rear (engaged) position. This will allow front wheel drive to propel the vehicle.

REAR AXLE SPECIFICATIONS

Rear Axle

- Type.....Full floating
- Make.....Spicer
- Drive.....Thru springs
- Road Clearance.....8⁷/₁₆"

Differential

- Type.....Hypoid
- Ratio.....4.88:1
- Bearings.....Timken Roller
- Differential Pinion Gears.....2
- Oil capacity.....See Lubrication Chart, Page 12
- Adjustment.....Shims .003", .005", .010", .030"

Pinion Shaft

- Bearings.....Two Timken Roller
- Adjustment.....Shims .003", .005", .010"

Bevel and Pinion Gear

- Back Lash......005"—.007"
- Adjustment.....Shims .003", .005", .010", .030"

Bearings

- Make—Differential Side.....Timken
- Cone and roller.....24780
- Cup.....24721
- Make—Pinion Shaft.....Timken
- Cone and roller.....Front 02872 Rear 31593
- Cup.....Front 02820 Rear 31520
- Shims......003", .005", .010", .030"
- Make—Wheel Hub.....Timken
- Cone and Roller.....Inner 18590 Outer 18590
- Cup.....Inner 18520 Outer 18520