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The **ARMY MOTORS**

VOLUME 2

AUG. 15 1941

NUMBER 5

THE HOLABIRD QUARTERMASTER DEPOT

MOTOR TRANSPORT SCHOOL

BALTIMORE MD.

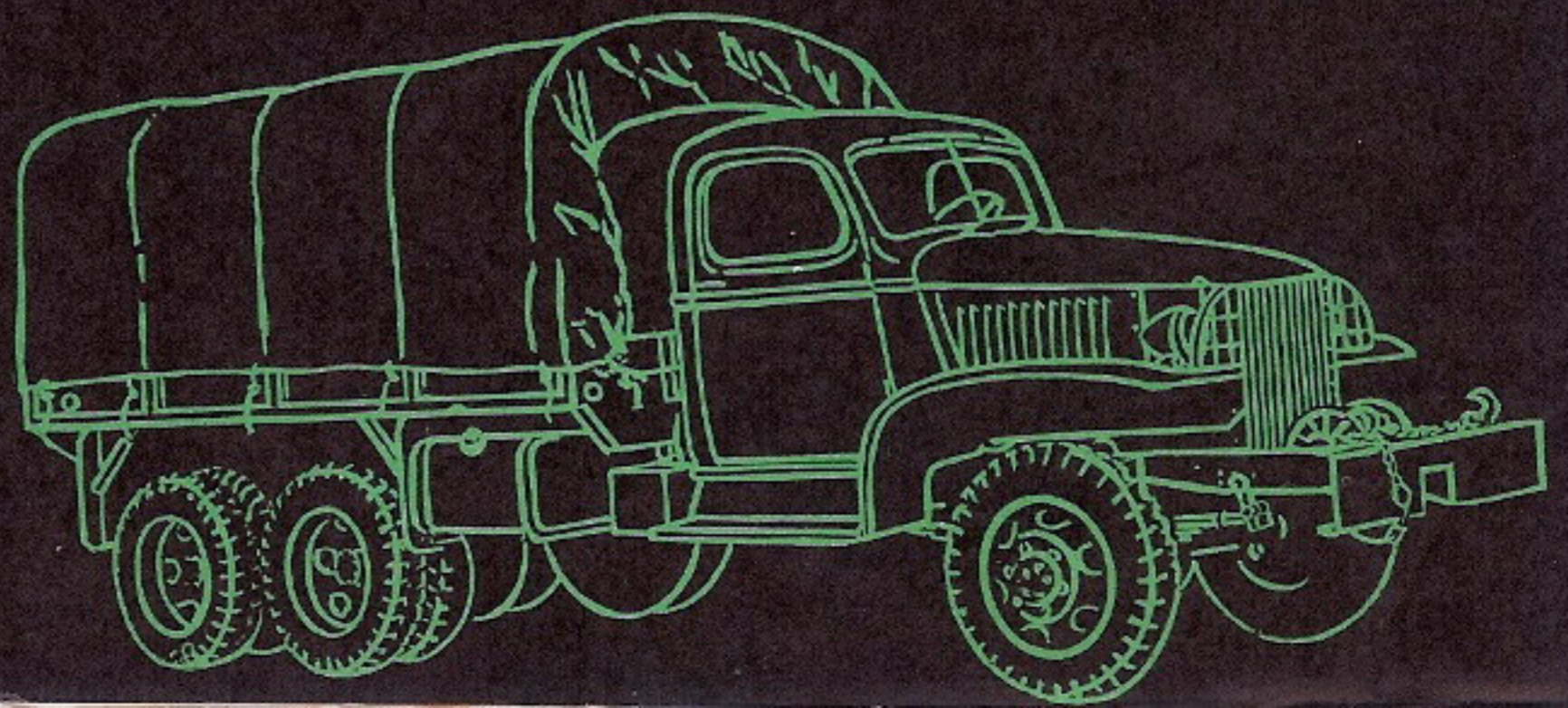
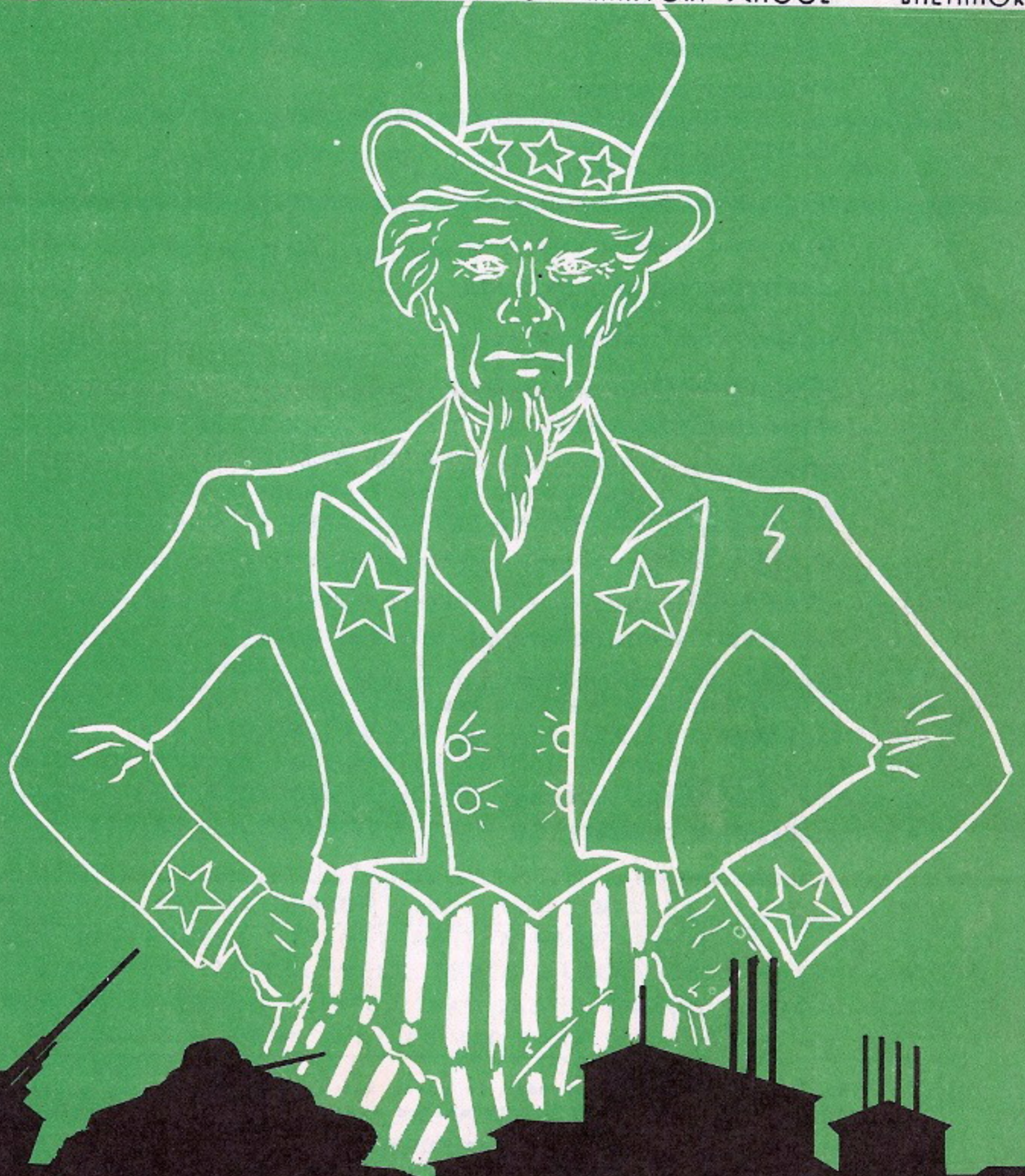


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THE 'AM is primarily intended to cover all angles of military motor transportation. Heretofore copies have been gladly mailed directly to all organizations and units.

The subscription list has grown so large, however, that it is a problem, with the limited personnel available, to maintain accurate records and promptly deliver THE 'AM on the 15th of each month.

So, in the future, it will be necessary to send issues to regimental commanders, or in the case of *separate* battalions, squadrons, companies, troops or batteries, to the commanders of those units. Copies will be marked for the attention of the motor transport officer, and sent in the following amounts:

For a regiment.....	15 copies
For a <i>separate</i> battalion or squadron.....	5 copies
For a <i>separate</i> company, battery or troop.....	3 copies

Due to the limited reproduction facilities available, and in order to have THE 'AM reach personnel interested and serve the purpose for which it is intended, it is suggested that the motor transport officer of the unit distribute the copies to best meet the needs of motor transport.



THE JAM

VOLUME 2

AUGUST 15, 1941

NUMBER 5

THE BIG PARADE

WE HAVE BEEN THINKING BACK ON ONE OF THE GOOD MOVIES OF THE PAST — "THE BIG PARADE." WE RECALL SEVERAL OF THE BATTLE SCENES — AND THEY WERE TERRIFIC — BUT WHAT WE HAVE BEEN THINKING ABOUT IS HOW THE VERY NAME OF THE PICTURE, WHICH SEEMED SO APT AT THE TIME, SERVES NOW TO WARN US HOW GREATLY THE TECHNIQUE OF WAR HAS CHANGED. YOU PERHAPS REMEMBER THAT THE TITLE OF THE MOVIE WAS TAKEN FROM THE TRUCK CONVOY THAT STARTED THE BIG PARADE OF AMERICAN TROOPS TO THE FRONT LINES.

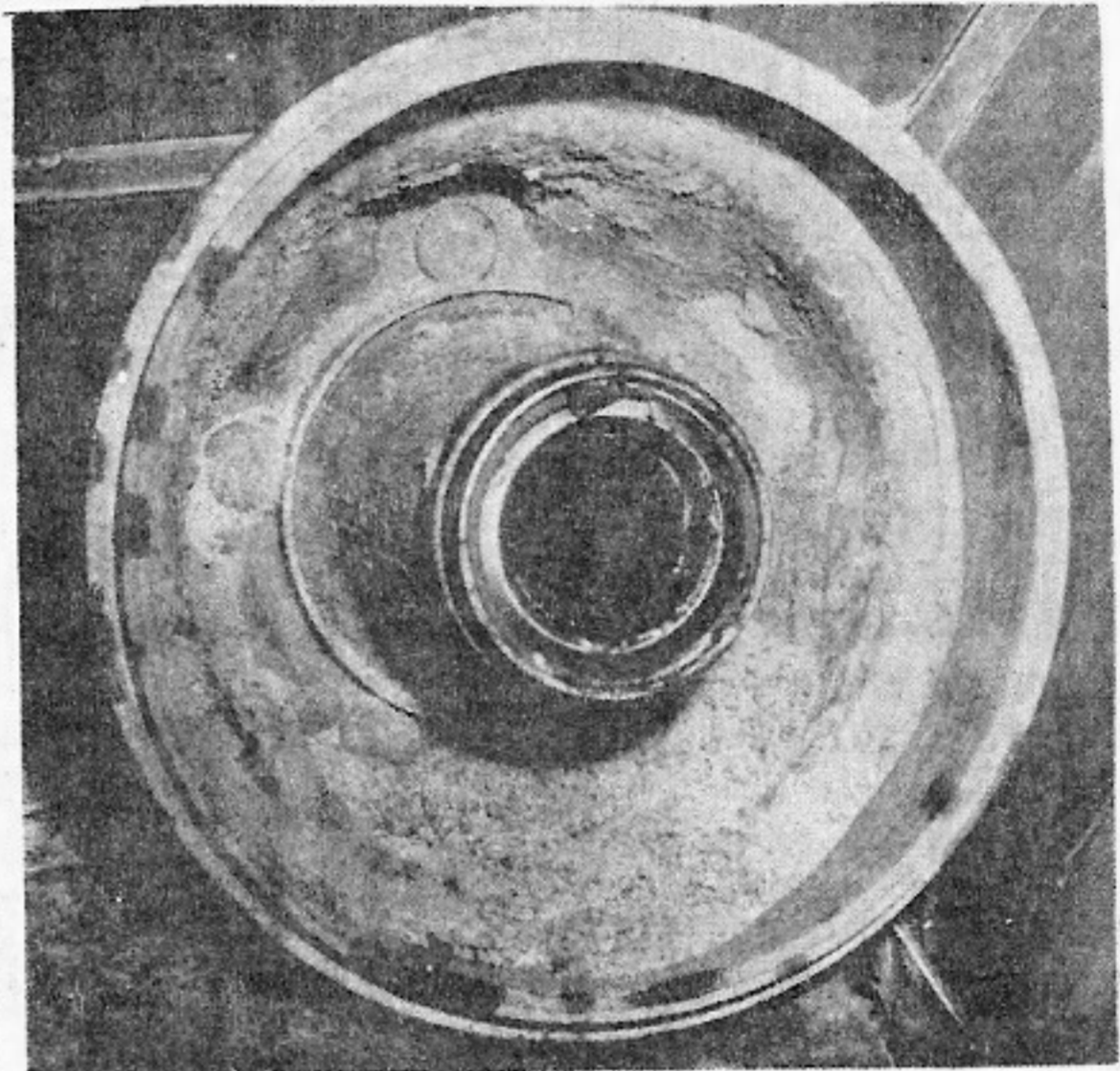
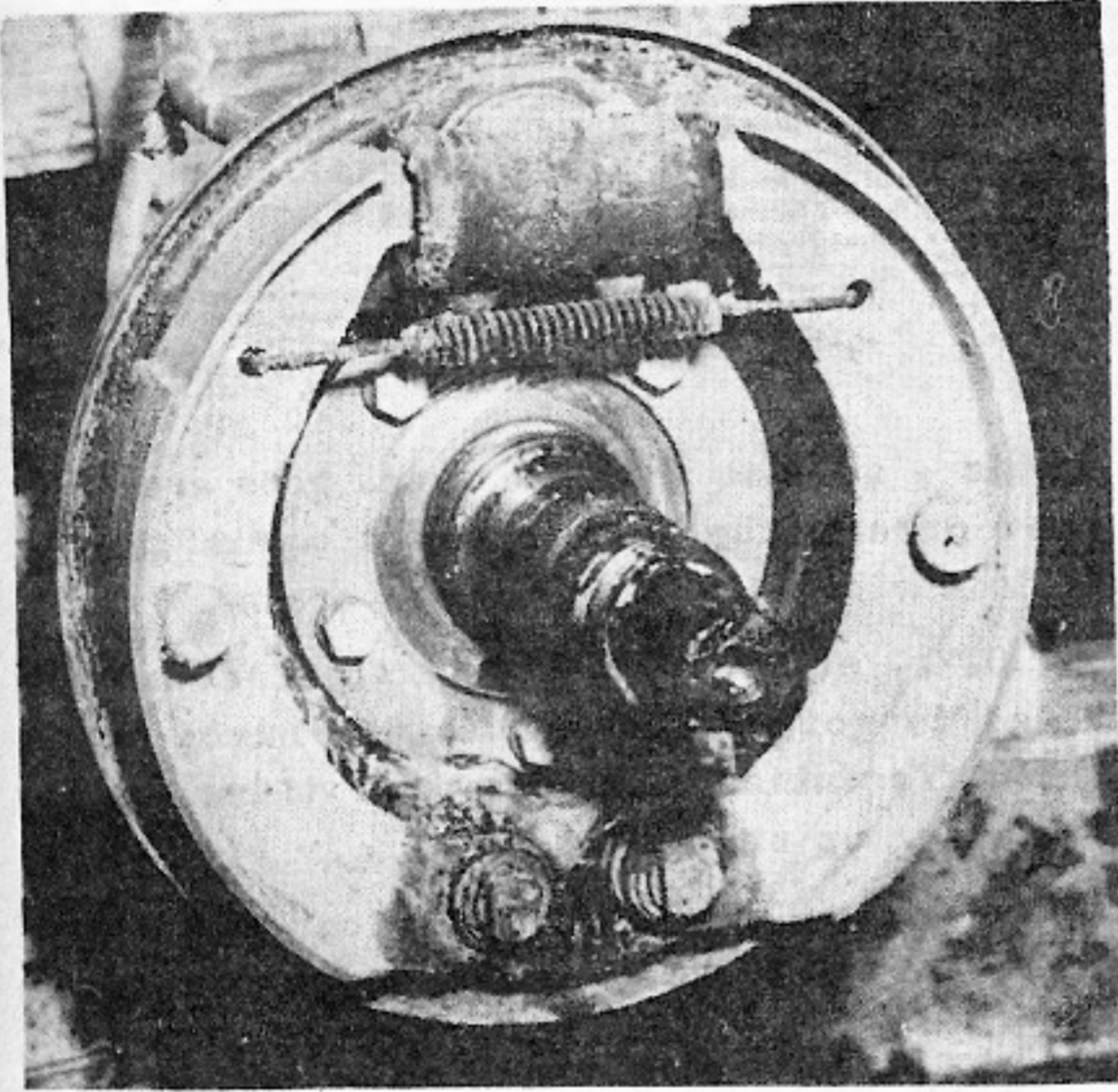
BEFORE THIS MAMMOTH CONVOY BEGINS, THE MOVIE IS CONCERNED WITH INDIVIDUALS' ACTIONS, BUT SUDDENLY THESE INDIVIDUALS ARE SWALLOWED UP BY THE MASS MOVEMENT OF TROOPS AND AT LAST EVEN THESE MASSES OF MEN ARE LOST AMID THE ENDLESS RANKS OF THE BIG PARADE. WE PASS WITH TERRIBLE SPEED FROM MAN TO MASS TO MACHINE. AS THE PICTURE REACHED ITS CLIMAX IT FADED OUT IN A VISION, AS FAR AS THE EYE COULD SEE, OF AN ENDLESS PROCESSION OF TRUCKS ROLLING IN UNISON THROUGH VILLAGES AND OPEN COUNTRY, OVER HILLS AND DOWN VALLEYS, THROUGH RAIN AND MUD AND GATHERING DARK, PRESSING RELENTLESSLY ON — MOVING UP — MOVING UP IN FORMATION.

BUT TODAY THIS IS NO BIG PARADE — NO TROOPS MOVING MAJESTICALLY TO A SHARPLY DEFINED FRONT. THERE ISN'T A FRONT ANYMORE. AND IT ISN'T A PROCESSION, BUT A PELL-MELL THREE DIMENSIONAL RUSH THAT BLUDGEONS THROUGH AT STRATEGIC POINTS, THAT DASHES AROUND FLANKS, THAT SWOOPS SWIFTLY THROUGH THE ENEMY'S LINES AND TOWARD THE REAR, KNIFING AT HIS SUPPLY AND COMMUNICATIONS.

INSTEAD OF MASSES MOVING SLOWLY IN CONCENTRATED FORMATIONS, WE HAVE INDIVIDUAL FORAYS BY MECHANIZED TROOPS THAT THUNDER ALONE. ISOLATED DETACHMENTS, EACH WITH ITS OWN PROBLEM OF MAINTENANCE AND SUPPLY, RANGE AT LARGE OVER HUNDREDS OF MILES. SKIRMISHES, BATTLES, BLAZING HERE AND THERE, TOTAL TOGETHER TO MAKE THE CAMPAIGN. TO SUCCESSFULLY CONDUCT SUCH A WAR OF MANEUVER, REQUIRES NOT ONLY ORGANIZATIONAL GENIUS TO PLAN THE WHOLE, BUT INDIVIDUAL PLANNING AND LEADERSHIP TO CARRY OUT THE SMALLER UNIT ASSIGNMENTS. "CONFUSION PAST CONFUSION WORSE CONFOUNDED GROWS" AS THE HOSTILE ARMIES CLASH AND TANGLE; PLUNGE TO EACH OTHER'S REAR; ENGULF EACH OTHER; CUT OFF ONE FROM THE OTHER.

THE "BIG PARADE" WINDING TO A FRONT OF STABILIZED TRENCH WARFARE, HAS BECOME THE HUNDRED RING CIRCUS OF THE BLITZKRIEG. TREMENDOUS MASSES OF MACHINES — TANKS, SCOUT CARS, "JEEPS", TRUCKS AND WHAT NOTS — MOVE MECHANICALLY OVER VAST BATTLE AREAS.

My dough-heads look too clean . . . the truck is washed but there ain't been no trucks washed in the garage all afternoon.. the wheel is laced with sand, nice silica sand to ruin the brake linings, scratch up the brake drums, ruin the bearings by mixin' with the wheel-bearing grease.



To prove the article is straight goods, here's a couple close ups showing how much sand got into the wheel after the truck was washed in the creek and how much damage it was in a position to do. The shot on the other page is more of the same.

Sure, you guessed it, they took the truck down to a creek and washed it, a sandy-bottom creek. Thought they'd take a little frolic in the water at the same time.

What? Sure army trucks are tough and got to plow through mud. But mud don't sift in like sand.

And besides, you gotta give 'em a little care. A clay or rock bottom creek woulda been all right to wash it in, if it wasn't deep enough to drown the wheel. Grease washes out. When they put in a high-pressure hose on a truck, they gotta keep it away from the lubrication fittings. Otherwise, the grease swims out and dust gets in. You wouldn't want dust and grit in your watch, would you?

* * * * *

But gettin' back to teachin' these zombies somethin' about preventive maintenance: J'ever see a wheel with about half

a keg of grease thrown into it from the universal joint?

Show it to these monkeys and right away they say, "The oil seals ain't no good!"

The oil seals! You put enough pressure behind Boulder Dam and it'll break.

That's what they do: fill up the universal joint 'till it screams uncle. What's more, they use a lube that's too light.

Then, when the joint starts movin' the grease gets warm, and starts expandin'.

When you gotta go, you gotta go. That's what the grease does. It goes right along the shaft, squirts around the corner and goes up to the wheel bearing oil seal, busts through it and keeps right on goin' into the brake.

With the pumpin' action in the universal, it ain't no time at all 'til the joint's pumped clean of lube.

Goodbye universal joint. Goodbye brake linin's. Good-bye oil seal.

I tell my dough-heads a million times: pack the universal with No. 2 year around. Then all you have to do is give 'er a few shots of grease about every thousand miles; leavin' the lower plug on the joint open so you know to stop when the grease starts

(Turn to page 141)

Weather Forecast
Fair and warmer today; gradually fair and
warm tomorrow; gentle shower
tonight and tomorrow.
Wednesday's temperature: High 82, low 61.
Altitude on Page 20.

111



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4 A.M.

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NEGLECTED TIRE RUINS AXLE

**PROPERTY BILL
PASSES SENATE,
GOES TO HOUSE**

Roosevelt Would Get Power To Seize Private Holdings For Defense

Limitations Placed On Conscription—Damage



**ROOSEVELT TALK SPEEDS
DRAFT CHANGE**

Congress Expected To Declare Emergency In Wake Of News

Senate Gets Resolution Giving President New Powers

**Panama Shipping Curtailed:
Japanese Are Affected Most**

Welles Says Repairs Are Going On; Tokuo Craft Leave, Presumably To Circle Horn

By the Associated Press
Washington, July 21—A dispatch from Panama, July 21, says that the Panama Canal was closed to traffic for several days by the failure to repair a break in the Panama Canal.

**BOLIVIAN ARMY
OFFICERS HELD
IN NAZI PLOT**

Military Chiefs And German Citizens Reported Arrested As Probe Goes On

Arms And Ammunition Declared Imported By Reich Firm Seized

By the Associated Press
Washington, July 21—A dispatch from La Paz, Bolivia, July 21, says that military officers and German citizens were arrested in La Paz, Bolivia, as a result of a probe into a plot to overthrow the Bolivian government.

**Colombian
Editor Slain**

By the Associated Press
Washington, July 21—A dispatch from Bogota, Colombia, July 21, says that a Colombian editor was shot and killed in Bogota, Colombia, on July 20.

**ODD PRESSURES
DIRECT CAUSE OF
PINION FAILURES**

**ALL DRIVERS CAUTIONED TO
CHECK ROLLING RADIUS AND
AVOID BREAKDOWNS**

By the Associated Press
Washington, July 21—A dispatch from Bogota, Colombia, July 21, says that a number of drivers were cautioned to check their rolling radius and avoid breakdowns.

Up to now, the cry has been, "Double the life of your tires by keeping them properly inflated." But today, Eustace, the program is gonna be different. We're going to relate the sad tale of where good little axles go when the tires are under-inflated.

Let's start with the loaded rolling radius. This you can measure by drawing a line from the center of the wheel to the ground. O.K., don't measure it, but remember it's important because it determines the circumference of the tire. Now, if one of the rear tires has less air in it than the other, it's going to have a smaller circumference. This means it's going to revolve more times per mile than its buddy.

In other words, say the right hand tire is properly inflated and has a loaded rolling radius of 16 inches, making 633 revolutions per mile. The left hand tire is underinflated and has a loaded rolling radius of only 15½ inches.

Voilà! we got the left-hand tire making 651 revolutions per mile or 18 revolutions more per mile than the right-hand tire. Thusly, in a 500 mile run, the left-hand wheel will make nearly 10,000 revolutions more than the right-hand wheel.

In this case you'd expect the left-hand wheel to arrive home about twenty minutes before the rest of the truck.

You'd expect it, that is, if you didn't know all about the differential which takes up the difference in speed between the

wheels - so that when the truck goes around the corner, the inside wheel marks time while the outside wheel swings around.

O.K., everybody's happy; the left-hand wheel is going faster than the right and the differential is making everything cozy by taking up the slack.

But - and here's the question - can the differential take it? - for very long, we mean.

Well, the differential has four little pinions that do the work of taking up the slack. They come into play normally when the truck takes a corner or a curve. With the proper lubrication, they'll keep doing this for the life of the truck.

But with one wheel going faster than the other, the pinion and side gears are called upon to operate continuously.

They are not built to operate continuously and they are not supposed to be mistreated like that.

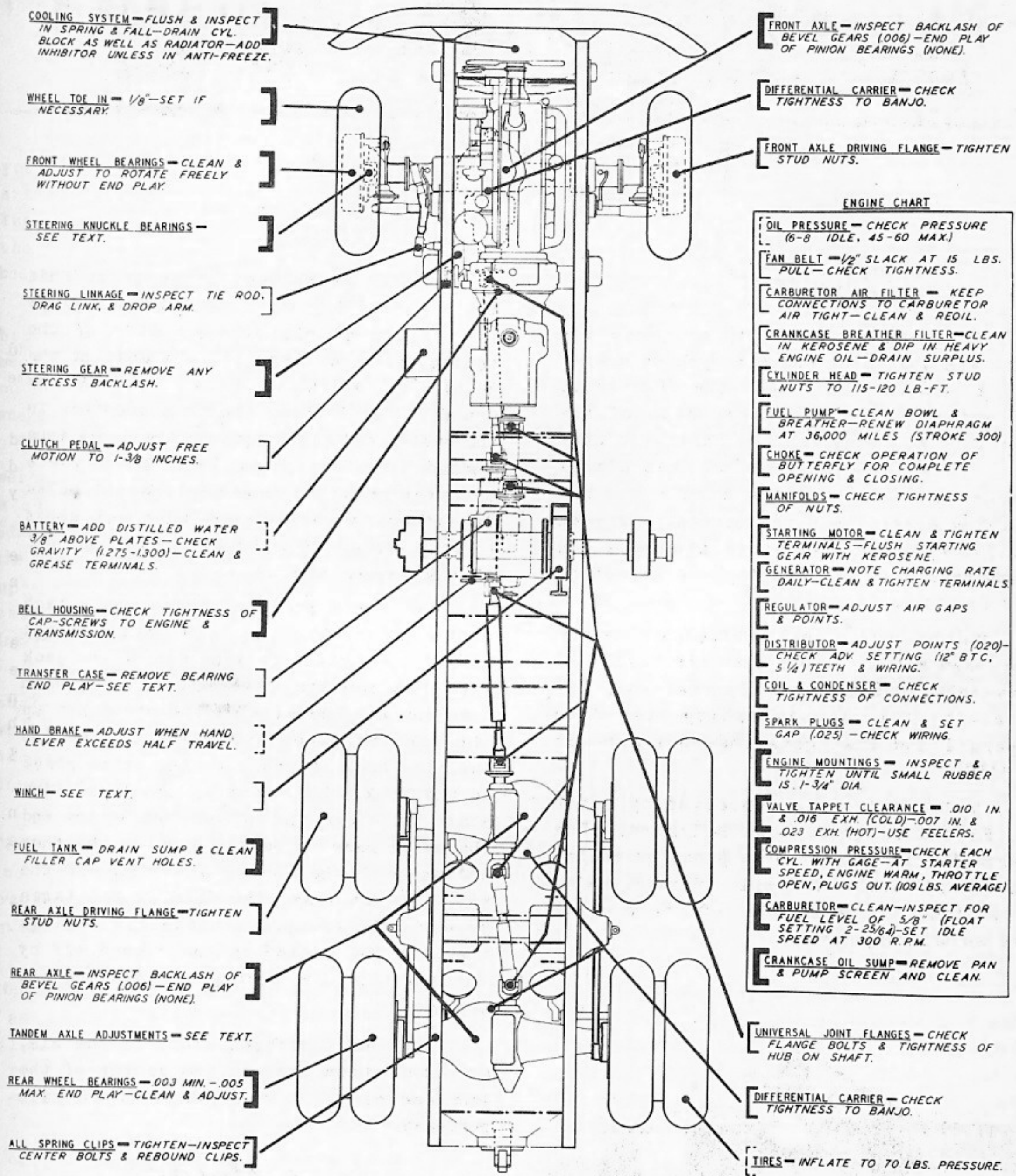
So, operating continuously under load, the pressure of the differential pinions against their bearings on the differential spider becomes excessive, the film of lube breaks down and destruction of the differential part follows.

In many cases, the pinions freeze to the spider and the pinion or side gear breakage results. Replacement of the entire differential assembly is expensive.

* * * *

'Nough said, Gentlemen, check your tires.

A TYPICAL ADJUSTMENT DIAGRAM FOR A 6 X 6 TRUCK



COOLING SYSTEM—FLUSH & INSPECT IN SPRING & FALL—DRAIN CYL. BLOCK AS WELL AS RADIATOR—ADD INHIBITOR UNLESS IN ANTI-FREEZE.

WHEEL TOE IN = $\frac{1}{8}$ "—SET IF NECESSARY.

FRONT WHEEL BEARINGS—CLEAN & ADJUST TO ROTATE FREELY WITHOUT END PLAY.

STEERING KNUCKLE BEARINGS—SEE TEXT.

STEERING LINKAGE—INSPECT TIE ROD, DRAG LINK, & DROP ARM.

STEERING GEAR—REMOVE ANY EXCESS BACKLASH.

CLUTCH PEDAL—ADJUST FREE MOTION TO $1\text{--}3\frac{3}{8}$ INCHES.

BATTERY—ADD DISTILLED WATER $\frac{3}{8}$ " ABOVE PLATES—CHECK GRAVITY (1.275-1.300)—CLEAN & GREASE TERMINALS.

BELL HOUSING—CHECK TIGHTNESS OF CAP-SCREWS TO ENGINE & TRANSMISSION.

TRANSFER CASE—REMOVE BEARING END PLAY—SEE TEXT.

HAND BRAKE—ADJUST WHEN HAND LEVER EXCEEDS HALF TRAVEL.

WINCH—SEE TEXT.

FUEL TANK—DRAIN SUMP & CLEAN FILLER CAP VENT HOLES.

REAR AXLE DRIVING FLANGE—TIGHTEN STUD NUTS.

REAR AXLE—INSPECT BACKLASH OF BEVEL GEARS (.006)—END PLAY OF PINION BEARINGS (NONE).

TANDEM AXLE ADJUSTMENTS—SEE TEXT.

REAR WHEEL BEARINGS—.003 MIN.—.005 MAX. END PLAY—CLEAN & ADJUST.

ALL SPRING CLIPS—TIGHTEN—INSPECT CENTER BOLTS & REBOUND CLIPS.

FRONT AXLE—INSPECT BACKLASH OF BEVEL GEARS (.006)—END PLAY OF PINION BEARINGS (NONE).

DIFFERENTIAL CARRIER—CHECK TIGHTNESS TO BANJO.

FRONT AXLE DRIVING FLANGE—TIGHTEN STUD NUTS.

ENGINE CHART

OIL PRESSURE—CHECK PRESSURE (6-8 IDLE, 45-60 MAX.)

FAN BELT— $\frac{1}{2}$ " SLACK AT 15 LBS. PULL—CHECK TIGHTNESS.

CARBURETOR AIR FILTER—KEEP CONNECTIONS TO CARBURETOR AIR TIGHT—CLEAN & REOIL.

CRANKCASE BREATHER FILTER—CLEAN IN KEROSENE & DIP IN HEAVY ENGINE OIL—DRAIN SURPLUS.

CYLINDER HEAD—TIGHTEN STUD NUTS TO 115-120 LB.-FT.

FUEL PUMP—CLEAN BOWL & BREATHER—RENEW DIAPHRAGM AT 36,000 MILES (STROKE 300)

CHOKE—CHECK OPERATION OF BUTTERFLY FOR COMPLETE OPENING & CLOSING.

MANIFOLDS—CHECK TIGHTNESS OF NUTS.

STARTING MOTOR—CLEAN & TIGHTEN TERMINALS—FLUSH STARTING GEAR WITH KEROSENE.

GENERATOR—NOTE CHARGING RATE DAILY—CLEAN & TIGHTEN TERMINALS

REGULATOR—ADJUST AIR GAPS & POINTS.

DISTRIBUTOR—ADJUST POINTS (.020)—CHECK ADV. SETTING (12° BTC, $5\frac{1}{2}$ TEETH & WIRING).

COIL & CONDENSER—CHECK TIGHTNESS OF CONNECTIONS.

SPARK PLUGS—CLEAN & SET GAP (.025)—CHECK WIRING.

ENGINE MOUNTINGS—INSPECT & TIGHTEN UNTIL SMALL RUBBER IS $1\text{--}3\frac{1}{4}$ DIA.

VALVE TAPPET CLEARANCE—.010 IN. & .016 EXH. (COLD)—.007 IN. & .023 EXH. (HOT)—USE FEELERS.

COMPRESSION PRESSURE—CHECK EACH CYL. WITH GAGE—AT STARTER SPEED, ENGINE WARM, THROTTLE OPEN, PLUGS OUT. (109 LBS. AVERAGE)

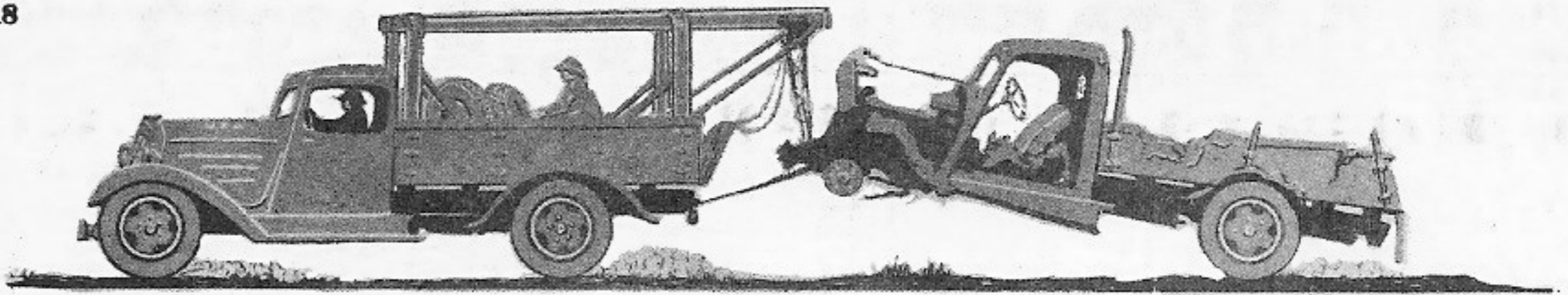
CARBURETOR—CLEAN—INSPECT FOR FUEL LEVEL OF $\frac{5}{8}$ " (FLOAT SETTING $2\text{--}2\frac{5}{64}$)—SET IDLE SPEED AT 300 R.P.M.

CRANKCASE OIL SUMP—REMOVE PAN & PUMP SCREEN AND CLEAN.

BRAKE CHART

RESERVOIRS—OPEN DRAIN COCK TO REMOVE MOISTURE & SLUDGE.	ALL SLACK ADJUSTERS—SEE TEXT.	ALL BRAKE CHAMBERS—CHECK FOR LEAKAGE—RENEW DIAPHRAGMS AT LEAST ONCE A YEAR.
ALL BRAKE SHOES—SEE TEXT.	GOVERNOR—CHECK FOR LEAKAGE AND TO LOAD AT 80-85 & UNLOAD AT 100-105 LBS—CLEAN AIR STRAINER—CHECK GAGE.	TUBING & FITTINGS—CHECK UNDER PRESSURE FOR LEAKAGE.
AIR COMPRESSOR—CHECK TIGHTNESS OF MOUNTING—CLEAN AIR FILTER—CHECK OIL PRESSURE (6-8) IDLE, 45-60 MAX)—CHECK DISCHARGE VALVE LIFT (042)—CHECK UNLOADER TAPPET CLEARANCE (.012).	APPLICATION, RELAY & RELEASE VALVES—CLEAN FILTER—CHECK FOR LEAKAGE & PROPER OPERATION—RENEW DIAPHRAGMS AS REQUIRED.	SAFETY VALVE—TEST TO OPEN AT 150 LBS.

DAILY 1000 MILE PERIOD 6,000 MILE PERIOD SPRING & FALL



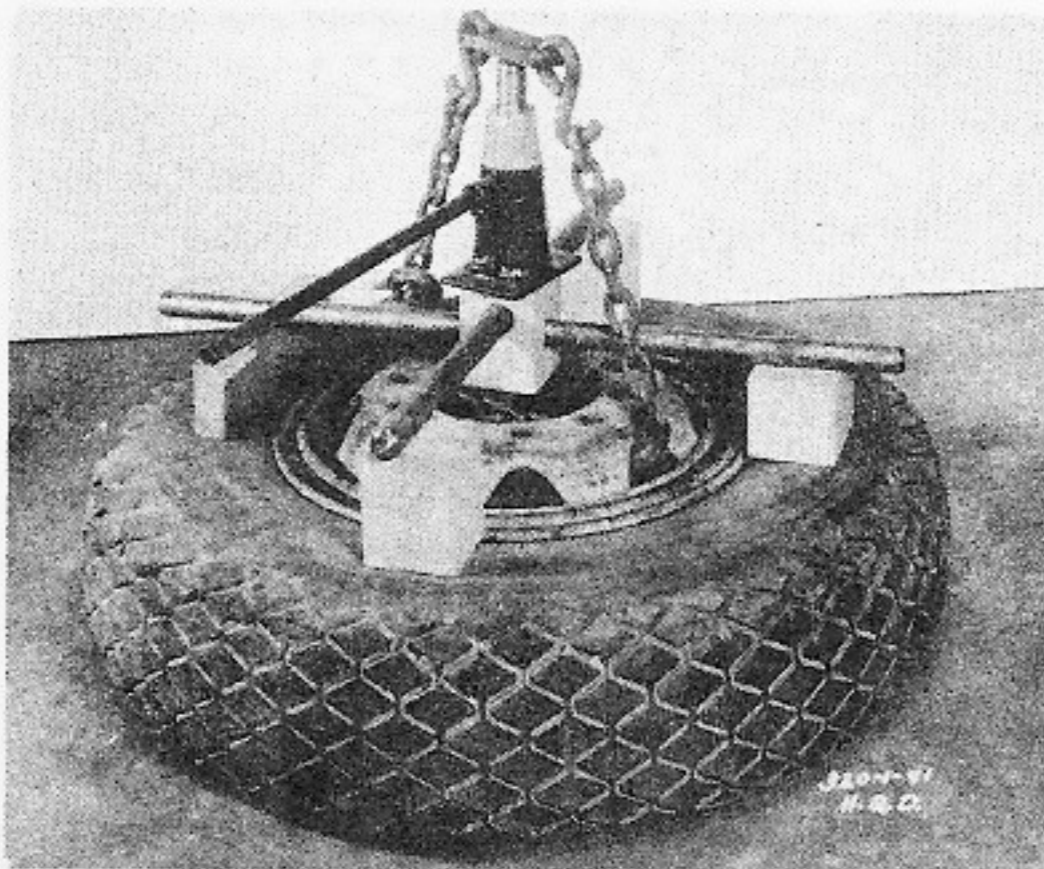
HELP!

Tire Tool

A method to speed up and ease the time wasting, back breaking job of changing tires has challenged the efforts of inventors since the first days of the automobile. Many are the fantastic contraptions devised, some of them almost larger than the vehicle itself and requiring several men to operate, and most of them harder to manage than the old fashioned job of hammering and wrenching off the flat.

But at last a really effective device has been hit on — one that can easily be assembled out of commonly available materials, that is simplicity itself to operate and that gets the work done in a jiffy.

This device was conceived by Major C. Elford Smith here at Holabird. The parts for it consist of a piece of chain, four wood blocks, a couple of metal rods, two hooks, a spare piece of scrap metal and an ordinary jack.



Briefly described, it works in this way. First, lay the tire flat and place one of the blocks on each side of the casing, then on these lay the ends of the metal rods, which, of course, cross in the center. Block these two rods together in the center and set a jack on the block thus formed. The next step is to get a piece of scrap metal of some sort, drill holes in either end of it, and then set hooks through these. (The hooks can be bent out of other spare metal.)

Now take a piece of chain and attach it to the hook on one end of the metal cross piece, place this on top of the jack and then run the free end of the chain down through one side of the wheel and up through the other and fasten it to the opposite hook attached to the metal piece on the jack. Now crank up the jack. The chain pulls the rim up from the bottom and the metal bars, pressing down on the four blocks, push the casing downward off the rim. In far less time than it has taken to describe the process the rim springs free and the casing can be pushed off by turning the tire over and repeating the process.

For wheels without slots in the rim, drop the chain through the center of the hub and slip a bar through it to give purchase.

Nut Holder

To hold nuts in a socket wrench used in a vertical position down in tight recesses, take small scraps of blotting paper, coat on both sides with gasket cement and allow to become tacky. Stick the blotting paper

on top of the nut and shove the socket over it pushing the nut all the way to the bottom with your finger. Now you can hunt the stud down in that deep crack without fear that the nut will fall out.

Puller

Those of you who read THE 'AM (and if you don't you should), will remember an article we ran last month on "Pullers." The article described the application of the "push-puller" principle to removing bearings.

This principle of the "push-puller", by the way, has been kicking around the mechanical game since Adam put his foot up on Eve's shoulder and gently but firmly snagged the apple away from her.

Anyway, talking about pullers, we weren't much surprised when we ran across a couple of Holabird Sergeants name o' Sdanowich and Scott (Companies C and B of the 53rd Heavy Maintenance), who had tooled up a puller which they were pleased to call a "Cam Shaft Bushing Extractor and Inserter."

Seems they got tired knocking old bushings out and ruining new bushings which spread like butter as they were hammered in, so they got themselves a coupla hunks of iron and went to work.

Sometime later they had completed the following miscellaneous hardware: A 1 inch shaft about four feet long, grooved every inch or so, with ten inches of thread on one end of it as shown in the sketches.

A number of bushing pullers to fit on the shaft. Shoulders on these pullers

guide the bushings.

A three inch collar to fit on the shaft and serve as a stop, a small, horseshoe-shaped key to fit into the grooves on the shaft and lock the bushing pullers, a nut to fit the threads on the shaft, a pin to fit into a hole bored in the shaft to keep it from rotating.

And here's how the gadget pulls out old bushings:

The shaft is slipped into the camshaft bushing housings with a bushing puller to fit each housing, strung along its length.

The last bushing is to be pulled so you lock the last puller by slipping the key into the groove behind it. Remember, the other pullers on the shaft merely keep it level, they will slide along the shaft since they are not locked with a key.

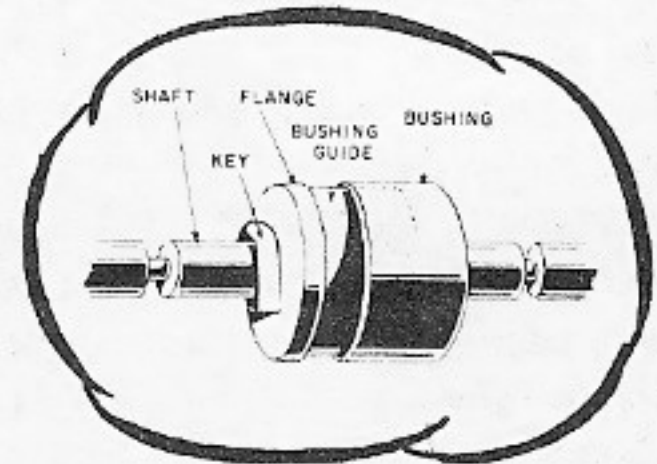
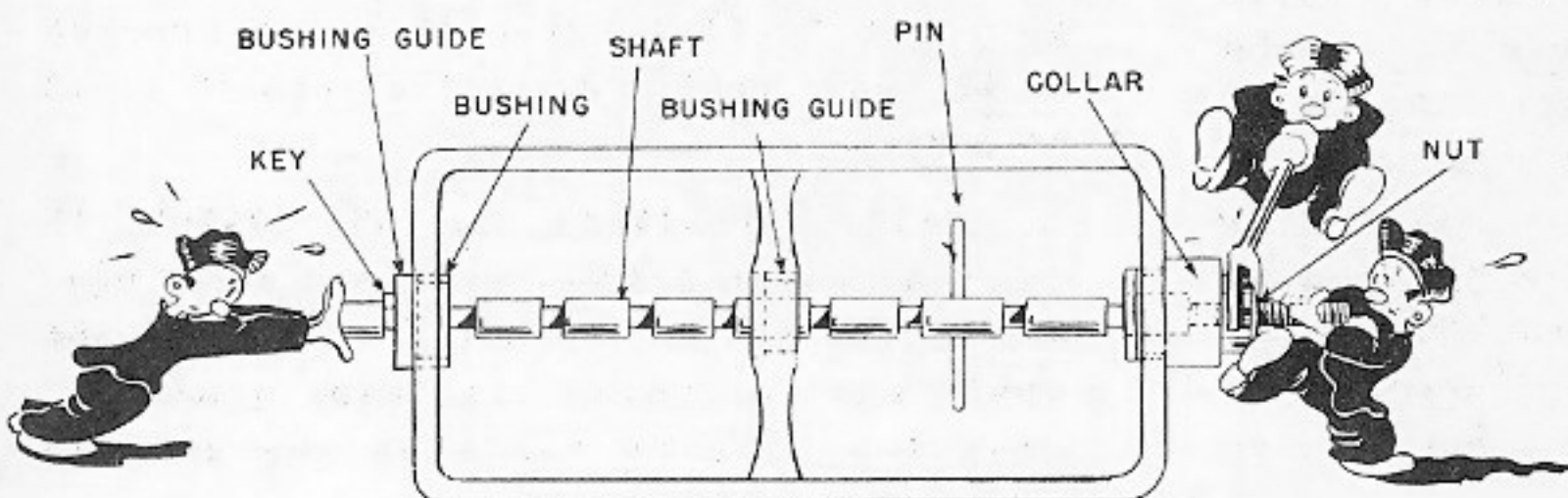
The nut at the threaded end of the shaft is tightened until it reaches the collar at that end. (The pin mentioned above as fitting into a hole in the shaft is used to keep the shaft from rotating.)

Now, if you've gotten this far, you will understand that as the nut is tightened, the locked bushing puller will press out its bushing — the other pullers not being locked, will merely slide along the shaft, keeping things level.

See? The nut turns, drawing in the shaft, which the pin keeps from revolving, the locked bushing puller strains its shoulder against the bushing, forcing it out.

No knocking', no hammerin' — just the old squeeze play.

Repeat this performance to jerk the rest of the bushings.



Here's the bushing inserted in the puller. When the flange hits the bushing, the action starts.

You can see how new bushings would be inserted — just fit the bushing onto the puller and proceed as above. The tightening of the nut will pull the bushing smoothly and evenly into place.

Just to be fancy, Sergeants Sdanowich and Scott have made their shaft sectional like a fishing pole.

Three beers - oops! — three cheers for Sergeants Sdanowich and Scott.

Analysis

DESPITE bigger, better and more comfortable cars, Mr. Average American Motorist found himself stalled on the road and in need of emergency help 13% oftener than last year, according to the annual compilation of breakdowns and their causes issued by the American Automobile Association. The A.A.A. report covering 1940 showed a record of 35,000,000 times when the garageman had to get cars going under their own power. The figures are based on calls for aid handled by A.A.A. "troubleshooters" working through 12,000 garages throughout the United States. (1939 showed a 23% increase in trouble over 1938 — page 118, August 1940 'AM.)

The figures should serve as a pretty good guide to what kind of trouble can be expected, and what spares should be stocked.

<u>SERVICE</u>	<u>NO. OF CALLS</u>	<u>PCT. OF TOTAL</u>
Tire	9,668,000	27.65
Battery	5,035,000	14.40
Ignition	4,608,400	13.18
Tow (Probably major engine trouble)	4,349,600	12.44
Out of gas	1,521,000	4.35
Stuck (mud, sand, snow)	1,461,500	4.18
Wrecker - Crane	1,314,684	3.76
Starter	1,255,244	3.59
Gas line	1,111,887	3.18
Lock and key	472,027	1.35
Carburetor	469,000	1.34
Brakes	426,573	1.22
Lights	367,100	1.05
Frozen	188,811	.54
Miscellaneous	2,716,781	7.77

Trailer Brake

You know what happens when you forget to release the parking brake on a truck - before driving very far your engine begins to labor and overheat, you smell something burning, and just about then you come to and do something.

However, if you don't release the brake on the 1-ton trailer, you won't come to until it's too late and the damage is done: burned linings, scored and distorted brake drums and possibly damaged tires.

Apply the brake when parking the trailer, and always RELEASE THE BRAKE before starting the tractor.

Trailer parking brakes are not meant to slow down or stop a trailer while it is being towed. Applying the brakes may loosen or shear off the rivets holding the brake drum to the hub, bend the brake support plates, or do other damage.

In assembling the trailer be sure to follow the exact procedure given in the maintenance manual for adjusting and equalizing the brakes. Note particularly in the Nash 1-ton trailer that the adjusting screw is to be LOOSENED ON THE TIGHTER WHEEL. Don't make the mistake of tightening the adjusting screw on the wheel with least drag, or you'll probably have insufficient clearance and brakes will drag.

Axle Aids

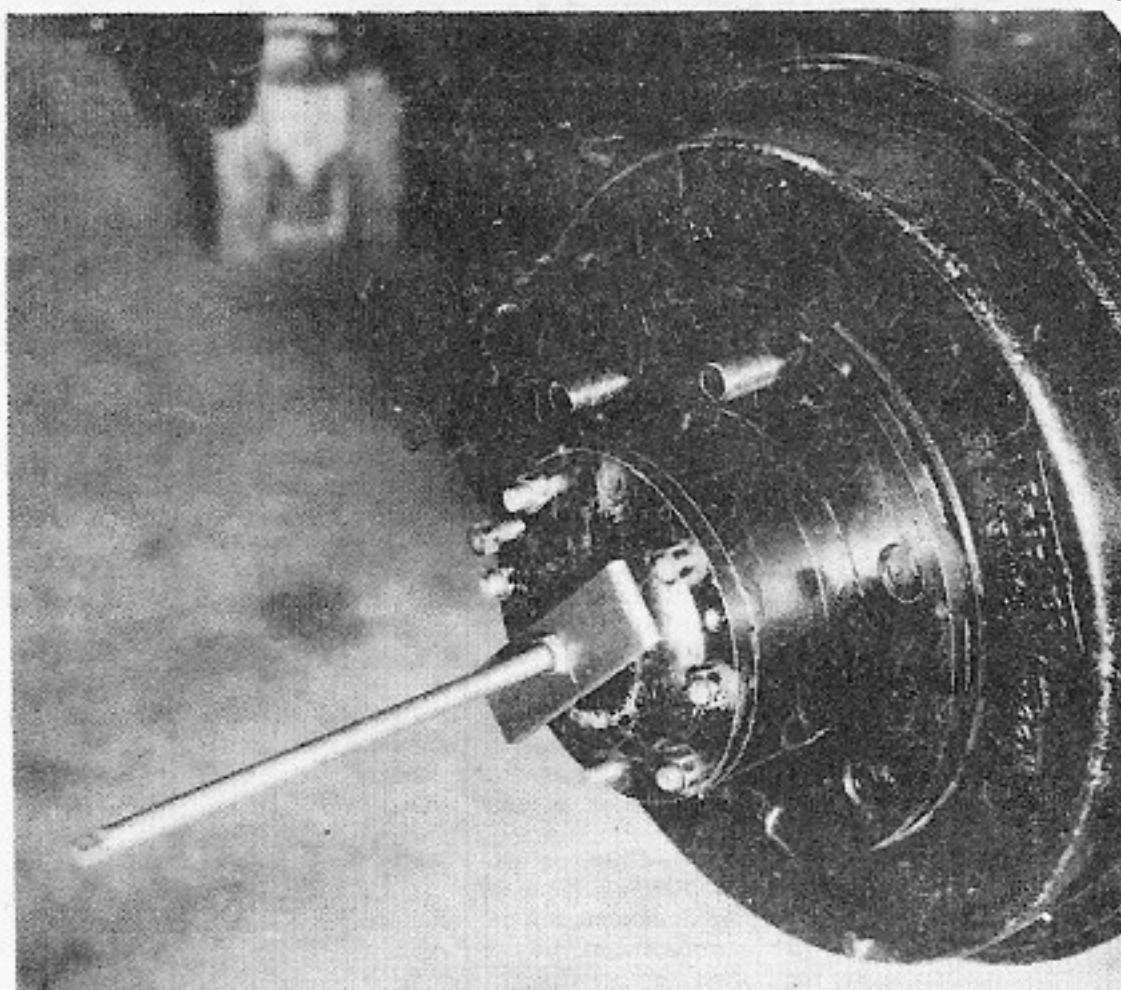
Mike the Mechanic sez--

The other day, a fellow brought in a G.M.C. truck, complaining about a funny clicking noise from the front axle whenever he turned a corner. Nothing very serious yet, but at that rate, in a few hundred miles, some pretty extensive repairs would be necessary.

Well, I followed the instructions in the G.M.C. Maintenance Manual and after disassembling the entire unit, I replaced the shaft and the universal joint assembly. Then I installed the steering knuckle

spindle to knuckle flange and tightened the two stud nuts. Everything was fine until I tried to slip the driving flange over the outer end of the drive shaft. The manual tells you three times not to shove the shaft in too far, but it doesn't tell *how* not to. So--to make a painful story worse, I shoved the */\$"% shaft too far in. It took me the rest of the morning to tear down the assembly again and retrieve the shaft.

While I was cussin' away, a chap came over and asked me what the trouble was. After recounting my tale of woe, he just laughed and said "Son, I've got a gadget that'll fix things." It seems that this fellow, Sonnet Bowden 's his name - an instructor over in the Chassis Bay at Holabird - thought up a gadget that holds the axle shaft in a G.M.C. in position while the flange is being replaced. It's just a threaded bar, about a foot long, and a flat metal plate, about 1½ x 5 inches slid on it, with a nut to hold it on. Have a look at the illustration.



Here's the gadget at work: bar, nut, and metal plate. It's one of those simple things good for a headache.

move the gadget and replace the plug.

It's as simple as that lads, as simple as that.

Rubber Care

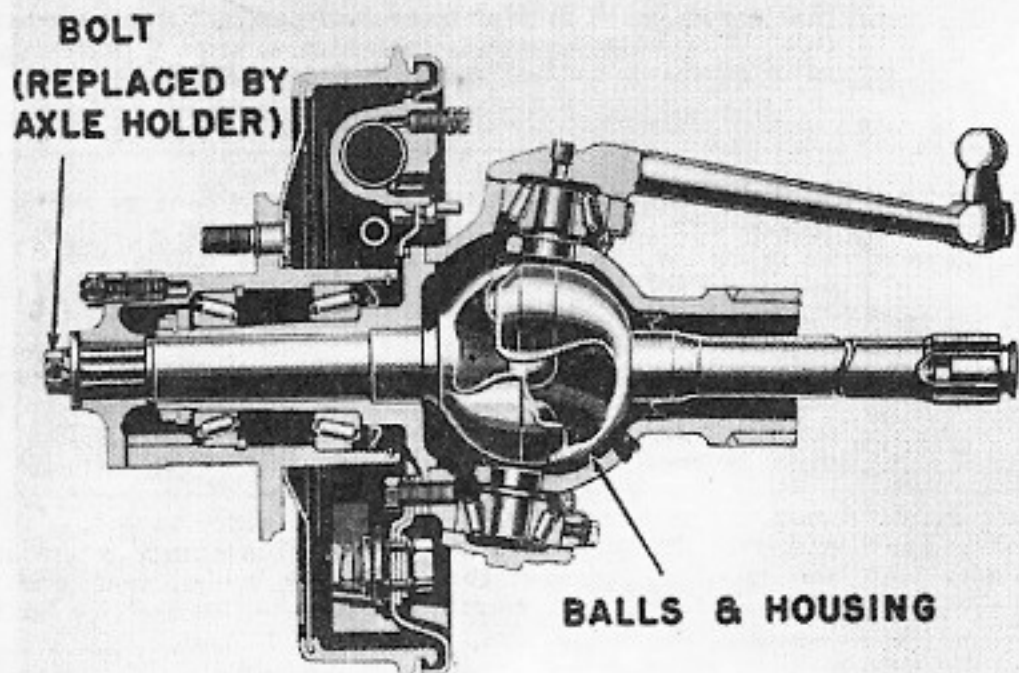
Although it is generally claimed that rubber parts require no upkeep, this material does need checking. Friction and vibration tend to develop squeaks, groans and improper fitting of rubber chassis parts, instrument panel accessories, and engine mounts. These faults should always be corrected.

Lubricating rubber chassis parts, therefore, is a definite necessity. It's a difficulty, too, for you can't use ordinary lubricants such as mineral oils, castor oil, engine oil, or other greases and solvents because of their tendency to swell or rot the rubber.

It's also necessary to use a lubricant that will be effective for rubber to rubber contact as well as for rubber to metal contact. In either case the problem is a difficult one, because in addition to eliminating squeaks and groans, the lubricant used should protect and prolong the life and spring of the rubber.

On the chassis, we find rubber parts

(Turn to Page 125)



Here's how to use it. You screw this tool in place of the bolt at the end of the shorter axle shaft. Then, build up the assembly, letting the button at the inner end of the short shaft stick out about a half inch. Then you can go ahead and rebuild the entire unit, using this tool as a means to hold the axle shaft out while working. Reassembling the unit will place the axle shaft correctly. Measure the space left between the end of the short shaft and the bottom of the thrust button and fill this space with shims. Then re-

CLASSIFICATION, COMPOSITION & USES OF LUBRICATING GREASES

	Class Name	COMPOSITION			Remarks and Recommendations
		Alkali	Fats	Mineral Oil	
According to Soap Base	Lime-base.	Calcium hydroxide (Slacked lime) $Ca(OH)_2$	Horse, hog, bone, wool, fats; fish, rape (colza), castor, palm, neatsfoot, cotton seed, soya bean, sperm, rosin oils; beef, mutton, vegetable tallows; esters of stearic, palmitic and oleic acids.	Various lubricating oils ranging from light spindle to heavy, dark residuum oils, depending on the purpose for which the grease is made.	General purposes greases containing usually from 70 to 90 percent mineral oil; widely used in compression grease cups, gear boxes, etc., in industrial plants. Not suitable where operating temperatures exceed 175° F., nor where they are subject to high speeds or churning action, because high centrifugal force incident to high speeds tends to separate the water and soap-oil mixture, thereby permitting the mineral oil and soap base to separate. Not suitable for anti-friction bearings that operate at high speed and temperature conditions. They are water repellent.
	Sodium-base	Sodium hydroxide (Caustic soda) $NaOH$	Same as for lime-base greases.	Same as for lime-base greases.	Suitable for high temperature and speed conditions as they do not contain water as a binding agent. Not recommended for use in the presence of water because they readily emulsify with it. Suitable for anti-friction bearings operating at high speed and temperature conditions, for plain bearings and in centralized pressure lubrication systems where a light product of non-separating characteristics is required to avoid clogging of the supply pipes. Suitable for wheel bearings, universal joints, steering gear and spring shackles of automobiles.
	Aluminum-base.	Generally sodium or potassium hydroxide used with oleic or stearic acid to form sodium oleate or stearate which in turn is combined with aluminum sulfate to form aluminum oleate or stearate.	Oleic and stearic acids, acidless tallow, castor oil and sodium naphthenate.	Various lubricating oils, ranging from light spindle oils to cylinder stocks.	Combine some of the advantages of both lime- and sodium-base greases. Are water repellent; withstand high temperatures; do not separate when agitated or used in centralized pressure greasing systems. Usually brilliant and transparent in appearance; often referred to as solidified oils or transparent cup and pressure gun greases. Used where operating temperatures and speeds are high. For example, rocker arms of aeroplane motors, high-speed gears, and many other applications where grease is applied by means of a pressure grease gun. They are non-spattering and are used where such a lubricant is demanded.
	Lead-base.	Lead acetate, lead monoxide (litharge), sodium hydroxide.	Oleic and stearic acids; fish whale, castor, rosin, neatsfoot, nut, linseed oils; naphthenic acids, etc.	Especially selected lubricating oils. Heavy black oils are not suitable.	These greases are usually classified as "extreme pressure" lubricants because of their ability to withstand high pressures. They are sometimes used as a compound in transmission greases, especially those intended for use in worm and Hypoid sets. They do not emulsify nor dissolve in water, but tend to settle out in the presence of water when in dilute solution in mineral oil.
	Zinc-base.	Zinc oxide zinc acetate, sodium hydroxide.	Sodium oleate and sodium stearate.	Same as for lime-base greases.	These greases are water repellent and are frequently used for lubricating the plungers of hydraulic elevators, piston rods of water pumps, slushing compound for preventing the rusting of wire cables that operate in water. These are frequently referred to as hydraulic greases.
	Mixed-base.	Calcium hydroxide+sodium hydroxide, potassium hydroxide+calcium hydroxide, aluminum hydroxide+sodium hydroxide.	Same as for lime-base greases.	Same as for lime-base greases.	Used where conditions do not permit using lime-base or sodium-base greases, such as high-speed bearings in the presence of moisture. Mixed-base greases combine to a certain degree characteristics of the individual soaps used in the admixture.
According to Manufacturing Methods	Cooked or Boiled.	Same as for lime-, sodium-, aluminum-, lead-, zinc-, and mixed-base greases.	Same as for lime-base greases.	Same as for lime-base greases.	The bulk of greases are manufactured by cooking or boiling. Cup, sponge, fiber and many other greases are made by this method. In general, all of the better grade greases fall under this classification. They are used for a wide variety of services as indicated above.
	Cold Sett.	Calcium hydroxide.	Rosin acid	Usually dark lubricating oils.	These greases in general are of the cheaper grade. They are commonly used to lubricate rough machinery in steel mills, coal mines, skids, launching ways, track curves, etc. They should never be used on brass bearings as they cause corrosion.
	Residuum.	None.	Generally none.	Dark, heavy oils, residuum or bottoms, and sometimes cylinder stocks.	Sometimes an animal or vegetable oil is added as well as tar, rosin oils, etc. Made in a wide range of consistencies; very adhesive and tacky. Used for lubricating wire cables, open gears, steel-mill roll necks, etc. generally applied hot by swab or brush.
According to Consistency	Fluid No. 0.	Usually same as those listed above under aluminum-base greases.	Same as for lime-base greases.	Generally light and medium viscosity lubricating oils.	Many of the so-called "solidified," "dripless" or "non-spattering" greases fall into this class. Such products are generally mineral oils thickened with usually less than 5 percent aluminium soap. Used where non-spattering characteristics are desired, such as in textile mills, bakeries, food-preparation establishments, and chain drives, speed reducers, cranes, circulation systems of gyratory rock crushers, wood-working machinery, etc.
	Very soft No. 1.	Same as for No. 3.	Same as for lime-base greases.	Various lubricating oils. See lime-base greases above.	Recommended for conditions similar to soft greases but where temperatures are lower and speeds generally higher. Soap content is usually very low.
	Soft No. 2.	Same as for No. 3.	Same as for lime-base greases.	Various lubricating oils. See lime-base greases above.	Used for light duty line-shaft bearings, ball and roller bearings, gear boxes, and in general where application is by means of grease cups and pressure guns.
	Medium No. 3.	Sodium, calcium, aluminum hydroxides singular and in combination. Also, lead and zinc alkalis.	Same as for lime-base greases.	Various lubricating oils. See lime-base greases above.	This consistency is widely used in many different plants and industries. Under certain operating conditions it is suitable for ball and roller bearings, line-shaft bearings, pumps, crushers, grinders, farm machinery, elevators, excavating machinery, machine tools.
	Hard No. 4.	Usually sodium or calcium hydroxide.	Same as for lime-base greases.	Various lubricating oils. See lime-base greases above.	Recommended for bearings in heavy duty such as coal conveyors, cranes, hoists, excavating machinery, shears, punch presses, etc.
	Very hard No. 5.	Usually sodium or calcium hydroxide.	Same as for lime-base greases.	Generally dark lubricating oils or cylinder stocks.	Some of these greases have melting points as high as 450° F. Used for very high temperature conditions, such as paper dryers, cement-mill kilns, tube mills, coolers, ball and rod mills and laundry calenders, mangles and ironers.

Class Name	COMPOSITION			Remarks and Recommendations
	Alkali	Fats	Mineral Oil	
Cup greases.	Usually calcium hydroxide.	Same as for lime-base greases.	Same as for lime-base greases.	Usually lime-base greases contain 80 to 90 percent mineral oil and 10 to 20 percent saponified fat. Water generally present from traces up to 1 percent. Melting point varies from 120 to 200° F., depending on the soap content. General purpose greases used in a wide variety of services, but are not suitable for high speeds and temperatures above 175° F. These are water repellent greases.
Graphite greases.	Calcium hydroxide.	Same as for lime-base greases.	Same as for lime-base greases.	Usually cup greases to which has been added from 2 to 20 percent flaked, powdered or colloidal graphite. Especially suitable where the lubricant is likely to be washed away by water, oil or chemical solvents. Hydraulic rams, plungers, slides and bearings exposed to water, elevator cables and slides are typical examples where these greases are used. Not suitable for ball and roller bearings unless graphite is in colloidal form. Obtainable in five consistencies.
Fibre and sponge greases.	Sodium hydroxide.	Same as for lime-base greases.	Same as for lime-base greases.	Called fibre or sponge greases because of their peculiar fibrous or granular structure. Melting point varies from 200 to 400° F. Cannot be used in the presence of water as they readily emulsify and are easily washed from the bearing surfaces. If of good quality can be melted and cooled again without altering their consistency. Contain no filler of any kind. Especially suitable for ball and roller bearings, automobile wheel bearings, universal joints, spring shackles, steering gears, etc. Obtainable in five consistencies.
Ball and roller bearing greases.	Calcium, sodium and aluminum hydroxide and lead oleate, as well as various mixed alkalies.	Same as for lime-base greases.	Generally high-grade lubricating oils.	Soft greases, composed of petroleum jelly, or mixtures of this with mineral oils; or soft cup greases containing 12 to 15 percent soap and mineral oil having a viscosity of 400 to 500 sec. Saybolt at 100° F.; or sodium base grease containing 16 to 20 percent soap and mineral oil having a viscosity of 500 to 600 sec. Saybolt at 100° F.; or aluminum soap greases and mixed base greases of lime and sodium. Generally lime-base greases are not recommended where temperatures are above 150° F. Greases are not generally recommended for these bearings where temperatures exceed 200° F. and speeds over 10,000 r.p.m. Essential features of these greases are that they are practically free of moisture, neutral and contain no filler other than colloidal graphite.
Automobile chassis greases:				
Wheel-bearing grease.	Calcium and sodium hydroxide.	Same as for lime-base greases.	Various lubricating oils.	Most automobile and bearing manufacturers recommend a short-fiber soda-base grease containing a mineral oil of not less than 300 sec. Saybolt viscosity at 100° F. for wheel bearings. In the past, cup greases have been extensively used for this purpose.
Universal-joint grease.	Sodium hydroxide.	Same as for lime-base greases.	Various lubricating oils.	To effectively lubricate the universal joint a grease must have strong adhesive and cohesive properties, as the high centrifugal force tends to pull the grease out of the joint. Usually the best grease for this service is a long-fiber soda-base type.
Steering-gear grease.	Calcium, sodium and aluminum hydroxide.	Same as for lime-base greases.	Various lubricating oils.	Many grease companies do not market a special grease for this service, but recommend regular gear greases or pressure-gun greases. These products render fairly satisfactory service if the housing is tight enough to hold such fluid greases. Steering-gear greases usually contain 5 to 6 percent of calcium soap and a very heavy bodied lubricating oil. Extreme pressure compounds are also frequently added.
Water-pump grease.	Calcium hydroxide.	Same as for lime-base greases.	Various lubricating oils.	Usually this is a hard calcium-soap grease containing 20 to 25 percent soap and having a melting point above 200° F.
Pressure-gun grease.	Calcium, sodium and aluminum hydroxide.	Same as for lime-base greases.	Various lubricating oils.	These greases are primarily intended for the lubrication of spring shackles of automobiles. They are frequently used for other purposes where application is by means of a pressure gun.

THE ABOVE TABLE CLASSIFIES THE STANDARD LUBRICATING GREASES ACCORDING TO THE SOAP BASE USED, THE MANUFACTURING METHODS, CONSISTENCY AND USAGE.

EXTREME PRESSURE COMPOUNDS ARE FAST REPLACING STRAIGHT MINERAL OIL FOR MANY USES. UNDER LIGHT LOAD AND SERVICE CONDITIONS EITHER MAY BE USED FOR STEERING GEARS, SPUR TOOTH TRANSMISSION GEARS, AND SPIRAL BEVEL REAR AXLE GEARS. HOWEVER, MINERAL OIL MAY PERMIT A METAL TO METAL CONTACT WHICH WOULD RESULT IN UNDUE FRICTION AND SCORING UNDER EXTREME CONDITIONS, SUCH AS IN HYPOID GEARS.

DURING THE LAST FEW YEARS, FIBRE GREASES HAVE INCREASED IN USE. TODAY'S HIGHER SPEEDS, RESULT IN HIGHER LOCALIZED TEMPERATURES AT POINTS OF ROLLING FRICTION SUCH AS IN WHEEL BEARINGS. FIBRE GREASE, PROPERLY MADE, IS HEAT-RESISTING.

FOLLOWING THE REMARKS AND RECOMMENDATIONS WILL AID IN SELECTING THE PROPER LUBRICATING AGENTS FOR EACH PARTICULAR NEED.



ENGINES NEED PROTECTION TOO

CLEAN AIR IS IMPORTANT FOR MAXIMUM ENGINE EFFICIENCY

The air is heavily laden with dust and dirt, with microscopic matter of every sort, spores and pollens of plants, bits of wood and paper and cloth and rock. We all know this; we can see the nasty stuff floating in the sunbeams, we see it gather daily on our machines and equipment. We know that at certain seasons almost overnight thousands of humans start to sneeze and choke and gasp because of something in the air. We know that our clocks and watches, no matter how tightly sealed, eventually go wrong because of dirt that gets into them.

In recent years we have begun to air-condition our homes, offices, plants, theatres, trains, and an important part of this process is the filtering or washing of the incoming air. But one of the first successful air-conditioning units can be found under the hood of your truck. Manufacturers long ago learned to protect the moving parts of their machines from the damage by dirt in the air. For dust, dirt

and grit, though microscopically small, are highly abrasive and tend to scar and cut the smooth glass-like surfaces of working parts and increase the frictional wear ever present in all engines.

To protect your truck engine against these dust particles in the air, you'll find it equipped with one of two principal types of air cleaners.

OIL SATURATED FILTERS

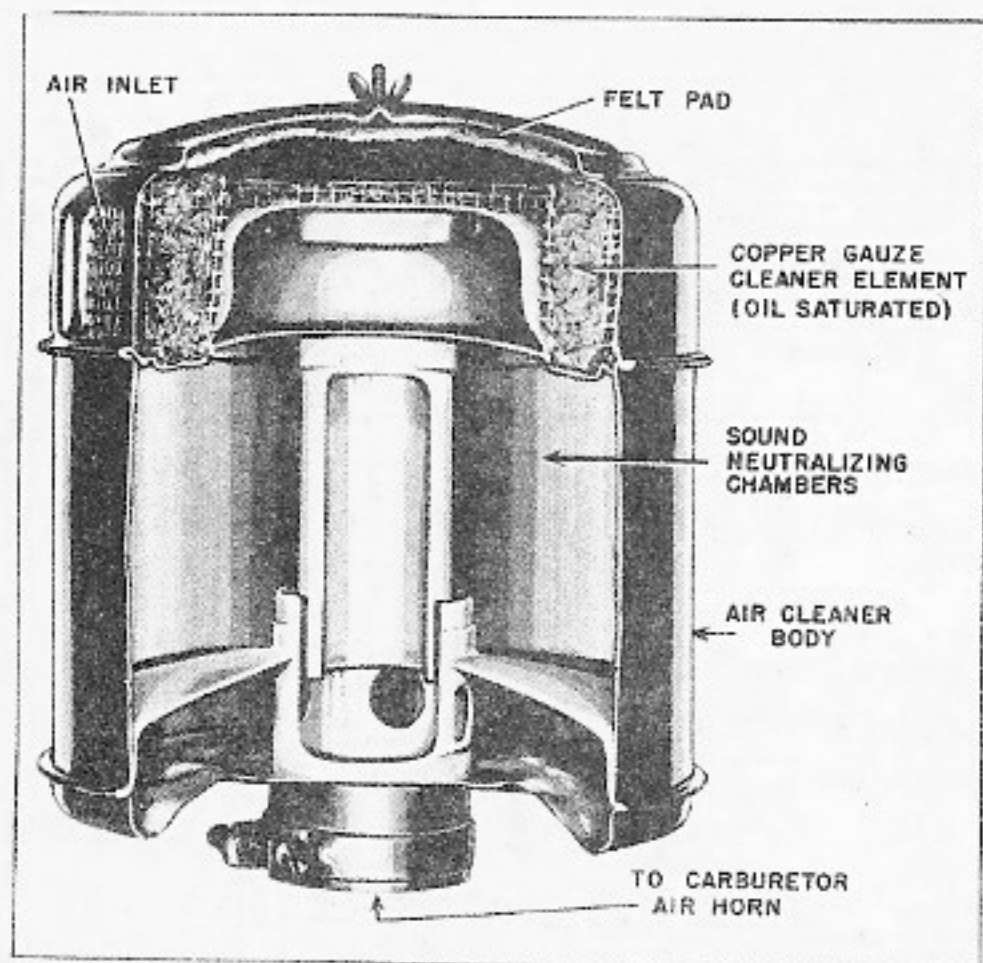
The copper gauze or oil saturated type of air cleaner, shown here, has a pad of oil soaked copper gauze or wool that filters particles of dust, dirt and grit as the incoming air passes through it. This metallic gauze pad also quenches any flame from backfire through the carburetor. This type of cleaner should be serviced every 1,000 miles under normal conditions; oftener if dust conditions are extreme.

"WET" TYPE CLEANER

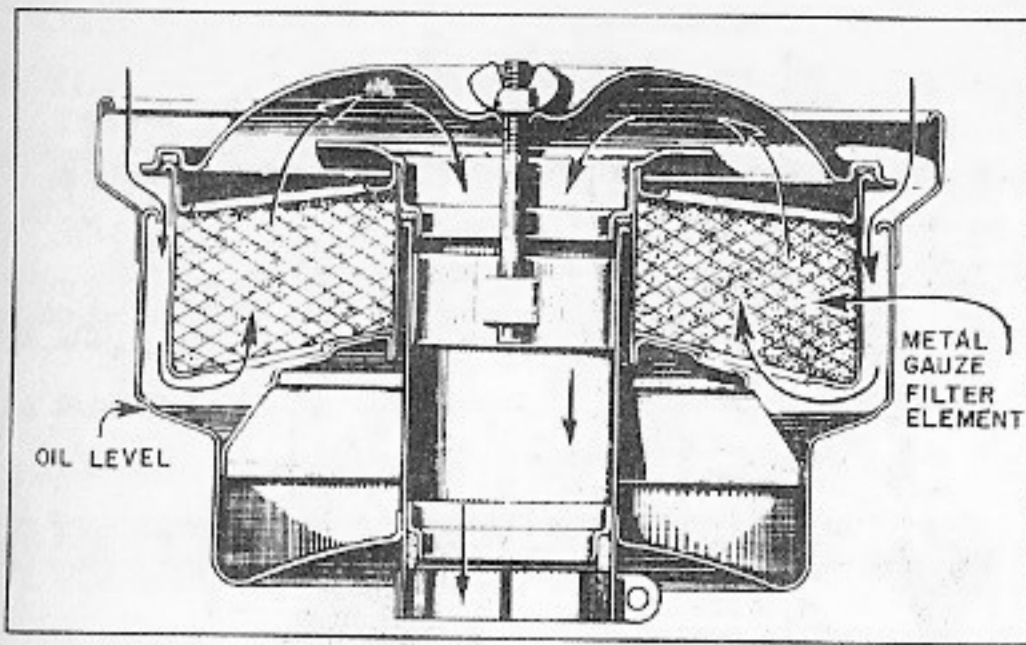
The other principal type of air cleaner, the oil bath or "wet" type is a heavy duty cleaner, adaptable to vehicles which operate in extremely dusty territories. Incoming air enters through passages at the top, flows down to an oil reservoir where it reverses its direction with an abrupt twist, thus causing the heavier dust particles to drop out into the oil, and then continues up through a wire gauze air cleaner. In this way much of the dirt is trapped in the oil bath before the air reaches the filter element. This type cleaner should be serviced every 5,000 miles under normal road conditions or every 2,000 miles or oftener when it is extremely dusty.

PROPER SERVICING

To service the copper gauze type of air cleaner, remove the filter element and



Oil Saturated Type Air Cleaner



Wet Type Air Cleaner

wash it in carbon tetrachloride or kerosene. Allow the filter element to dry and then submerge it in S.A.E. 50 oil. Drain excess oil from the gauze before replacing it in the cleaner shell.

To service the "wet" type or "oil bath" air cleaner, remove the filtering element, wash it in carbon tetrachloride or kerosene

and allow it to dry. Clean the oil reservoir and fill it to, never above, the line marked *oil level*. Replace the filtering element. In summer pour one pint of S.A.E. 50 through it, or in winter the same grade as is used in the engine. At no time use an oil lighter than S.A.E. 20. Distribute the oil over the filtering element uniformly and wait for the excess to drain off before replacing it.

P.S. We've just heard from a field inspector who's been investigating a number of bearing failures in new trucks on the West Coast. He tipped us off that the oil saturated air cleaners were full of dirt and that some of them held a 1/4 inch of grit saturated oil. Naturally the dirt was pulled down into the cylinders and crankcase, contaminating the oil and eventually wearing out the bearings. Take a tip from this and keep those air cleaners CLEAN.



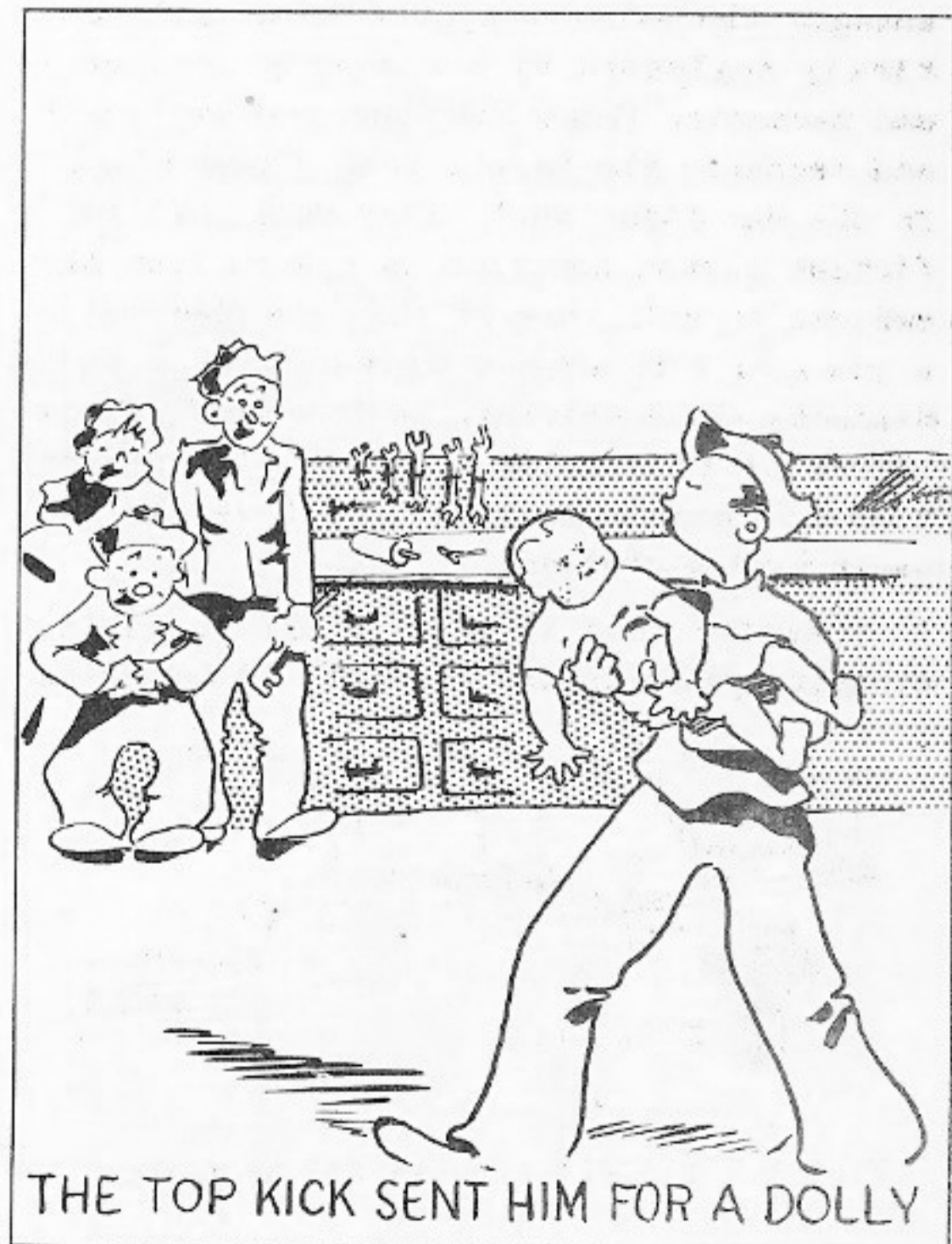
HELP

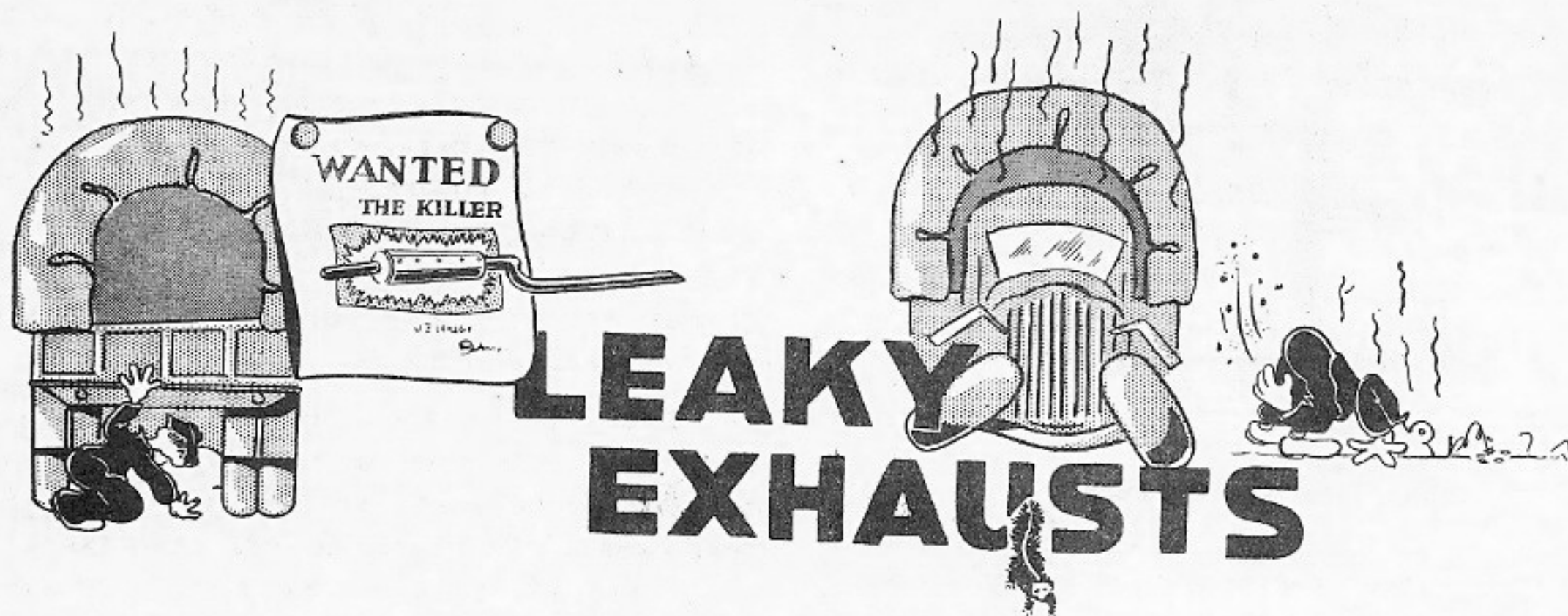
Continued from page 121

on spring shackles, sway eliminators, knee action units, engine and body mountings, in shock absorber arms; and as insulation on the steering gear, grommets, link pads, etc. In fact, it is apt to be used where any metal parts make contact. However, and this is important, rubber parts which are used to keep other parts from slipping or rotating should *not* be lubricated.

Although the exact composition of commercial rubber lubricants is not available, a good compound for the purpose can be made by dissolving colloidal graphite in glycol, or glycerol, and adding enough water to prevent rapid drying before the solution has penetrated.

This solution can be applied with an ordinary spray, but a needle spray will be needed to force the lubricant between parts having close clearance.





Everyone, no matter how little mechanically inclined he may be, knows what the exhaust system in a vehicle is for. It is to get rid of the smell! And he knows what the muffler is for, too. That's some sort of a gadget that gets rid of the noise. Since noise and smell are two things we all dislike, you'd think that drivers would be exhaust-system-conscious and would be pestering mechanics to check their manifolds and mufflers every day. But strangely enough, the exhaust system is usually entirely neglected by the average driver - and mechanic. (That is - the average driver and mechanic who hasn't read "Poison Gas!" in the May 1940 'AM.) They know that sufficient carbon monoxide is spewed from the exhaust to kill them if they are shut up in a garage; but when a driver gets a dull headache while driving, he frequently finds it easier to swallow a couple of aspirins than to chase a mechanic and have his exhaust system checked.

Despite this sketchy idea of what the exhaust system is, few drivers and mechanics

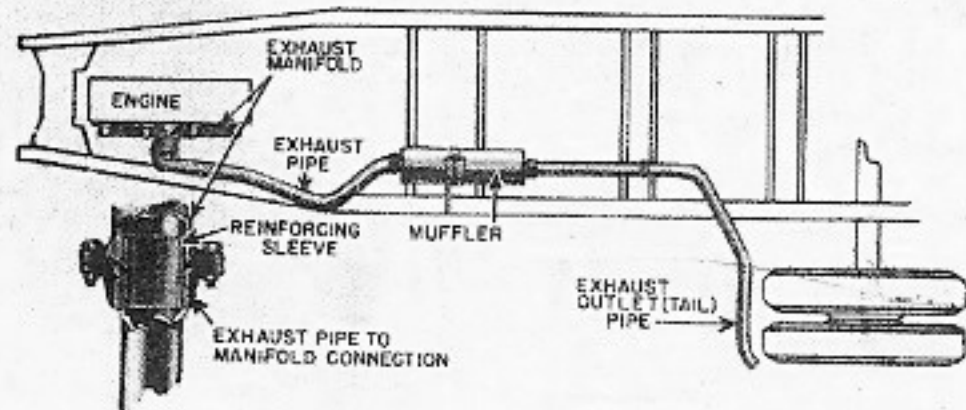


Fig. 1. Typical Exhaust System Layout

think of it as affecting engine performance. After the carbon has been removed, valves ground, new rings and spark plugs put in, a couple gaskets replaced, the ignition checked, etc., they still feel that the old bus hasn't enough pep, but since it's been completely overhauled they figure the darn truck isn't any good anyway, so why bother checking it further?

EXHAUST SYSTEM SEEMS SIMPLE

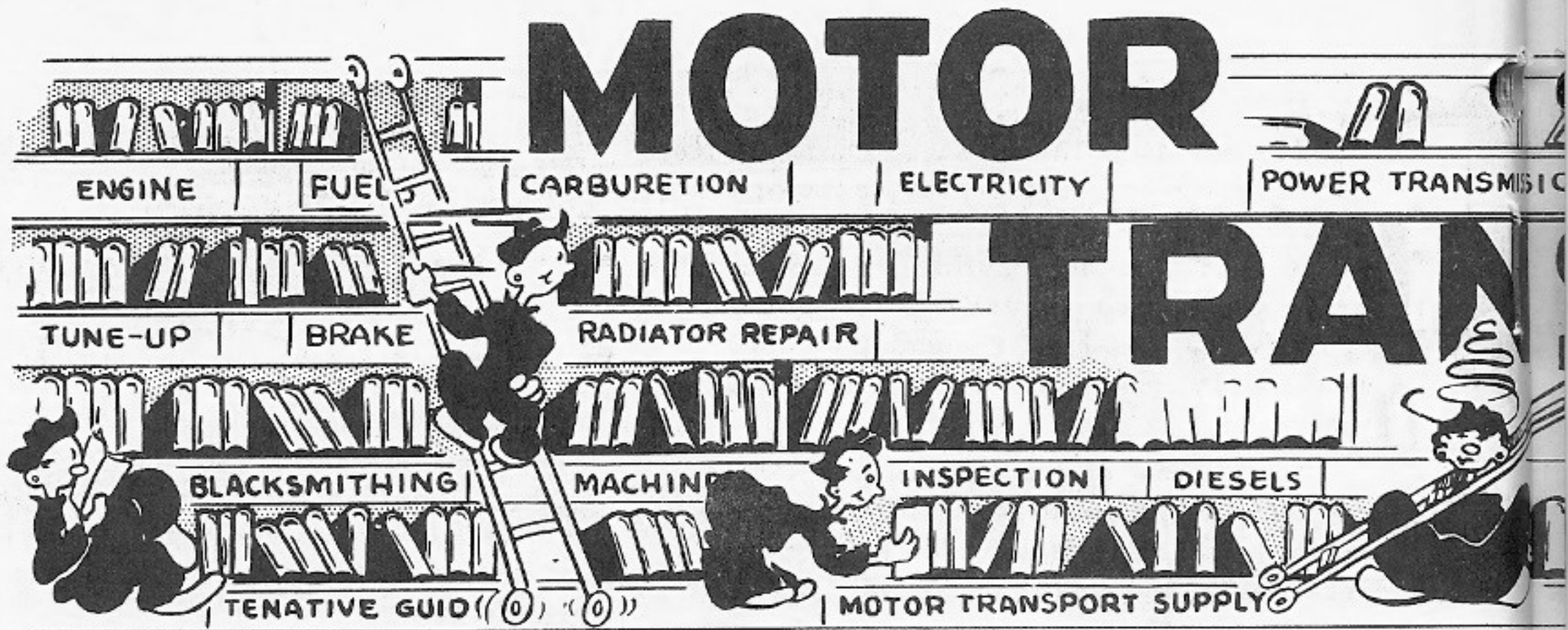
The exhaust system seems such a simple thing - so darn simple it doesn't seem reasonable that it should go wrong. That's where the trouble begins.

Ever been constipated? Know that dull, bleary-eyed feeling that leaves you blaaah? Exactly! That's just the way your engine feels when it has a clogged muffler or tail pipe. No pep, no snap, just a dull, logy response to the accelerator.

The exhaust system is extremely vulnerable to attack: from within by opened seams in the muffler, by loose and defective gaskets and baffles and by corroded metal; from without by corrosion, flying stones, high curbs, deep ruts and the like.

CHEMICAL FACTORY

Inside the exhaust system we have a chemical factory which is a perfect set up for aiding corrosion. For every pound of gasoline burned in the engine more than a



*They're No Snap;
They're Where
The Blitzkrieg Begins!*

In any school there are always two types of students in attendance; those who have come and those who have been sent. All children in the lower grades are "sent" to school, no matter how willingly some of them may chance to go. Education is more often a system of compulsion than we are willing to admit. At first the child has to be disciplined to accept it at all. Of course we tell ourselves the same thing we tell the child over and over again, that it is for his own good. And certainly it is: education in our complex existence is a vital necessity; we need more of it, not less. But we will never tell the child the truth we seldom admit to ourselves, that there is another consideration in our insistence upon his attending school; i.e. that we want to get rid of him for a part of each day. The truth, however, is that even the fondest mother is usually glad to be relieved of responsibility for her pride and joy for a few hours each day, while to parents with excess and ornery brats school is virtually a godsend.

INFORMATION REQUESTED

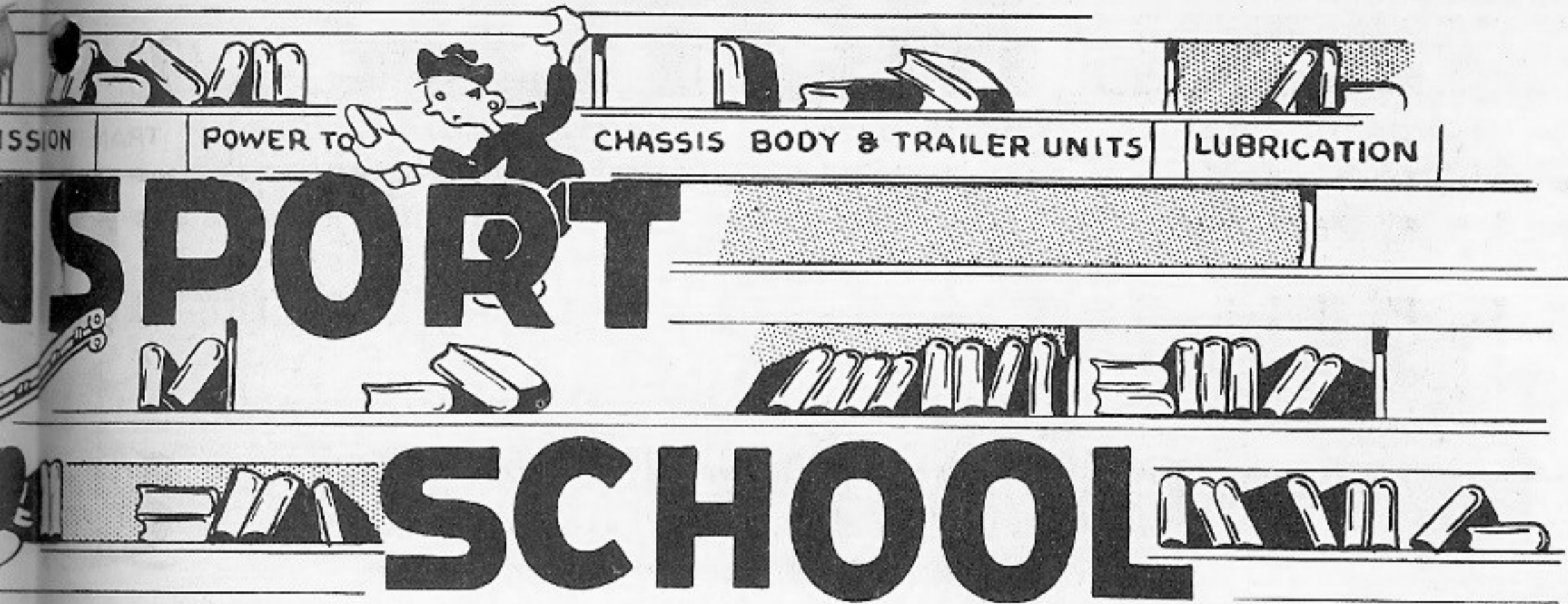
But what, I can hear you ask, has all this to do with THE 'AM? Well, we operate

a Motor Transport School here at Holabird, you know, and we have been receiving a great many letters asking for information about it. Apparently the army is full of men anxious to take advantage of the educational facilities offered. This seems rather strange to us; we well remember the average kid's reluctance to attend school. We recall that in our own case only the threat of the castor oil bottle could on certain cold mornings drive us out of bed. Therefore, this intense interest in the subject of schooling, while quite encouraging, is also a bit puzzling. We can't help wondering if some of these fellas who are so hepped up on the prospect aren't merely casting about for greener pastures. It is of vital importance, therefore, that we get straight on this before we go any further.

The truth of the matter is that the resources of all Army Motor Transport Schools are limited and there is considerable urgency in all the work they do. They must get results and get them quickly. To do their best they need the best. We have no argument with the theory that there is a place somewhere for every man, but this is hardly the time for the idle testing of doubtful talents.

TYPES OF STUDENTS

The men who "come" to the Motor Transport School at Holabird, for instance, are



of two types. First we have men of demonstrated competence, men of real skill and capacity who are here for a swift review of those phases of a subject on which they have become a bit rusty. Second, we have those students who came here because of a demonstrated potential aptitude for the work involved. These potential mechanics comprise one of the nation's chief lines of defense, and every facility is their's for the asking.

But in addition to these two types who "come", we receive also a third type who is "sent". This is the type that opined he would just as soon be a mechanic as anything else--provided you asked him that first. If you had asked him first if he would have liked to be a baker, butcher, or candlestick maker, he'd probably have been just as content to prepare for one of those agreeable professions.

The Motor Transport Schools aren't large enough and haven't sufficient time to accommodate students who may in the long run develop into mechanics in spite of themselves. What they want and what they need are students who "come" because they are sure of themselves; they can do very well without those students who are "sent" because somebody else is uncertain about them. And above all, there is no time or room for men seeking a snap. Highly specialized work done at a blistering pace is what they will get. Intensive study and intense

practice are demanded. Prodigies are performed - men become mechanics almost overnight. But slackers are lost in the rush - probably feel a bit like a Blitzkrieg has hit them. For it is well to realize that Blitzkriegs are indeed born in the machine shops of a nation.

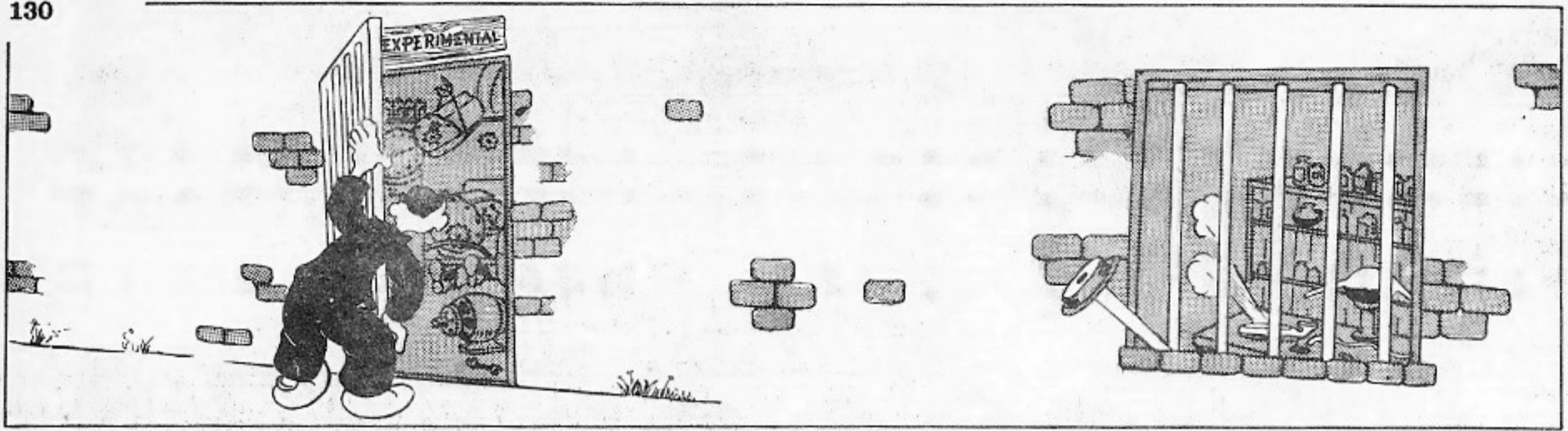
THE FOUR BIG SCHOOLS

And now that we have that off our chest - and if any of you are still interested - we will give you the latest information on where the schools are and what they teach. If you want more details you should write through channels to the Quartermaster General's office.

There are four Quartermaster Motor Transport Schools: Holabird Quartermaster Depot, Baltimore, Maryland which releases 450 men a month; Fort McPherson, Atlanta, Georgia, which releases 300 a month; Normoyle Quartermaster Depot, San Antonio, Texas, 200 a month; and Camp Ord, Monterey, California, 200 a month. These figures are only approximate - the schools are expanding so fast we can't keep up with them. The three-month specialist courses in these schools include engine specialists, chassis specialists, carburetion and electricity, motorcycle mechanics, welding and blacksmithing, body and radiator working, machinist, diesel mechanics and foremen-inspectors.

In addition to the above, each school has a two-month course in basic motor me-

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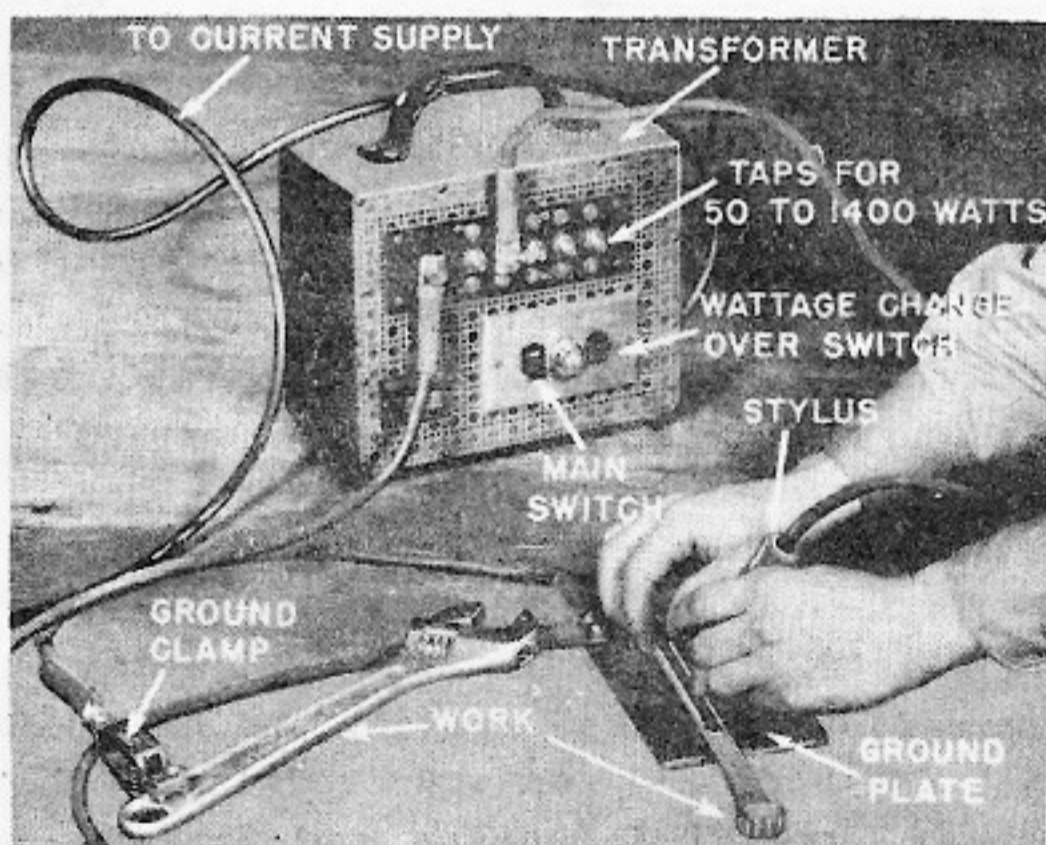
Well, lads, you can throw away your old hammer and punch — the Holabird Engineers got a new gadget for marking tools.

It's an electrical tool-marker — and it's simple as a dimple, too.

At first glance, you think the QM's going to pass out portable radios — it's portable all right, but it ain't a radio. You're looking at a transformer.

Leading out from this transformer are a couple of insulated wires with gimmicks on the end of 'em. The gimmick at the end of the first wire is the markin' tool. Looks a little bit like a pencil with a thick cork handle, except it's got a fine metal tip instead of lead.

The second wire branches out in two,



Here's the tool marker in actual use. The hidden soldier is marking his identification on a new twelve point end wrench. While he is using the ground plate for this job he will use the ground clamp for the large adjustable wrench.

with a universal clamp dangling at one end and a metal plate at the other. The plate and the clamp are the second terminal in the electrical circuit. Use the clamp for large tools, but lay small tools on the plate.

Here's how it works: Say you want to etch your initials on some tools. First you notice five brass "taps" on the side of the transformer. These each carry a different wattage, giving heat enough for marking anything from a little feeler-gauge to a heavy-duty tool.

You figger the tool is big enough to take about 300 watts, so you attach the wire of the marking tool to the third tap and slip the clamp on the tool. Remember that if it was a little tool you were working on, you'd put the tool on the metal plate.

You plug the transformer into an outlet and you're all set.

Taking the marking tool in hand, you pick out a nice, clean spot and start etchin'.

There; up and around and over — "B", period.

Notice how the point of the tool is on an angle? Well this is so you can get a nice perpendicular contact with the metal surface.

Up and down up and down "M", won't the sergeant be pleased!

The actual etching or burning into the metal is done by an electrical arc hoppin' between the point of the stylus and the surface of the tool.

The sergeant will be hoppin' when he sees your initials on his pet tools.

P.S. We'll tell you how to get one of these tool-markers later; as for soothing down the Sarg, — that's your problem.

P.P.S. Stick to your own property.

Bracket

We seem to be plugging gas from all angles these days - but since motor transport can't roll without it, there's no harm done.

The latest is a universal gas can bracket being developed by the Holabird engineers. The bracket will carry the new 5 gallon container and can be mounted to a vertical or horizontal surface almost anywhere on the vehicle.

The photographs show the most promising bracket developed to date. You need only drill holes and bolt it in the position desired.

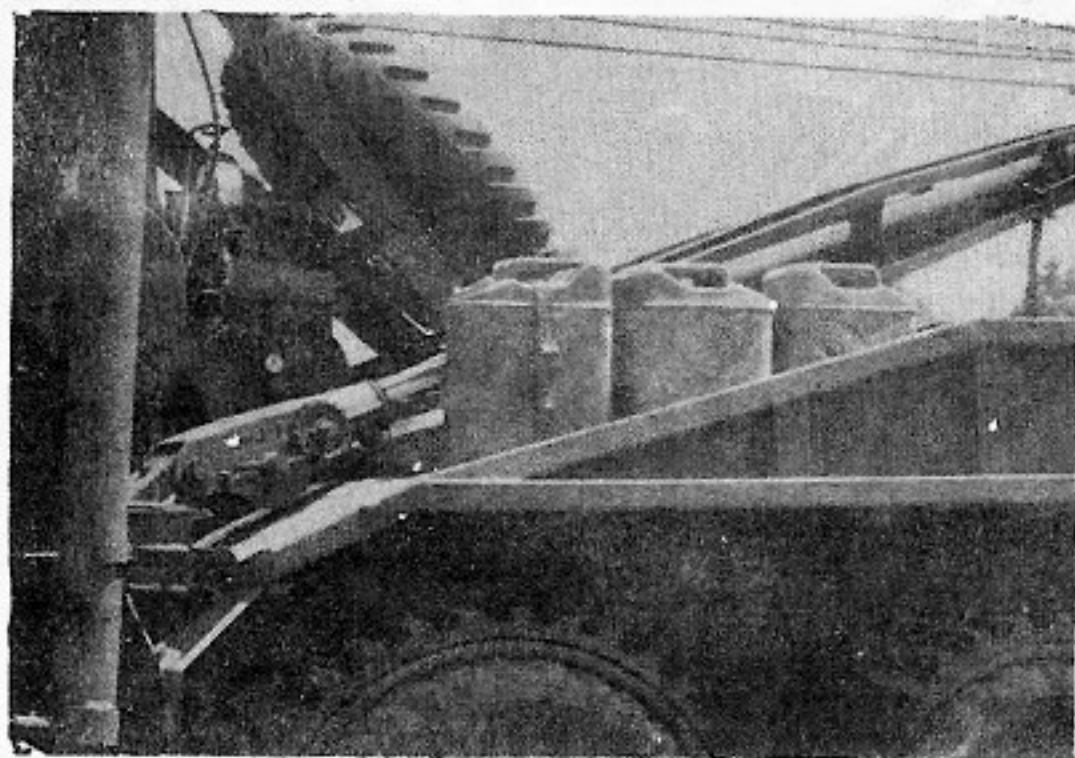
More on this later as the news comes in.



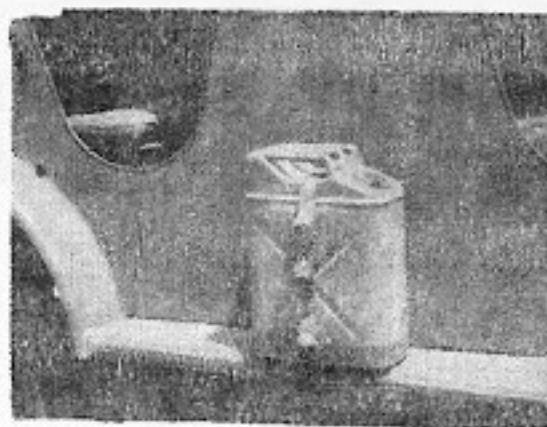
Bracket



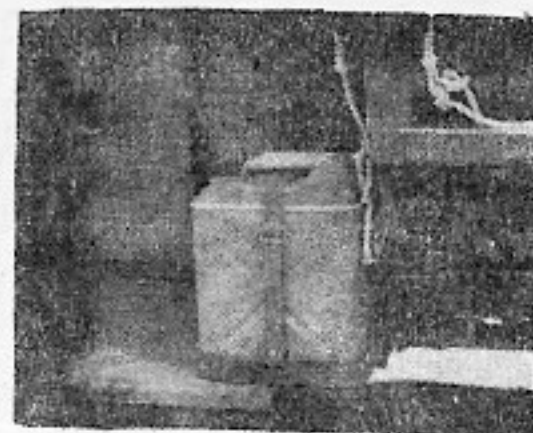
Can in Bracket



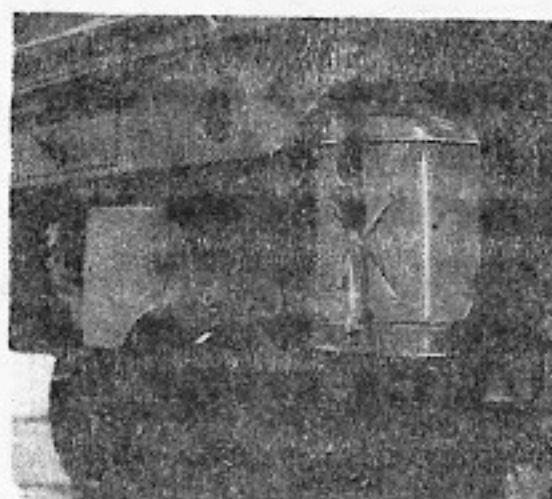
These pictures show suggested placement of cans on various trucks. This is a Diamond T Wrecker.



One-Half Ton



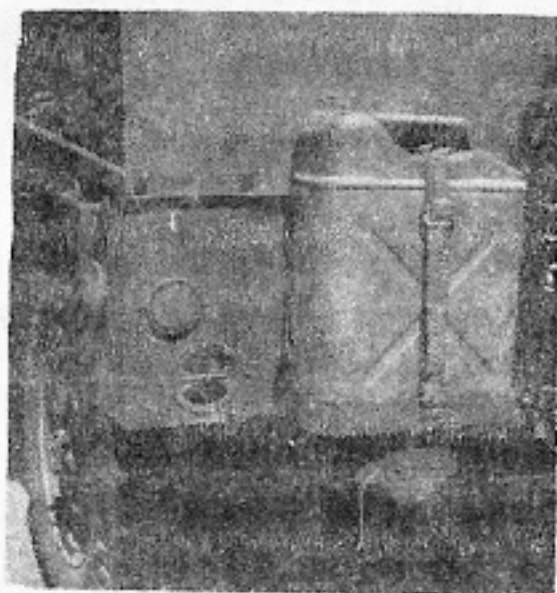
2½ Ton or 1½ Ton



Mudguard 1-1/2 Ton



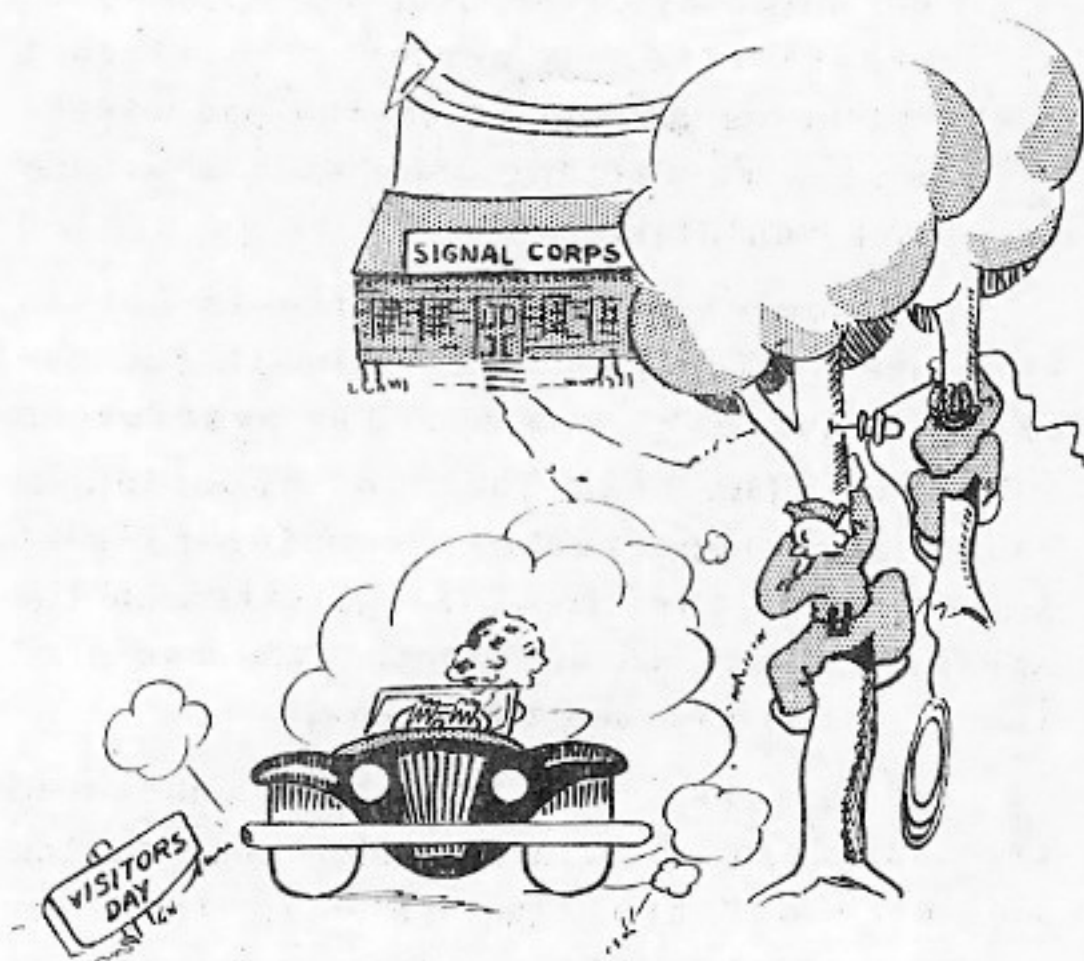
Mudguard 2-1/2 Ton



Quarter Ton



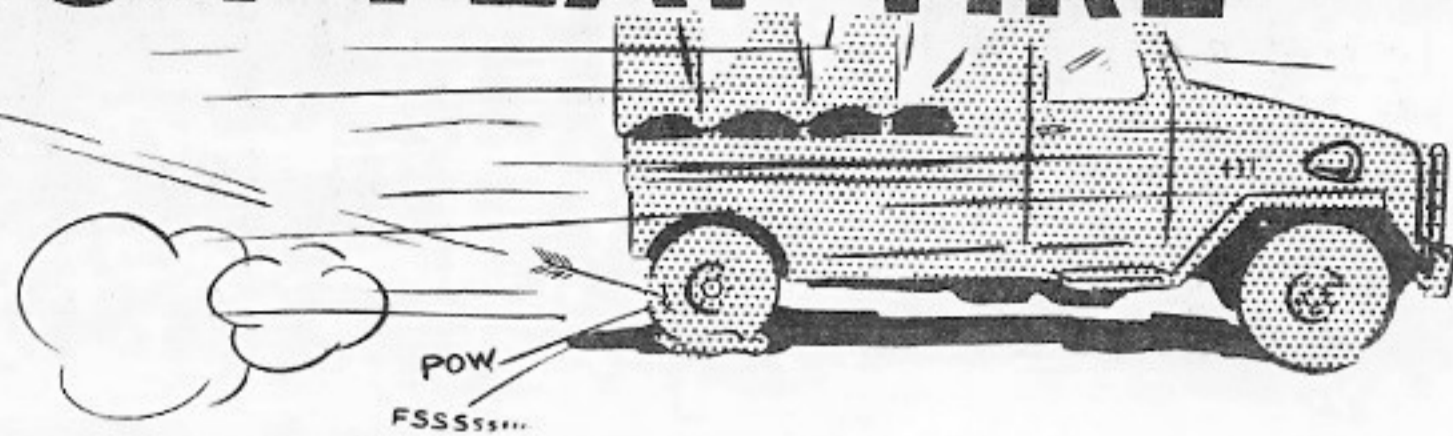
Can in Bracket



IT'S O.K. TO COME DOWN BOYS
I'VE BEEN DRIVING SIX MONTHS



RUN-FLAT-TIRE



Once upon a time there was a Greek by the name of Achilles. When this Greek was little, his mother grasped him by the heel and dunked him in the river Styx. Thus he was rendered strictly bulletproof - except for his heel by which his mother had grasped him.

Later on, the story goes, he was shot in the only place where an arrow could penetrate - his heel - and shortly thereafter, he went the way of all flesh.

Today - 1941 - the problem of the "Achilles' heel" is still around. The modern army vehicle can soak up more bullets than a sponge can water - but a shot in the tires will send it sprawling.

Since the day pneumatics were born, countless inventors have gone buggy from unsuccessful attempts to make tires invulnerable. While their efforts have not been entirely in vain, there have been no outstanding successes until quite recently.

Then somebody dreamed up the "run-flat" or "combat" tire. A series of stringent tests is being conducted on the new tires, with a view to fitting them to combat and transport vehicles.

The secret of the new tire is not in the tube (which is normal) but in the use of a "bead lock" and heavily reinforced casings. The bead-lock is a continuous strip of strong rubber, running between the beads of the tire. A split rim on the wheel, presses in or "locks" the beads of the tire against the bead-lock.

In this way, the bead of a punctured tire, instead of folding under and rolling the tire off the rim, is held in place against the bead-lock. The extra-strong casings enable the tire to support a speed-

ing vehicle for a run of fifty miles or more.

Strictly an emergency measure, the new tire, when shot flat by bullets or shrapnel, will keep a vehicle moving.

And brother, next time you're speedin' away from a pack of troubles and the tire goes phoosh!.....

Why, like old man river....you'll just keep rollin' along.

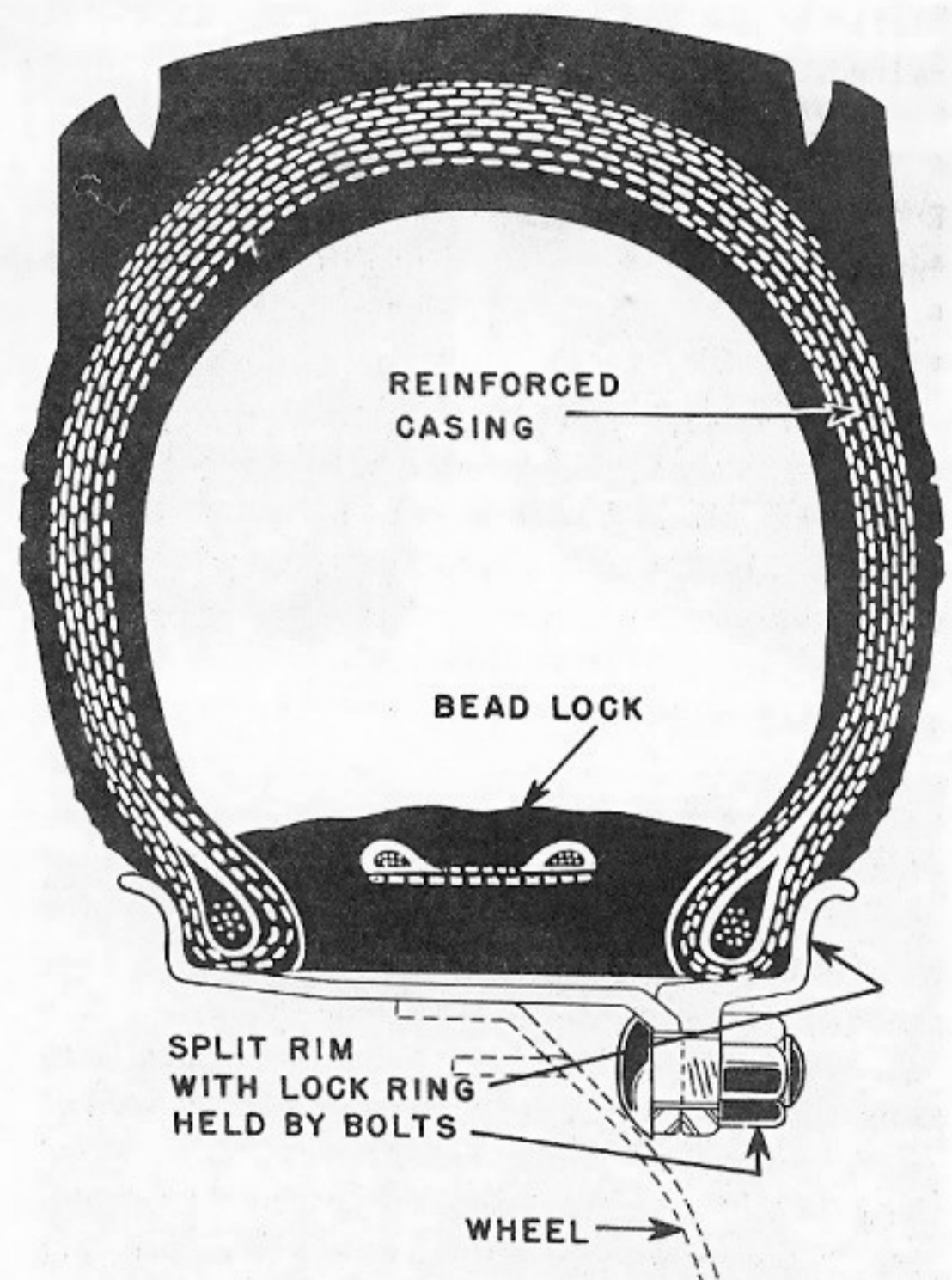
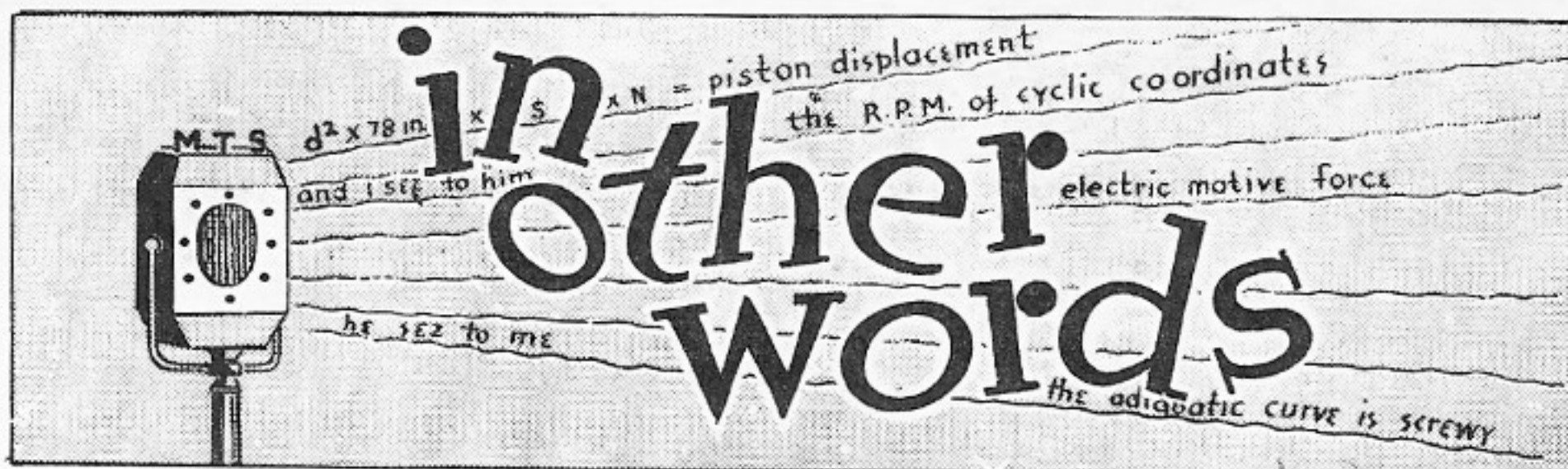


Diagram showing one of several experimental bead locks in position on the rim. The engineers hope to perfect a rig that will permit a tire to be run flat for many miles in an emergency.



COMPRESSION.- WEBSTER SAYS: *Act of compressing the working fluid in a heat-engine cycle after admission and before the working stroke.*

The compression stroke is probably the most important stroke in the cycle of an internal combustion engine because it has a direct bearing on the amount of power obtained from the power stroke of the piston. The more you compress a gas, the more its pressure increases; and the more its pressure increases, the more work you can get out of it. Back in the 1600's sometime, an Irishman named Boyle was experimenting with gases, and he found that at a constant temperature the pressure of a gas is in inverse proportion to its volume.

In other words, if a piston on its compression stroke squeezes the air-fuel mixture into one-third the space, the pressure of the fuel will increase three times. *Compression pressure* is the name given to the amount of pressure obtained by compressing a gas.

The reason the compression pressure is important is this: the amount of pressure above the piston in an engine at the end of the compression stroke is multiplied approximately four times when the mixture is ignited by the spark from the spark plug and the burning gases expand. The amount of pressure or power released by this burning mixture is called *combustion pressure*. So - the more compression pressure you have, the more combustion pressure you can obtain.

In other words, the relationship between compression pressure and combustion pressure is this: you start off with an

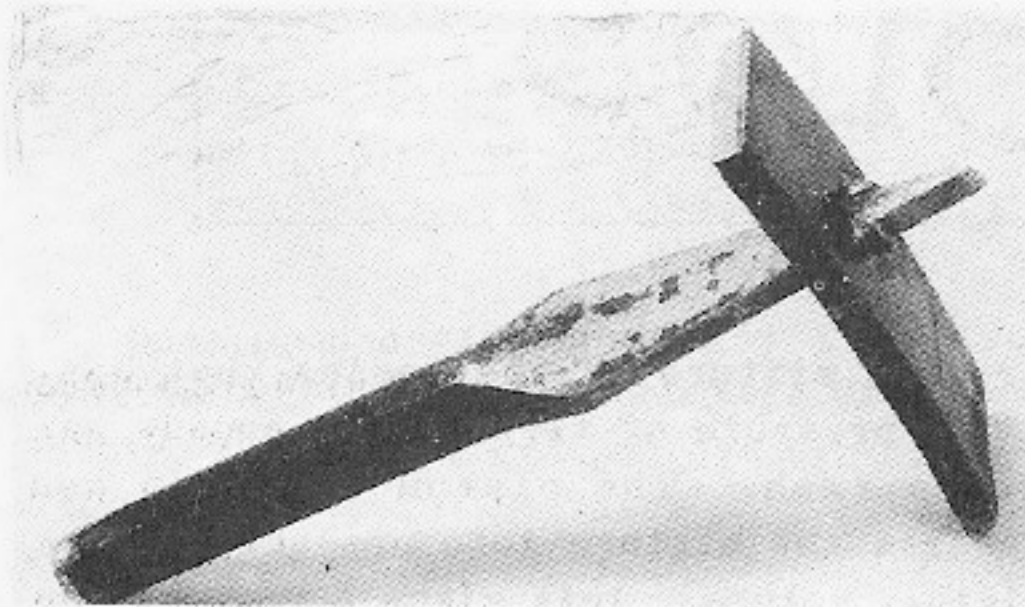
air-fuel mixture in the engine that has, say, a pressure of twenty five pounds per square inch. The piston comes up and squeezes the mixture into one-quarter its original volume. This gives a compression pressure of one hundred pounds per square inch (four times twenty five). The spark jumps the gap in the plug and starts the mixture burning. The burning gases start expanding and increase their pressure four times, or four hundred pounds per square inch. So, in starting with a pressure of twenty five pounds per square inch, we wind up with a pressure of four hundred pounds per square inch -- all by using the old squeeze play.

"That sounds like a 'cinch'," you'll probably say. "Why don't engineers increase the pressure of the air-fuel mixture more than they do now and really get some pep out of these buggies?" It would be a 'cinch' if they could control the burning rate of gasoline. The more you compress gasoline or a gasoline-air mixture, the faster it burns. The faster it burns, the more it knocks; and the more it knocks, the harder it is on the engine.

Ethyl treated gas burns slower than the untreated, and the use of Ethyl gas has allowed compression ratios to increase from about three to one to as high as nine to one; and in Diesel engines compression ratios come as high as sixteen or seventeen to one. A compression ratio of three to one means that the gas is compressed into one-third its volume, and nine to one means it is compressed into one-ninth its volume - which, of course, allows greater combustion pressures and greater working pressures, pushing the piston down and increasing the power and speed of the engine.

(turn to page 139)

This 'n That



Yes, this is just a picture of a chisel! One chosen at random from a lot of 40,000 purchased by the Army and tested by being clean-driven through solid steel. It is strikingly clear that these chisels are going to be capable of taking considerable more punishment than ever falls to the lot of the average chipper. And it is just this extra quality built into nuts and bolts and chisels, into trucks and airplanes and guns that the Army demands and that American industry produces.

DEPARTMENT OF USELESS INFORMATION

Spinners and nut busters — Do you realize that when a 2-1/2 ton 6 x 6 GMC truck with a gross weight of 14,000 pounds is stopped short, enough energy is released to:

1. Bring 1,714 pounds of lead from 75° F. to the melting point.
2. Bring 30,000 pounds of ice to the melting point.
3. Bring 25.5 gallons of water to the boiling point from normal room temperature.
4. Do the work of 764 average horses.
5. Lift the truck over 1-1/2 times as high as the Empire State Building.

PROBLEM: How many B.T.U.'s of heat does your motor sergeant liberate when you strip the gears on a new truck?

SMART DRIVERS

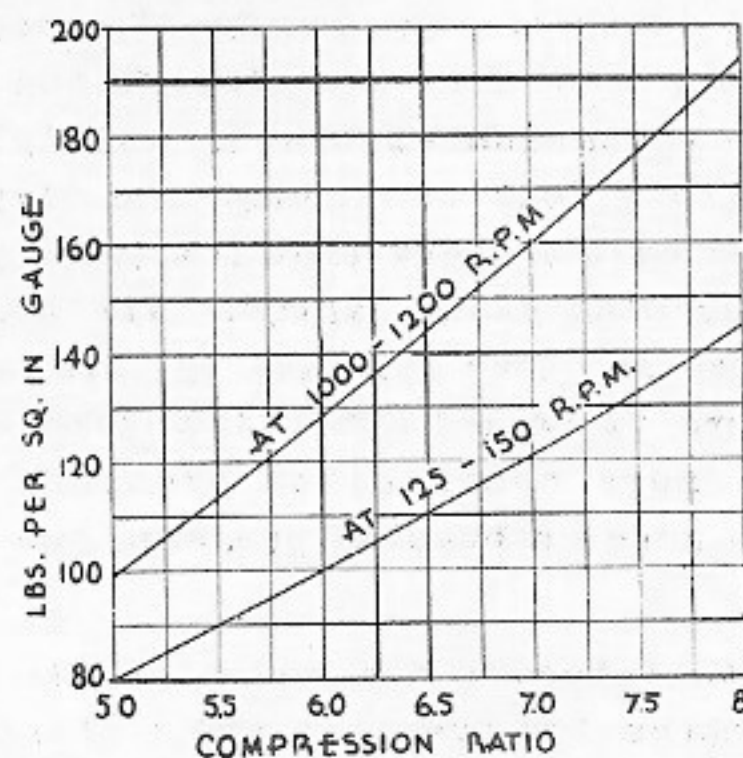
never cut the engine immediately after a hard drag and a big load. They allow the engine to idle a while, thus reducing the likelihood of piston ring sticking.

TESTING COMPRESSION

Taking compression tests of an engine may have some of you stumped. In some specifications, the compression pressure figure is given at cranking speed, while in others it is given at 1000 r.p.m. Taking a compression reading at cranking speed is easy but you need a dynamometer to take it at 1000 r.p.m.

In other words, there must be some means of driving an engine at 1000 r.p.m. other than its own power to make a compression test at this speed.

Here's a chart which has been worked out to convert compression pressure at 1000 r.p.m. to a compression figure at cranking speed. I believe this chart will be of assistance to you in checking those cars for which you have only the specifications at 1000 r.p.m. Of course, you realize that all compression tests should be made with a wide-open throttle to obtain an accurate reading. Be sure to read this month's "In Other Words".



of a hydraulic brake master cylinder, inspect the place where the compensating port enters the barrel, because a burr is sometimes formed around the edge of this orifice. This burr not only blocks the free passage of the fluid into the cylinder but will cut the piston cup as it passes over it.

Maybe you'll feel that any four-year-old should know the answer to this one, but you'd be surprised at the controversy this has created at times in the past. Which is the left side of your truck?

a. The side to your left as you sit in the cab of your truck?

b. The side to your left as you stand in front of your truck, facing it?

(Correct answer - a)

We'd like to know if you know what you'd like to know if you were looking at the odometer on your truck.

a. The speed at which you're traveling?

b. The distance you have traveled?

c. The oil pressure?

d. The electrical current?

(Correct answer - b)

Watch this one. It's tricky. What is the front side of your speedometer?

a. The side with the dial, facing the driver?

b. The side away from the driver, toward the engine?

(Correct answer - b, as decided by the S.A.E.)

In which of these instances would you have use for a "Prony Brake"?

a. When determining the "brake horsepower" of your truck?

b. When the emergency brake fails?

c. When parking on a steep hill?

(Correct answer - a)

If you went over your truck, which of these items would you suspect to have a "pyrexilin base filler"?

a. The tires?

b. The paint surface?

c. The steering wheel?

d. The headlamp?

(Correct answer - b)

A secret that died with the ancient Egyptians, comes to life again with the research into the element beryllium.

The secret - the tempering of copper - is a secret no more, for with the addition of just a pinch of beryllium (2 per cent) copper is transformed into an alloy comparable to steel - and with even more resistance to fatigue.

A beryllium-copper file will cut through steel without a shower of sparks - which is a good reason why tools made of the new alloy are being used more and more by men who work around oil and gasoline.

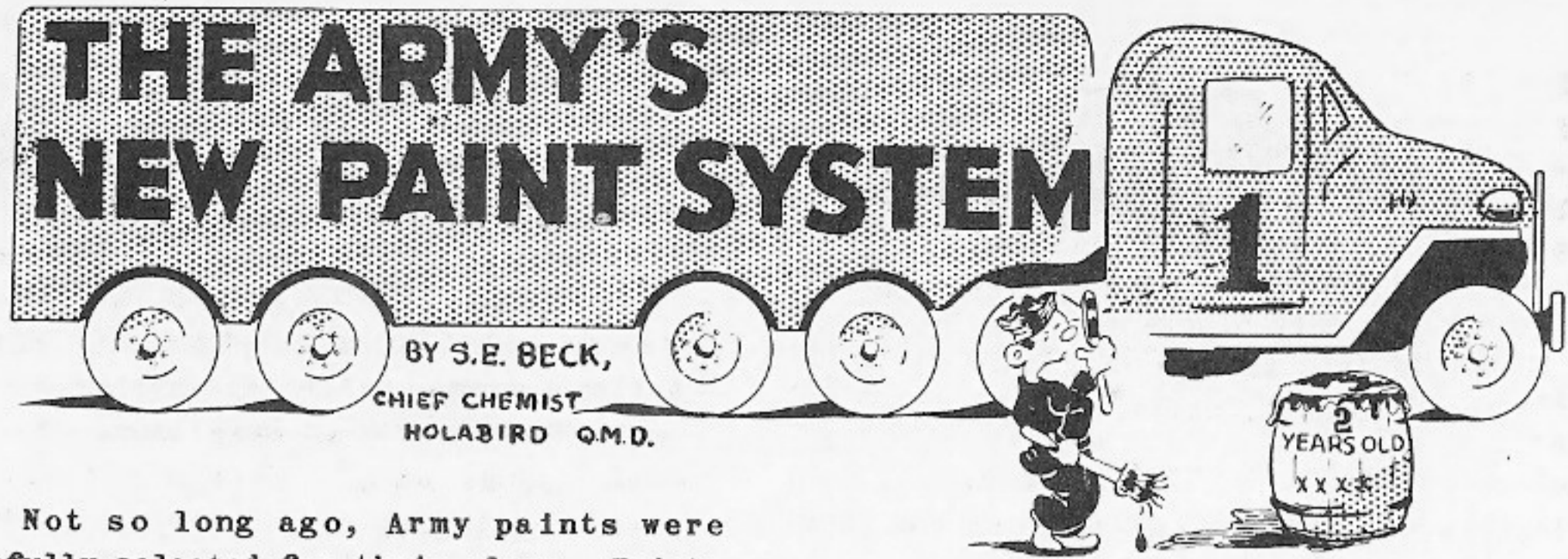
A tire that is on a wheel only one-half inch out of alignment is literally dragged sidewise 87 feet in every mile.

Don't overinflate tires in the belief that with a few more pounds of air in them they will require less frequent checking. Pressures above those recommended by the car manufacturer unbalance wheel alignment, cause poor steering and ruin front end assemblies.

When replacing glass in a window or windshield be sure you know how it was broken. Unless it was struck by some object, it was probably caused by abnormal frame tension. If so it should be corrected in order to avoid a repetition.

Oil around the spark plugs doesn't always mean that the engine is pumping oil. In most cases the trouble is due to a loose plug or a worn plug gasket.

Did you ever wonder why the solder you have put on a panel became chalky and unworkable? That's because you got the solder too hot and the tin ran out. The only remedy is to remove the solder and start all over again.



Not so long ago, Army paints were carefully selected for their gloss. Paints which did not shine brilliantly enough were rejected. "Spit and Polish" was the watchword. In some cases machines were purchased to polish lacquer films to a dazzling lustre. Today, shiny paint is only a memory. Army planners, before the European war began, recognized the need for a new type of paint for tactical vehicles. Before the Defense Program had even hit low gear, the new paint specifications were tested and ready. But the Army had dropped a bomb shell in the paint world.

As one startled paint expert put it, "the Army has a paint job that's two years old before it's on one day." From many points of view that statement was true.

The traditional functions of vehicle paint are twofold:

1. To beautify the vehicle.
2. To protect the metal surface from rusting.

The Army has forgotten about shining beauty and emphasized the camouflage aspect. Rust prevention is only a secondary consideration.

The camouflage plan that is at present employed on Army vehicles utilizes three factors: color, gloss and stenciling.

COLOR

Vehicles are finished in a solid olive drab color, which was chosen to blend in reasonably well with the average landscape. This color when moistened is a close match to the old glossy olive drab color.

GLOSS

It is common knowledge that a vehicle painted with ordinary glossy paint can be

detected in bright sun light from a surprising distance because of its gleam. The new lustreless paint makes a vehicle difficult to see from the air or from great distances over land.

STENCILING

In addition to these two camouflage effects, the paint system now used by the Army includes a third improvement. White stencil numbers have been eliminated. This was done because they can be photographed from the air, as was demonstrated in recent maneuvers. The blue drab stencil enamel, which is now used, cannot be photographed from the air, even using yellow or red filters. Furthermore, it is illegible to the normal eye at distances exceeding seventy-five feet.

NEW PAINT REQUIRES CARE

In order to preserve these camouflage features, more care must be taken with vehicles. To secure the necessary degree of dullness, it was necessary to adapt a relatively rough paint. A dried coat of this paint contains thousands of angular particles of pigment which break up the surface so that a minimum of light is reflected. It is obvious that continued friction or rubbing will eventually smooth down the surface and produce a reflecting finish. This must be avoided at all costs. Careless washing is one of the principal causes of glossing-up. The vehicle should not be washed more than once a week. Pains should be taken to see that the washing is done entirely with a sponge or soft rag. The surface should never be rubbed or wiped, except while wet, or a gloss will be developed.

Continual friction of wax-treated tarpaulins on the sides of a vehicle will also produce a gloss. This may be removed by washing with degreasing solvent. (Covered by QM Spec. ES-No. 398 of latest issue. This material is on contract and may be purchased against Contract Bulletin No. 88).

It is not necessary to keep the new lustreless vehicles as scrupulously clean as was customary when glossy paint was used. In fact, a certain amount of dust increases the camouflage value of the paint.

Grease spots should be tolerated, as far as possible. The relatively porous paint soaks up oil as a blotter absorbs ink. Whatever portion of the grease spot cannot be removed by washing with degreasing solvent, should be allowed to remain.

TENDENCY TO FADE

The new paint has some tendency to fade. Each organization should provide itself with standard color chips of the olive drab color and the blue drab color. These standards may be obtained from the Engineering Division, Holabird Quartermaster Depot, Baltimore, Maryland. When the color has faded until it is definitely lighter than the standard, much of the camouflage value is gone and repainting is necessary. Tests at Holabird indicate that repainting will probably be needed once yearly in the

case of the olive drab and twice yearly in the case of the blue drab enamel. 137

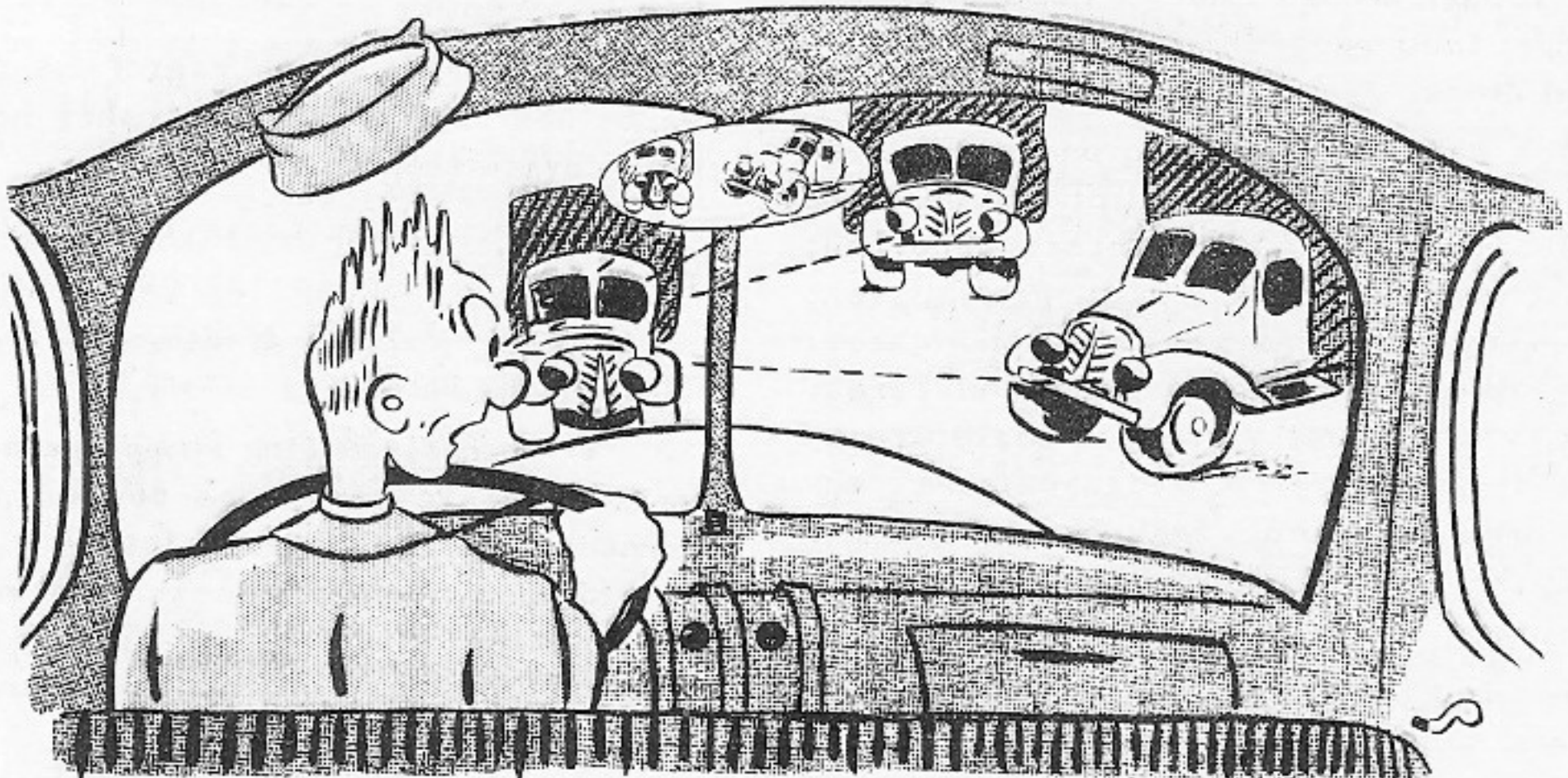
The secondary purpose of vehicle paint, rust prevention, is taken care of by a primer. It was found that lustreless olive drab enamel was too porous and insufficiently adhesive to provide adequate protection over an ordinary primer. This new primer has extraordinary water-resistance and adhesion, and is used under the olive drab enamel on all Army vehicles. Its special values are utilized only where it is applied directly over the bare metal. Consequently, it is not suitable for use as a refinishing primer over old paint coats. This subject will be treated in detail in a later article on repainting.

The lustreless olive drab enamel referred to in this article is covered by Quartermaster Corps Tentative Specification ES 474 of latest issue.

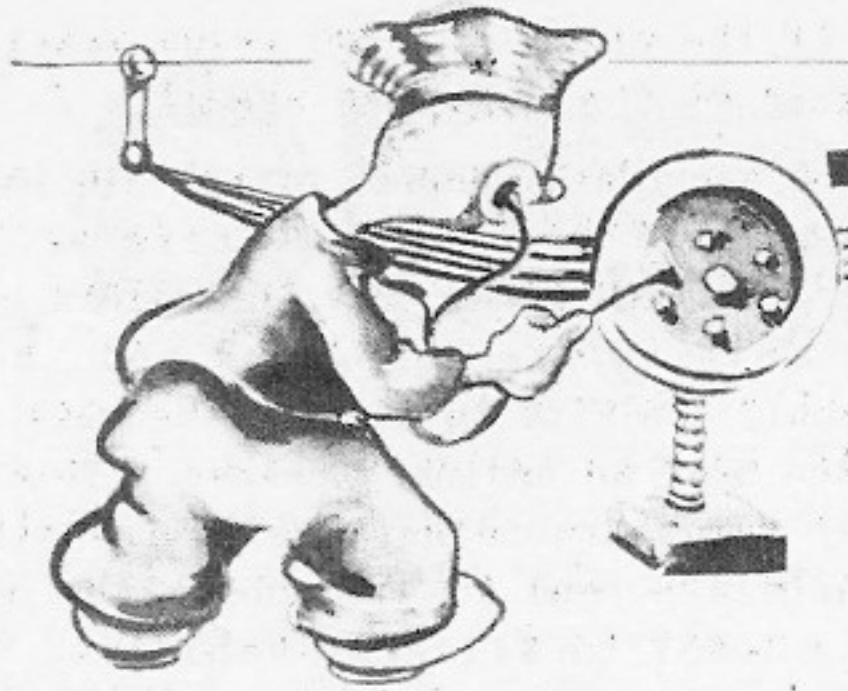
The primer mentioned is covered by Quartermaster Corps Tentative Specification ES-359 of latest issue.

Both of these paints should be thinned with Thinner and Diluents, Synthetic, covered by Quartermaster Corps Tentative Specification ES-370 of latest issue.

These materials are on contract and may be purchased against Contract Bulletin No. 104 in Zones 1, 2 and 4 or Contract Bulletin No. 94 in Zone 3.



Trucks to the right of him, trucks to the left of him -- into a street full of traffic rides our inexperienced driver. Situations like this are to him as delicate as a foot-full of blisters.



TROUBLE SHOOTING ON HYDRAULIC BRAKES

Here's a handy list of symptoms that will help you diagnose hydraulic brake ills.

1. When all brakes drag, look for: Incorrect adjustment of shoes; mineral or other improper fluid in system; defective rubber piston cups and valves; pedal not returning to full off position; clogged compensating port in master cylinder.

2. When one wheel drags, look for: Weak or broken brake shoe return springs; incorrect shoe adjustment; defective wheel cylinder piston cups; loose or defective wheel bearings; stuck wheel-cylinder piston.

3. When brake pedal goes to floor board, look for: Excessive clearance between brake shoes and drums; Worn brake lining; air in hydraulic system; leak in hydraulic system.

4. Excessive pedal pressure is caused by: warped brake shoes; grease-soaked lining; incorrect shoe adjustment; egg-shaped drums.

5. When car pulls to one side, look for: different kinds of lining on opposite wheels; grease-soaked lining; incorrect adjustment of anchor pin; primary and secondary shoes reversed on one wheel; loose wheels; unequally inflated tires; tires worn unequally; scored brake drums; brake dust or other foreign material between drum and lining; weak chassis springs; defective or weak shock absorbers; rough brake drums.

6. Excessive pedal action is caused by: incorrect brake shoe adjustment; scored

brake drums; incorrect lining; loose brake backing plate.

7. Spongy brake pedal is caused by: air in system; incorrect brake shoe adjustment.

8. Squeaking brakes are caused by: warped brake shoes; loose lining; dirt imbedded in lining.

In closing, here's a few ounces of prevention contributed by Lieutenant Leo Timamian, Co. B 5th Sig. Tng. Bn., Fort Monmouth, New Jersey.

Mineral oil or other improper fluid, and all foreign matter are poison to the hydraulic brake system. Don't leave parts near or clean them with anything but hydraulic brake fluid.

"Handle with care" is the first prescription when doctoring the hydraulic brake system.

(1) Storing brake fluid and flexible parts near steam pipes or other hot spots deteriorates them.

(2) Keep sharp tools away from rubber parts.

(3) Keep oil and grease away from brake linings and shoes.

(4) When assembling shoes against wheel cylinder make sure shoe toe is properly located in piston insert slot.

(5) Don't use more than a 5" wrench on tube nuts or fittings or bleeder screws. Anything more than ordinary pressure is not required.

ONE-ARM DRIVERS ARE HEADED FOR THE ALTAR - PROBABLY IN A BOX.

LUBE MEMO

We saw a letter from an infantry unit the other day, requesting information on flushing transfer cases, transmissions and differentials. They said that they had been using a hot flushing oil and that it seemed to work satisfactorily.

Well, we started talking things over, discussing it from all angles, and asked, "Why should a gear case be flushed? It is sealed against dust and dirt and if the drained lubricant shows signs of metal cuttings, it should be disassembled and inspected, not just flushed." Finally we more or less all agreed on this. It's not an official opinion, of course, but we're giving it to you for what it's worth.

FLUSHING NOT RECOMMENDED

It doesn't seem advisable for anyone to attempt flushing transmissions, differentials, or transfer cases. The big commercial fleet operators are discontinuing such practice. If these units are pressure flushed with hot oil, it will undoubtedly spoil the oil seals; and if any solvents are used, they are very apt to cause dangerous reactions in hypoid lubes. Foam, which will not drain out, will also form in the case. The flushing oil is sometimes poured into the case and then the engine is cranked or run to circulate the oil by churning. This practice may ruin the gears because of insufficient lubrication.

CLEANING IS RECOMMENDED

If these units are regularly drained at normal operating temperature, it doesn't seem necessary to do any kind of flushing

or cleaning at all for at least the first 25,000 miles. After that time if the units require a cleaning, we suggest that the 4th echelon, and *only* the 4th echelon, clean them thoroughly with flushing oil, or solvent if disassembled, and then wipe them dry with a lintless rag.

Again we say that there is nothing official about this, but nevertheless, we are passing it on for what it's worth.

IN OTHER WORDS

Continued from page 133

COMBUSTION PRESSURE: The pressure released by burning gases.

COMPRESSION PRESSURE: The amount of pressure resulting from the compression stroke of the piston when it has reached top dead center.

COMPRESSION RATIO: A ratio expressing the extent to which a fuel and air charge is compressed. It is a relationship between clearance and displacement volumes and is found as follows:

$$\frac{\text{Piston Displ.} \quad \text{Clear. Vol.}}{\text{Clearance Volume}} = \text{Compr. Ratio}$$

For example: The compression ratio for a 3½-by 5-inch cylinder having a piston displacement of 48.105 cubic inches and a clearance volume of 12.026 cubic inches would be $\frac{48.105 + 12.026}{12.026} = 5$. This means

that the original charge would be reduced or compressed to one-fifth of its original volume.

"YOU MAY AS WELL RUN ME OVER AS SCARE ME TO DEATH"

Have you ever been withered by this bit of scornful contempt from a victim of your thoughtless hornblowing?





A very important item under the heading of Tire Maintenance, is correct tire storage. Tires can be stored safely up to three years with proper precautions. Tubes should not be stored for more than two years, however.

Light, heat, air in motion, ozone (this comes from the electrical discharge of motors, generators and sunlight), oils, dust and dirt all rot rubber. Obviously, if you guard against these, your stored tires will last longer.

A tarpaulin or other heavy, tightly woven fabric over the tires and tubes will protect them against light, air and dirt. The darker the storage place, the better.

HEAT AND AIR

have a very destructive effect on tires. 70° to 80° should be the maximum temperature.

Draughts and other movements of air keep replenishing the supply of oxygen, and the more oxygen present, the more rapidly the tires deteriorate.

New tires, which are usually wrapped, are fairly moisture-proof, but be sure that the rubber does not come into contact with any oil or grease. Stack stored tires on clean wood strips about 1/2" thick.

"Lacing" the tires in piles tends to kink the bead wires and distort the form of the tires. Pile the tires horizontally, one on the other, taking care to pile only tires of the same size together. The smaller the tire, the shorter the stack should be. The heights range from 7 feet for 5.50 to 15 feet for large heavy duty tires.

SPECIAL PRECAUTIONS

must be taken with used tires. Clean and repair the tires before storing them.

MOUNTED TIRES

Vehicles in storage should be blocked so that the weight does not rest on the tires. Release the air. If this is not possible, the air pressure in the tubes should be checked periodically.

Tires that must remain outside should be coated with a synthetic rubber paint as a protective covering. If possible, a cover or wrapping of heavy canvas or similar material can be used. In general, observe the same precautions for used tires as you do for new ones.

TUBES

must be handled with even greater care than tires. They should be left in the original package and when they are not boxed, they should be stored in a cool, clean place where they are well covered and protected from deteriorating influences. Tubes should not be inflated before storing, or piled so that the weight will stretch them along the folds.

In cases where the tube is received in the tire, the pressure should be reduced to a point where the tube is just retained by the tire. The unit can then be stored in the recommended manner.

USED TUBES

should be removed from the tire, and completely deflated by removing the valve core. They can then be folded and stored in the same manner as new tubes. It is advisable to make all necessary repairs before storing.

O'FLAHERTY ON BRAKES

Continued from page 115

coming out.

Do they hear me? Go talk to a brick wall!

Or, if they do, by some freak of nature, remember that - then they pull another fancy trick.

They stick too much grease in the differential.

What happens? Oh, nothin' much. Just that the grease expands, busts through the oil seal leading from the differential and

spills into the universal joint.

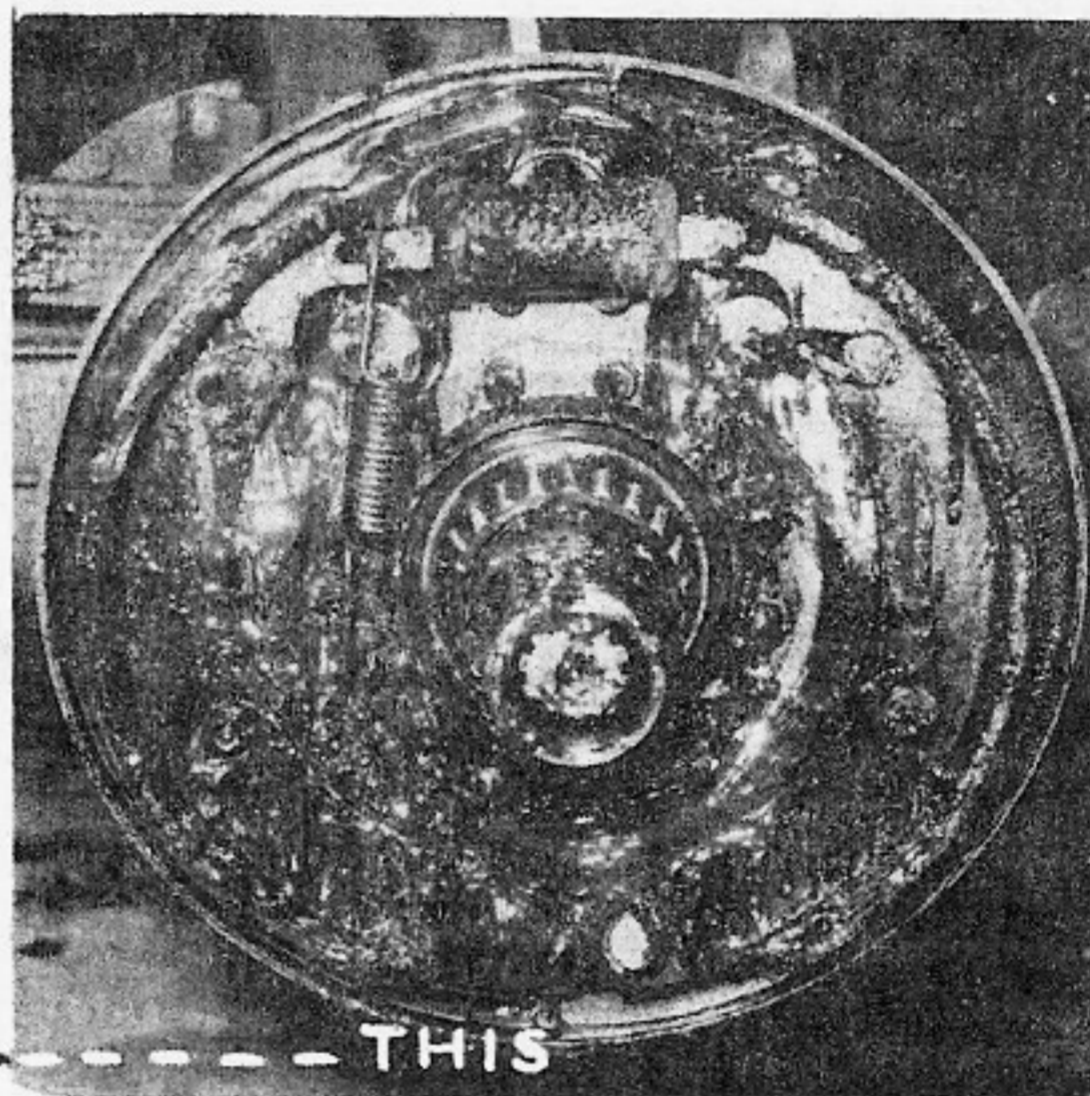
You take it from there. The universal is now too full of grease so the grease busts through the front bearing seal and dives into the brake again.

Eat your heart out.

"Gentlemen," I say, "Always keep the oil at the proper level in the differential, grease at the proper level in the U-Joint, and pack wheel bearings properly."

* * * * *

"And furthermore, Gentlemen, /&%\$-#"@!"



MOTOR TRANSPORT SCHOOL

Continued from page 129

chanics with a running capacity of 500 students, turning out 250 each month.

TRADE SCHOOLS

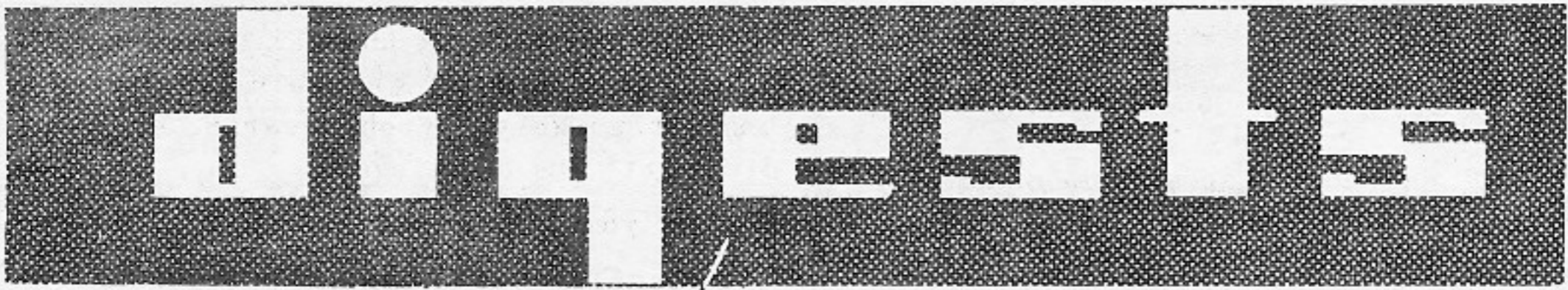
Industry, in education as in everything else, is cooperating with the Army in training men as specialists in ignition, tires and brakes, motorcycles, and motor transport work.

Camp Lee, Petersburg, Virginia; and Fort Warren, Cheyenne, Wyoming, which are Quartermaster replacement centers, give courses in the following:

1. Motor - includes: General Mechanics; Ignition and Carburetion; Sheet Metal and Radiator; Blacksmith and Welder; Mechanics; Foreman and Inspectors; Storekeepers and Clerks; Body Finisher; Draftsmen; Engine

Specialists; Motorcycle Mechanics; Chauffeurs; 2. Bakery Company. 3. Laundry Company. 4. Depot Supply. 5. Shoe Repair. 6. Q.M. Salvage. 7. Sales Commissary. 8. Railhead Company. 9. Sterilization and Bath. 10. Refrigeration. 11. Q.M. Service Company. 12. Salvage Collecting Company. 13. Mess Sergeants. 14. Cooks. 15. Clerks, A. & S. 16. Q.M.C. Air Base. 17. Electricians. 18. Painters. 19. Carpenters. 20. Plumbing.

A new brake gadget is scheduled for the market in the near future. It will give you a parking brake on all wheels. A poppet valve is placed in the line between the master cylinder and the wheel cylinders. A cable operated from the instrument panel will close the valve while the brakes are applied, holding the fluid in the wheel cylinders until the valve is released.



C U R R E N T

"MOTOR"

July 1941

"Let's Keep It Up All Year 'Round" -

There are still some doubts as to the safety and efficiency of battery quick-chargers. This article offers conclusive evidence that rightly used, the quick charger is a safe aid to battery up-keep.

"AUTOMOBILE DIGEST"

July 1941

"Light Relays" - Tells how to install simple electrical relays. The relay reduces the circuit to the shortest possible distance between the battery and the lights, horn, or starter. Installing such a relay is a simple improvement to make. This article gives you all the dope.

"Brake Pedal Adjustment" - Discusses very fully the way to get proper pedal action where the design calls for free play.

"COMMERCIAL CAR JOURNAL"

July 1941

"Tire Trends and Techniques" - The 'Lowdown' on what makes tires stand up. "Rubber being what tire men call a hysterical material has to be liberally dosed with sedatives to make it behave in a prescribed manner." Here is a good, racy description of the technique of tire manufacture. It deals with such tire questions as cotton vs. rayon, synthetic rubber vs. natural, national demands vs. national defense.

"Figuring Load Distribution" - Here is a fully illustrated and detailed explanation of all the factors affecting load distribution. The author insists that proper weight distribution affects performance, maintenance, cost and safety and he presents many diagrams which aid the reader to follow his calculations.

"Claims about Reclaiming" - This brief article would seem to dispose of any favorable claims. Modern engine performance depends on high grade oils, and chemicals added to the fuel to meet these requirements are either depleted in operation or lost in the reclaiming process.

"AUTOMOTIVE INDUSTRIES"

July 1941

"Chemical Coating Metals" - This article describes a modification in the phosphating process of protecting metals against corrosion. The Parco-Lubrite process converts the metal surface layers into non-metallic, oil absorptive phosphates. This coating is effected by an actual chemical reaction and results in an oil absorptive medium.

"FLEET OWNER"

July 1941

"Driver Fatigue" - (Based on a U. S. Public Health Service Report) The results of tests given to determine the relationship between hours of driving and other conditions of work. Fatigue and physical

CONTRACTS

T E C H N I C A L M A G A Z I N E S

fitness of the drivers were measured by psychological, physiological and medical tests.

"Truck Springs" - An answer to a questionnaire asking "Should Truck Springs Be Lubricated? If so, how, when and with what?" A venture into a field of uncertainty. There doesn't appear to be any uniform body of opinion on the subject of springs.

"Fuel Costs" - A description of some simple equipment that will help to cut fuel costs. The value of a good 'timing-light' and the advisability of stamping ignition timing marks plainly and conveniently are stressed. The material includes a diagram for constructing a carburetor and fuel pump test stand.

"One Mirror or Two?" - Advocates the use of two mirrors. One of the chief reasons advanced is that the mirror on the right protects the truck driver against the motorist who attempts to pass on the inside.

"S.A.E. JOURNAL"
July 1941

"Designing for Alternate Materials." -
A report on various substitutes coming into

use as alternates for critical materials needed for national defense. The most important substitution program is the effort to replace aluminum-alloy pistons with cast-iron or cast-steel ones. Other critical materials for which substitutes are being made are nickel, zinc, tin, rubber and chromium.

"MOTOR AGE"
July 1941

"Why Brakes Fail" - A complete picture story of brake failure. Pictures various defective parts, causes for their condition as well as repair and replacement remedies. A handy spread to hang on the wall for reference at a glance.

"The Inside Story of Generators" - Goes into the fundamentals of polarity and field magnetism.

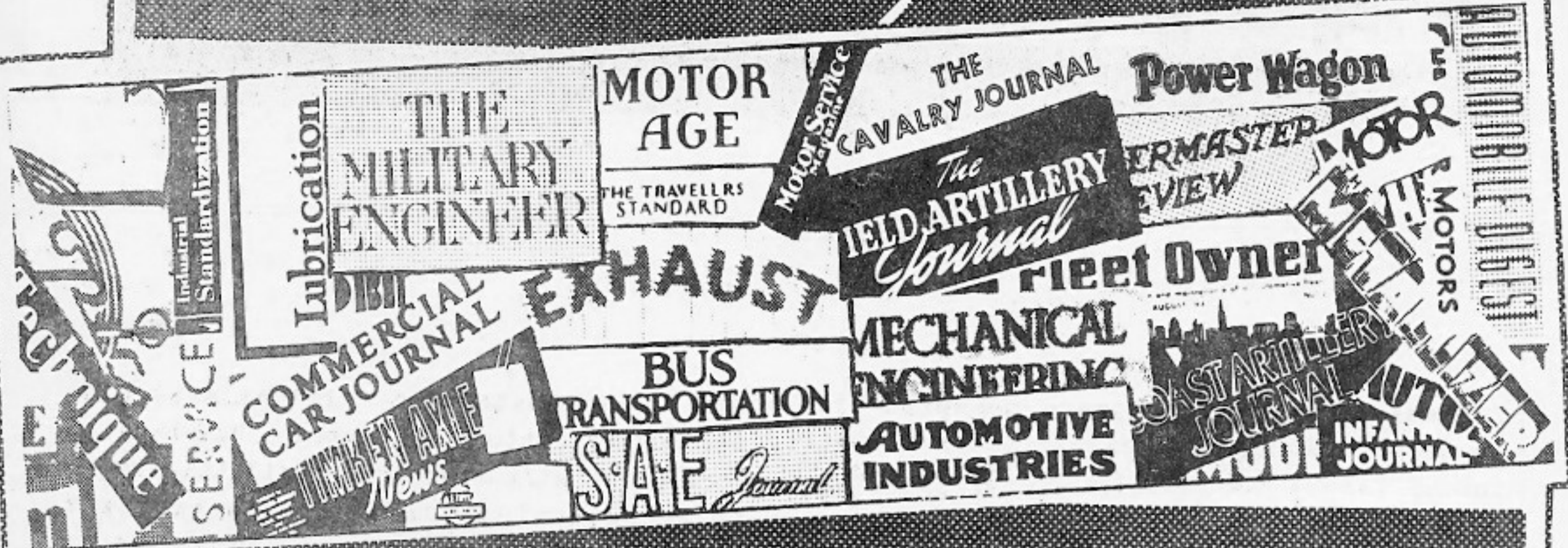
"Complete Battery Service" - A pictorial follow through on battery installation. Convenient reminders of all the steps you should take to insure proper installation.



WE TRY TO CHECK EVERYTHING SIX WAYS FROM SUNDAY, BUT SOMEBODY SLIPPED ON THE CONTRACT BULLETIN PURCHASES ARTICLE ON PAGE 101 OF THE JULY ISSUE. YOU'LL FIND AN INSERT SHEET THIS MONTH DISCUSSING THE BONERS WE MADE.

INCIDENTALLY, THERE'S A BATCH OF HOT NEWS FLASHES ON THE BACK OF THE INSERT THAT ARE IMPORTANT. LOOK FOR THEM!

Acknowledgments



*The editors wish to thank the following publishers for their courtesy in allowing **The 'A M** to make use of articles and illustrations from their publications. There were many articles that could not be used, but it is hoped that those published here will stimulate interest in the source material.*

"Neglected Tire Ruins Axle", page 116, was based on an article in the TIMKEN AXLE NEWS. Timken-Detroit Axle Company.

The "Adjustment Chart" on page 117, was taken from T/M 10-1601, THE MACK MAINTENANCE MANUAL.

"Help" articles were taken from the COMMERCIAL CAR JOURNAL, MOTOR AGE, AUTOMOBILE DIGEST, and the NASH-KELVINATOR CORPORATION.

Some articles in "This 'n That" were taken from THE AUTOMOBILE DIGEST, COMMERCIAL CAR JOURNAL and MOTOR AGE.

"O'Flaherty on Brakes", was based in part on material contributed by Major Leland T.

Reckord, 104th Q.M. Regiment, Fort George G. Meade, Md.

"Trouble Shooting Hydraulic Brakes", page 138, was based on an article in the June MOTOR AGE and material contributed by Lt. Leo Tamamian, Fifth Sig. Tng. Bn., Fort Monmouth, N.J.

"Tire Storage", page 140, was based on material supplied by the FIRESTONE TIRE & RUBBER COMPANY.

The idea for the cartoon on page 137 was contributed by members of the Motor Transport Shop and drawn by Pfc. Sarlo, dispatcher, Fort Totten, N. Y.

HOT OFF THE WIRE

WE'VE HEARD THAT "MOTOR MARCH" AND "MOTOR MARCH UNIT" ARE GOING TO REPLACE "CONVOY" AS THE OFFICIAL TERMS.

NEW ITEMS BEING PROCURED ARE: GRAVITY DISPENSING, HOSE ASSEMBLIES FOR 750 GALLON TANK TRUCKS; ALSO 10,000 FIVE GALLON GAS CAN BRACKETS FOR FIELD TESTS.

TO ELIMINATE HIGH SPEED MISS AND HARD STARTING IN THE WC-8 AND WC-18 DODGE RADIO TRUCKS: SET SPARK PLUG GAPS TO .025; DISTRIBUTOR POINT GAPS AT .020; AND WATCH FOR A TECHNICAL SERVICE BULLETIN WHICH IS BEING PREPARED TO COVER MOST IGNITION AILMENTS ON THESE RADIO TRUCKS.

AS PROMISED ON PAGE 11 OF THE APRIL '44 DELIVERY OF NEW BLACKOUT EQUIPMENT FOR 1940 VEHICLES IS UNDER WAY IN ACCORDANCE WITH OQMG CIRCULAR LETTER #97 - 5-27-41.

MOTORCYCLE BLACKOUT SWITCHES REFERRED TO ON PAGE 90, JULY '44 ARE AVAILABLE. REQUEST REPLACEMENTS FROM HARLEY-DAVIDSON MOTOR COMPANY, MILWAUKEE, WISCONSIN, FOR ANY MACHINES IN THE FOLLOWING GROUP:

- HARLEY-DAVIDSON MODEL 1941 WLA SOLOS:
 - U.S.A. W-64291 TO U.S.A. W-64939 INCL.
 - U.S.A. W-65448 TO U.S.A. W-68647 INCL.
 - U.S.A. W-87848 TO U.S.A. W-88012 INCL.
- APPLY TO INDIAN MOTORCYCLE COMPANY, SPRINGFIELD, MASSACHUSETTS, FOR REPLACEMENTS FOR MACHINES HAVING NUMBERS SHOWING BELOW:

- INDIAN MODEL 640-B SOLOS:
 - (MOTOR NO. FDO-1015)
 - (SERIAL NO. 640-1015)
 - (MOTOR NOS. FDO-1017 TO FDO-1515 INCL.)
 - (SERIAL NOS. 640-1017 TO 640-1515 INCL.)
 - (MOTOR NOS. FDO-2310 TO FDO-3852 INCL.)
 - (SERIAL NOS. 640-2310 TO 640-3852 INCL.)
- ORDER BY REGISTRATION OR SERIAL NUMBER AS INDICATED ABOVE.

SEE OQMG CIRCULAR LETTER NUMBER 165, 7-18-41 FOR IMPORTANT HINTS ON ENGINE BEARING FAILURES AND EXCESSIVE ENGINE WEAR.

ALWAYS USE THE UNIVERSAL TOW BAR TO SPACE AND STEADY A TOWED VEHICLE. USE THE V-SPACER WITH THE HOLMES WRECKER.

BE SURE TO SEE CIRCULAR LETTER NUMBER 146 FROM THE OFFICE OF THE QUARTERMASTER GENERAL WHICH REQUESTS THAT AN INVENTORY OF "OLIVE DRAB GLOSS ENAMEL" IN STOCK AT POSTS, CAMPS AND STATIONS, BE SUBMITTED BY THE QUARTERMASTER OF ALL CORPS AREAS TO REACH THAT OFFICE NOT LATER THAN SEPTEMBER 1, 1941.

TO AVOID RIPPING REAR CURTAINS ON DODGE WC RECONNAISSANCE COMMAND TRUCKS, UNFASTEN ALL 'DOT' FASTENERS AT BOTTOM OF CURTAINS AS WELL AS THE 'BUTTON' FASTENER WHICH IS UNDER THE FLAP WHERE TOP MEETS SIDE.

IT'S GOT TO STOP!



233 Are Killed,
Five In State,
On Fourth

99,000 WILL DIE
From ⁶⁰ Accidents In 1941

ACCIDENT
FACTS

Violations
Promises Close
Works
Lives
Pay

HOW MANY ERRORS?

How many errors did you find?

Nope, this isn't a "How many errors did you find?" contest. It is just a question about the sample purchase order we reproduced in the July 'AM. We got tangled up in a pretty complicated affair and we'll probably be lucky to get home in one piece after you've jumped on us.

Did any of you experience a queer feeling of vague doubt concerning the distribution of copies we listed on the face of the order? If so, did you bother to check your doubts against the Army Regulations? A finance officer here at Holabird did just that -- and bang! raised another welt on our belabored backs.

The distribution we listed was given to us by an authority on purchasing and contracting, so we returned to him for confirmation. He maintained that the purchase order pictured was correct, pointed out that the Contract No. (398-QM-9749) indicated a contract entered into by a local quartermaster (in this case Holabird QM Depot) and that the distribution the finance officer had given us applied to TPS (Treasury Dept., Procurement Div.) contracts. The only trouble was that we had neglected to write the fact that it was an indefinite quantity contract across the face of the purchase order. The finance officer, therefore, presumed it was a Treasury Department order. This sort of error within an error business got everybody a bit confused. Just to keep the record straight, now that we are once again out in the open, we suggest you consult Paragraph 16 b, AR 5-200, for the distribution of the TPS contracts.

THE REGULATIONS

The merry-go-round ride emphasizes the extreme importance of knowing, and in case of doubt, consulting your Army Regulations. There is often much confusion as to what paragraph in Army Regulations applies specifically to a subject under discussion. Interpretation will always vary when memory is depended on for an answer. The AR's are so finely detailed that you should never trust your memory to recall the various sub-headings of the various divisions of the various Regulations. To be sure you have the correct reference, consult your Regulations and circulars carefully; wade through all the sub-heads, cross references and changes until you are absolutely sure you haven't overlooked a single footnote. Even an obscure one line paragraph might clarify the whole subject.

THE PURCHASE ORDER

Compare the corrected sample purchase order with the one previously printed and you'll note the following errors.

1. According to sheet No. 1 of contract No. 78, all orders should be made in favor of Harley Davidson Motor Company, care of nearest authorized dealer. The original reproduction failed to meet this requirement and has been changed to conform with it.

2. The number of the Contract bulletin should be entered before the bid date.

3. The duration of the contract should be written across the bottom face of the purchase order, as is now shown.

4. Discounts should be shown as net here. The matter of discounts is a vitally important one and THE 'AM intends in the near future to run an article on the subject. The important thing to know now is that discount terms are always given in the Contract Bulletins.

One thing which merits particular attention is the delivery date. If delivery is made after the specified date.

but if the shipment is accepted upon a reasonable explanation of delay, a certificate attesting the circumstances should accompany the receiving slip. (See Circular 1-4 QMC, dated March 31, 1939.)

And that is all the news on Purchase Orders up to this minute.

Unless YOU have found other errors!

If you have, maybe we'll make a contest out of this after all and offer a pair of slightly worn britches and all our file copies of the July 'AM as prizes.

QUANTITY	UNIT	ARTICLE	UNIT PRICE	TOTAL PRICE
1	ea.	1002-40M Muffler, complete.	10.00	\$10.00
			Less 20%	2.00
			Net Total	\$ 8.00

Distribution:
 2 ea. signed copies
 Original - General Accounting Office. (Audit Division)
 Duplicate - Contractor
 2 ea. - Authenticated copies
 1 copy to - The Finance Officer
 1 copy to - P&C File
 2 ea. - copies
 1 copy to - The Quartermaster General
 1 copy to - Contracting Officer
 Holabird QM Depot

3 Purchased in accordance with Indefinite Quantity Contract Period May 1, 1941 to June 30, 1942.

William C. Johnson, Major, QMC
 PURCHASING AND CONTRACTING OFFICER.

SEE IMPORTANT INSTRUCTIONS ON REVERSE SIDE WHICH ARE MADE PART OF THIS AGREEMENT

WAR DEPARTMENT
 Q. M. C. Form No. 308
 Revised April 19, 1937

PURCHASE ORDER WAR DEPARTMENT

DATE June 2, 1941

The Quartermaster,

Fort Meade, South Dakota.

To Harley-Davidson Motor Company,
 c/o Harley-Davidson Minneapolis Co.,
 1923 4th Avenue,
 St. Paul, Minnesota.

SHIP TO

The Quartermaster,
 Fort Meade, South Dakota

CONTRACT No. (IF ANY) W 398-QM-9749

PURCHASE ORDER
 (OFFICE IDENTIFYING) No. 136

REQUISITION No. QM 500-86-41

TO EXPEDITE PAYMENT PLACE THE ABOVE NUMBERS ON ALL
 PACKAGES, BILLS, AND CORRESPONDENCE

PAYMENT WILL BE MADE BY FINANCE OFFICER

AT Ft. Snelling, Minn.

TO WHOM INVOICES, IN TRIPLICATE, WILL BE RENDERED. SEE
 PAR. 7 OF INSTRUCTIONS ON THE REVERSE SIDE HEREOF.

THE SUPPLIES AND SERVICES TO BE OBTAINED BY THIS
 INSTRUMENT ARE AUTHORIZED BY, ARE FOR THE PURPOSE SET
 FORTH IN, AND ARE CHARGEABLE TO PROCUREMENT AUTHORITY,
 NO. QUOTED BELOW, THE AVAILABLE BALANCE OF WHICH
 IS SUFFICIENT TO COVER COST OF SAME.

AUTH. No. QM 000-P35-1280-A0525-01

2 In accordance with your Contract Bulletin No. 78, bid dated 5-19-41, No. _____, and subject to all conditions and requirements thereof, award is hereby made you for furnishing the following articles. Allowable variations from quantities cited _____ per cent, exclusive of condition 7 on reverse side hereof.

Discounts Net 4 F. O. B. Fort Meade, South Dakota.

Deliveries Not later than June 13, 1941 Inspection and acceptance at destination.

2-5748

CHECK CORRECTIONS DESIGNATED BY ENCIRCLED NUMBERS WITH FORM SHOWN IN JULY 'AM

HOT OFF THE WIRE

IMPORTANT: SEE T.S.B. #18 FOR DETAILS ON INSTALLATION OF PIPE FITTINGS ON 1/4-TON WILLYS TO PREVENT DRAG LINK INTERFERENCE WITH OIL PRESSURE SENDER. T.S.B. #F1 GIVES CORRECTION DATA ON FAN BLADES STRIKING RADIATOR SHROUD.

JOMG CIRCULAR LETTER #118, 6-23-41 IS A MUST FOR MOTOR TRANSPORT SUPPLY. IT MISSED US UNTIL JUST NOW SO IF YOU HAVEN'T SEEN IT, CHASE AROUND AND FIND A COPY.

THE FOLLOWING SLIDE FILMS BASED ON HOLABIRD MOTOR TRANSPORT SCHOOL TEXTS ARE AVAILABLE THROUGH CORPS AREA SIGNAL OFFICERS:-

- SUBJECT
- THE MOTOR VEHICLE
 - THE INTERNAL COMBUSTION ENGINE
 - FUELS AND CARBURETION
 - AUTOMOTIVE ELECTRICITY
 - AUTOMOTIVE TRANSMISSION UNITS
 - CHASSIS, BODY AND TRAILER UNITS
 - AUTOMOTIVE BRAKES
 - DIESEL ENGINES AND FUEL
 - THE MOTORCYCLE
 - LUBRICATION
 - HAND MEASURING AND POWER TOOLS
 - THE BLACKSMITH AND THE WELDER

INFORMATION ABOUT THE HYDRO-VAC BRAKE SYSTEM ON 1/2 TON 4x4 CHEVROLET MODELS G-4105, G-4113, G-4152, G-4162, G-4163, G-4165 AND G-4174 CAN BE FOUND IN SUPPLEMENTARY PAGES 5-1 TO 5-6 OF T-M 10-1431. IF YOU HAVE ANY DIFFICULTY GETTING THESE SUPPLEMENTARY PAGES, LET US KNOW.

A LETTER FROM 1st ARMY HEADQUARTERS, GOVERNORS ISLAND, DECEMBER 19, 1940, FILE A.G. - PUH. - D - 451, HAD A TYPOGRAPHICAL ERROR THAT CAUSED STREAKING OF LUSTERLESS VEHICLE PAINT. INSTRUCTIONS SPECIFIED A REDUCTION OF 1 PART LUSTERLESS ENAMEL TO 8 PARTS THINNER (SPEC. ES-370) FOR THE FIRST COAT; 1 PART ENAMEL TO 5 PARTS THINNER FOR THE SECOND COAT. IN HOT WEATHER (85 PARTS LESS ENAMEL TO 15 PARTS REDUCER). IN HOT WEATHER OD ENAMEL, SPEC. ES-474 CORRECTLY CALLS FOR 15% REDUCTION OF LUSTERLESS ENAMEL TO 15 PARTS THINNER FOR BOTH COATS OF LUSTERLESS ENAMEL, MANUFACTURER RECOMMENDS TWO COATS OF 5 PARTS OF LUSTERLESS ENAMEL TO 1 PART OF MINERAL SPIRITS, SPEC. TT-T-291. SPEC. ES-370-A THINNER DRIES TOO RAPIDLY IN HOT WEATHER.

KEEP THOSE REGIMENTAL INSIGNIAS AWAY FROM THE RADIATOR. THEY MAY LOOK NICE BUT THEY SERIOUSLY AFFECT THE AIR FLOW AND COOLING. BETTER HAVE YOUR ENGINE RUN SNAPPY THAN LOOK SNAPPY.

SEE CHANGE TO CIRCULAR #4, MARCH 19, 1941, SHOWING TENTATIVE LIST OF ARTICLES IN UNIT EQUIPMENT FOURTH ECHELON SET NUMBER TWO. THIS TOOL SET IS AUTHORIZED FOR QUARTERMASTER COMPANIES, HEAVY MAINTENANCE, (T-9 10-47) IN LIEU OF TOOL SET (COMPLETE WITH TOOLS) UNIT EQUIPMENT, 4TH ECHELON SET NO. 1 NOW NOW AUTHORIZED IN CURRENT TABLES OF BASIC ALLOWANCES. THIS TOOL SET WILL NOT BE ISSUED IN ADDITION TO THE TOOLS AND EQUIPMENT NOW ON HAND WITH QUARTERMASTER COMPANIES, HEAVY MAINTENANCE; HOWEVER, SUCH ITEMS INCLUDED IN THE LIST WHICH ARE NOT ON HAND MAY BE REQUISITIONED SEPARATELY.