

DETAILS OF MOTOR BUGGY PARTS.

Fig. 1.—Angle iron frame with wood spring bars. Fig. 2.—Plan and elevation of engine hangers. Fig. 3.—Expanding brake sleeves and operating rod. Fig. 4.—Plan and end view of fuel tank. Figs. 5 and 6.—Plan and side view of radius rods. Fig. 7.—Wiring diagram for engine.

be driven by leather or spring-wire belt from a pulley on the crankshaft.

Radius rods are made from 7/8-inch hexagon stock, turned down as in Figs. 5 and 6, and with right and left threads cut on the ends, so that they can be lengthened or shortened by turning.

A two-speed planetary transmission is used, which also has a reverse gear. The band nearest the fly-wheel gives reverse motion, and the other is for first or slow speed ahead. High speed is controlled by a lever on the side, which, when pushed forward, locks all the gears, the transmission turning as a unit, so that the drive is direct at the same speed as the engine. First speed and reverse are controlled by pedals, which, when pushed forward, tighten the friction bands around the drums on the transmission. The bands should be free of the drums when the car is not running. Otherwise the machine will have a tendency to creep forward or backward when the engine is running and the gears are not engaged, according to which band is dragging, and the bands will wear out rapidly. The pedals are held in plates screwed to the floor of the car in front of the seat, and have ratchets to hold them in position when set. The brake pedal is held in the same way. The footboard must be sawed away to receive the plate at just the proper distance from the seat to be comfortable in operation, and care must be taken to have the pedals come in exact line with the transmission bands, otherwise there will be a tendency for the rods to pull the bands sidewise, so that they will not hold securely and will wear unduly.

All the necessary parts and materials for transforming a buggy as described, and equipping complete, can be bought ready made at a total of \$283.57, as itemized herewith:

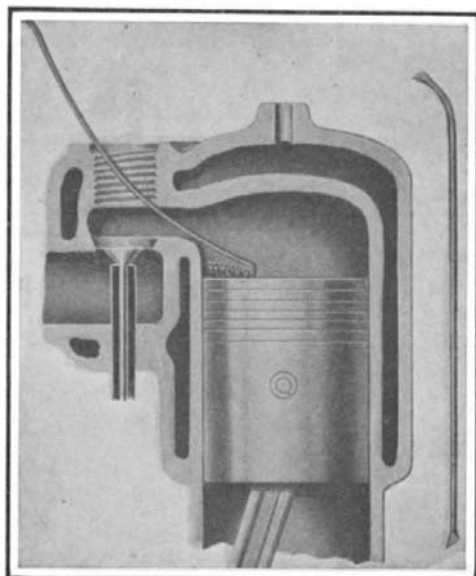
1—2-cylinder spark coil.....	\$14 00
1—switch .....	70
2—standard spark plugs.....	2 68
1—6 1/2 x 12-inch muffler .....	7 50
5—dry cell batteries .....	2 00
6—battery connections .....	20
6—secondary copper terminals.....	15
6—primary copper terminals.....	20
20 feet primary wire .....	2 80
10 feet secondary wire .....	3 00
1—pair side lamps .....	5 00
1—tail lamp .....	5 00
1—set of lamp brackets .....	3 00
1—4 1/2-inch horn .....	4 00
1—gallon can lubricating oil.....	1 40
1—pound can of cup grease.....	30
1—1/2-inch brass grease cup .....	28
1—oil gun .....	60
1—small oil can .....	30
1—box assorted cotter pins.....	25
1—box assorted lock washers.....	60
1—tool kit .....	8 00
1—rear wheel brake drum.....	4 25
1—3/4-inch pitch 1/2-inch wide 60-tooth roller chain sprocket .....	10 20
1—countershaft sprocket hub .....	2 00
1—3/4-inch pitch, 1/2-inch 9-tooth roller chain sprocket .....	50
6 feet 3/4-inch pitch, 1/2-inch roller chain,	

\$1.17 per foot .....	7 02
2 feet 1-inch pitch, 5/16-inch block chain.....	86
1—1-inch pitch 5/16-inch 6-teeth 5/8-hole sprocket	36
1—6-horse-power double-opposed air-cooled motor .....	85 00
1—6-horse-power transmission .....	32 00
1—4-feed force-feed oiler, pulley and belt.....	15 00
1/2 pound oil tubing .....	60
3 feet 1-inch standard pipe for muffler (8 cents per foot). (Add 10 cents for each piece cut and threaded) .....	24
2—1-inch malleable elbows .....	20
2—1-inch Street ells .....	20
1—1-inch tee .....	15
1—1 by 2-inch nipple .....	10
1—steering wheel complete (with fittings, turn-buckles, tie rods, etc.).....	15 00
1—set power-plant supports (hangers, pipe, high-speed lever, support, bolts, etc.)... ..	18 00
1—high-speed lever, finished .....	75
1—set radius rods, complete, with axle clips....	6 00
1—set brake shoes, hangers, rod, yokes, etc., complete .....	6 00
1—pedal plate, transmission rod and yokes....	5 00
1—frame to fit any body, finished complete....	7 00
1—starting crank, finished .....	75
1—set spark and throttle control rods, levers, etc. ....	1 25
1—pound copper tubing, for gasoline.....	1 20
1—gasoline tank, holding about 3 gallons.....	2 00
Bolts and screws at any hardware store.	

\$283 57

SCRAPING CARBON FROM THE PISTON HEADS.

Carbon is deposited in the combustion chambers of all automobile engines by imperfect combustion of the cylinder oil and gasoline. Dust from the road, drawn into the engine, adheres to the oily surfaces, and adds to the accumulation. On the piston heads, and sometimes elsewhere as well, this deposit in time becomes



HOW THE CARBON IS SCRAPED FROM THE PISTON HEAD.

so thick as to be raised to incandescence, so that it causes premature ignition of the charge. It may usually be removed from the piston head by the use of long scrapers, as illustrated. These scrapers are made of 1/4-inch or 5-16-inch soft steel, with the ends flattened in the forge and bent hoe-shaped. By suitably bending the shanks and by turning the crank to bring the piston into an accessible position, it is usually possible to detach all the carbon on the latter. Kerosene is used to soften the carbon, and a small battery lamp connected to a length of cord, aided by a flat dentist's mirror, enables the whole interior of the combustion chamber to be explored with ease. The material detached is scooped out clean with the piston at its highest point.

RELINING THE BRAKE SHOES.

There is more to the care of the brake shoes than simply keeping them in proper adjustment. By degrees the materials of the friction surfaces wear away, and the toggle or other mechanism by which the brakes are expanded or contracted reaches the limit of its efficient movement. It then becomes necessary to reline the brakes, or to provide new brake shoes, according to the nature of the friction material. Usually the brake drum is a steel casting, but the shoes may be fiber, cast iron, bronze, or mixtures of asbestos, camel's hair, copper, and the like. It is easy to tell what to do when replacements become necessary. The important point is to bear in mind that adjustment cannot be indefinitely repeated before the brakes become ineffective.

WHEN A LOST NUT CANNOT BE REPLACED.

There are various roadside expedients possible when a nut has been lost and no duplicate is at hand. Usually as good a plan as any is to wind the threads of the bolt tightly with soft iron wire, such as stove-pipe wire, of which a coil should always be carried in the tool locker. The winding should start at the end of the bolt, and follow the threads up to the part it is desired to retain. The wire is then wound back in a second layer over the first, and the ends twisted together. If there is a hole in the bolt for a cotter pin, one should be inserted, and the ends of the wire twisted around it, so that the improvised "nut" cannot screw itself off from the bolt.

GETTING HOME WITH A WEAK BATTERY.

When a storage battery is exhausted, no more current can be obtained from it until it has been recharged, which should be done at once. A dry battery, on the other hand, weakens gradually. If one gets out on the road and the engine starts to miss after running a few miles, he may get to the next town sometimes by slightly adjusting the trembler contacts, sometimes by adjusting the tremblers themselves to bring them a little closer to the magnetic core beneath them, and sometimes by bending the spark-plug points a little closer together, so that the spark has a smaller gap to jump. If these expedients fail, the pitch may be dug out from the tops of the cells, and water poured in until the cells are saturated. If salt is at hand, salt water is better.