Handy Man's Workshop

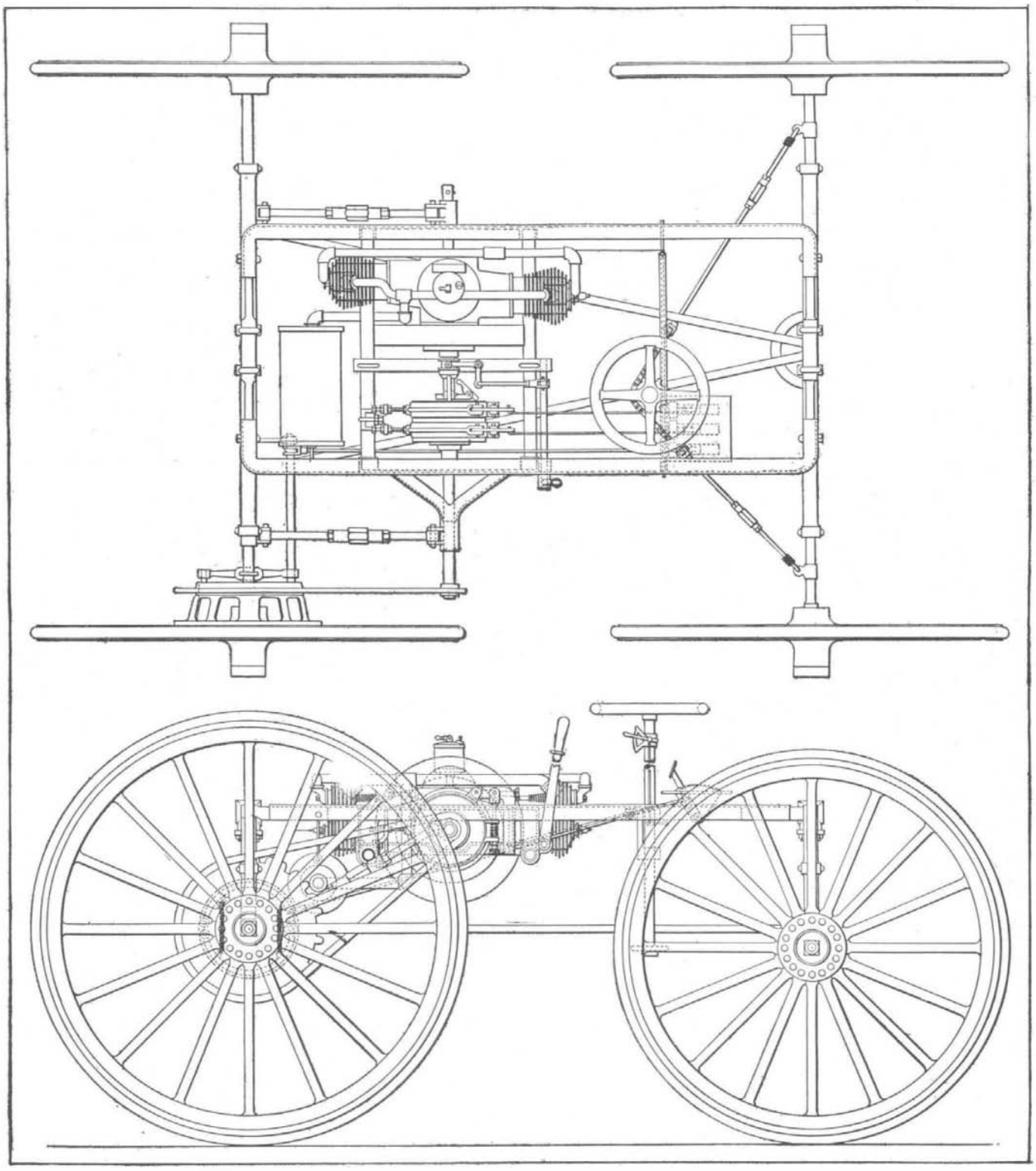
How to Convert a Horse-drawn Buggy Into a Motor Buggy for Less Than $300.

By George Heron.

By following the directions here given, a horse-drawn buggy can be rebuilt at moderate cost into a self-propelled vehicle, which, though roughly made, will give good results and prove satisfactory.

The frame is of angle iron, 1½ x 1½ x ¼ inches, cut 6 inches longer than the distance from the front to the rear spring of the buggy, and bent cold 3 inches from the ends, as in Fig. 1. Triangular pieces should be sawed out where the corners are to come, and the bending done little by little. The body hangers or spring bars for the front and rear can be made of wood, as indicated. Drill a ⅜-inch hole at each end, and fit large-head carriage bolts, with the heads inserted in the wood. About 1½ inches from the edge of the dash (inside) and the same distance from the rear panel of body, drill ⅜-inch holes for body bolts, and 3 inches from the front and rear of the engine hangers cut slots for ½-inch bolts.

The engine and transmission should be placed under the center of the seat, to avoid cutting the floor boards. The supports should be secured to the angle-iron side members of the frame with three ½-inch carriage bolts, one on each end and one as near the center as the transmission shaft and starting crankshaft will allow without striking. The holes in the side members should be slotted to provide for chain adjustment, and made large enough to insert the square of the bolts, to prevent them from turning when loosened. Power-plant hangers can be bought, or may be made as shown in Fig. 2. Holes of ⅜-inch diameter should be drilled in the frame for the steering-post supports where the steering wheel will be most convenient, which can be determined by trying the wheel in different positions. The distance can then be marked off from the inside of the dash.



PLAN AND SIDE ELEVATION OF THE ASSEMBLED BUGGY.

The engine should be fastened securely to the engine hangers, and the transmission bolted to the flywheel or coupling before babbitting the transmission bearing. Cut two washers out of wood to fit easily over the shaft, making the inner washer in two parts, so that it can be fitted around the shaft after the hanger is in place. Putty all cracks where there is danger of the babbitt metal running through. Drill one 5/16-inch hole near each end of the bearing on top, and one ½-inch hole in the center for pouring. Build three cones around the holes, the largest one around the center hole and about ¾ inch high. Heat the bearing until it gets hot, but not red, before pouring. When melting the babbitt, put about a teaspoonful of resin in the ladle to make it flow better. To tell when the babbitt is hot enough, insert a perfectly dry stick for a second or two, and if it begins to char or to blaze, the metal is ready. Continue to pour steadily until the bearing and the pouring hole are full, and if the babbitt settles below the holes, pour in more while hot.

As this buggy is driven by one rear wheel only, no differential countershaft is needed, and only one brake drum, drive chain, and set of sprockets is required. Driving sprockets for the transmission shaft and rear wheel can be bought from the manufacturers or dealers. To insure that the wheel sprocket will be concentric with the hub and run true, it is advisable, when marking out holes for the brake drum, to mark one first, then secure the drum to the wheel with one clip, place the wheel on the axle, and hold a stick on the axle. Now revolve the wheel and shift the drum repeatedly until the stick touches all around. Then mark off more holes, two at every fourth spoke (if it is a 16-spoke wheel) and clamp spring clips to the wheel and revolve as before until it runs true. Finally, mark off two holes for clamps to straddle every second spoke.

Brake bands, cams, and hanger set can be bought or can be made, as shown in Fig. 3.

Steering rods are secured to the front axle as in the plan view and are fitted with turnbuckles. The length of chain passes around the rear arc of a sprocket on the lower end of the steering post, which should be in the same horizontal plane as the axle. The steering wheel and column complete can be bought.

When setting the spark and throttle controls, it is advisable to have them drawn as far to the rear as possible, the spark lever on the right and the throttle lever on the left. Set the commutator or timer arm backward also (provided, of course, the timing shaft turns in the opposite direction from the crankshaft) and make the rods of the right lengths to enable you to get the timer lever all the way back.

As the engine shown in the drawing is of the automatic intake type, the intake valves will take care of themselves. Turn the engine over toward the front until the exhaust valve begins to open, as shown by the compression of the valve spring. Continue turning until the valve is full open, when a wire inserted through the spark-plug hole will show that the piston is at the top of the cylinder or at the upper dead center. At this point the flywheel will revolve some distance without the piston's moving. Mark the wire, and then turn the wheel one more complete revolution and until the piston descends about 3/16 inch past the dead center. Now set the roller, ball, or other type of contact of the timer where it will strike the contact post that is to represent the cylinder you have timed to fire at this point, making sure that the roller or ball is striking the contact so that it will continue to spark after passing 3/16 inch beyond dead center, as this is a vital point. Fasten a double-cylinder spark coil to the inner side of the body nearest to the engine, so as to use short wires.

Throttle lever, rods, etc., should be set backward as the timer was. A simple, inexpensive carbureter is advisable, such as a Schebler model E, which has only two adjustments to make, one for the air and another for the gas. Screw the air adjustment screw about half way down, and lock it there. Then adjust the gas to give the best results. When the gas throttle is closed, the lever on the steering post should be in rearward position, that is, toward the driver.

The gasoline tank should be made to fit between the sills of the seat and fastened on the right-hand side, leaving the space over the engine open. The tank can be made in any tinshop, of galvanized iron with strap iron supports, as in Fig. 4.

A force-feed oiler will give the best results, and can

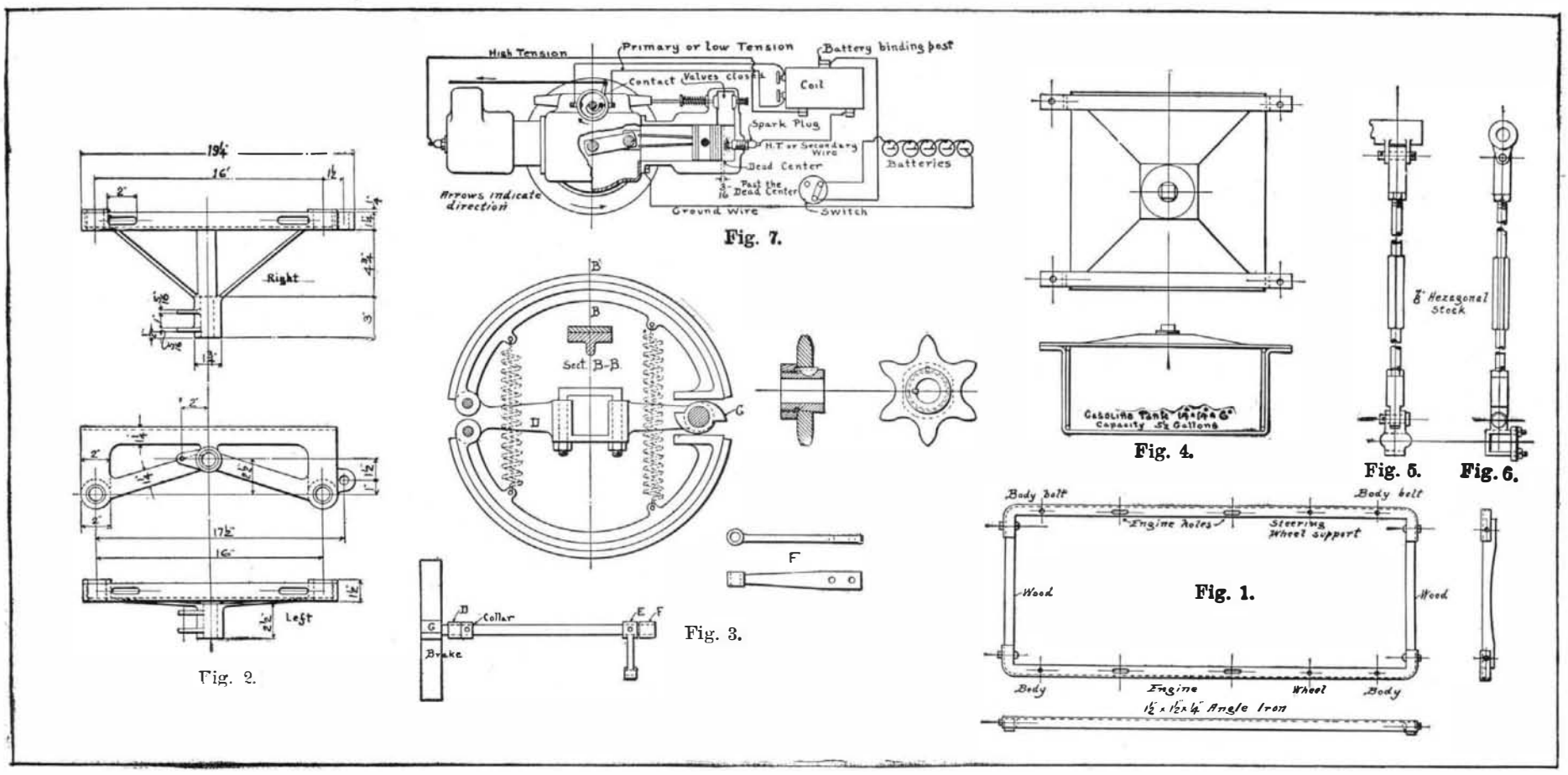


Fig. 2. Fig. 7. Fig. 3. Fig. 4. Fig. 5. Fig. 6. Fig. 1.

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 ⅞-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.

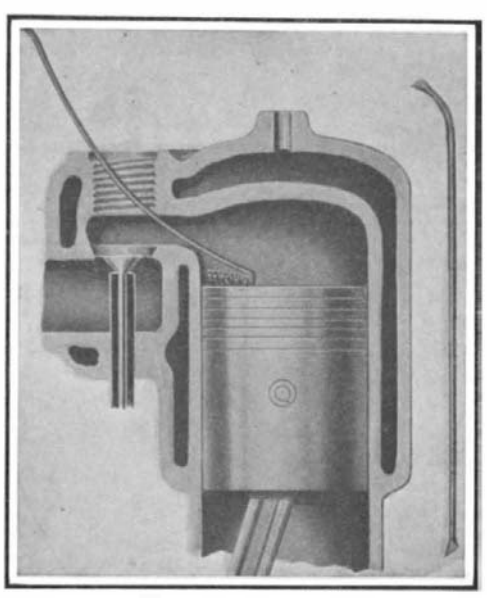
A two-speed planetary transmission is used, which also has a reverse gear. The band nearest the flywheel gives reverse motion, and the other is for first or slow speed ahead. High speed is controlled by a lever on the side, which, when pushed forward, locks all the gears, the transmission turning as 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—6½ 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—4½-inch horn	4 00
1—gallon can lubricating oil	1 40
1—pound can of cup grease	30
1—⅛-inch brass grease cup	26
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—¾-inch pitch ½-inch wide 60-tooth roller chain sprocket	10 20
1—countershaft sprocket hub	2 00
1—¾-inch pitch, ½-inch 9-tooth roller chain sprocket	50
6 feet ¾-inch pitch, ½-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 ⅝-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
½ 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 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 ¼-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.



HOW THE CARBON IS SCRAPED FROM THE PISTON HEAD.

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 stovepipe 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.