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Strange Oil-Hunting Craft

RUNS ON LAND, WATER OR MUD

ABOARD a fantastic-looking vehicle that traverses land, water, or marshland, surveyors and prospectors of the Gulf Oil Company are exploring the Louisiana coast in quest of new oil fields. Half rolling, half floating on ten-foot tires, the amphibian carries them safely and speedily through veritable jungles of marsh grass whose conquest has awaited the

coming of the new amphibian "tank."

Automobile, tractor, and boat rolled into one, the hybrid vehicle looks like an inventor's nightmare—but it works! When it is on dry land, its huge pneumatic tires, the biggest ever molded, cushion the shocks of rough terrain. In the water they act as floats, providing so much buoyancy that the weight of the 7,500-pound machine scarcely wets them to the rims. Rubber cleats hooked about them like tire chains, twelve to each wheel, serve as paddles for aquatic travel and aid traction in slippery mud.

Advance parties of surveyors use the "marshbuggy," as oil men have christened it, in surveying and mapping a region to be explored for possible sources of petroleum. Then prospectors load their equipment aboard it and get to work. They are among the 260 field crews currently

searching for new American oil fields by means of geophysical prospecting, the modern, scientific way of plumbing the earth's crust for hidden mineral riches.

No longer are oil wells sunk hit-or-miss, with a waste of time and labor each time a "dry hole" results. Before a drill point even scrapes the earth, sensitive divining instruments now explore the underground structure of the rock and show where oil is likely to be found. A good place to see how they work is the gulf-coastal plain of Louisiana and Texas, where they have proved conspicuously successful by locating more than 100 new oil fields.

Here oil occurs in the neighborhood of curious subterranean formations known as "salt domes"—great masses of rock salt, thousands of feet in diameter, rising from unfathomed depths to within a mile or less of the earth's surface. While geologists are not in complete agreement as to how they got there, the important thing to oil men is that they produced enough of a subterranean upheaval to bulge the overlying rock into huge arches. Oil seeping upward through subsequent ages became pocketed in the rock layers that form the sides and cap of many of these domes, forming vast pools of trapped petroleum. Though not an infallible sign of oil, a salt dome is therefore a promising place to look for it.

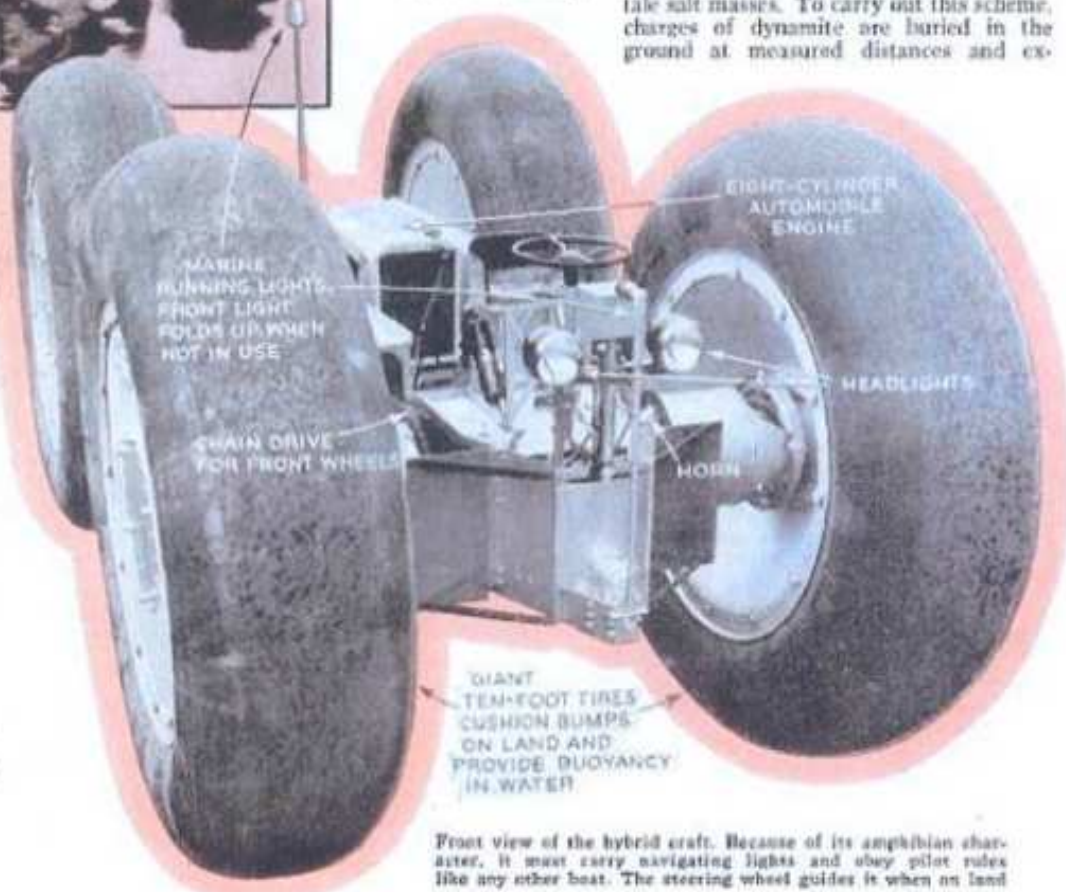
In one method of geophysical prospecting, artificial earthquakes reveal the tell-tale salt masses. To carry out this scheme, charges of dynamite are buried in the ground at measured distances and ex-



The "marshbuggy" afloat. The giant tires provide buoyancy, and cleats give traction in the water.

*Prospecting Crews
Navigate Swamps
In a Hybrid "Tank"
That Transports
Modern Divining
Instruments for
Scientific Tests*

By
**GROVER C.
MUELLER**



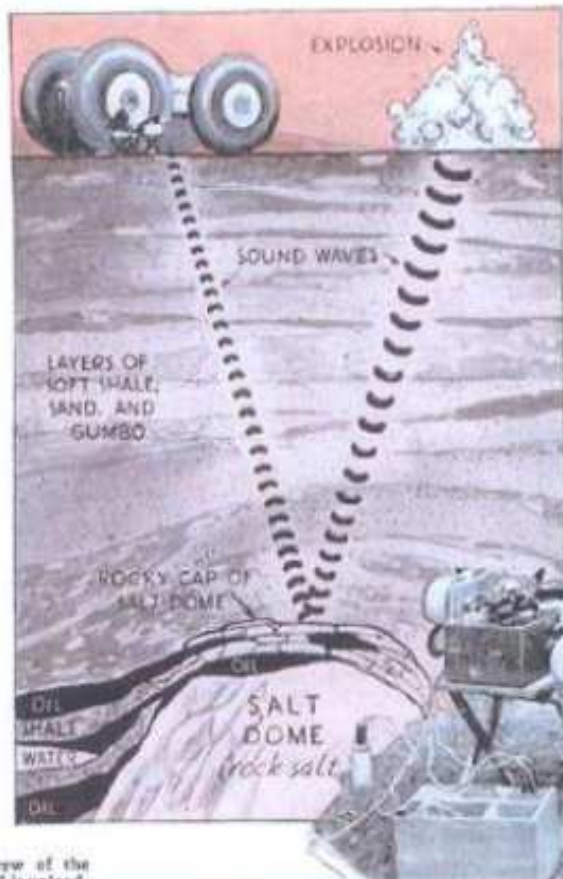
Front view of the hybrid craft. Because of its amphibian character, it must carry navigating lights and obey pilot rules like any other boat. The steering wheel guides it when on land.

ploded. Seismographs or earthquake-detecting instruments time the interval between each explosion and the arrival of the reflected tremor that rebounds, like an echo, from the underground rock. The longer it takes to return, the deeper the rock must lie at that particular point. Much as the ocean floor is charted by "echo sounding," the contour of a hidden rock layer is mapped and the bulges that mark salt domes are detected.

Geophysical prospecting provides another way, too, of finding the salt domes. Like lumps in mashed potatoes, they differ in density from the surrounding bed in which they occur. The result is a faint but measurable difference in the force of gravity above the domes, causing a variation in the "pull" of the earth on any objects immediately above them. Thus, by noting slight changes in the apparent heaviness of a weight hung from a spring balance, at different points on the earth's surface, the underlying rock can be "weighed" and the oil-bearing formations located. Of course, no ordinary spring scale will do; the instrument actually used, called a gravimeter, must be so sensitive that it can detect variations in weight of less than one part in 10,000,000! In a typical model, the instrument is housed in an air-tight case so that changes in atmospheric pressure cannot affect it, and the indicating pointer is a beam of light seen through a microscope eyepiece.

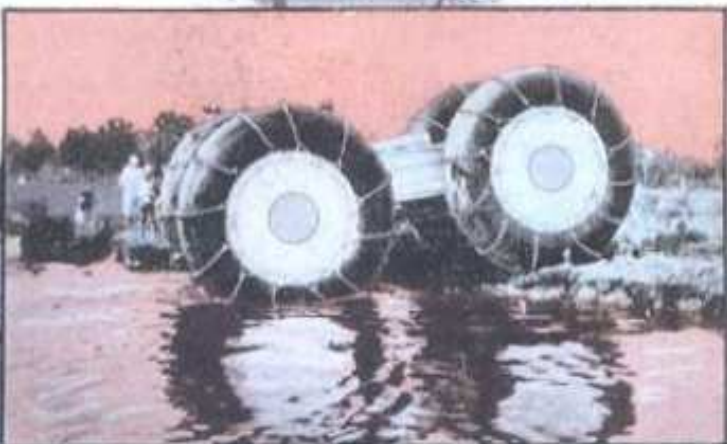
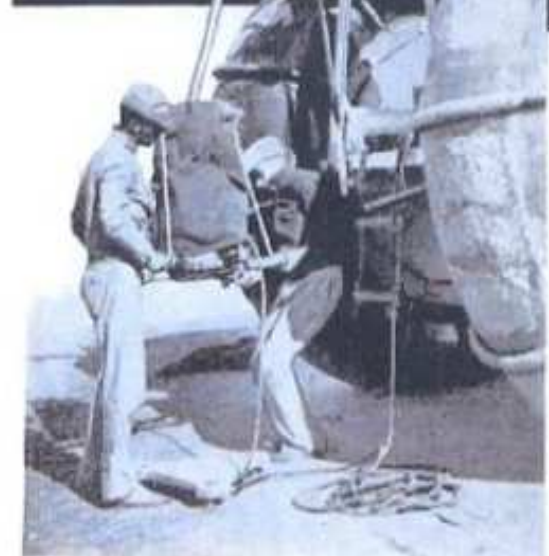
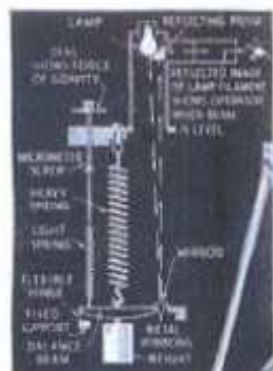
This "gravity" method is the one currently employed by the crew of the "marsh buggy." Accompany them to a prospecting site, and you

Below, the crew of the "marsh buggy" is unloading a delicate instrument that measures faint variations in the force of gravity. Drawing at left shows how it works. Right, the "buggy" going ashore



HOW ECHOES CAN PLUMB THE EARTH

Man-made earth tremors, reflected from underground rock layers as shown in the drawing at the left, reveal "domes" that may hold oil. Below, a small seismograph that records the rebounding vibrations



will see them slide the 100-pound gravimeter off the rear of the machine. Gingerly they lower the delicate instrument to a built-up foundation of wood or metal, steady enough to hold it level in the marsh during the brief time required for a reading. The leveling is the most time-consuming part of the task; when it is done, the actual observation takes but a moment, and the hybrid tractor, with the instrument loaded back upon it, rolls away to another site.

As this is written, plans also are under way for providing the marsh buggy with the 1,000-pound

equipment needed for hunting oil by the artificial-earthquake, or "seismic," method. Observations made by the prospectors with the gravimeter and seismographs will check and supplement each other, and the findings will be reported to headquarters and plotted on maps to guide well drillers in choosing likely sites.

The idea of building an amphibian vehicle that would open hitherto inaccessible oil fields to these up-to-date methods of exploration originated with Abbot A. Lane, of the Gulf Research and Development Company. With his startling scheme approved by officials of the firm, he and his assistant, E. W. Jacobson, with other laboratory staff members worked out the plans from which the machine was built at Pittsburgh, Pa. Since nothing like it had ever been constructed before, each detail had to be invented as they went along.

For the power (Continued on page 132)

STRANGE HYBRID CRAFT HUNTS OIL IN 'SWAMPS

(Continued from page 41)

plant, a standard eight-cylinder automobile motor of popular make was chosen. On roads or smooth ground it propels the marsh buggy at a speed of thirty-five miles an hour, through marsh land at an eight to ten-mile pace, and in the water at six knots. Its power is applied through a pleasure-car transmission and a tractor transmission, in turn, giving the machine ten speeds forward and six in reverse. Screens cover the radiator, generator, and air intake to keep them from becoming clogged by the white fluff from the bulrushes that grow in the marshes.

ENDLESS chains link the wheels on each side to provide a four-wheel drive and thus obtain maximum traction. By means of individual brakes, the wheels on one side may be stopped while the ones on the opposite side keep turning, enabling the vehicle to be steered in the water. On land, a steering wheel guides it like a conventional automobile. The front axle, pivoted at the center, tips sidewise to let the wheels ride smoothly over uneven ground.

Made to special order by a leading rubber firm, the enormous tires are inflated with air under three to five pounds' pressure, and are so resilient that the marsh buggy needs no springs. Permanent air lines lead from the tires through the wheel hubs to a pump, which may be turned on to blow up the tires while the machine is in motion. Relief valves on the tires make it impossible to overinflate them. In case of a small puncture, the pump will keep a tire filled with air until a convenient place is reached for repairs. The wheels themselves, made of aluminum and measuring sixty-six inches in diameter, are water-tight drums that provide reserve buoyancy in case of need. An aluminum body rests upon the standard automobile frame that constitutes the backbone of the vehicle, and many of its fittings also are of aluminum, to conserve weight.

Since the "marsh buggy" operates in the water, it must be equipped in accordance with the legal requirements for small boats, the fittings including a white light visible on the full horizon and red and green lights displayed at the sides. The designers solved the problem of mounting the latter where they could be seen by placing them on a hinged rod, which can be lowered to project ahead of the front wheels. The white light, on a staff at the "stem" of the amphibian, is supported high enough to be seen over the tops of the trees. An automobile horn complies with the rule requiring a warning signal, and the prescribed copy of marine regulations is carried in a brass case beside the seat of the "pilot."

AT THE rear of the vehicle an aluminum trolley aids in loading and unloading the heavy prospecting instruments. Above it, a platform serves as a vantage point for surveying, and provides a perch for a lookout when the grass is so high that it completely obscures the driver's vision.

Even in the remotest parts of the Louisiana marshes, the crew of the odd amphibian will be in constant communication with other engineers at the base camp of the expedition. A complete, two-way short-wave radio-telephone set will enable them to report their progress, call for help in unexpected emergencies, and flash word of any important discoveries. It also will enable directing engineers to control the movements of the "marsh buggy" and forward instructions in unforeseen contingencies.

In time, other equipment will be added, as new uses are found for the strange craft in making the marshes accessible to man.