The AUTOMOBILE

HOW TO REMEDY ELECTRIC TROUBLES.

Automobile drivers experience more trouble on the road now-a-days from something electric than probably from any other cause. And doubtless the electrical parts of a car are the least understood by the average owner. Many autoists have no idea of the functions of batteries and wires and switches and other parts of the electrical equipment. Consequently when anything along this line goes wrong, they are helpless.

In dealing with the electrical equipment of a machine the owner should understand that a complete circuit is necessary in order to have the current do its work. That is, starting with the battery as the course, a wire leads the current from the battery through the switch to the device to be operated and then the current must be led back to the battery.

In looking for troubles the first thing to inspect is the battery. To see if it is charged a voltmeter or a hydrometer should be used. Each terminal from the battery should be tested. For instance, there is a wire to the lighting switch. It is insulated, and the first thing to test, after making sure that the battery is all right, is at the switch. If there is no current there the wire may be broken or the terminal connections poor. But whatever the trouble may be it must be limited to this one small stretch of wire.

The next step is to test where the wire leaves the switch to go to the device to be operated. If the current gets to the switch and does not get out of it it is apparent that the trouble is in the switch, or if it gets to the switch, but not through the fuse, the fuse is at fault.

If the current leaves the fuse, but does not get to the lamp which the switch controls, then it is certain that the trouble is in that wire somewhere. If the current gets to the lamp but the lamp will not light, it is certain that the difficulty is in the lamp. If the current is traced through the lamp but does not reach the battery, then the wire leading back to the battery is at fault.

Looking Over the "Ground."

If the juice is carried back through the frame of the car, as is often the case, frequently the ground connections are poor or there is a break in the ground. Thus a ground wire might be attached to a piece of iron on the dash. If the dash is of wood, that piece of iron might be insulated from the remainder of the metal work of the car and the ground connection would be complete.

A friend of mine recently spent half a day, aided and abetted by friendly neighbors, trying to find out where an extra wire on his switch should be connected. He could not get the engine started, the horn would not blow, the headlights would not light, the starting motor would not turn over, but the dash and tail light, which were in series, did light.

A little experimentation developed the fact that when the starting pedal was depressed the dash light grew very dim. This indicated that it was not possible to draw a large amount of current from the battery or that the battery was either in a discharged condition or that the connections leading from it were poor. It was found that when the wire connected to the battery terminal was moved the light would brighten up. This wire was disconnected and cleaned carefully to make sure that the contact was good. But when it was assembled there was no improvement. So it was taken apart again, and a careful inspection showed that one end of the taper on the inside of the terminal had a slight shoulder which prevented the taper end of the wire from being drawn into place snugly. Therefore a very light contact was made, and sufficient current could not pass to operate the starting motor. This shoulder was removed with a penknife, and the engine started without difficulty.

Look at Source of Current.

Several hours of time would have been saved if the owner had started to look for the trouble at the source of the current, instead of puzzling over the end of a wire that was not intended to be connected to anything and had nothing to do with the trouble. It was simply an extra wire for use in case some certain new device should be installed. In my experience corroded battery terminals are responsible for a majority of the electrical troubles.

A week later this same man was unable to start his engine, and again he worked over it for several hours before calling for help. This time the lights were all right, but the engine would not start. To determine the condition of the battery, he turned on a light and depressed the starter pedal, as before, to see if the light would dim very much under the heavy load. As it did not, it was decided that the battery was all right this time.

The hood was opened and it was observed that when the starter pedal was depressed the fan did not revolve and therefore the engine was not being turned over, though one could hear the starting motor buzzing plainly. This showed that the overrunning clutch of the starter motor was slipping. As correcting this trouble was a shop job, the owner cranked the engine over by hand, but still it did not start.

To make sure that the spark was being delivered, the wire leading from the ignition coil to the high tension distributor was disconnected and given about a one-sixteenth-inch gap. As soon as this was done it was plain to see that a spark was being delivered. Also the engine started immediately. Making a slight gap in the secondary circuit increases the intensity of the spark at the plug and often aids in starting a balky motor. This was an occasion when an outside spark gap was of value. After the engine was warmed up, it could be started any time without difficulty.

Study the Wiring Diagram.

Other electrical troubles include sick horns which give out awful sounds in place of the usual not-too-musical tones, and sick lights which fail to brighten the corners where motorists are apt to be in the night. Most of these troubles point to the fact that a complete circuit is necessary to have an electrical current do its work. Therefore, when electrical troubles occur, the course of the juice should be examined first and then the current should be traced through its entire path leading from and returning to the battery.

A little concentrated study of the wiring diagram of a car will help an owner to become somewhat of a nerve specialist in the realm of automotive electrical mechanics and should be of great practical value to him in operating his car.

In Cuba, tobacco is planted, grown and gathered in ninety days.

People are never impressed with a man's importance by an arrogant or over-bearing manner.

New Means of Flying to Great Heights

The atmosphere, of course, gets thinner as altitude above the earth increases. This means less resistance to the thrust of the airplane propeller.

At high levels the thinning of the air and its low temperature have a tendency to interfere with the normal operation of the driving engine.

Means of obviating these difficulties are provided by a method of airplane construction which a New Jersey inventor, Samuel D. Mott, has newly patented. Summed up, they might be described as a system of barometric control which the inventor asserts will virtually overcome the troubles previously experienced in flying at high attitudes.

The propeller is so constructed that, by the help of a barometric device, changes of air-pressure automatically alter the angle of its blades. In other words, the "pitch" of the propeller changes responsively to the density of the air, so that the action of its blades upon the atmosphere is accommodated for high levels. Thus, the higher the machine goes, the faster it can travel, resistance to its forward movement being less.

In the rear part of the machine is a sealed compartment into which air is pumped by a rotary blower-fan driven by an electric motor, independent of the aircraft engine. The fan is barometrically controlled. As the pressure of the surrounding atmosphere [illegible] going up) the air inside the [illegible] piston which so acts upon [illegible] controller as to increase the speed and power of the motor, causing the fan to revolve faster, and storing a larger volume of the more tenuous air in the above-mentioned compartment.

The idea is to keep the air in the compartment at approximately normal sea-level density, no matter how far aloft the airplane may be sailing. As the machine descends, and the atmosphere becomes more dense, the speed of the motor and its fan slows down, until near the ground the motor automatically stops running.

A similar barometric contrivance is used for operating a heater, to keep the air inside the compartment at a moderate and constant temperature. To furnish the requisite current, a dynamo generator driven by the engine, is employed, an arm moving over a series of contacts so as to throw out or in any number of heater-sections in automatic response to changes of atmospheric pressure. Thus the higher the airplane ascends, the greater the amount of heat supplied.

The aim in view is to supply the engine, at all levels, with air of the same density and temperature. But another important object may be gained by "feeding" this warm sea-level air to the aviators.

This may be accomplished by providing them with suitable airtight inflatable suits and connected headpieces, somewhat like those worn by divers, but as light as possible, the air they need for breathing and to keep them warm being supplied to them from the tank through suitable pipes, supplemented by valves for permitting its escape when expired.

—and the worst is yet to come

SHACKLETON TALKS OF SOUTHERN TRIP

ENDERBY QUADRANT NEGLECTED.

"The Impossibility of To-day is the Commonplace of To-morrow, Says Traveller.

A correspondent of the London Times, who interviewed Sir Ernest Shackleton on his voyage of exploration in the little ship Quest, writes:

"First I questioned Sir Ernest on the region he is going to explore. He answered me with a particular reference to the Antarctic, which is only a part, though a very large part, of his object.

"It is a curious thing," he said, "that the Enderby Quadrant has been neglected by explorers—by modern explorers, I mean. I think this is due in great measure to the fact that no extensive land mass has acted as a magnet on their imagination.

Search for Lost Islands.

In the Ross Quadrant the gigantic elevations and volcanoes, and in the Weddell Quadrant the mountains of Graham Land have naturally attracted men to follow up certain lines and find, if possible their terminations. While in the Enderby Quadrant there are the same stormy ice laden seas to plough through, no big land masses stir the fancy. But, if the vision widens beyond the distant horizon, one can descry a goal: those mountains not yet seen, those gulfs not yet entered, those icy barriers yet unmeasured. Here in this narrowing world of ours are 3,000 miles of land or sea to explore. Such is the most serious work of the Quest."

"And what of the lost islands?"

"To my mind an island always has a fascination. There is something compact and personal about it, no matter how desolate it may be. Some of the islands we are going to visit, and the others we shall try to locate, will have their history written only on the rocks and their life displayed only in the scanty plant and animal existence.

"We may find a connection between some of these islands and the nearest continent. We may come on purely indigenous forms of life. One such discovery may throw a flood of light on the building of the world and the changes that have passed over it. With the staff that man's the Quest, information of value to the scientists at home is sure to be forthcoming. But what may be discovered I am not in a position even to prophesy."

A Coast Line Voyage.

"Shall you make the land journey?"

"We are equipped to land and make short journeys for geological purposes, and also for magnetic observations. Practically no magnetic work has been done in this area—I am alluding, of course, to the continent. Landings will always be made, wherever possible, on the islands; and 'dip' and other magnetic observations carried out. But the ships will not winter in the Antarctic. Were I going to the Ross Sea or the Weddell it would be necessary in the interests of exploration to winter. A coast line voyage, if we can achieve it successfully, will add much more to our knowledge of the continental nature of the Antarctic than isolated journeys into the interior from fixed positions."

"Your ship is very small."

"Just 111 feet long. Yes, she is very small. But, properly handled, she will be safer in stormy weather than a larger vessel: and in the ice she will have the supreme advantage of being able to twist and turn more readily."

"And how will it work having a crew all officers and no seamen?"

"Well, at least nine of the sixteen are seafaring men, and willing hands among the scientific staff, whether in the stokehold or on deck, will add to our efficiency. Each member of the expedition is imbued with love of the job and with the spirit of adventure. So I hope that our expedition, like former ones, will be a happy family devoted to making a succes sof the enterprise. Let me say, also, the ship is fitted with every labor saving device."

Seaplanes Are Useful.

"About the seaplane—what do you expect to do with it?"

I consider that seaplanes or airplanes are now a serious factor in exploration. Undoubtedly, when the weather is calm, we can gain more information on the trend of the Antarctic coast line or the position and extent of floating pack ice from a height of 5,000 feet in an airplane than would be gained in weeks of battering through the ice in the ship. One's horizon from the crow's nest of the Quest is approximately eleven miles. From the seaplane we shall be able to enlarge this horizon so much that it may make all the difference to our manoeuvring in the pack."

"Have you any theories on the sort of weather you are likely to get when you reach the Antarctic?"

"That is a most difficult question. On our last expedition there was practically no summer. I understand from the Argentine Meteorogical Station at the South Orkneys that last winter was the most severe ever recorded in the south polar regions. It is just possible that the Southern summer this year may be an open one for navigation. If so, instead of a falling to twenty miles a day progress, the ship may reel off 100 to 150 miles."

"A fine rate to plunge into the unknown."

"Yes; one feels what Keats calls 'the dearth of human words and the roughness of mortal speech' when one tries to express all the experience means."

"Yet there are people who say it is nothing but fun—for the explorer."

"You mean the people who ask what is the good of all this exploration? If theirs had been the view held 600 years ago, and explorers had not gone forward, we should have had a cramped and sorry world to live in now. Life must be lived not for the moment alone; we must live and order our lives for posterity as well as ourselves.. The impossibility of to-day is the commonplace of to-morrow, and it is surely the privilege of a century like our own to extend the bounds of human understanding farther than they have yet been placed."

New Use for Seaplanes.

A new use for the seaplane has been found on the Pacific Coast by the officials of the department of marine and fisheries working in co-operation with the air-board authorities at the Vancouver seaplane station. It is in carrying fish eggs from the hatcheries to otherwise inaccessible parts of the coast line where the eggs can be placed under the water in special boxes invented by one of the hatchery officers and allowed to complete hatching there. Patrols are also being undertaken in connection with the fisheries department by officials to circumvent fur poachers who stray into forbidden waters.

War Against the Cougar.

Excellent results are being obtained by the British Columbia Game Conservation Board in its war against the cougar inaugurated some time ago. Nelson Island, known as one of the worst cougar haunts on the coast, has been absolutely cleaned of these animals through the activities of Sam Becker, said to be the finest cougar hunter in the province. Each cougar is now netting the hunter about $65. Some of the daring "nimrods" bag four and five a day.

Newest Notes of Science

Jamaica will electrify its Government railway, utilizing water power to produce current.

Water is heated in a new laundry machine for home use by a tiny coal stove beneath the tank.

To save room an inventor has inserted a phonograph in the case of a player piano, making two instruments occupy the floor space of one.

Several planters in Sumatra are experimenting with camphor cultivation.

Sausage casings have been invented which are made of wood pulp cellulose.

Norwegian experimenters are trying to drive automobiles with acetylene gas.

Phonograph needles which produce a very clear tone are being made of clay.

The magnification is adjustable in a telescope rifle sight invented in Europe.

Both ends of steel pins are countersunk at the same time with a new drilling machine.

When a new sunshade is closed it becomes a handbag, the handle disappearing within it and the carrying being done with loops.

The Argentine Government has ordered a technical investigation of native materials suitable for the manufacture of news paper.

To hold a flashlight on a person's arm and have both hands free is the purpose of a wire bracket invented by a Pennsylvanian.

French chemists have patented a method for dyeing textiles with dry colors, electricity playing an important part in the process.

For protecting bananas from bruising while being shipped an inventor has designed a burlap crate enclosed within a cylindrical crate.

In the centre of a new ash tray is a reel of paper coated with material for striking safety matches, some of which can be removed to present a fresh surface when worn.

An Englishman is the inventor of apparatus which automatically receives radio messages and translates and prints them in ordinary type on a paper ribbon.

An hydro-electric plant of 20,000 horsepower has been completed in France to supply power to Lyons.

Among the household novelties is a porous covered dish which keeps its contents cool by evaporation.

Invented in England is a woman's vanity bag which ejects a shoe shining pad when a spring is pressed.

To help solve its fuel problem the Government of Brazil is encouraging the planting of Eucalyptus trees.

A new word counter for typewriters is mounted on one end of the space bar being operated as the bar is depressed.

Experiments in England indicate that fish dried in electrically heated air can be kept in good condition for years.

A woman is the patentee of a cook book in which each recipe is illustrated by pictures of the ingredients to be used.

An electro-magnet instrument has been invented by a French scientist to test a person's memory and power of attention.

The French Government is considering damming the Upper Nile to irrigate sufficient land in the French Sudan to supply all France's requirements in cotton.

The designer of a new anvil for garages claims it will fit all types of automobile rims that need to be straightened with some of its numerous faces or grooves.

A plant has been reopened in Tasmania for the development of some 6,000,000 tons of shale in a single deposit, estimated to contain 360,000,444 gallons of oil.

A self-winding electric clock in New Jersey is automatically corrected at noon each day by wireless impulses from the Government Observatory at Washington, D.C.

An unsinkable lifeboat invented will be launched from a chute sufficiently far from the side of a ship to avoid danger of striking it.

One species of American holly has been found to contain large amounts of caffeine, as much as one and one-half per cent. of the drug being obtained from dried leaves.

ARTIFICIAL HEAT RIVALS NATURE'S

IMITATING NATURE IN MAKING PRECIOUS STONES.

High Temperatures Obtainable in Electric Furnace May Assist in Diamond Manufacture.

The temperature of the sun is estimated at 10,000 degrees Fahrenheit. We can beat it. The most improved electric furnaces can produce a heat 4,000 degrees higher than that. This is a matter of much importance to mankind, inasmuch as industries dependent upon the electric furnace and its products are becoming and will continue to become steadily more numerous.

No volcano can approach the heat of the electric arc. Thus the latter may be said to open the way into a whole domain of chemistry, which as yet is only beginning to be explored. It may be that before very long the chemist, with the help of the electric furnace, will be able to reproduce all kinds of precious stones. Their materials are simple and well known. Many years ago M. Moissan, a Frenchman, made indubitable diamonds by raising to 5,400 degrees a mixture of sugar charcoal and soft iron, the carbon crystalizing out of the mass under great pressure. Unfortunately they were very tiny and their manufacture was expensive.

One of the commonest substances in nature is the metal aluminum; it forms 7 per cent. of the crust of the earth. Oxide of aluminum is what we call corundum; it may be bought cheaply by the pound. Yet corundum is the material of most of the very precious gem-stones.

What We Know of Gems.

Colorless crystals of corundum are white sapphires. Blue ones are blue sapphires. Green ones are Oriental topaz. Red ones are rubies. Oriental amethyst is corundum. The material of all of these is the same; it is merely stained with different tints by various mineral salts, which in a way are impurities.

Thus it is oxide of chromium that makes the ruby red, and oxide of titanium that paints the sapphire blue. The true amethyst (not to be confused with the Oriental variety) owes its purplish pink color to oxide of manganese.

Well acquainted as we are with the simple substances which go to compose the gem-stones, it ought surely to be possible for chemists to reproduce them in the laboratory. In some cases indeed, this is now accomplished; and a news despatch from Paris states that a process has been discovered whereby true emeralds (as distinguished from the Oriental) are obtained by fusing beryl at extremely high temperature with a small proportion of some metallic oxide.

In the National Museum, at Washington, is a single crystal of beryl that weighs 1,100 pounds. Though "in the rough," exactly as nature made it, its geometrical shape makes it look as if carved by a stone-cutter. Beryl is a silicate of aluminum. True emerald is merely a variety of beryl with enough coloring to give it a vivid green hue. True topaz is exactly the same material tinted yellow.

Oriental amethysts have been produced in pottery furnaces by accident—a fact which seems to make manifest the practicability of manufacturing all kinds of corundum gems, including the sapphire and ruby.

Producing Artificial Stones.

Indeed, both sapphires and rubies are now being artificially made in France, and are said to be practically indistinguishable from the natural stones, the materials being the same that nature uses. The main difficulty has been to produce perfectly clear and transparent crystals.

The process is very simple, the requisite high temperature being furnished by the oxyhydrogen blowpipe. This instrument, long familiar, is a forked tube through which oxygen and hydrogen are brought together and ignited producing an intense heat. A finely powdered mixture, consisting of 98 per cent. aluminum oxide, 1½ per cent of iron oxide (iron rust) and half of 1 per cent. of titanium oxide (for coloring), is poured down in a small continuous trickle through the blowpipe, and, being melted, falls in incandescent drops into a cup of lime. As it cools it crystalizes, forming a pear-shaped globule of sapphire.

The same process serves for the production of ruby, a small quantity of oxide of chronium (to give the red color) being substituted for the titanium.

Diamonds in nature are a volcanic product. Those found in South Africa occur in ancient volcanic pipes—that is to say, in vent-holes out of which lava streams flowed once upon a time. Such conditions imply enormous heat and tremendous pressure, a result being the crystallizing out of carbon in the form of diamonds—some of those found being so huge (one of them weighing over a pound) that they have actually had to be chopped into pieces in order to be marketable.

Able as we now are to engender temperatures far higher than the volcanic, it might be supposed that we could make diamonds of size. Quite possibly we may. But it is conceivable that in nature a great length of time may be required for the production of large diamond crystals.

In Our Garden.

In our garden
Happy hours,
Moist warm earth
And smell of flowers.
Drone of bees
And butterflies,
Great tall lillies,
Deep blue skies.

In our garden
Song of birds,
Happy hearts
And gentle words.
Chi'dren's laughter,
Flowers to pull,
You are here, love,
Life is full.

—Florence M. Edmonds.

Nobel, the founder of the Nobel prizes, owed his vast fortune to his discovery of dynamite.