AUTOMOBILE

As the result of ten years' study and experiment, the White Company has at last perfected a kerosene burner for its steam cars, the results obtained with which are claimed to be equal in every respect to those of the gasoline burner. The new burner has the additional advantage of being adjustable for gasoline also, so that whichever fuel is most readily accessible may be used.

A demand is arising in France for road races for stock cars only. The specially constructed road-racing machines of France having been defeated, their celebrated makers came to the conclusion that they were an expensive luxury, and road racing waned in popularity. The Grand Prix of this year has only about six entries, including a "freak" single-cylinder car with a 4-inch bore, 10-inch stroke, and three each of intake and exhaust valves. This state of things is causing a demand among the smaller makers for races limited to strictly stock cars.

In England, where the road problem is somewhat different from ours, consisting of the damage to previously good roads by automobile traffic, instead of the absence of good roads suitable for the latter, it has come to be realized that the difficulty is largely one of maintaining a surface suitable for *mixed* traffic. It is pointed out that in the old coaching days these vehicles were often more numerous on the highways than motors are now, and that it is only since the railways so greatly reduced road traffic that highways came to be considered a legitimate playground for children, dogs, and chickens, so embarrassing to the automobilist. The further elimination of horses, due to the increasing use of automobiles for all purposes, will soon bring about a state of things in which highways will not be subjected to two opposed methods of wear and tear which cannot be resisted by the same means, and the problem of maintaining a durable and dustless surface will be greatly simplified.

The brake and dust trials conducted by officials of the Department of Agriculture at Newark, N. J., produced some interesting results, which should be consoling to the nervous pedestrian who considers the dangers of the street to be increased by the multiplication of automobiles. The fact, already obvious to the well-informed, that a competently driven automobile is much more controllable than the best-driven horse-drawn vehicle, was conclusively proved; and as the majority of automobile drivers are more skilled, or at least more trained, than the majority of horse drivers, the increase of automobilism should make for public safety. All kinds of motor cars, motor cycles, and pair and single horse-drawn vehicles were included in the trials, and the best stops made by the latter were in 27 and 55 feet at 10 and 18 miles per hour respectively, while automobiles stopped in 10 feet and 31 feet at 10 and 20 miles per hour, and in 53 and 74 feet at 21 and 30 miles per hour. It is thus shown that automobiles may safely proceed at twice the pace of which a horse-drawn vehicle is capable and still be pulled up in the same or less distance.

In the recent efficiency test conducted under the auspices of the New York Automobile Trade Association, known as the "one-gallon" test, the points were awarded in such a manner as to really indicate the comparative merit of design of the different cars, which can hardly be said of any previous contest on similar lines. In previous tests of distance traveled for a given quantity of fuel, distance was the only criterion of success, and, given equal ability on the part of the drivers in economic manipulation of fuel, the chances were all in favor of the lighter cars, which obviously ought to travel a greater distance per pound of fuel consumed than heavier ones. In the recent contest, however, the basis of comparison was the ton-mile transported, so that a heavy car traveling a shorter distance had a chance of beating a light car traveling a greater number of miles. The obvious advantages of this diagnostic, at least to the inexpert amateur looking for an economical car, were sufficiently borne out by the results: although the contest was won by the fifth lightest car out of twenty entered, the heaviest car on the list was first in its class and third in the entire list, and this in spite of its being of the six-cylinder type generally considered to be large consumers of fuel. The winner was an 18-H.P. 4-cylinder Franklin weighing 1,900 pounds light and 2,880 pounds with its full complement of five passengers, which it carried for 35.8 miles, making a score of 103,104 pound-miles or 51.55 ton-miles. The second was a single-cylinder 10-horse-power Cadillac, one of the cheapest cars entered, which ran the longest distance of all, 42.6 miles, making a score of 99,045 pound-miles; while the big Lozier, which was third, carried its 5,230 pounds of car and passengers 17.2 miles, making a score of 98,443. These figures are certainly rather a revelation of the possibilities of economical travel by means of automobiles, 51½ ton-miles for a gallon of gasoline, i. e., at a cost of 16 cents, representing remarkably cheap road haulage of either passengers or freight.

ELECTRICITY.

In order to permit of using tungsten lamps of low voltage in illuminated signs, a special type of transformer has been designed, which reduces the voltage in the ratio of 10 to 1. With a view to preventing loss of current in a flashing sign, these transformers are controlled through the primary circuit.

A novel galvanic cell has recently been invented, which generates an alternating current. The electrodes of this cell are thin sheets of iron, and the electrolyte is a mixture of equal volumes of a two per cent sulphuric acid solution and a saturated bichromate solution. This cell deflects the needle of the voltmeter to each side of the zero position every five or ten seconds, the voltage indicated being plus 0.4 volt and minus 0.4 volt. This action is kept up for hours.

The city of Boston is having 3,000 magnetite arc lamps installed for street illumination. The magnetite arc burns in open air like the original carbon arc, and on a direct current only. One of the electrodes is of copper, while the other, or negative electrode, is made of iron oxide and titanium. Only the latter electrode need be replaced when trimming the lamp, while the positive electrode lasts for over two years. One of the advantages of this type of arc lamp is that it can be operated on the same circuits with tungsten incandescent lamps, making a very convenient and attractive combination for street lighting.

To protect wooden electric light and telephone poles from being gnawed by horses, it is customary to wrap the wood with wire. With a view to facilitating this work, which is quite slow and consequently expensive when done by hand, a pole-wrapping machine has been devised. The machine carries a reel of wire, and is mounted on four grooved rollers which bear against the pole, being held in contact by the tension of a spiral spring. A cutter wheel is mounted on the machine, which serves to cut a spiral groove for the wire. The pitch of the groove may be varied by adjusting the cutter. With this machine it requires but fifteen or twenty minutes to wrap a pole, and the wire is laid on so tightly that it may be held with a single row of staples. The machine also serves for splicing poles.

An ingenious method of measuring the moisture in corn is to convert the kernel of the corn into a battery cell. The instrument is supplied with two pins, one of copper and the other of zinc, which are forced into the kernel of corn and serve as the electrodes of the battery, while the moist germ of the kernel is the electrolyte. A tiny current is thus generated, and its value is read by means of a galvanometer. In this manner it is possible to determine the amount of moisture in the corn. In a similar way, wheat and other grains are tested; but as it is impossible to penetrate the kernels, the grain is packed tightly in a vessel and two large plates are used for the electrodes. In some cases, a current is passed through the grain, and the moisture is determined by noting the electrical resistance with a Wheatstone bridge.

When a Wehnelt interrupter is used with an alternating current, the anode, which is ordinarily made of platinum, is very rapidly disintegrated. To overcome this defect, a German inventor has devised a type in which a carbon rod is used in place of platinum. A porcelain tube with a 3-millimeter bore is supported in the vessel, which is filled with sulphuric acid. A carbon rod covered with a thin coating of copper is arranged to fit into the bore of the porcelain tube. The porcelain arm, which bears against the bottom of the rod, may be adjusted to raise or lower the rod, thus determining the amount that projects below the end of the tube. A weight on the carbon rod presses the anode against the porcelain arm. The intensity of the current is determined by the thickness of the coating on the carbon. This construction was found to be very satisfactory on alternating-current circuits. A voltage of from 60 to 150 was required to operate the interrupter.

Investigations of the electrical state of the upper atmosphere during July and August last were made at the Glossop Observatory in England. A wire was elevated by a kite and a dead-beat galvanometer was used to measure the currents. It was found that the current was too large, at times, for the capacity of the instrument, and it was necessary to connect it in shunt. The results of the experiments were as follows, the mean current values being given:

Height above ground.	Current in amperes.
2,000 feet	5×10^{-5}
4,000 feet	13×10^{-5}
6,000 feet	23×10^{-5}

The current values varied considerably during the period of the investigations, and seemed to depend to a large extent upon the velocity of the wind. The greater the velocity, the greater was the current. Although the investigators attempted to measure the potential of the air, they were unable to obtain very satisfactory results, owing to the impossibility of insulating the apparatus perfectly against the high potentials.

SCIENCE.

A large villa was recently unearthed at Pompeii by a restaurant keeper, who obtained permission recently to excavate on a plot of land adjacent to some recently discovered tombs. It is stated that some excellently preserved frescoes were revealed.

By a process recently patented in Austria, caoutchouc is recovered from materials of every kind which contain it, by heating the finely divided material to 212 deg. F. or higher with ethers of the cyclic or acyclic series which boil at temperatures higher than 212 deg. F., and by precipitation the caoutchouc from the solution is thus obtained.

Typhoid fever vaccination has met with the approval of the army. Of the 150 men of the hospital corps on duty at the Walter Reed Hospital in the District of Columbia, 98 per cent have volunteered for anti-typhoid vaccination, and already over two-thirds have voluntarily returned for the second application. By this writing, probably all have returned. No opposition has been encountered, and the entire experiment has proved a success.

Auer von Welsbach, the well-known inventor of the incandescent gas mantle, has produced an alloy of iron and thorium which possesses remarkable properties. When struck lightly against a piece of iron this alloy emits exceedingly bright sparks, produced by the almost instantaneous oxidation of particles detached by the blow. Sufficient heat is developed to ignite tinder instantaneously, without the repeated efforts required by the old-fashioned flint and steel. The new thorium "flint," indeed, may be called an everlasting match. It will be very useful to explorers and tourists and should be of great value for the ignition of explosives, for military and other purposes.

Near the little Italian city of Adria excavations are being made on the site of the ancient Adria, a prosperous Etruscan seaport which gave its name to the Adriatic Sea. In the course of ages the city was buried beneath the alluvium of the Po and the Adige, and the sea receded from its site, which is now 18 miles from the coast. The project of exhuming the buried city has been discussed for many years, but until recently its accomplishment was prevented by financial difficulties. The work is in charge of a commission which includes the most celebrated archæologists of Italy, and it is expected to result in the discovery of archæological treasures of the greatest importance.

Of all the preservatives for milk, hydrogen dioxide has been regarded as the simplest and safest because of its ultimate decomposition into innocuous products. In the Moniteur Scientifique E. Feder condemns the use of this substance as dangerous and gives a method by which its presence in milk can be detected. This method, devised by Fritzmann, consists in adding to the suspected milk a small quantity of a mixture of formaldehyde and strong sulphuric acid. The presence of hydrogen dioxide is revealed by a bluish violet coloration. The same coloration is produced when formaldehyde and hydrochloric acid are added to the milk at the temperature of ebullition.

Mr. Marconi denies the statement which has recently been made that wireless telegraph waves are injurious to operators, and that they produce various diseases such as conjunctivitis, corneal ulcers, leukoma. To use his own words: "During the twelve years or so of our operations we have had to deal with no single case of compensation for any injury of this origin, nor, so far as I can ascertain, has any such injury been suffered. Speaking for myself, I may remark that my own health has never been better than during the often extended periods when I have been exposed for many hours daily to the conditions now challenged, and in the constant neighborhood of electrical discharges at our transatlantic stations, which I believe are the most powerful in the world."

The use of compressed acetylene has hitherto been prevented by the great risk of explosion incurred when this gas is confined under a pressure exceeding two atmospheres. According to Claude and Hess, this danger does not exist when the compressed acetylene is dissolved in 90 per cent acetone. In the practical application of this principle the acetone is forced into steel cylinders, filled with a porous mass composed of infusorial earth, a special wood charcoal and a suitable binder. Acetylene, also under high pressure, is then forced in and dissolves in the acetone. At ordinary temperature and atmospheric pressure acetone dissolves 24 times its volume of acetylene, but at 12 atmospheres it dissolves nearly 300 volumes of acetylene (measured before compression). In practice cylinders of about ⅛, ½, and 1 cubic foot capacity are employed, which contain respectively 12, 50 and 100 cubic feet of acetylene. They are useful for lighting railway cars, automobiles, buoys, etc., and for autogenous welding of metals.