

The central pin passes through a bearing in its sleeve, and through a hole forming another bearing in the end of the cylinder. In its outer end are two or three holes for matches. The match-scratching plate is placed horizontally at the end of the cylinder, and is mounted on a small coiled spring that keeps it at the proper height for the head of the match to rub over it when the central pin carrying the match is shot forward. The rim around the plate is notched and the plate is slightly inclined in order that the match may strike and rub over it without breaking. Furthermore, a little support keeps the match from falling when it is in position, ready to be lit.

The front end of the cylinder, and the parts attached to it, are inclosed in a cylindrical box or casing provided with an opening for the passage of the central rod and attached by a bayonet joint. This box is closed by a cover which is retained in place by a long bent wire, and attached to the box by a short chain. The blow of the central rod that holds the match, unlatches the cover and knocks it off. It was found necessary to protect the match from dampness, and hence this box was constructed to cover it.

To set the apparatus, it is only necessary to set the alarm of the clock at the desired hour, place a match in the end of the central rod, and push this into the cylinder as far as it will go, so as to engage the curved wire that holds it, in the notch at the end of the long slot in the cylinder. The cap is then placed on the box at the front end, and the apparatus is ready to work.

This device is evidently capable of various applications for industrial, as well as for household, use. It can be employed in all cases in which a lamp or a fire must be lit at a certain time. An automatic apparatus like this dispenses with a good deal of attention and of incommodious, as well as expensive, hand work. We will not cite all its uses, as the reader can easily comprehend them, and will doubtless think of some to which it has not yet been applied.

#### Manufacturing Boats for the War Department.

The United States War Department recently placed an order with the Electric Launch Company, of Bayonne, N. J., for one hundred and twenty large wooden boats or launches, which are to be used for laying submarine mines. The specifications call for 20-foot boats equipped with eight oars and extra heavily built to carry the mines, a pair of which will be stored on each boat. A roller at the stern will facilitate lowering the mines into the water. These boats will be carried on torpedo cruisers, each vessel being equipped with thirty of the launches.

Owing to the fact that the order calls for so many boats, all exactly alike, the Electric Launch Company decided to build one boat as a model, and then construct the rest in quantity from templates fashioned after the model boat. This process of manufacturing instead of building the launches is something new in the construction of boats. Ordinarily, every boat has its own individuality, and seldom are two built exactly alike. Occasionally a dozen or more may be built after the same pattern, but as far as we can ascertain, never before have conditions arisen which would make it profitable to manufacture boats. At Bayonne the mine-laying boats are being manufactured in two lots. The model boat has already been built, and templates have been formed of each part. These parts are now being reproduced in rough form, sixty at a time. Each rough form is clamped to the proper template, and brought into contact with a rotating cutter or forming tool, which cuts it to exact shape and size in a few seconds. This process results in a great saving of time, particularly in shaping odd parts, such as stern posts and stem pieces.

#### Facts About the Luminous Phenomena Due to Ozone and Radium.

F. Richarz and R. Schenck some time ago communicated to the Berlin Academy of Sciences the observation that sidoblende (zinc sulphide) becomes luminescent in a stream of ozone. In a paper recently read before the same academy, the experimenters record some other cases of luminescence due to ozone. While white phosphorus, as is known, will glow even in air, red phosphorus shows a luminescence only in ozone, this luminescence being of a slight intensity in the case of ordinary red phosphorus, while that of phosphorus derived from a phosphorus tribromide solution is very strong. As regards the disozonizing effect of sidoblende and red phosphorus, a stream of ozone which, having been left to itself, was not capable of acting on a steam jet, would act strongly after coming in contact with either of these substances. Among other substances showing a slight incandescence in ozone, there is vitreous arsenic acid, while a drop of turpentine oil shows a strong luminescence. The experimenters even happened to note that a finger held in a stream of strongly ozonized oxygen escaping into the air, as well as wool, paper, linen, or cotton, would show a luminescence, due most likely to the adherence of ozone to such bodies as smell of ozone, even after

half a day or a whole day. As regards the question whether the luminescence is due to the substances themselves being oxidized by ozone or to the O-ions being freed by the disaggregation of the ozone, the authors intend making spectroscopic investigations to determine.

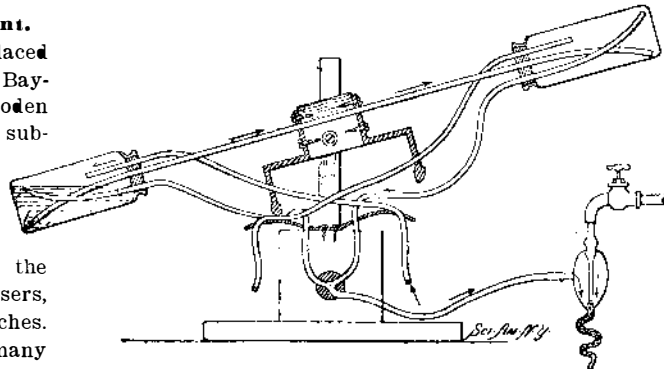
#### AN IMPROVED MICHAUD APPARATUS.

BY J. FID. TRISTAN.

Here is a little apparatus which, like Mariotte's bottle, can be used with success to demonstrate many laws. It can be made in a short time with ordinary laboratory implements, and has proved very useful in my class.

Two bottles are employed, each provided with two flexible tubes, one serving to admit, and the other to exhaust air from the bottle. The bottles are connected by a main glass tube which is bent down at each end in the bottle as shown. This tube is mounted at the center in a wooden block pivoted between two arms of a standard. Two pieces of brass depend from this block and, as the apparatus oscillates, are adapted alternately to close certain of the flexible tubes by compressing them against a metal plate on the standard. The exhaust tubes of the bottles are connected to an aspirator, and one of the bottles is partly filled with water so as to tilt the apparatus to the position shown. In this position it will be observed that the exhaust tube of the lower bottle and the inlet tube of the upper bottle are both closed. Now, when water is turned on in the aspirator, a vacuum is produced in the upper bottle, and as the inlet tube of the lower bottle is free, water rises rapidly through the glass tube to the upper bottle. As this bottle slowly fills, it overbalances the other bottle and swings down to the lower position. The conditions are now reversed, and the same operations are repeated on the other side. About fifteen oscillations per minute are thus obtained.

The principle of this apparatus was first made



AN IMPROVED MICHAUD APPARATUS.

known by Dr. Gustave Michaud in the SCIENTIFIC AMERICAN of December 16, 1893. The apparatus illustrated is an improvement on Dr. Michaud's device, and is so modified as to provide a longer duration of oscillations.

#### Results of Experiments With Westrumite for Laying the Dust on Highways.

Some experiments were recently made in France with a mixture of various oils, tar, etc., called "Westrumite," on 3.1 miles of national road between Nice and Monaco. The road was carefully swept one evening and was thoroughly sprinkled the next morning with 5 and 10 per cent solutions of westrumite. With street sprinklers containing 1,000 liters (264.2 gallons) of water to which had been added 100 or 50 liters (26.42 or 13.21 gallons) of the product, 1,000 square meters (10,764 square feet) were covered. After two or three hours, the road was sufficiently dry for traffic to be resumed. This was especially the case if the road was sprinkled at night, which was preferable. The next day the same sections of road were sprinkled anew with the same solutions, so as to obtain a better penetration of the product. Ten days after these sprinklings, in spite of a summer sun, a great deal of wind, and a very considerable automobile and horse traffic, the dust had completely disappeared on those parts of the road which had been sprinkled twice with 10 per cent solutions, while the results obtained from two sprinklings with 5 per cent solutions lasted only four or five days.

No harm was done to the garments of travelers, to pneumatic tires, or to the varnish of fine carriages. The Westrumite soaks into the road to a depth of from 3 to 5 centimeters (1.18 to 1.96 inches) and becomes incorporated with it. Torrents of rain which fell during two days did not wash it off the road, as the volatile substances which make it soluble in water evaporate when it first dries, whereupon it becomes insoluble and can no longer be washed off by rain water. The formation of mud by the latter is considerably diminished, and the good results appear to last quite a while. Subsequent sprinkling solutions need contain only 2 per cent of Westrumite. Instead of sprinkling the road every day with the water, it only requires sprinkling once in two weeks with a

2 per cent solution of Westrumite. A kilometer (6-10 of a mile) of road 6 meters (19.68 feet) wide can be sprinkled for about \$60 for the first two times and certainly for not more than \$40 for the balance of the year; so that it costs in the neighborhood of \$100 a kilometer, or \$165 a mile, to keep a road free from dust the whole year round.

#### Automobile Notes.

The annual hill-climbing test held last month at Boston by the Massachusetts Automobile Club resulted in a tie between a 40-horse-power Richard-Brazier machine and a 60-horse-power Mercedes. Both cars covered the fifth of a mile hill in 15 2-5 seconds, thus reducing the previous record of 43 1-5 seconds by about 60 per cent. In the steam vehicle class, a Stanley steam carriage lowered its previous record of 17 seconds by 2-5 of a second, while the old electric-vehicle record of 76 3-5 was reduced one second.

Arrangements have not as yet been completed for the 300-mile race for the cup given by Mr. William K. Vanderbilt, Jr. Joseph Tracy, on a Peerless racer, ran over the proposed course on Long Island recently, and he reports the roads in fine condition. It is probable that the race will be run over them some time this summer, if the necessary permission can be obtained. In connection with this race, one of the automobile papers suggests that it be run on two days, the light cars being raced the first day, and the heavy ones the second. This would allow more vehicles to compete, and only the same class of vehicles would be placed in direct competition, while the race would be won just the same by the car that made the best time.

Two inventions that are destined to be of great value in improving gasoline motors of both the water and air-cooled types have lately been made. One is a method of electrolytically depositing a copper water jacket around a cylinder, while the other is a process of casting steel and copper heat-radiating flanges integrally with the cylinder, and thereby obtaining a much more efficient radiation. In carrying out the first process, the outside of the cylinder is electroplated with copper. The plating of copper is then covered with the proper thickness of wax (which has been treated so that it is a conductor) and a complete jacket is electroplated over the wax, which is then melted out, leaving a thin, integral, copper water jacket capable of withstanding a pressure of 30 pounds per square inch, and which is 60 per cent higher than the usual cast jacket.

What will unquestionably be the greatest automobile event of the year in this country is the run to the St. Louis Exposition, which is planned for the latter part of July. The New York division of tourists will start about the 25th of the month, and will have the choice of two routes—one through the Catskill Mountains and across New York State to Buffalo, whence they will proceed to Chicago, and then travel south to St. Louis, and the other via Philadelphia and across southern Pennsylvania in a direct line west to St. Louis. New England automobilists will start from Boston, and, traveling via Albany and along the line of the New York Central Railroad to Buffalo, will join the New Yorkers at that point. (The intention is to have motorists from all parts of the country make a triumphal entry into St. Louis on the same day, which will probably be Thursday, August 11. The various routes are all being investigated, and full information concerning them will soon be obtainable from the American Motor Association.) That through the Catskills and across New York State, which was traversed last fall successfully by so many American cars, under the severest weather conditions that could possibly obtain, should be a picturesque and easy route in mid-summer, capable of being run over by any well-built and medium-powered car. From Cleveland to Chicago and south to St. Louis, the roads are mostly of the good gravel or dirt variety. There are numerous short, sharp grades of not exceeding 15 per cent, but nothing that should offer insurmountable difficulties. The route directly west through Pennsylvania, though a straighter and shorter one to the fair, is much more hilly, and the roads are not so good. There is a good deal of picturesque mountain scenery, however, to be enjoyed on a trip to St. Louis by this route.

A return has been issued by the Admiralty, giving the results of prize firing in the fleet during 1903, in which their lordships note with satisfaction the improvement in shooting with nearly all classes of guns. The award of medals, it is announced, will be promulgated shortly. Among the battleships, the "Majestic," flagship of the Channel squadron, heads the list, the "Albion" and "Goliath," of the China squadron, being second and third respectively. The "Benbow," of the home squadron, is thirty-second, and last of the list, her barbette guns actually scoring no points whatever. Among the cruisers, the "Good Hope," of the cruiser squadron, was first; the "Charybdis," of the North American squadron, second; and the "Flora," of the Pacific, third.