A GASOLINE STEAM CARRIAGE.

The steam carriage recently invented by Ransom E. Olds, of the Olds & Son's engine works, Lansing, Mich., proves to be such a practical success that we give herewith an engraving of its appearance, as photographed. The frame is made of steel arched over the forward wheels, and is low enough at the rear end to form a platform on which the engines and boiler rest fifteen inches from the ground, so that the engines are low enough to make connections on main axle in front, on which the cranks are placed at each end at right angles, there being an engine on each side with a 3×8 inch cylinder.

The boiler is upright and placed between the two cylinders on the rear platform, both engines being connected so as to work as one engine. Just behind the seat are the water and gasoline tanks. The water tank is sufficient for a ten or fifteen mile run, while the gasoline tank is sufficient for a forty mile trip. Over the entire vehicle extends a canopy top, so that the general appearance of the rig is like an ordinary surrey. The fire regulation is automatic, so that more or less gasoline is admitted to the burners as is required by the grade of the road, and when the vehicle is stopped it also closes off the gasoline so that the steam will not rise above its given point. The steering lever is adjusted so that any one can operate the steering, while the throttle and reverse lever are by the operator's seat.

It carries two passengers besides the operator and it is the intention to couple on another vehicle behind if wishing to carry more passengers. The steam from the engines is entirely done away with by an ingenious contrivance of the inventor, and there is no smoke. The engines couple on direct, so that there is no gearing whatever, and the rig runs as quietly as an ordinary carriage. The boiler and engines at the rear end are inclosed by curtains which shut out all view of the machinery, so there is nothing about it to scare horses and they do not seem to mind it any more than an ordinary carriage. Its usual speed on good roads is fifteen miles per hour, and it will ascend any ordinary grade.

The vehicle as a whole includes many new merits. Mr. Olds states that its great advantages are that it never kicks or bites, never tires out on long runs, and during hot weather he can ride fast enough to make a breeze without sweating the horse. It does not require care in the stable, and only eats while it is on the road, which is no more than at the rate of 1 cent per mile. Weight 1,200 pounds.

A GASOLINE STEAM CARRIAGE.

Mercury.

The striking and unique properties of mercury have caused it to be an object of interest and investigation since the earliest times. Being the only metal that is liquid at ordinary temperatures, it has many valuable applications in the arts; while its property of uniting with metals to form amalgams, and of not adhering to or wetting most other solids, renders it still more useful in many ways.

Mercury is a silver-white liquid metal of high specific gravity (13·54), freezing at a temperature of about 40° below zero—the only point where the Fahrenheit and Centigrade thermometer scales coincide. Its boiling point is correspondingly high, being 662° F.—a temperature readily produced in the laboratory, so that it can be distilled like water. The alchemists, in their vain search for the "philosopher's stone," held this metal in almost superstitious reverence, and distilled and redistilled it, hoping to be able to transmute it to gold or silver. A few grains of the precious metals, present as an impurity, were all that rewarded their efforts; but even these were sufficient to encourage them to further exertions, which, as must have been the case, resulted in nothing but a quantity of very pure mercury.

The most common ore of mercury is cinnabar, or the sulphide of the metal, which is mined principally in Austria, Spain, and California. The metal is separated from the ore by a simple process of roasting, by which the sulphur is driven off and burnt, while the mercury is set free in the state of vapor and condensed and collected in convenient receptacles.

When mercury is heated to the boiling point for some time in the air, it absorbs oxygen and becomes converted into mercuric oxide (HgO), a reddish powder. If this oxide is heated to a still higher temperature, it is again decomposed, oxygen gas is given off, and metallic mercury remains behind. This reaction is historically interesting as being the method by which oxygen was first prepared by the English chemist Priestley, and also by the French chemist Lavoisier, who first discovered the true nature of combustion, and recognized the pre-eminent importance of this element in the establishment of a rational theory of chemical philosophy.

Pure mercury will not adhere to glass, and this property renders it particularly useful in the manufacture of scientific instruments. Its regular expansion by heat is made use of in constructing thermometers; while its high specific gravity, which enables a column of mercury about thirty inches in height to balance a column of air of equal sectional area, renders it especially well adapted for barometers.

One of the principal uses of mercury is in the silvering of glass for mirrors. While, as above stated, pure mercury will not adhere to glass, it has the property of uniting with or dissolving other metals, forming compounds known as *amalgams*, which adhere very strongly to clean polished glass. In the manufacture of mirrors, an amalgam of mercury and tin is used. A sheet of tinfoil of the size of the glass is laid upon a perfectly level table and rubbed over with mercury, a thin layer of which is afterward poured upon it. The glass, previously cleaned, is then carefully slid on to the table, so that its edge may carry before it the superfluous mercury and the impurities upon its surface. Heavy weights are then placed upon the glass to squeeze out the excess of mercury, and after several days the amalgam is found to have adhered firmly to it. The process is one requiring much skill, and the workmen are liable to suffer from the poisonous action of the mercury vapor.

The amalgams referred to above are of great theoretical interest. The attraction of mercury for gold and silver is particularly strong, and a piece of gold dropped into a dish of mercury disappears like a lump of sugar in water. This attraction for the precious metals is taken advantage of in the extraction of gold and silver from their ores. Iron and platinum are the only metals which are not corroded by mercury, and it adheres even to the latter metal.

When mercury is triturated in a mortar with fine powders, such as chalk, which have no chemical action upon it, it loses its fluid character and forms a grayish or bluish powder, from which the common medicine known as blue pill is prepared. Although its metallic character is apparently unchanged, there is probably a partial oxidation to which the change is due.

The use of mercury in medicine originated with the alchemists, who sought in it the elixir of life as well as the philosopher's stone. The metal and its salts have a most powerful effect upon the human system, and, except in small doses, are extremely poisonous. In the treatment of certain diseases, mercury and its compounds are still found indispensable; but the promiscuous drugging with calomel, blue pill, and corrosive sublimate by former generations of physicians is now, happily, done away with. It is a curious fact that while *mercuric* chloride, or corrosive sublimate ($HgCl_2$), is a most powerful poison, *mercurous* chloride, or calomel (Hg_2Cl_2), is much less violent in its action, and is administered in comparatively large doses as a medicine. It is hard to see any reason on theoretical grounds why such a trifling difference in composition should confer such different properties.

Vermilion is a brilliant red pigment identical in composition with the ore of mercury known as cinnabar. Its brilliancy of color, however, depends upon the process of manufacture, and the Chinese still succeed in making the finest quality by their apparently rude methods.

Chemically, mercury is allied to copper, a metal from which it differs widely in its physical characteristics. From the specific gravity of its vapor and other considerations we learn that its molecule consists of a single atom, and we assume that many other metals are similarly constituted, although, owing to the high boiling point of most of them, we cannot make a direct determination.

The metal most resembling mercury in point of fusibility is the rare element gallium, which melts at 86° F., or less than the heat of the hand. When once melted, it remains fluid even if cooled far below this temperature; but if touched with a piece of the solid metal, it solidifies at once. In all other respects, however, the two metals are very different.

Among the minor uses of mercury we may mention the mercuric fulminate used in percussion caps, the amalgams used by dentists in filling teeth, and its occasional use in gilding and silvering. A few cases have been reported by physicians where several pounds of mercury were given to patients suffering from obstruction of the intestines, with the intention of forcing out the obstructing matter by the weight of the metal. Fortunately, this heroic method of treatment is "more honored in the breach than in the observance."

While not an indispensable metal, mercury is a very convenient and useful one. It is certainly very singular that only one out of the numerous metals known to us should be liquid at ordinary temperatures; but perhaps when the true nature of what we call the elementary bodies, and their connection with each other, are better understood, we may be able to discover a rational explanation for the remarkable differences in their chemical and physical properties.

Palm Oil.

The total import of palm oil into England is about 50,000 tons, valued at over £1,000,000, but it is considered that this is an exceedingly small commerce compared to what might be the case were the enormous resources fully, or even moderately, utilized. For miles along the west coast of Africa, extending between Cape Bianco and St. Paul di Loando, there are vast forests of palms, the oleaginous fruit of which has, for centuries, rotted unused upon the ground. The oil palm forests at the back of the coast line of Cape Palmas and Elmina are said to be practically inexhaustible; and so also in the neighborhood of Fernando Po immense tracts are covered with the trees.

Lagos furnishes the purest oil; for there are in commerce regular and irregular oils. When analyzed, if the water and impurities exceed 2 per cent, an allowance is made; for often these oils contain 10 to 15 per cent of water and impurities.

Palm oil is eaten as butter by the natives, and used for anointing their bodies. In England it is used in the manufacture of soap and candles, and in South Wales in the preparation of tin plates. Its non-drying qualities render it valuable as a preservative of the surface of the heated iron sheet from oxidation until the moment of dipping into the bath of melted tin, the sheets being rapidly transferred to that from the hot oil bath, which consists almost entirely of palm oil.

In 1871, as well as in 1880 and 1891, the imports of palm oil into the United Kingdom exceeded 1,000,000 hundredweight. From 10,000 to 15,000 tons of palm oil are shipped direct from Africa to the Continent. The price of the oil has ranged from 35s. per cwt., in 1883, to 23s., in 1890.

THE Bureau of the American Republics is informed of the completion of the Grand Trunk Railway of Uruguay from Montevideo 362 miles north of Rivera on the Brazilian frontier. The works were begun in August, 1888. The immediate result of this line to Brazil will be to open up a vast tract of fertile land hitherto comparatively valueless. The Brazilian government is now constructing a railway south from Rio Grande to Polotas, which will soon reach the boundary and furnish direct railway communication between Montevideo and those two important cities of Southern Brazil.