

ACETYLENE MOTOR WAGONS AND CARRIAGES.

Our engravings give an idea of the running gear of a standard truck for delivery wagons, etc., and of a victoria, both being operated by acetylene gas and made by the Auto-Acetylene Company, of 15 Park Row, New York city.

The standard truck for delivery wagons and other heavy vehicles, shown in our second engraving, weighs 1,000 pounds as it stands. The motor consists of a duplex engine having four cylinders and two exploding chambers. It is capable of running without a fly-wheel, and the normal speed of the engine is 1,000 revolutions per minute which, when connected with the driving mechanism, propels the vehicle at a rate of 12 miles an hour, which is sufficient for all business purposes. The intermediate gearing permits the reduction of the speed to $1\frac{1}{4}$ miles per hour. The engine itself is not reversible, but back-gearing is provided and can be thrown into operation by a foot shift and the wagon backed at a speed of $1\frac{3}{4}$ miles per hour. The speed forward can be graduated from the minimum to the maximum with the greatest ease. No water jacket is necessary with this motor, nor is any other means for cooling the engine necessary. With a special apparatus arranged for speed on a test of nine hours, the motor ran at the rate of 35 miles per hour with none of the parts of the engine heating abnormally. A vehicle similar to the one represented in the engraving has traveled 6,390 miles with but one accident or stoppage due to any defective part of the machinery. The engine employed is designed specially for the use of acetylene gas; 1,500 cubic inches of carbide will drive the truck, which is of 10 horse power, 70 miles at a speed of 12 miles per hour. There is a valve provided which permits of changing from acetylene gas to gasoline and from gasoline to kerosene oil, so that while the engine is operated most economically and satisfactorily with acetylene, at the same time other fuels can be used in an emergency, if supplies of carbide are not readily obtained.

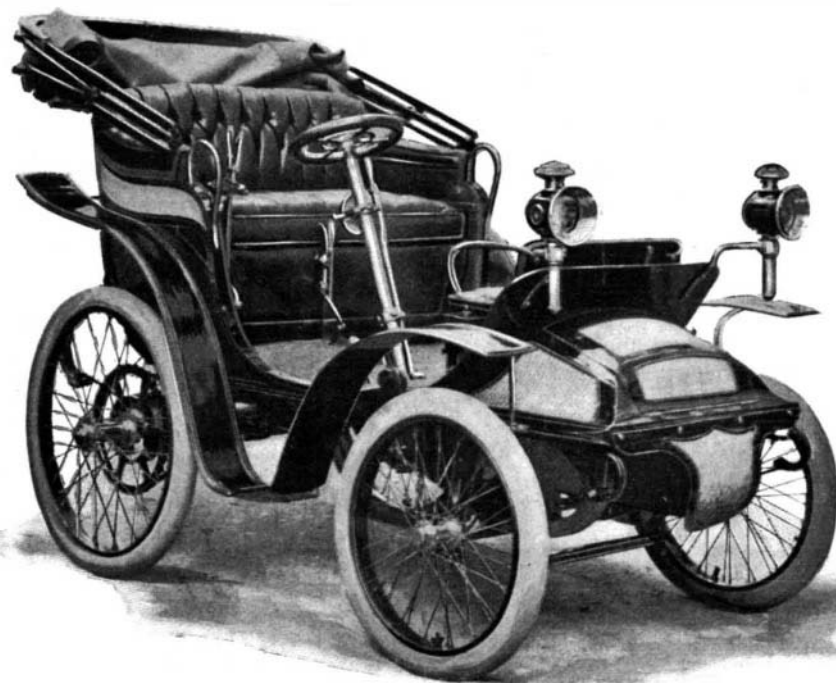
The same company has recently made three miner's prospecting wagons which possess many features of interest. The wagon is constructed so as to possess strength, and all machinery is carefully shielded, so that underbrush, etc., will not interfere in any way with its operation. The idea in these prospecting wagons is to provide a miniature mining camp complete which can be transported at the rate of $2\frac{1}{2}$ to 4 miles an hour. A small ore crusher is mounted upon the truck, so that it can be connected directly with the motor, and an assay furnace is also provided to test the gold-bearing ore as it may be found. The seat in front can be turned down to provide a bunk for two persons, and while one man drives the wagon his companion can busy himself making assays of the findings. Ample food supplies can be carried, and with one of these wagons a trip of two or three weeks can be made by prospectors.

Our other engraving represents a comfortable victoria for two or three people and has one auxiliary seat which can be used if desired. The engine is mounted on the forward truck. The total weight of the carriage is only 750 pounds. The explosion of the hydrocarbon mixture is between the pistons moving in opposite directions. The vibration is neutralized, and no shock is imparted to the vehicle. At all speeds it is practically noiseless, making no more sound than a well-constructed electric vehicle. The pleasure carriages are provided with duplex speeds that give all the speeds that can be obtained with a truck, as we have already seen, and this can be multiplied by two, three, or four, which means that a vehicle can be operated from $1\frac{3}{4}$ miles to 48 miles per hour. As the carriage is provided with an 8 horse power motor, this seemingly phenomenal speed will be understood. The motor operates directly in proportion to the power required. The cycle calculation is so determined that the fuel consumed is in direct ratio to the power exerted. What has already been said concerning the carbide and gasoline for the truck applies equally well to the victoria. The steering is done by means of a wheel or a lever. Either device may be used at will, the wheel being the best for long journeys and the lever for short ones. The steering gear is cushioned upon a telescoping hub.

In the carriage shown in the engraving the wheels are of bicycle construction, with wire spokes, steel rim, and rubber tires, but in future carriages with wooden wheels with solid tires will be substituted, for most of the trouble with motor carriages comes from the pneumatic tire, and sooner or later motor carriage manufacturers will come to this view of the matter.

Some Far-Reaching Experiments in Agriculture.
BY DR. EUGENE MURRAY-AARON.

By act of Congress there was appropriated for the



ACETYLENE GAS DRIVEN VICTORIA.

use of the Department of Agriculture, during the fiscal year 1899, \$20,000 for the collection, purchase, propagation, and distribution of rare and valuable seeds, bulbs, trees, shrubs, vines, cuttings, and plants from foreign lands, with the view to their acclimatization and introduction into this country. To further this work Secretary Wilson has founded a Section of Seed and Plant Introduction, under the direct care of the Division of Botany, and for this section several "agricultural explorers" have been sent to, or are now in, various foreign countries. It is not so much in the field of the domestication of wild or little known plant life that the secretary has wisely determined to expend the fund at his disposal as in that of the introduction into our land of useful plants already elsewhere domesticated and thoroughly proved to be of great agricultural value. One of the explorers sent out is Mr. W. T. Swingle, who, after a most painstaking and successful trip in the countries bordering both shores of the Mediterranean, has returned laden with material and data of the greatest possible value. From a preliminary report made by him many of the following facts are taken.

FINER TABLE GRAPES.—Notwithstanding the great progress made in this country in the improvement of the native grapes, we yet have nothing comparable in

ties of the stock are combined with the high quality of the graft, and it has been discovered that the combination is also more prolific than were the European varieties before the advent of phylloxera.

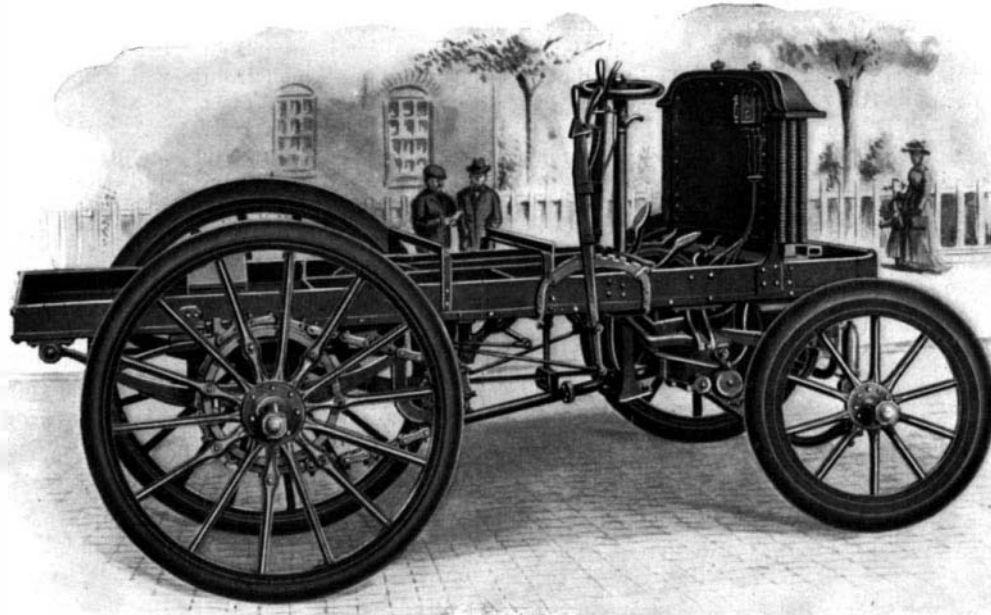
Mr. Swingle has secured upward of 2,000 plants of 119 of the best varieties, all grafted on specially selected American stock. These are to be thoroughly tested in chosen localities in North Carolina, Florida, Alabama, and Kansas, under the direction of the Division of Pomology. Careful observations will be made, so that these varieties may be eventually distributed to the regions best adapted for them, and it is hoped, with confidence, that they can be established in many parts of the South, and that table grape culture can be greatly extended by the culture of these superior European sorts.

General interest will be felt in the South and Southwest in the methods of corinth (commonly called "currant") culture in Greece and Turkey, and the importation of the best sorts of this vine, which it is hoped to make next winter. At present we import of wines, corinths, raisins and fresh grapes, an aggregate of over \$8,350,000 a year. No inconsiderable part of this great amount is that which goes to pay for corinths and seedless raisins. It is agreed, and with reason, that not only ought we to be able to produce all of these commodities needed for our home consumption, but we should be able, in time, to add them to our articles of export.

Certain new hybrid varieties, crossed between the delicate high-grade European and the hardy American grapes, the so-called "Franco-American" varieties, have also been obtained, and much is hoped from them, since the resistance of the American parent is to a certain extent combined with the fine quality of the European parent in their offspring.

EVER-BEARING STRAWBERRIES.—Of great interest to the suburbanite and the amateur fruit culturist, although not likely to prove attractive to truckers and market gardeners, is a large, ever-bearing strawberry, much esteemed and very successful in France. The plants of this variety produce fruit for some months each year, and a small patch will yield all the season. In this connection it is interesting to point out that in several portions of the high mountains of the West Indies there grows a variety of wild strawberry which may be picked from the same plants for at least six months, if not longer. These I have found in high pockets or arroyos on the north side of the "Blue Range," in Jamaica, and La Selle Range, in Hayti, and it is more than likely that they will be found in the higher ridges north of Santiago, Cuba. They appeared very prolific for the wild sort, and of a very unusual and delicious flavor.

FIGS AND THEIR CAPRIFICATION.—During the pursuit of his investigations, Mr. Swingle obtained large numbers of the insect, Blastophaga, which is necessary for the fertilization and the production of the richest flavors in the fig. The "caprifig" is the fruit of the male form or tree of the fig species, of which the ordinary fig tree known to commerce and our hothouses is the female form. The caprifig tree does not bear edible fruit, but a small, tough, knurly fruit, filled with the galls of the Blastophaga, from which these little, black, wasp-like insects emerge in due course of their transformation. While forcing themselves out of the male fruit, these insects become thoroughly coated with pollen, which in many cases at that season (July) is carried by them into the female flowers of the fig, which thus become fertilized and ripen good seeds. This seed perfection is valuable to the fig growers in two ways, by preventing the miniature fruit from aborting and falling off, and by reason of the rich, nutty flavor which the fig gets only from the perfected seed. To insure this caprification, the growers suspend bunches of the caprifigs in the female trees at



RUNNING GEAR OF ACETYLENE GAS DRIVEN TRUCK

the proper time of the year, and thus aid in the act of fertilization. While there are certain varieties of figs not requiring caprification, the best sorts for drying can only thus be obtained. The only product comparable to the finer imported caprifigged Smyrnas are a few pounds produced in California every year by the laborious process of hand pollination.

The California State Board of Horticulture was promised, in 1897, by Secretary Wilson, that the capri-

flavor or general market value to the fancy European stock derived from varieties of the species *Vitis vinifera*. Being less hardy than our native species, these foreign varieties have not so well withstood the attacks of the dreaded phylloxera and other enemies to the vine. The French viticulturists long since discovered that a remedy lay in grafting the European vine on selected American stocks, which are almost proof against such attacks. In this way the resisting quali-

fig insect should be introduced and supplied to them during the present fiscal year. Dr. Howard, entomologist of the department, visited the fig-raising districts of California, in 1898, with reference to the insect problems involved, and Mr. Swingle soon after fortunately originated a new method of shipment, which has made it possible to send the *Blastophaga* as far as California and assure their arrival alive. This was by wrapping the winter or slow-developing form in tin-foil and sending by letter post. They have now been sent from Italy and from the mountains of Algeria, and, having begun to breed in California, it is hoped they will successfully hibernate there and become regular and useful residents. Small orchards of the caprifig (male) tree will, however, be planted, so that, should a cold snap kill the insect in any given locality, it will be possible to recoup the loss from our own insect farms rather than face the delay and trouble of further introduction by mail. As most of the parasitical hymenoptera are, however, much more adaptable to climatic conditions than are the species of the fig, it is safe to prophesy that *Blastophaga* will ultimately adjust itself to any region where fig culture will succeed. Now, in California, Arizona, and like regions, where a mild winter is combined with a dry August and September, we may look for abundant success in the fig-drying industry, one which now costs us many thousands of dollars annually on the import side of our national ledger.

THE TRUE ARTICHOKE.—This name is here commonly applied to a tuber resembling the potato, which is now grown in some localities quite extensively for stock feeding and alcohol distillation, but is of little value for human food. This is the "Jerusalem artichoke." The unopened heads of a thistle-like plant are, however, the real artichoke. The latter are a delicacy greatly prized in certain parts of Europe and produced in enormous quantities in France and Italy. The plant, a perennial, does not come true from seed, but is propagated, like the pineapple and many other plants, from suckers.

As the true artichoke is much prized in New Orleans, Savannah, Philadelphia, and New York, having for some time been grown for local use in the former city, it is believed that the general introduction of the plant will be appreciated by the people throughout the country, and a sufficient number of suckers have been imported by the department to early insure their indefinite multiplication. The cultivation of the artichoke should prove to be a profitable venture among our Southern truckers, especially as it is adapted to furnishing a canned delicacy.

A JAPANESE DELICACY.—The *Stachys* is a vegetable imported into France from Japan and known in its adopted country as the *Crosne*, from the location of the estate of M. Pailleux, of Crosne, a gentleman who devotes his time and grounds to the culture of new and strange vegetables from all quarters of the globe. This vegetable is perfectly hardy, grows in all soils, and yields up to five tons per acre of white tubers two to four inches long, the size of a finger, looking like a crowded string of beads. It is considered one of the most delicious vegetables known to man.

PISTACHE CULTURE.—The culture of the pistache nut is likely to prove of very considerable value in California, Arizona, and New Mexico. With the exception of the home-consumed product of a few isolated trees, the entire quantity now used in this country is imported and its use is limited almost exclusively to ice cream and confection flavoring.

Along the Mediterranean, where the choicest walnuts and almonds are raised, the pistache is considered the very best of all nuts for table use. It is very nutritious and fattening, and of a delicious flavor of its own, and should soon come to be a leading article of its kind in our markets. Mr. Swingle perfected arrangements by which some choice grafts will reach this country next spring.

DATE PALM CULTIVATION.—While able to withstand considerable frost in winter, this palm must have a very dry and exceedingly hot climate at the time of the ripening of the dates. The sandiest and, generally speaking, the poorest soils produce the best dates; while it will yield in any soil, it takes most kindly to otherwise almost worthless land, even that which is white with alkali suiting it. Still, an abundance of water is at certain periods of its maturing quite necessary.

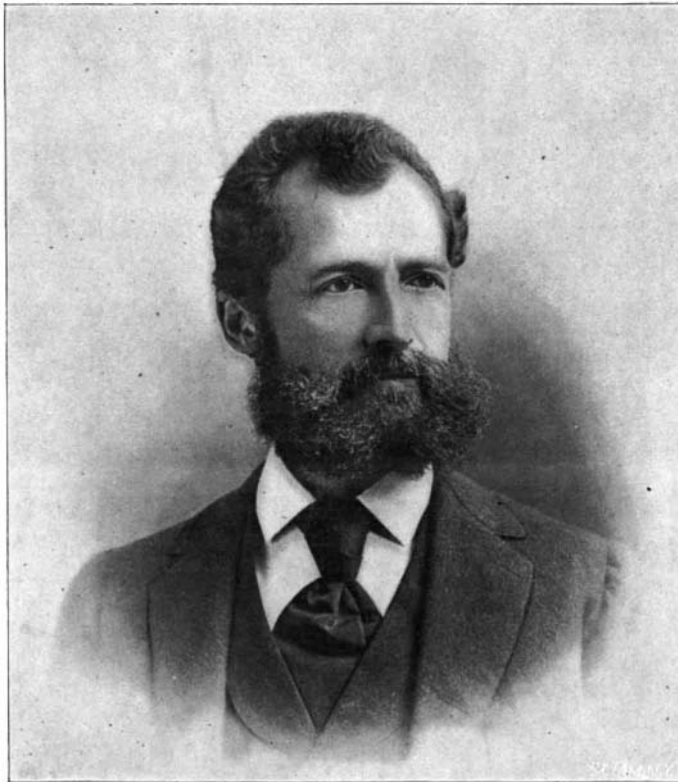
Mr. Swingle has studied date culture in Algeria, and shipments of the suckers of the true *Degletnoor* date and other choice varieties from the Sahara Desert have already been sent to the Arizona Experiment Station. There investigations show that the best dates will succeed in Arizona. This is pleasing to Secretary Wilson, who has had success in this profitable culture for otherwise neglectable lands much at heart.

THE ST. JOHN'S BREAD.—A most promising forage plant for growth in the warm parts of this country is the carob, or St. John's Bread, a variety of the *Leguminosæ*. The carob, through the medium of

vast quantities of bacteria, which are parasites upon it, yet not especially harmful, derives its nourishment quite largely from the air, and is, therefore, a productive bearer in poor soil. A full-grown tree will average half a ton of pods, and as much as one and a half tons has been yielded in one season by a single tree in Spain. The pods, which are often eaten by man, make excellent food for horses, cattle and sheep, being very nourishing, containing, as they do, over 40 per cent of sugar, over 8 per cent of protein, and less than 25 per cent of indigestible matter. Enormous quantities of carobs are produced in all the countries surrounding the Mediterranean, where they are a much prized product, none the less because of the fact that they do best on arid soil, where nothing else will, preferring a rocky or calcareous soil near the sea. Although doing well in poor soil and without water, their cold resistance is slight, and they are confined to regions in which the orange will thrive.

Some young grafted trees have been secured by Mr. Swingle from the best sorts in Algeria, and varieties from other lands have been arranged for. There are large areas in the Southwest where it should be a valuable addition, and it is intended to give it thorough trial along the Gulf.

VALUABLE PRICKLY PEARS.—Another forage plant of much promise for the warm and arid regions is the thornless cactus, a species of the prickly pear. Enormous quantities of the "pad," or so-called leaves, in reality flattened branches, are yielded, from ten to fifteen tons per acre being often reported. Yielding only from five to ten per cent of dry matter, and thus being a very watery food, the pads are excellently



OTTMAR MERGENTHALER.

adapted to stock raising in dry regions or seasons, especially where more concentrated food, as cotton seed, is also fed. Varieties of these cacti have been sent from Sicily and others have been obtained from the Argentine. The latter are entirely smooth, even without the minute prickles of the European forms. Both are well adapted for fodder purposes, but the Argentine form also produces delicious fruit, which, however, do not grow if the plant is cut for cattle feeding. In Almeria, Spain, and elsewhere most delicious fruit is raised from the prickly pears, as high as fifteen tons to the acre being sometimes produced. Some of the best sorts have been obtained, and are being distributed to the experiment stations of the Southern and Southwestern States, where they are destined to become a very popular fruit, both for local and shipping uses.

The foregoing is but a brief résumé of the work of one of several explorers under the Agricultural Department's direction: but quite enough is here said to indicate that this fiscal year will be a banner period in the introduction of really promising agricultural experiments.

Appendicitis Caused by the Habit of Crossing the Legs.

A foreign surgeon has put forward the suggestion that appendicitis is caused by the habit of crossing the legs, which restricts the action of the digestive apparatus. The appendix is only loosely attached to the cæcum, and there is always some half-digested food in the cæcal bag. By crossing the legs there is liability that the undigested food may pass into the vermiform appendix and set up an inflammation, in a few hours pathological processes set in, and an attack of appendicitis is developed.

THE DEATH OF A GREAT INVENTOR.

In the death of Ottmar Mergenthaler, who died at his home in Baltimore, October 28, America loses one of her foremost inventors, the creator of the "linotype" machine which bears his name. Mr. Mergenthaler was born in Würtemberg on May 10, 1854. His father was a teacher in the public schools of the kingdom and tried to have his son enter upon the same profession, but the bent of the latter's mind was for mechanics, and he spent much of his time in watching machinery in motion and in the study of problems of mechanics. Finally he was apprenticed to a watchmaker, and while learning his trade attended night schools and schools which were open on Sunday. His term of apprenticeship expired in 1872, and to avoid enlistment in the army he came to the United States, landing in Baltimore, and he soon secured a place in Washington where electrical and experimental work was carried on, and most of the necessary experiments on the electrical instruments used by the United States Signal Service were carried out under the direction of Mr. Mergenthaler. He came in contact with many inventors, and soon demonstrated that his life work was to be one of them.

In 1876 he became connected with a mechanical engineering firm in Baltimore, and made his home in that city. A Washington stenographer, named Clephane, who had made a study of writing and printing machines, employed the Baltimore firm to make some models for him, and Mr. Mergenthaler showed such aptitude for the work that he began experimenting on his own account, and for four years he devoted all his spare time to the invention of typesetting machines. His first idea was a rotary machine, with keys for impressing female dies in a continuous strip of heavy paper, which was cut into short lengths for adjustment as the matrix of a column of type. This was superseded by a machine controlling a series of sliding parts, each bearing on one edge all of the characters and spaces. A key mechanism moved these bars endwise, so as to bring a selected character on any bar in line with the selected character on any other, and thus form the matrix of a complete line of casting.

In 1880 he made a complete change of system and adopted the plan which he brought to perfection in the linotype machine, which is used in newspaper offices nearly all over the world. The machine is operated by a keyboard something like a typewriter. These keys set a line of key dies or types, justify them to the exact width of a column or any required measure and cast them into a solid line of type metal. Two machines were built on the same principle, and one was tested in the summer of 1884. It worked smoothly and silently. The matrices slid into their places, were clamped and aligned, the pump discharged its contents, and the finished linotype was the result, the matrices returning again to their normal positions. All this was the work of fifteen seconds. In February, 1885, the second machine with an automatic justifier was completed and put on exhibition in Washington, and was visited by President Arthur, James G. Blaine, and others. The linotype at that time was satisfactory, though not perfect; no tabular work could be

done on it, and the operator could not correct an error without discarding all that part of the line which had been formed prior to the discovery of the mistake which had been made. Mr. Mergenthaler set to work to overcome this defect and finally accomplished it.

At first he had difficulty in obtaining capital to manufacture the machines, but finally it was raised, and the machine was finally perfected in 1885. It was arranged so that the line was assembled in view of the operator, and he could make corrections as he proceeded, or he could insert, by hand, any character not carried in the magazine, but the machine could not produce tabular matter. The first of these new machines was installed in the composing room of the New York Tribune in July, 1885, and after this time they came into general use. The 1886 machine required an air-blast for propelling the matrices, and had other imperfections, which Mr. Mergenthaler set himself to rectify. He was weakened by overwork, and he was seriously ill in the fall of 1888. He finally recovered, and the company was reorganized. In 1890, one hundred machines were contracted for. In 1891 there was another reorganization of the linotype company. In January, 1894, the practical method of justification by step justifiers had been devised by Mr. Mergenthaler, and about that time the company bought the wedge justifier, for which it paid \$416,000. In 1894, Mr. Mergenthaler's physicians stated that he had consumption, and he was obliged to relinquish personal control of the Baltimore factory. This ended the public life of one of the most remarkable inventors America has ever seen, and to him will be assigned a high place in the annals of the art preservative of arts.

THE engines of a first-class man-of-war cost about \$700,000.