MACHINES IN THE ELIMINATION RACE FOR THE VANDERBILT CUP.

Our illustrations show six out of the eight different makes of machines which started in the Vanderbilt Cup elimination race on the 22d instant. This is the second time that sufficient American machines have been entered to make necessary an elimination race for the selection of the five cars that constitute the American team. Out of fifteen entries there were twelve starters, and three of the latter succeeded in finishing. A description of some of these machines, and a paragraph telling the result of the race, will be found below.

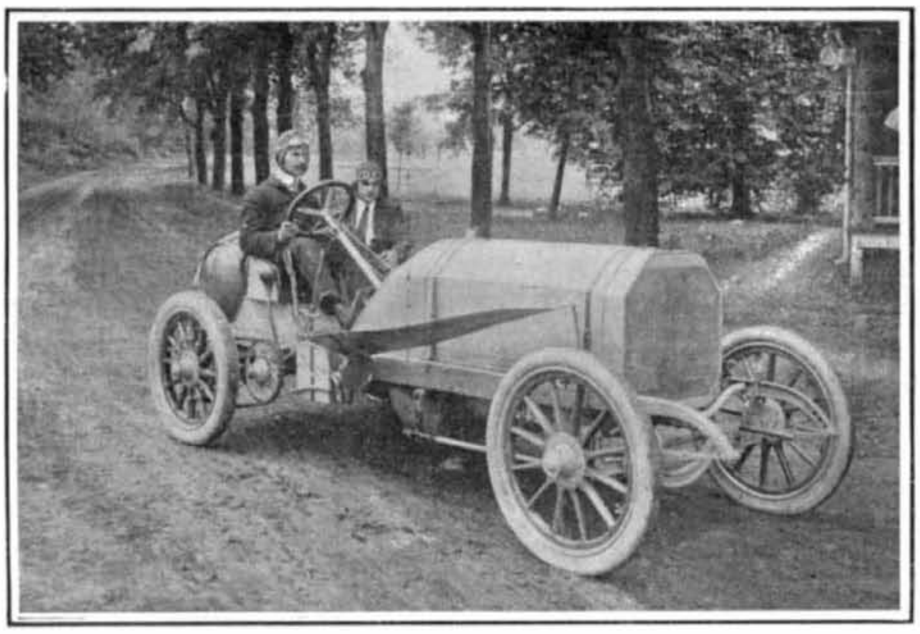
The race consisted of ten rounds of the 29.71-mile course. The course has eleven sharp turns, and a number of stretches of winding road, besides several hills having a grade as high as 10 per cent.

The machine that won the 1905 elimination race was a four-cylinder, 60-horse-power Pope-Toledo. The Pope Manufacturing Company also entered a six-cylinder machine of 90 horse-power in last year's event, but this car did not fulfill expectations. Consequently, the makers have decided this year upon a four-cylinder racer of 120 horse-power. The cylinders have a bore of 7½ inches, and the stroke of the pistons is 6¾ inches. This engine develops its full power at 1,200 R. P. M., at which speed of the motor the car travels 100 miles an hour upon the fourth speed. A clutch of the multiple disk type is employed. The transmission is of the selective type, there being two main sets of bevel driving gears, so that a direct drive is had on both the third and fourth speeds. The first three speeds are 25, 50, and 75 miles per hour at full speed of the engine. High-tension magneto ignition is used, the spark plugs being located in the side of the cylinders just below their heads. The cylinders are cast in pairs, and fitted with copper water jackets. Besides the regular mechanical oiler, there are special oil pumps for forcing oil into the crank case. The car is fitted with Hess-Bright ball bearings in the wheels, but plain bearings are used in the engine and transmission. The wheel base of the car is short, being only 104 inches. The wheels are 32 inches in diameter, fitted with 3½-inch tires in front and 4½ in the rear.

The Locomobile racer finished second in last year's elimination, and obtained third place in the Vanderbilt race itself. This year two complete racers were built by the Locomobile Company after the designs of Mr. A. L. Riker. The new machines are somewhat more powerful than the 1905 racer, and they accelerate much faster. The engines have a bore and stroke of 7¼ and 6 inches respectively, and the rated horsepower is 110 at 1,100 R. P. M., at which speed of the engine the car travels about 100 miles an hour. Copper water jackets are used again, owing to their light weight and the ease of casting the cylinders. These are cast in pairs, as heretofore. The magneto and make-and-break igniters, together with an 8-volt storage battery for starting, form the ignition equipment of this machine. The carbureter has a balanced piston throttle valve, which does away with any sticking of the valve and makes it easy to operate. The engine is lubricated by a series of small hand pumps placed on the footboard, so that they can force oil directly from the tank (which is behind the latter) to the bearings and crank case of the engine. These racers are provided with a leather-lined cone clutch of large diameter, which is thoroughly incased and protected from oil. A positive clutch consisting of pins which slip into holes on a plate attached to the flywheel is also provided. This can be slipped in after the cone clutch has taken hold. A three-speed sliding-gear transmission of the usual Locomobile type, but having its shafts mounted on ball bearings, is employed. The wheels also run on ball bearings of the single-ring silent type. The wheel base of the racer is 120 inches, and it is fitted with 3½ by 34-inch tires in front and 4½ by 34 in the rear. The usual double chain drive to the rear wheels is employed. Expanding ring emergency brakes are fitted to the rear wheels, and a pedal-operated band brake to the differential.

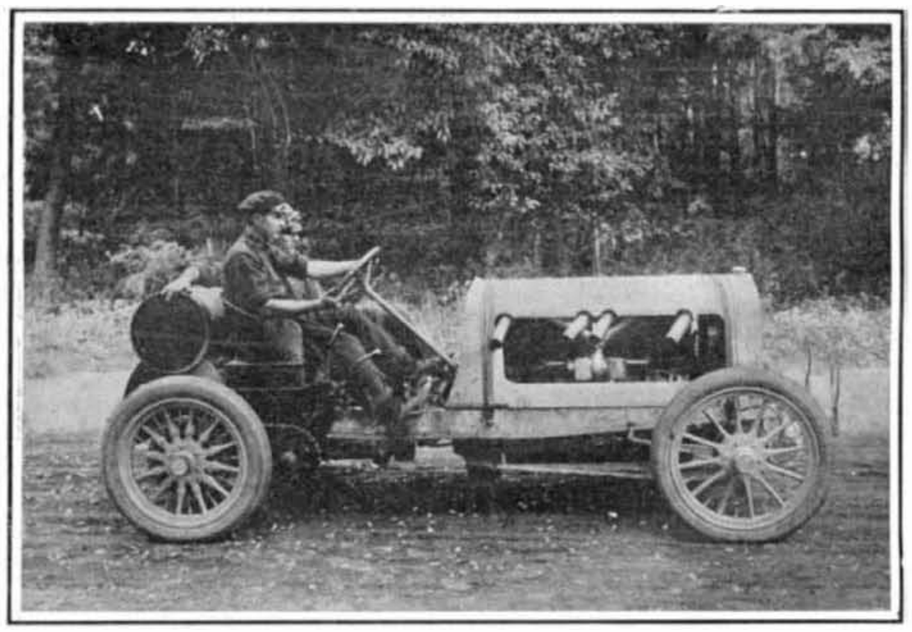
The Thomas firm, which also tried a six-cylinder racer last year, has this year returned to the four-cylinder type of motor, and has built no less than three powerful racers of 115 horse-power, all three of which started in the elimination event. The engines of these racers have 6⅞ x 5½-inch cylinders, and at 1,300 R. P. M. they drive the car 100 miles an hour. As can be seen from the illustration, the Thomas engine is one of the most clean-cut engines on any of the cars. Each pair of cylinders is an integral casting. The inlet valves are placed directly over the exhaust valves, and are opened downward by means of horizontal lever arms worked by vertical push rods from the single cam shaft. Magneto ignition by a special form of high-tension magneto is the only system used. If the magneto becomes disarranged, there is no chance of running the car upon batteries. The engines are provided with mechanical oilers chain-driven from the cam shaft. No fan is used behind the radiator, the natural draft being depended upon. The transmission furnishes three speeds, and is of the selective type, each speed being obtained by selecting one of three sets of pinions. A direct drive to the countershaft is furnished on all three speeds. The final drive is by double chains to the rear wheels. A large cone clutch with positive supplementary locking device is used, and a double universal joint is fitted between the engine and the transmission. All three of the Thomas racers have their rear wheels fitted with removable rims, so that all that is required to change a tire is to remove six nuts, take off the rim, put on a new one, and replace the nuts—an operation that can be accomplished in a couple of minutes with the aid of special socket wrenches.

The most novel and distinctively American type of car in the elimination trial was the Frayer-Miller. Three of these machines were entered, and all started in the race. These cars are remarkable from the fact that their engines, which have the same bore and stroke as those in the Locomobile racer, viz., 7¼ x 6 inches, are cooled entirely by air, which is forced by a powerful gear-driven blower, located in front of the engine, through a casing extending over the tops of the cylinders and connecting with aluminium air jackets. That this method of cooling has been applied successfully to so large an engine speaks volumes for American ingenuity. These machines were built by the Oscar Lear Automobile Company with the idea of demonstrating to a finish the air-cooled principle. They are without exception the largest air-cooled cars ever constructed. In order to make these cars as light as possible, their designer, Mr. L. A. Frayer, built them with tubular axles and wire wheels. After a number of practice trials had



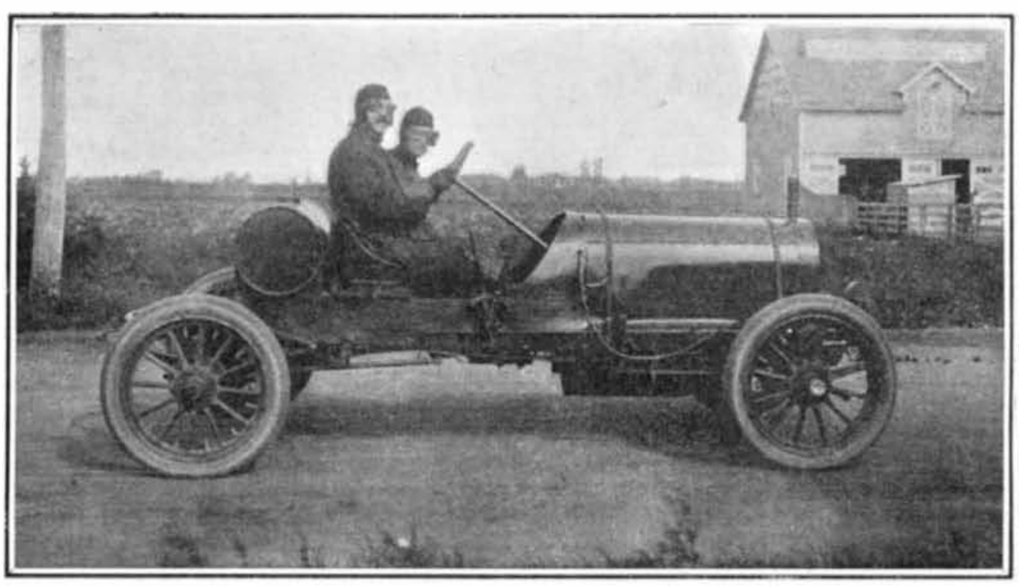
Tracy and Poole on the Winning Locomobile Racer.

Despite the trouble on the first round, this machine gained steadily and won in 5 hours, 27 minutes, 45 seconds. The fastest round of the 29.71-mile circuit was made in 29 minutes, 29.6 seconds.

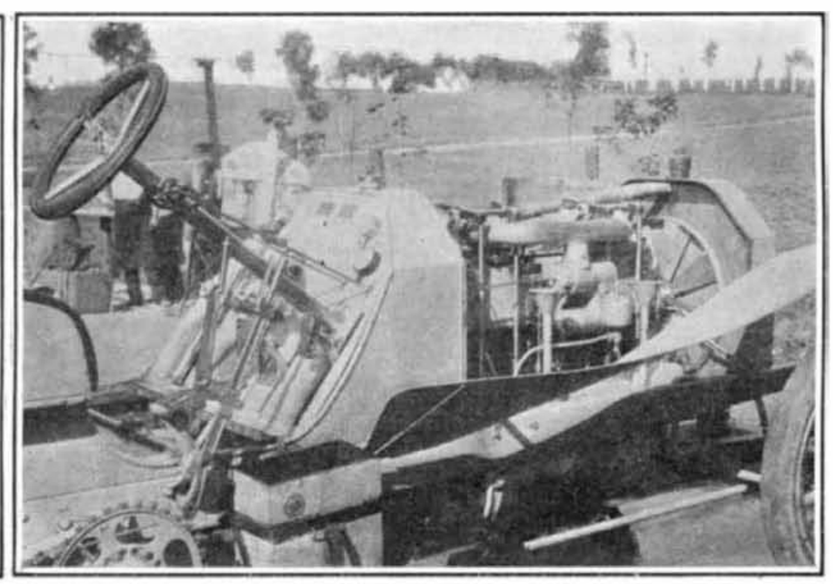


Lytle and Dingley on the Pope-Toledo Racer.

Three tires of this car were replaced on the sixth round. Trouble was also experienced with the radiator leaking. The car was in fourth place on its final round when the race was stopped.



The 60 H. P. Haynes Car, Which Finished Third in 6 Hours, 25 Minutes, 39 Seconds.



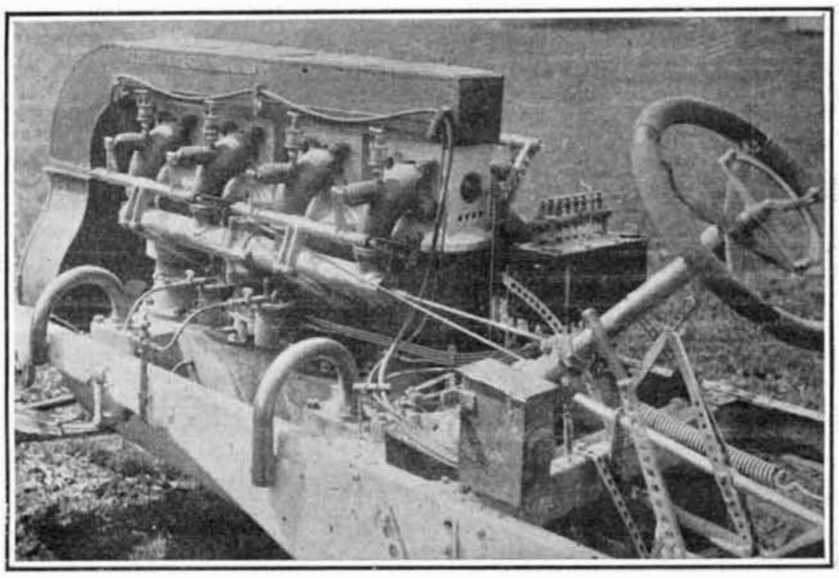
The Engine, Control Levers and Footboard of the 110 H. P. Locomobile.

SOME OF THE WINNING MACHINES IN THE VANDERBILT CUP ELIMINATION TRIAL.

been made on the course, however, he found that the wire wheels would not stand the strain of the many sharp turns. Consequently, wooden wheels were substituted. The drive of all three cars is by means of a propeller shaft and live rear axle of the floating type, in which the weight is all carried upon the tubular outer axle. The wheels are fitted with both internal and external band brakes, which are applied to a drum on the metal hub. The engines of these cars are made up of four separate cylinders, having the inlet and exhaust valves placed horizontally in the cylinder heads and on opposite sides of the cylinders. The ignition is by means of batteries and coils.

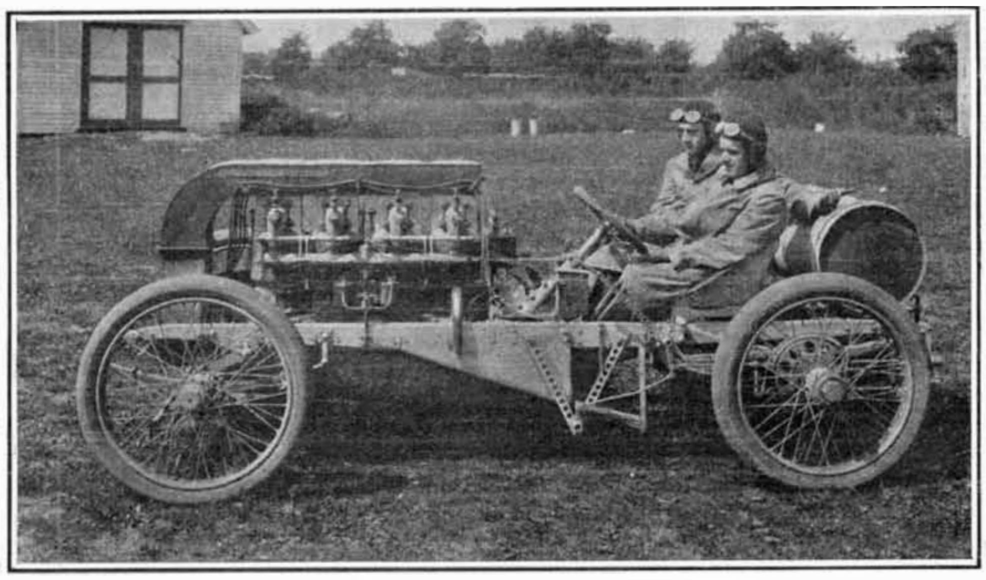
The transmission of the Frayer-Miller cars is of a new type known as the Belden change-speed gear. for operating the make-and-break igniters. These igniters are very simple in construction, and allowance is made for a considerable amount of wear. There is an ingenious arrangement which makes it possible to start the motor from the seat by pushing a round disk seen on the rear of the dashboard near the floor. This disk is on a special cam shaft extending across the engine, and by pushing it and releasing it suddenly, the proper igniter is snapped and the engine starts. The transmission of the Matheson car is of the selective type, giving four speeds forward. There are two sets of bevel driving gears, thus affording a direct drive on both the third and fourth speeds.

The clutch is of the multiple-disk type, and contains cylinders have the inlet and exhaust valves located symmetrically on opposite sides. The engine is rated at 80 horse-power at 800 R. P. M. Two radiators are used, one in front of the engine, and the other just back of it. The water circulation is on the thermo-siphon principle. The clutch is of the multiple-disk type, the disks having a 6-inch working face and are 1-16 of an inch thick. A pressure of 600 pounds to the square inch is obtained from the clutch spring. This clutch is exceedingly small, and is completely incased in the transmission gear box, which contains a set of gears giving three speeds forward and a reverse. The drive is by propeller shaft to the live rear axle. The entire eight cylinders of the motor are supplied from a single carbureter.



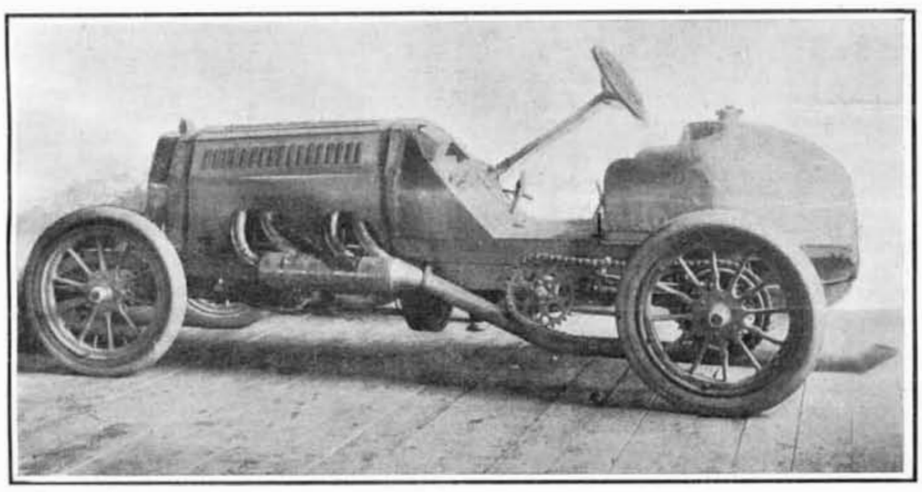
The Largest Air-Cooled Automobile Engine Ever Constructed.

The cylinders (of 7¼ inch bore by 6 inch stroke) are cooled by air from a blower located in front. Note the double carbureter and the mechanical oiler at the right.



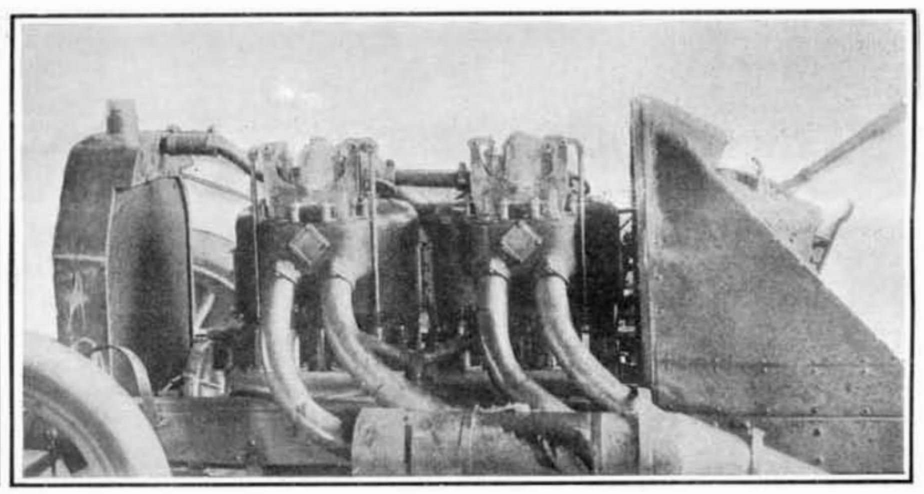
The Frayer-Miller 110 H. P. Air-Cooled Racer.

One of these cars was on its ninth round and was running in sixth place when the race was called off.



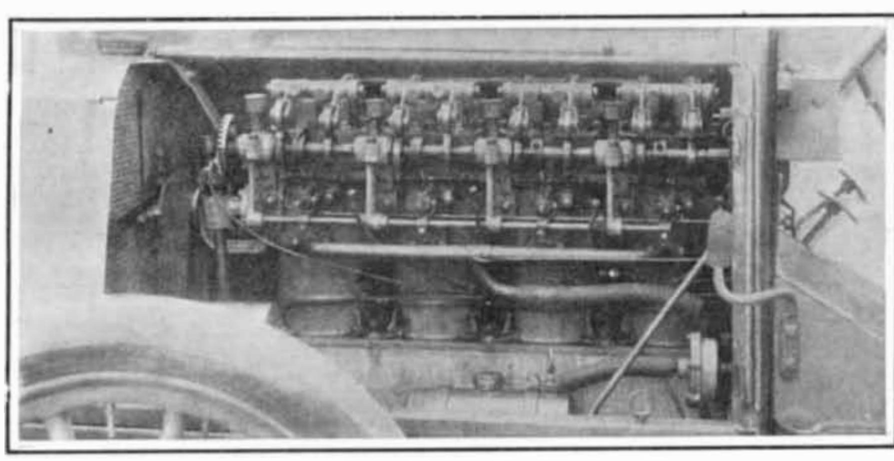
One of the Three 115 H. P. Thomas Racers.

Thomas Car No. 6, driven by Le Blon, obtained second place in 5 hours, 51 minutes, 25 seconds.



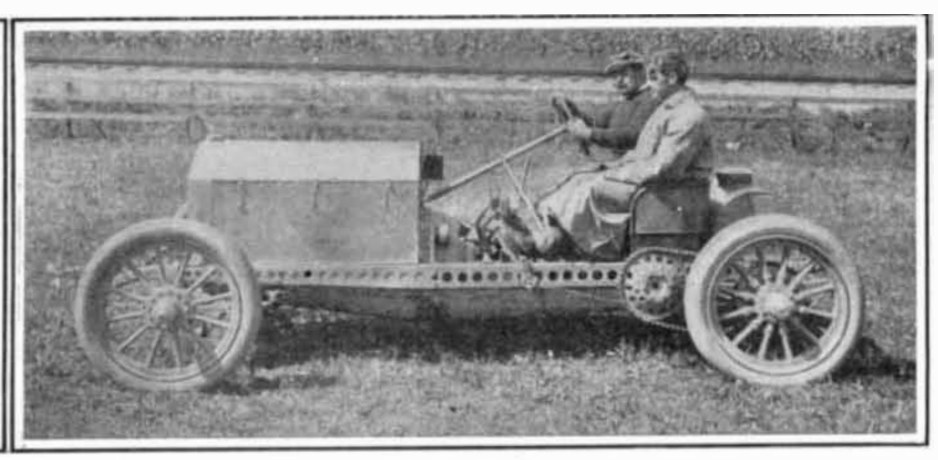
The Valve Side of the Thomas Engine.

No fan is used behind the radiator of this car. The valves are all on one side, mechanically operated.



The 60 H. P. Engine of the Matheson Car.

Valves in the cylinder heads operated from a single exposed camshaft, together with make-and-break igniters fed by a magneto, are the distinguishing features of this engine.



The Matheson Stock Racer.

This car was eliminated on its first round owing to a burst tire causing it to swerve and run into the ditch.

SOME OF THE WINNING MACHINES IN THE VANDERBILT CUP ELIMINATION TRIAL.

This type of transmission consists of a series of roller bevel pinions that engage circular sets of pins on the driven member. The chief advantage is that a direct drive through one set of bevels is had on each speed. Consequently, there is no loss of power in driving through a number of gears. The transmission and wheels of these cars are mounted on ball bearings.

The Matheson racer is in reality a regulation stock car of 60 horse-power. The engine is of the standard four-cylinder vertical type, with both inlet and exhaust valves located in the cylindrical heads of the cylinders and operated by rocker levers from a single cam shaft located near the tops of the cylinders. This cam shaft is driven from a vertical shaft by means of bevel gears. The cam shaft is also fitted with special spiral cams fifty-one steel disks running in oil. Hess-Bright ball bearings are fitted to all the wheels, as well as to the transmission and the differential and sprocket shafts. The weight of the car is well up to the limit of 2,204 pounds. As the frame was much heavier than the designer specified, it was drilled full of holes to lighten it. The engine develops its maximum power at 1,200 R. P. M., at which engine speed the car makes 90 miles an hour. The dimensions of the engine are 6 inches bore by 6 inches stroke. The car has the usual side chain drive to the rear wheels, and the latter are fitted with expanding ring brakes.

The Maxwell eight-cylinder racer was damaged before the race and did not start. The bore and stroke of the cylinders are each 5 inches. The

The Haynes machine is the stock car with a racing body. The engine is rated at 60 horse-power, and has a 5¼-inch bore by a 6-inch stroke. At 1,200 R. P. M. it drives the car over 75 miles an hour. The Haynes car made one of the best performances in the last elimination race, it having obtained fourth place. The present car has many of the features that were first brought out on last year's racer.

Still another stock machine was the Oldsmobile 40 to 45-horse-power car. This car met with several accidents during the practice spins on the course. It is merely the chassis of the standard stock car, and it has been lightened as much as possible for the race.

Both the 110-horse-power Christie front-drive racer and the 80-horse-power Apperson racer were demolished by crashing into telegraph poles a few days prior to the race. Neither Walter Christie nor his mechanic was badly hurt, but Robertson and his man were seriously injured. Christie stripped his recently completed 50-horse-power touring car, fitted on a racing body, and started ninth in the race.

The result of the elimination race was as follows: Tracy, on the 110-horse-power Locomobile, first in 5 hours, 27 minutes, and 45 seconds—an average speed of 54.38 miles an hour.

Le Blon, on the 115-horse-power Thomas, second in 5 hours, 51 minutes, 25 seconds, or an average speed of 50.72 miles an hour.

Harding, on the 60-horse-power Haynes, third in 6 hours, 25 minutes, 39 seconds, or an average speed of 46.22 miles an hour.

During the first few rounds the race was a close one between the Pope-Toledo, the Locomobile, and Le Blon's Thomas. The Locomobile had tire trouble in the first round, which caused it to assume sixth place, but it kept gaining on each subsequent lap till, at the end of the fourth (which was made in 29.48) it held first place. At the end of the fifth lap it had fallen back to third place, Le Blon's Thomas being first and Lytle's Pope-Toledo second. The remainder of the race was a battle between Tracy and Le Blon for first place. The former held it at the end of the sixth lap, and the latter regained it at the end of the seventh and eighth, only to lose it finally during the ninth round. From fourth place at the end of the fifth lap, the Haynes moved to third at the end of the sixth, and held this position to the end of the race. The Pope-Toledo was second at the completion of half the race, but an inordinate amount of tire trouble on the sixth round caused it to drop back to fourth place, in which position it was running (having completed nine rounds) when the race was called off. Walter Christie had finished his eighth lap and was on the ninth and holding fifth place when the race was stopped. Frayer-Miller No. 11 was sixth, and was the only remaining car running.

By obtaining third place the Haynes car gained new laurels for steady and consistent running. Its average speed was not quite as high as that made last year, but it was one place ahead of that obtained last year at the finish. None of the other stock cars made a favorable showing. Of the two teams of three cars each—the Thomas and the Frayer-Miller—but one car of each team succeeded in finishing or in keeping going till the race was called off.

The result of the eliminatory race seems to show that the American team will have but one racer that is in the same class with the foreign machines, and that can be depended upon to run steadily without breakdowns and yet have sufficient speed to make up time lost by tire trouble. That only a racer of this description will have any chance in the Vanderbilt race on October 6 seems to have been proven by the results of that race last year. It is to be hoped that the one representative American racer will finish the race proper in the same position in which it finished the elimination.

The Insulation of Insulators.

Commencing with the green bottle glass telegraph insulator, the size of a tea-cup, about ten years ago, the electric power-transmission engineers have been steadily increasing the size and cost of their high-tension insulators, until now they are using huge glass or porcelain insulators, the size of a cabbage. According to the Electrical World, there has been no help for this visible swelling of the insulator. The little ones simply would not stand the electric stress, as the electric pressure rose by leaps and bounds. Even now the manufacturers would be ready to risk constructing transformers for one hundred kilovolts if the line engineers would accept that pressure. Perhaps the line engineers may do so before long. The question is what will their insulators then be? Will they be as large as umbrellas? Is long-distance transmission to be limited by the cost of conductors, or by the cost of insulators? A new suggestion is offered from Italy. Instead of placing the high-tension conductor on the top of the insulator, and arranging a series of porcelain petticoats beneath, so that a beetle would have to walk some 60 centimeters in the shortest path over the surface from wire to pin, the new insulator hangs the wire underneath the topmost petticoat which is expanded into a relatively thin umbrella.

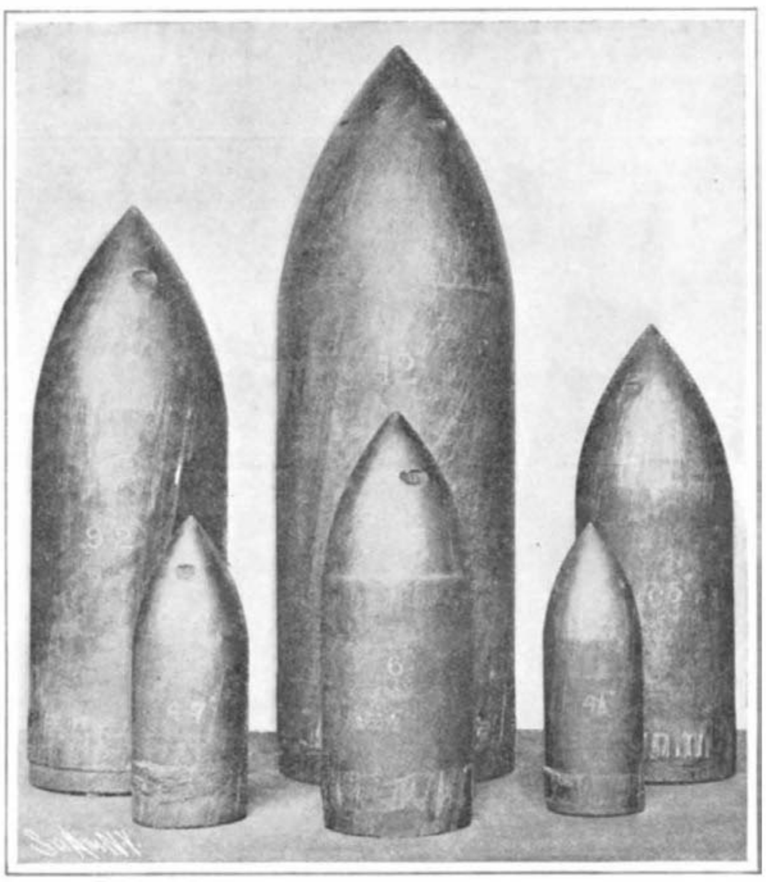
The purpose of the umbrella is only to shelter from rain and not to insulate; so that the umbrella can be made light and inexpensive. The actual insulator below the umbrella is stated to be considerably smaller than would be necessary in case the umbrella were removed.

SOME REMARKABLE RESULTS WITH ARMOR-PIERCING SHELLS.

During the past year some interesting experiments with a new type of armor-piercing shells have been carried out by the British government authorities. This new projectile, known as the "Heclon," is the product of the Hadfield Foundry, of Sheffield. They are of the "capped" type, and the results obtained therewith have exceeded anything previously accomplished. The projectiles of 2½ per cent bursting capacity range in caliber from 4⅛ inches to 12 inches, and have successfully pierced Krupp cemented armor plates ranging from 5 inches to 12 inches in thickness without breaking. The results achieved are as follows:

	Plate, Inches.	Striking Velocity, Foot-Seconds.
4⅛-inch projectile perforated......	5	1990
4.7-inch projectile perforated......	6	2100
6.0-inch projectile perforated......	6	1990
7.5-inch projectile perforated......	7	1980
9.2-inch projectile perforated......	9	2033
12.0-inch projectile perforated......	12	1981

In Spain equally successful results have been achieved, and the makers have completed the unit of large caliber capped shell for the Spanish navy. A supreme test was imposed upon one of these shells upon the proving grounds of another important European power. In this case the plate to be attacked consisted of a 12-inch Krupp cemented armor plate backed with 12-inch oak and three ½-inch skin plates. Instead of firing a 12-inch projectile, as is generally done, at such a plate, a 10-inch Heclon projectile was utilized, being fired at the low velocity of 1,877 foot-seconds. The shell perforated the plate and backing, and, despite the severity of the test, the projectile was found with only two small pieces of the shoulder broken, no less than 2,600 feet beyond the target. These projectiles have been adopted by the British authorities, since they have been found to excel other types in their penetrative capacity without breaking.



"HECLON" ARMOR-PIERCING CAPPED PROJECTILES RANGING FROM 4⅛ INCHES TO 12 INCHES.

The photograph shows the shells after they perforated armor plates varying in thickness from 5 inches to 12 inches.

It is reported by the Vienna journals that a party of Dalmatian fishers, when drawing up their nets from a depth of 100 feet or more, brought up an interesting object in the shape of a cutlass, coming no doubt from a long-sunk wreck. Judging by the crustaceous deposits which partly covered the blade, it must have lain at the bottom of the Adriatic for many years. The fishers in question brought their discovery to Spalato, and an army officer saw it and purchased it for a small sum. The officer then sent the cutlass, still covered with crustacea, to the Minister of Marine. After examining it carefully, it was found that the hilt was in a very good state of preservation. This arm apparently belonged to the navy, and it is thought by some authorities that it may have been used on board the frigate "Radetzky," which was sunk in 1869. At present the weapon is to be seen at the Imperial and Royal Marine Museum at Pola.

The Luscious Red of the French Cherry—Its Chemical Genesis.

Consul-General Robert P. Skinner, of Marseilles, was asked by a California correspondent to ascertain by what method French *glacé* or preserved cherries are dyed, as they command a higher price than California cherries in the American market "solely on account of color." The inquirer adds that French cherries possess "a beautiful deep-red color that is bright and clear, although they lack the flavor of the home-grown fruit. We could increase our sales many fold if we could color our cherries artificially as they do in France." Mr. Skinner replies:

French candied cherries are first bleached with sulphurous acid and then dyed in the course of manufacture with an aniline preparation known commercially as "rose nouveau." In former times carmine powders made of cochineal were used, and are still in use in a limited way for very superior products, but the aniline color is cheaper, and I am notified by four of the leading houses exporting to the United States that they use the cheaper material. One of these four houses writes as follows:

"The fruits invoiced by us are colored with 'rose nouveau,' a dye authorized in France after analysis by the Municipal Laboratory of Paris. All our labels bear the mention 'artificially colored,' to conform to the American custom-house regulation. The boxes of 'chinois verts,' plums, and angelicas, although containing no coloring matter, bear the mention 'colored with sulphate of copper,' in order to prevent any possible difficulty with the customs." The "rose nouveau" is a methylated and ethylated derivative of coal tar. "Rose nouveau" is likewise utilized in the manufacture of colored biscuits, sometimes alone and sometimes mixed with dry carmine.

The consul suggests that the future of California preserved fruit and every other natural product may be improved in the long run, if the packers will carefully refrain from the exercise of those merely decorative arts presumed to appeal to the public taste. It may be doubted if any great portion of the consuming public is either deceived or flattered by the artificial gorgeousness of fruits which have been boiled until their natural color has departed and then dipped in aniline dye. Though the preparation may be perfectly harmless, it certainly contributes nothing to the excellence of the finished article, and the knowledge of these facts tends to hold in check the public demand.

The use of sulphur bleach upon thin-shelled almonds has actually diminished the demand for these nuts in France, for the reason that the kernels are sooner or later affected, acquiring an acrid taste which nobody likes. As applied both to almonds and walnuts the sulphur bleaching process is, furthermore, frequently a species of mild fraud, as it enables the dealer to mix nuts of old and new crops and different countries, give them the same shade, and get the same price. It is presumed that public taste requires a nicely bleached nut, although no intelligent individual really objects to the honest color of a walnut or almond shell, especially when that color may be taken as a guarantee of the quality of the kernels.

Vice-Consul Brown sends from Lyon the following directions for coloring cherries:

The fruit is selected, washed, stemmed, and spread upon slat frames of wood underneath which at intervals basins of sulphur are placed; the cherries are subjected to the fumes of the ignited sulphur until they are of a uniform color, which is usually yellow. A quantity of the coloring matter (rose nouveau) is dissolved in a liter of cold water. Then the cherries are placed in an earthen pot with a little of the coloring liquid, dissolved sugar, and glucose, glucose being used only in sufficient quantity to prevent crystallization and souring and to keep the fruit soft. The mass, after mixing, is turned into copper kettles and boiled slowly for about ten minutes. It is then all turned back into the earthen vessel and allowed to cool for two or three days to permit the coloring matter to permeate the fruit. If the color is not as desired a very little more coloring matter is added and the above process is repeated sometimes fifteen or twenty times, or until the desired color is obtained and the *glacé* process finished.

One and one-half kilos (kilo = 2.20 pounds) of this coloring matter is sufficient to treat 10,000 kilos of cherries. The fresh cherries cost about 6 to 7 cents a kilo and after being treated by this process they are sold at 36 to 42 cents per kilo.

The Duke of the Abruzzi has named the three highest peaks of Mount Ruwenzori after Queen Margherita, Queen Alexandra, and King Leopold.