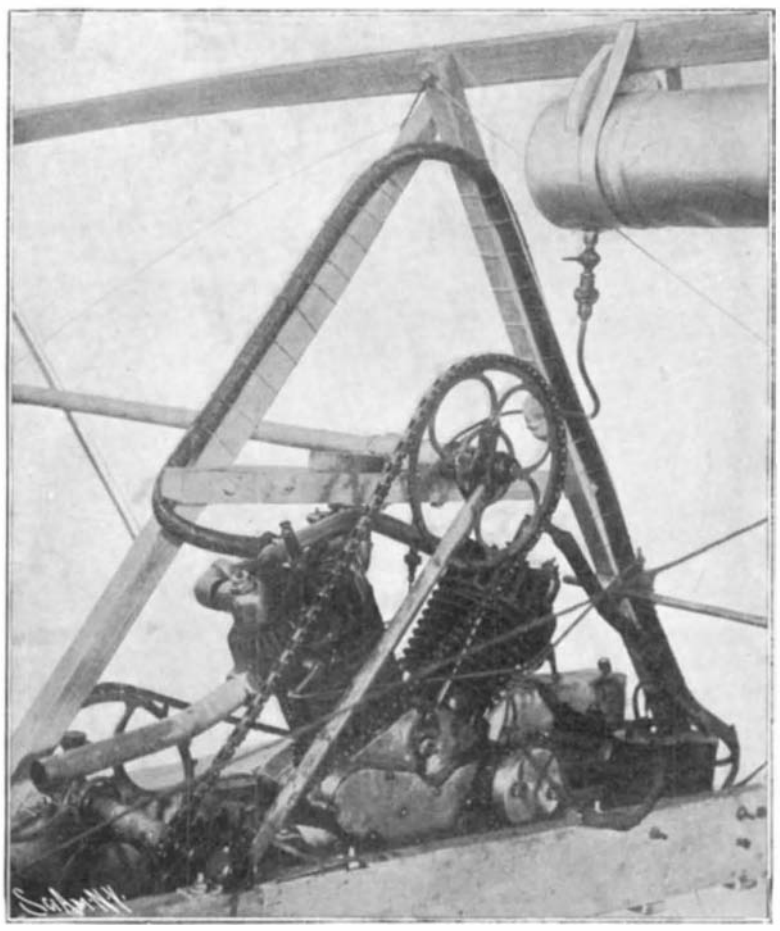
A POWERFUL LIGHT-WEIGHT GASOLINE MOTOR.

The V-shaped motor shown herewith is a 5-horse-power air-cooled bicycle motor that has met with great success for other purposes during the past year. Beginning with making a 10-mile record in 8 minutes, 45 2-5 seconds at Ormond Beach last January, when used on a motor bicycle, one of these motors finished by driving the only successful airships at the St. Louis Exposition, and by making a record in aeronautic work on Christmas Day, when one drove the Baldwin airship 20 miles in 1 hour, 13 minutes, against a 12-mile-an-hour wind for half the distance.

The motor is built with the cylinders set to form a V in order to economize space as much as possible. The crankshaft runs on roller bearings, which reduce friction to the minimum and do not wear out readily. The bore and stroke of the cylinder and pistons are each 3 inches and high compression is used. The motor develops its full horse-power at 2,000 R. P. M. On the Benbow airship two of these motors, coupled together, were used. The Baldwin airship, which has a 15 x 45-foot balloon, and a framework 21 feet long by 3½ feet wide, was propelled by a single motor like the one here shown, which weighs complete but 60 pounds. The Curtis Mfg. Co., of Hammondsport, N. Y., is the maker of this little engine.



5-HORSE-POWER CURTIS AIR-COOLED MOTOR AS USED ON THE BALDWIN AIRSHIP.

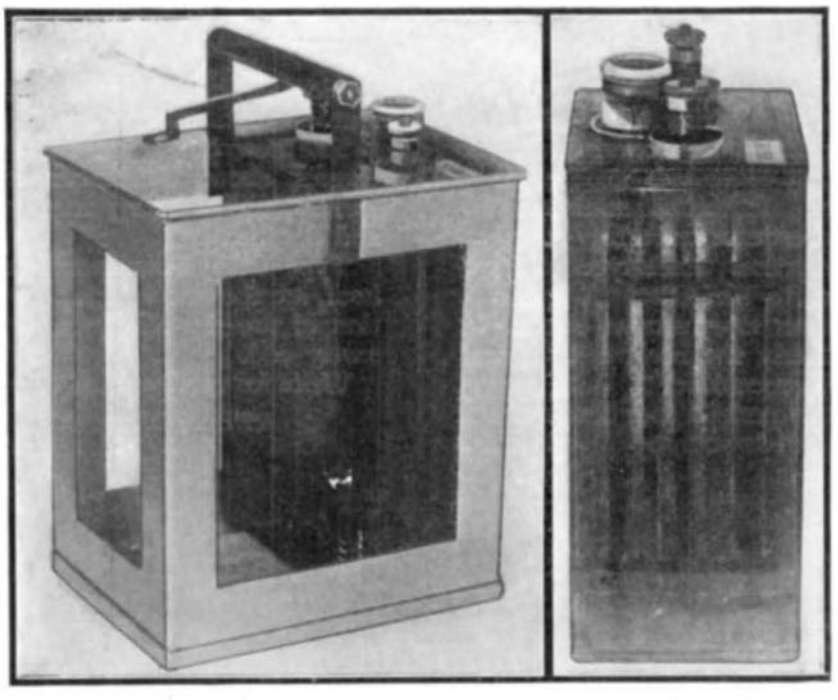
IGNITION ACCUMULATORS.

Two or three storage cells can be used on every gasoline automobile for ignition and for furnishing electric light. When so used, if they are of a good make and of sufficient capacity, they will be found to give excellent results. On a single or double-cylinder car, cells of 40 to 50 ampere-hours capacity should be employed, while a four-cylinder machine should have cells of double the size. These should assure the good running of the engine for several thousand miles, and they can then be recharged from any ordinary direct-current electric-light circuit, whereupon they will be found as good as new. This recharging can be repeated hundreds of times, and the life of a well-constructed ignition accumulator should extend, provided the cell is properly treated, over at least five years. As the storage cell is a reservoir of electric current, it is capable of supplying electricity for lights as well as for ignition. With a properly-constructed parabolic headlight, it is astonishing what a powerful light can be projected with a lamp of but 3 or 4 candle power and of about an ampere current consumption at a voltage of 4 or 6 (two or three cells). Every extra light that is burned on a machine necessarily tends to run down the battery more quickly, so that if more than two are regularly used, it will be advisable to either have a larger battery or a small dynamo on the machine for recharging. Almost any good ignition dynamo can be arranged with an automatic switch, so that it will charge the battery as soon as it comes up to speed. With an arrangement of this kind a battery of small capacity can be used.

One of the neatest ignition cells now on the market is the "Duro," which is made in Chicago. A specially constructed grid sawed out of a lead plate is used in this cell, and the spaces between the plates are filled with a jelly electrolyte, thus making the cell practically a dry one. The hard rubber battery jars are packed in a copper carrying case, which is substantial and non-breakable, and, being coated with acid-proof paint, is not liable to attack from acid fumes. The makers of the "Duro" battery also furnish lamps of various types to be used with these accumulators. Among these are extremely efficient parabolic head lights, suitable side lights, tail lights, and a small lamp with flexible cord for investigating the machine in case of a breakdown.

The "Vesta" accumulator is another Chicago product that has been meeting with considerable success. The plate used in this cell is also of the pasted type, the grid being in two halves which are pasted and then pressed together, thus locking the active material between diagonal ribs that cross at right angles. The "Vesta" cells are neatly incased and lamps are furnished to go with them if desired.

Undoubtedly the finest ignition accumulator made in America is that put out by the Storage Battery Supply Co., of this city, and which is shown in the annexed cut. The plates, of the usual pasted type, are hung from supports on the inside of celluloid jars and are spaced 7-32 of an inch apart and suspended with their bottoms ⅝ of an inch above the bottom of the jars. On account of the wide space between plates, separators are unnecessary, while the condition of the plates can always be seen through the transparent celluloid jars. Celluloid jars are used very generally abroad for ignition cells, but the "Reliance" is the only American battery put up in jars of this material, which is exceedingly tough and can be hermetically sealed at all joints, thus making it free from the moisture of acid fumes and the usual corrosion. The same company also puts up a cheaper cell in hard rubber jars. Both types are fitted with patented plugs which prevent the spraying of the electrolyte when the batteries are gassing freely upon being recharged.



RELIANCE IGNITION ACCUMULATORS.

The plates are suspended in celluloid jars and properly spaced apart without the use of separators.

Ocean-Going Motor Boats.

Mr. W. E. H. Humphries, a Cambridge science graduate who has devoted himself to the study of the use of high-power internal combustion engines for submarine vessels and is a practical motorist of wide experience, writing on motor-boat building in the publication To-day, says that the folly of those makers who propose competing in the Atlantic motor-boat race with 40-foot boats furnished with 100-horse-power motors should be apparent when he states that they would require for the journey 15 tons of fuel, which would occupy more than the whole cubic space of the hull. Mr. Humphries fears that many of the competitors in the trans-Atlantic race will fall into the mistake of throwing any handy big engine into any convenient boat without regard to the question of design, proper engine bed, distribution of weight, etc. The motor boats which crossed the English Channel, "excellent as they were for their own particular purposes, were more or less freak boats," because in design they fell away from the lines normally maintained in marine practice. In yacht designing "the highest ambition of those who aim at speed is to exceed a speed in knots greater than the square root and a quarter of the vessel's length. The Atlantic liners cannot do it; motor boats and the torpedo-boat destroyer can, but such speed is only attainable at enormous extravagance and by making the vessels mere receptacles of vibrating machinery and limiting their range."

Writing on this subject for the Pall Mall Gazette, he expresses the opinion that—

"To cross the ocean in a manner to fulfill the published details a boat must be nearer 400 feet than 40 feet. The conditions of the race are that the boats shall be able to travel at a speed of at least 15 knots, shall carry all their own fuel, lubricating oil, and spare parts, and shall start with at least six persons on board. This at once rules out of the contest all small racing craft, for, apart from questions of accommodation and seaworthiness, they could not carry the fuel to feed their engines. The normal consumption of a petrol engine may be regarded as 1 pint per horse-power per hour, which means that for every 100 horse-power of the engine there is consumed approximately 300 gallons per day. With a 15-knot boat the passage from Havre to New York might be expected to occupy from twelve to fifteen days. Hence for every 100 horse-power of the engine it will be necessary to carry 4,500 gallons of fuel, occupying approximately 723 cubic feet of space and weighing 15 tons, or more, if fuels heavier and less efficient than petrol be employed. To complete the absurdity, the Calais-Dover racer would require, to enable it to cross the Atlantic, a bulk of petrol of greater weight and greater displacement than the boat itself. Seemingly nothing smaller than a torpedo-boat destroyer could attempt to fulfill the conditions laid down, and for a vessel of these dimensions an engine of 500 horse-power would not be excessive."

The 4,000-mile "reliability trial" of a motor-car which has been made under supervision of the British Automobile Club was brought to a successful conclusion on December 7, 1904. The trial was undertaken by Capt. Deasy in a 16 to 20-horse-power Martini car fitted with Dunlop tires and weighing empty 23¾ hundredweight. A distance of 4,002 miles was covered under ordinary touring conditions, and under the continuous observation of officials appointed by the club. The daily run consisted of a maximum of 200 miles a day on main roads, starting from and returning to the Automobile Club. The number of days occupied was 22, the total gasoline consumption 245¼ gallons, the total consumption of water 3.9 gallons, the average daily mileage 181.8, the average mileage per gallon of fuel 16.3, and the average mileage per gallon of water 1,015. The roads throughout the trial were somewhat heavy and greasy, and there was much fog. Rain and snow and numbers of loose patches of stones were encountered. On the fourth day a bad side-slip occurred, the near hind wheel hitting the curb hard and slightly displacing the rim. This caused the tire to chafe on the head of the chain bolt. A new wheel and tire were fitted at the end of the day's run. Three other side-slips also occurred. The car was fitted with low-tension magneto-ignition. Considering the state of the weather during which the runs were made, the result is highly creditable to the makers of the car. The test has successfully established the fact that a good motor-car can be thoroughly relied upon for all that it can be reasonably called upon to do, and that it is no more liable to accident or disaster than any other machinery.

Dr. E. S. Banks, field director of the University of Chicago expedition to Babylonia, has reported the discovery of a statue which he regards as the oldest in the world. It was found eight feet beneath the ruins of the ancient city of Udnun, near the present village of Bismya, and has been identified by an inscription as that of King Daddu, of Udnun. The statue is of pure white marble, weighing 200 pounds, and is almost perfect. Udnun is mentioned in the code of Hammurabi, but little is known of it. King Daddu is not mentioned in the earliest records.