

A NOVEL MOTOR ICE BOAT.

The motor ice boat shown in the accompanying illustration was built by Mr. Charles S. Ketcham, of Eastport, L. I. The boat consists of an ordinary scow having mounted within it a two-cycle gasoline motor of four or five horse-power, which is connected direct by a belt to a large spiked wheel mounted forward of the motor, and adapted to engage the ice through a slot in the floor of the scow. The motor scow is steered with a sharpened steel rudder blade on the end of a long sweep. This motor ice boat is a very simple affair that can be constructed by any amateur, and yet it is capable of attaining a considerable speed and giving much enjoyment to the owner.

THE HEATON AIRSHIP.

Since the publication of our article last week in which the failure of Heaton's airship, the "California Messenger," was chronicled, we have received the two pictures herewith published. They show admirably the construction of the craft, and indicate that it differs not very widely from most gasbag dirigible balloons. To recapitulate the information published last week, it may be stated that the Heaton airship consists first of a silk gas reservoir 76 feet long and 14 feet in diameter, with a capacity of 10,000 cubic feet of hydrogen gas, of a lifting power of 600 pounds. Directly beneath the bag is a sheet of canvas, denominated by the inventor an "aeroplane," designed to assist the movement of the airship in falling or ascending. The rudder is lightly constructed of bamboo covered with sacking, and is governed by ropes at the will of the engineer, the air current, generated by the rapid revolution of engine and propeller, assisting in the prompt control of the airship in the line of direction as the operator determines. The platform upon which the operator stands is built of bamboo rods trussed to the net above by linen lines.

The engine, though generating 20 horse-power, weighs, exclusive of propeller, but 55 pounds. It is described as a double-cylinder, 4 by 4, revolving around a stationary crankshaft, the propeller blades being attached to and a part of said cylinders. It is constructed of steel, and the motive power is furnished by gasoline. Power is increased by the elimination of flywheels, as well as lightness by dispensing with water coolers, the cylinders being kept cool by the strong air currents generated by the rapid motion in revolving. The two fans have each a surface of 8 square feet and are 5 feet from tip to tip.

In common with other affairs of life, some of the most simple and apparently obvious facts of steam engineering have only been learned after long experience and endeavor in a contrary direction to natural laws. Years ago, before the days of the distillers on board ship for supplying fresh water to the boilers, it was the practice in the United States Navy to use salt water for the "make-up," i. e., to supply the water lost by leakage and other wastes. The rule was never to allow the salinity of the boiler water to exceed $1\frac{1}{2}$ per cent of saturation. But, of course, it happened more than once that this rule had to be broken on account of leaky boilers, stress of weather or other reasons which make it impossible or unsafe to blow off and replace with sea water. Under such circumstances the surprising result was always noted that the scale deposits were more friable and easily broken loose from the sheets and tubes, so that cleaning the boilers was an easier task than when the salinity had been kept down to the prescribed percentage. The reason, of course, was that when the salinity was kept at a low percentage more sea water had to be pumped into the boilers, which introduced more lime and other scale-making properties. The lime being thrown down at once, formed a hard insoluble scale that could be removed only with difficulty. With less seawater introduced less lime was deposited, hence less scale.—Machinery.

There were six mines in the United States which produced over 1,000,000

tons of ore each in the year 1903. Five of these—the Fayal, the Mountain Iron, the Adams, the Stevenson, and the Mahoning—are on the Mesabi range, in Minnesota; the sixth is the Red Mountain group, in Alabama. Eleven other mines shipped

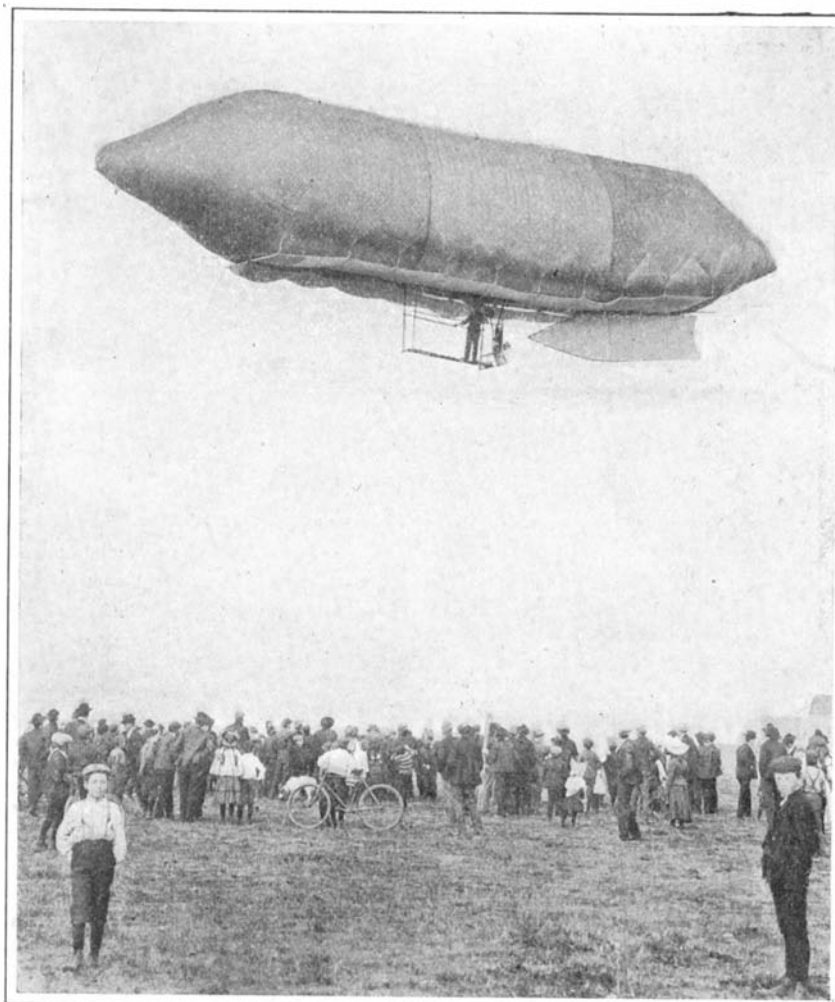


A HOME-MADE MOTOR ICE BOAT.

over 500,000 tons and less than 1,000,000 tons each. These were the Biwabik, the Spruce, and the Burt, on the Mesabi range; the Pioneer and the Chandler, on the Vermilion range, in Minnesota; the Chapin, the Cleveland Cliffs, and the Pewabic, on the Menominee range in Michigan; the Aragon and the Lake Superior, on the Marquette range; and the Norrie, on the Gogebic range.



Heaton Standing Next to the Frame of His Airship.



THE HEATON AIRSHIP IN FLIGHT.

MOTOR BOAT ENGINES AT THE SPORTSMEN'S SHOW.

At the eleventh annual Sportsmen's Show, now being held in Madison Square Garden, New York, the exhibit of motor boats and their engines, together with a large oval display tank in which the boats are shown in action, occupies the entire main floor. Although there is no great change in the construction of the boats themselves, there is a decided increase in the size of the gasoline engines used on some of the larger ones for the purpose of developing high speed, and the number of cylinders used is as high as six or eight.

The accompanying illustrations show several of the noteworthy engines on exhibition. The 250-horse-power, eight-cylinder Craig engine used in the "Onontio" when she made her record nautical mile in 2 minutes, 26 seconds (28.42 statute miles per hour)

last October is the largest engine at the show. The large inlet and exhaust pipes used on this engine are noticeable in the photograph. They are 3 and 4 inches in diameter respectively.

The cylinders have a $7\frac{1}{4}$ -inch bore and a 9-inch stroke, and their heads contain twin inlet and exhaust valves mechanically operated by bell cranks worked from a single cam shaft on one side. The compression used is 80 pounds, and the speed of the engine 850 R. P. M. A three-bladed, reversible propeller was used with it on the "Onontio." The cylinders are mounted on nickel-steel stanchions, the cranks being entirely exposed. The bearings and cranks are lubricated by wick oilers. The crankshafts, of which there are two coupled together at the center, are $2\frac{3}{8}$ inches in diameter. They are of nickel-steel, hollow-bored. The bedplate, bell cranks that operate the valves, and a number of other smaller parts are made of manganese bronze.

The total weight of the engine is 3,520 pounds. Variable make-and-break igniters are used on this engine, the current being supplied by two magnetos driven by bevel gears. The two four-cylinder engines of which it is composed are thus independent even to their ignition current supply. Separate carbureters supply each also.

Another engine built on somewhat the same lines as the Craig is the new 100-horse-power, six-cylinder Standard, which has 8 x 10 cylinders and develops its power at 300 R. P. M. This engine has its valves in a valve chamber beside the cylinder. The inlet valve is automatic, or suction-operated, and is provided with a small piston on its valve stem. This piston (which is fitted with one piston ring) works in a closed cylinder having but two or three small air holes, through which the air can escape. Thus it forms an air dash pot and keeps the valve from seating too heavily.

An extra set of cams permits of running backward. Three of the cylinders are fitted with auxiliary valves for letting in compressed air for starting and reversing purposes. A special cam opens the exhaust valve during every up-stroke of the pistons, and air is admitted during every down-stroke, so that the three cylinders form a single-acting compressed-air motor under those conditions. As soon as the other three cylinders begin to fire, the air is shut off and the whole engine is run on gasoline. Sufficient air is carried, at a pressure of 75 to 100 pounds per square inch, to run the engine two or three minutes this way alone. The air is compressed by an air pump driven by an eccentric on the crankshaft. The starting and reversing feature makes a clutch and reverse gear unnecessary, as the engine can be started and reversed under load.

The 150-horse-power Simplex engine of the "Challenger," which boat covered a mile recently in Florida at the rate of $29\frac{1}{2}$ miles an hour, consists of eight cylinders cast in pairs and bolted to a single aluminium crank case. The crankshaft is a steel forging of generous size. The bore and stroke of the cylinders are $6\frac{1}{2}$ and $6\frac{3}{4}$ inches respectively, and the compression used is 95 pounds. The motor develops its full power at 800 R. P. M. It is fitted with jump spark ignition from

storage batteries and two spark coils, the secondary current being distributed to the various spark plugs by means of two high-tension distributors. The oil is kept at a certain level in the eight compartments of the crank case by means of a special oil pump. A small scoop on each crankpin box dips into the oil and raises a small quantity of oil at every revolution, pouring it into a trough in the upper part of the case, which directs it to the bearings. The sight-feed oilers at the top of the engine also oil the bearings and cylinders. A single automatic carbureter supplies all eight cylinders. In this carbureter the main air passage is very small, and the auxiliary air enters through specially-shaped passages determined by experiment and so shaped that the rate of admission of the air varies with the speed of the motor. The motor has all the improvements suggested by a large automobile experience, such as the ends of the exhaust-valve springs being passed through holes in the valve stems instead of being secured by a washer and pin, for example. It is set at an angle of 5 deg. in a boat, but the special oiling system assures a liberal supply of oil to all bearings, without too much oil at the lower end and consequent fouling of the spark plugs.

The two six-cylinder engines shown by the Gas Engine and Power Company, of this city, were two of the finest and best-finished engines at the show. This company's product, both motor boats and automobiles, is sold under the name "Speedway." Two types of four-cycle motors, besides several small two-cycle engines, are manufactured by it. The most interesting engine on exhibition is the six-cylinder four-cycle motor with elliptical brass water jackets. The inlet and exhaust pipes pass up within the jackets, and the only pipe or piece of machinery exposed besides the cylinder is the rod that operates the rocker on top for opening the exhaust valve. The inlet valves are automatic, and, with the exhaust valves and spark plugs, are located in the head. The contact maker is on a vertical shaft at the rear end of the motor. Individual spark coils with tremblers are used. The cylinders are mounted upon steel stanchions instead of on the crank case. The bore and stroke are both 6 inches, and the motor develops 60 horse-power at 900

One of the novel motor boats on exhibition was shown by the Electric Launch Company, of Bayonne, N. J. The motor of this boat was placed forward of the cockpit in the bow of the boat, and the cockpit contained four small seats with aluminium backs, such as are seen on automobile racers. The steersman is intended to sit directly back of the motor, and the whole layout is much the same as on an automobile. The Panhard boat was constructed on similar lines, although the motor in this instance was not placed so far forward. This design does not appear to be as good as the usual one, in which the motor is placed in the center of the boat; for with the motor in the bow, the

small fraction of a horse-power in the transformation. The cold air is discharged into a refrigerating tank, which, if of 100 cub. feet capacity, will be kept at a temperature of 16 degrees. If desired, vessels of water placed in this tank can be frozen, in order to keep the tank cool while the plant is not running. This plant is an accessory that will be found very convenient by yachtsmen.

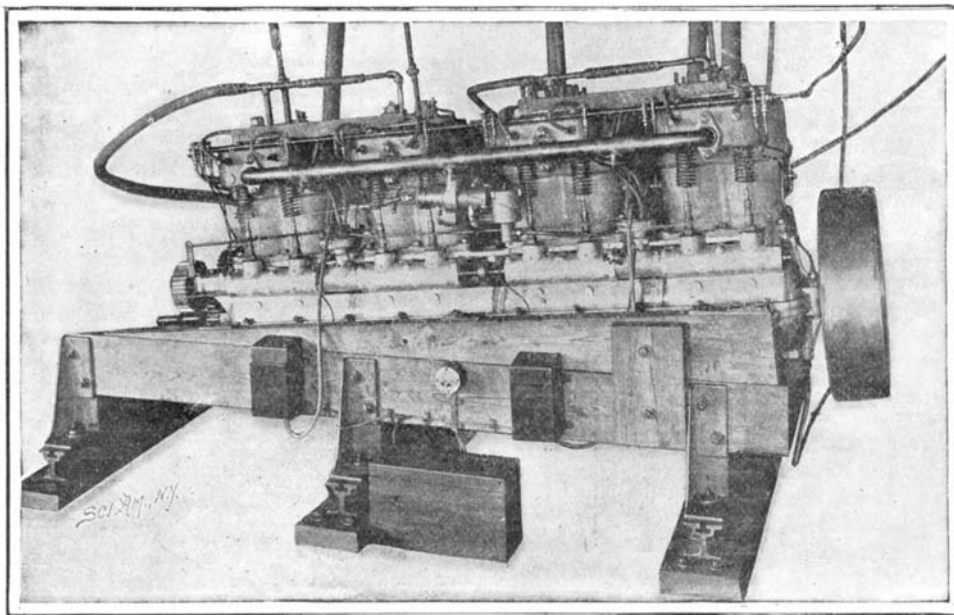
Raisins.

Soak some raisins in water and examine them. With in the thin skin is a soft pulp, in which several small seeds lie. The fruit appears to be one-celled, but when quite young was two-celled, the dividing wall disappearing as the fruit ripened, and forming part of the pulp. It is superior, no trace of a calyx being discernible at its apex, and may be classed as a berry, although the berry is usually inferior. The pulp has a sweet, slightly acidulated taste, but the small, hard, pear-shaped pips are astringent, as is also the skin.

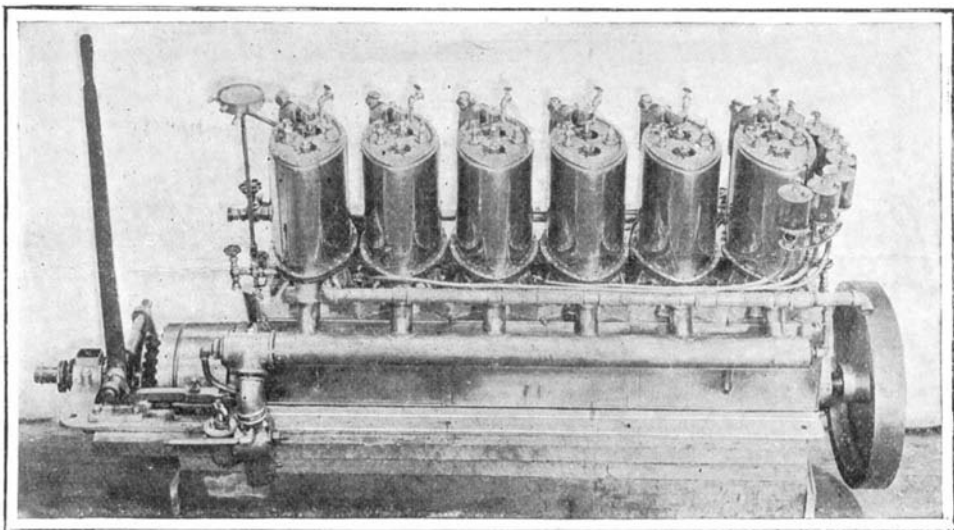
Raisins are the dried fruit of the grape-vine, and are produced chiefly in Spain, although vines are cultivated in many other countries (Italy, California, Australia, Greece, etc.). They are usually partially dried on the vines, the stalk being twisted or broken to prevent moisture from reaching them, and the drying completed in a warm room. They are packed for exportation either in bunches (muscatel raisins from Malaga) or loose (Valencia raisins). Sultanas are a small, seedless variety of grape, exported from Smyrna, and currants a still smaller variety, exported from the islands of the Grecian Archipelago.

Raisins are slightly laxative in their action, as, indeed, most fruits are that contain abundance of sugar. They contain about 25 per cent of water, 65 per cent of sugar (dextrose and levulose), and 1.4 per cent of acid, chiefly present as potassium bitartrate. If kept for a long time the water evaporates, and crystalline nodules of sugar or potassium bitartrate make their appearance.—Pharmaceutical Journal.

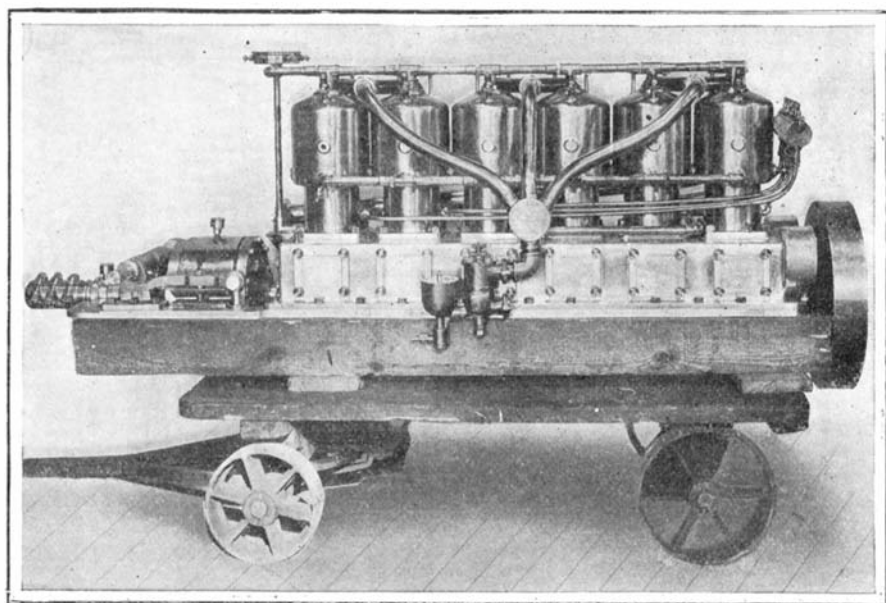
A huge project for the perfection of the drainage system of the city of London is being prepared. This undertaking has become necessary owing to the fact that the metropolis is increasing in size at the rate of



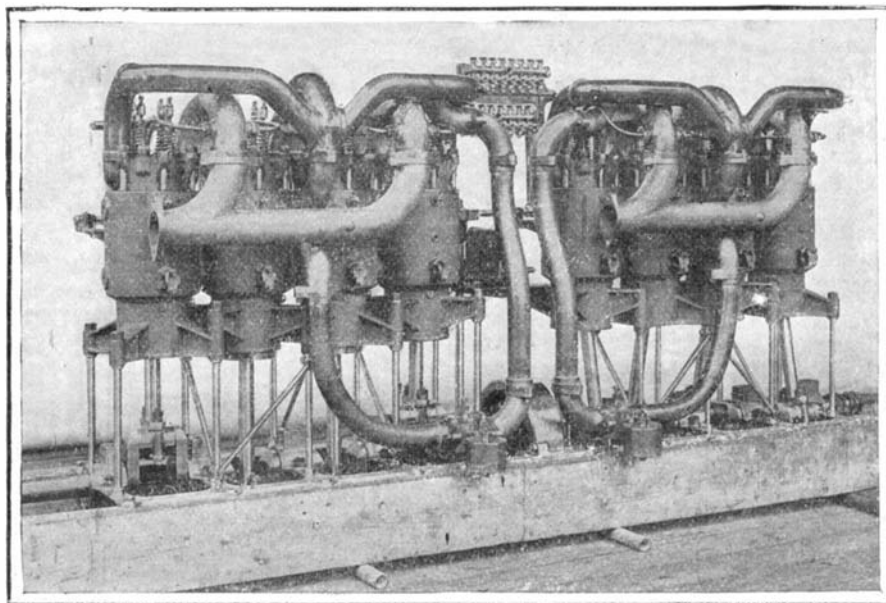
The 150 H. P. Engine of the "Challenger."



60 H. P. "Speedway" Motor Boat Engine Fitted With Brass Water Jackets.



42 H. P. "Speedway" Engine, Showing Carbureter and Reverse Gear.



250 H. P. Craig Marine Engine, Which Made a Record Mile in the "Ontario."

MOTOR BOAT ENGINES AT THE SPORTSMEN'S SHOW.

R. P. M. The other four-cylinder motor is of the standard automobile type, with individual, integrally-cast cylinders bolted to the crank case, with mechanically-operated inlet and exhaust valves, single carbureter, jump-spark ignition, etc. It has a 4½-inch bore by 5-inch stroke and develops 42 horse-power at 900 R. P. M. The company also builds a 7-horse-power two-cylinder, a 10½ and a 21-horse-power three-cylinder, and a 14, 28, and 60-horse-power four-cylinder motor of this type, as well as a 90-horse-power six-cylinder. A 3-horse-power single-cylinder and a 6-horse-power double-cylinder two-cycle engine are also manufactured.

boat is liable to be topheavy in a seaway, and the motor also is difficult to get at for adjustments.

The Standard Company also exhibited a novel electric lighting and refrigerating plant for yachts, consisting of a 5-horse-power, single-cylinder gasoline engine combined with an air-compressing cylinder on one side and a jacketed air-expanding cylinder on the other, the three-throw crankshaft being direct-connected to a 2-kilowatt dynamo. The air, compressed in one cylinder to 75 pounds to the square inch, is sent through a system of cooling coils and then expanded in the expansion cylinder, which reduces its temperature to about 15 degrees below zero, while consuming only a

1,000 houses per month, and the existing facilities are not sufficient to cope with the requirements. This new scheme involves the construction of 300 miles of main and flood sewers. At the present time London is not provided with two systems of drainage—one for houses and the other for streets. The result is that when there is an abnormal rainfall, floodings invariably follow, and the contents of the buildings are considerably damaged thereby. It is anticipated that the new scheme will occupy from four to five years to carry out, at an expenditure of \$35,000,000. The underground works will cost \$15,000,000, and when the enterprise is complete, London will be one of the healthiest cities.