costly apartment house for the rich, nor the squalid tenement for the poor, but "American Homes and Gardens" for all; let the cost be what it may, regulated by the income or financial ability, yet with every possible comfort, every convenience, and the best decoration.

Scientific knowledge of new methods and plans for construction, hints for the exterior and interior illustrations, charming in reality and helpful in suggestion, besides articles upon current topics of the most comprehensive character, as perfectly described in your editorial, present an almost unlimited province for thought, investigation, and practical enterprise.

Years ago, we wondered why the Building Monthly did not develop into such a magazine, which now gives every promise of realization in fact of all that the projectors have formulated theoretically.

Mrs. Edward P. Foster.

Cincinnati, Ohio, July 3, 1905.

THE SIXTH INTERNATIONAL AUTOMOBILE RACE FOR THE BENNETT TROPHY.

On July 5, for the fourth time, the Bennett trophy was won by a French machine. Not only this, but, what is more notable still, by a machine almost identical in construction to that which won it last year, and driven by the same successful chauffeur, Leon Théry. The race this year was over the same course that the French eliminating trials were held upon three weeks before—a circular course 85.35 miles in length, known as the Auvergne circuit. The course had more sharp turns, steep pitches, and narrow stretches than any on which the race has been run heretofore, and that an average speed of over 47½ miles an hour was maintained by the winner in traversing it four times speaks well for his driving and for the car. That familiarity with the course has considerable to do with winning a race is shown by the fact that in this, the second race he has won upon it, Théry increased his average from 45½ to 47.63 miles an hour.

Eighteen machines were entered in the race this year, the following six countries being represented: England by two horizontal-cylinder Wolseley machines and a Napier; France by two Richard-Brazier cars and a De Dietrich; Germany by three Mercedes; Austria, ditto; Italy, three Fiats; and America, two Pope-Toledos and a Locomobile. With the exception of the Wolseley machines, all had four-cylinder vertical gasoline engines capable of developing something like 100 horse-power. The two Pope-Toledo machines were the lowest-powered of the lot, they being only 50 horse-power each.

The start was made at Laschamps at 6 A. M., Théry on his Richard-Brazier being the first to get away. The other cars followed at five-minute intervals, the 140-horse-power Locomobile driven by Tracy being the last machine to be dispatched (at 7.25 A. M.). Only 15 minutes later Théry reappeared, he having made the first round in 1 h. 41 m. Car No. 6—Lancia's Fiat—made the fastest time on its first round, viz., 1 h. 35 m., which is equivalent to a speed of 53.9 miles an hour. The machine dropped out in the second round, however, owing to a stone hitting the radiator and breaking it, so that the water leaked out. After this accident to the Italian car, Théry had no formidable rival. His machine ran like clockwork, and owing to its being equipped with improved Michelin tires, the tire trouble which he experienced was comparatively slight and new tires were quickly obtained. That any tires can be built to stand the strain of taking such sharp corners as that shown in one of our illustrations at speed, seems marvelous; but when such corners have to be rounded every few minutes in the course of a seven hours' run, much depends on the judgment and skill of the driver as to whether the tires will last. Let him not slacken his pace properly in making the turn and the result is almost certain to be a burst tire. Even Théry is said to have had the shoes of his car replaced twice, besides having to repair several punctures on the road. Upon pulling up at a tire station, four men quickly jacked up the machine, while others removed the old tires and put on new ones, which were almost instantly inflated by compressed air stored in reservoirs for the purpose. Only 5½ minutes were required in which to change all four tires. The race may be said to have been a race of tires; and it is at any rate partly owing to the extensive preparations for their renewal that the victory went to a French car.

On a course of this nature, one would naturally expect the machines having the greatest horse-power to make the fastest time, on account of their more rapid acceleration. Such is not always the case, however; and a long-distance automobile road race bears a resemblance to the fabled race of the hare and the tortoise, in that the ability to go and keep going, even if the speed is not of the highest, often gains a machine a prominent place. A case in point is that of the 50-horse-power Pope-Toledo driven by Lytle. A stone flew up and struck the main oil pipe of this machine in the early part of the race, but the mechanic managed to hold the pipe together, and the race was finished in this manner, the car obtaining twelfth place, although the engine received scarcely any oil. The Locomobile racer broke a chain in the first round, and later developed trouble with the clutch-shifting collar, such that it was obliged to drop out of the race on the second round. It may be recalled that Lytle is the driver who finished in the Vanderbilt race last year after many mishaps. In both events he has shown great perseverance and, although driving a low-powered car, has managed to finish in spite of all difficulties. He is to be rewarded, we understand, by being placed at the wheel of a powerful six-cylinder Pope-Toledo racer now building for the Vanderbilt race on Long Island on October 14.

As the race progressed, it was seen that Théry was in the lead, and he was anxiously awaited at the starting point at each successive lap. He finally came around for the fourth time at 1.10 P. M., having won the race in 7 hours and 10 minutes. Cagno, on a 120-horse-power Fiat, got second place in 7:26, and Nazzaro, on another Fiat, third in 7:27. Fourth place went to Callois on the second Richard-Brazier, his time being 7 hours and 29 minutes. Earp, on an 80-horse-power Napier machine, was fifth in 8 h. 30 min., while an Austrian Mercedes driven by Braun came in sixth. None of the other Mercedes machines made a favorable showing. Next to the French the Italians did the best. That their running was very uniform is shown by their finishing only one minute apart. It is significant that the first four cars to finish within 19 minutes were equipped with Truffault-Hartford shock absorbers.

SOME NEW AUTOMOBILE TRACK RECORDS.

In America track racing is more in vogue this year than ever before, and meets in the vicinity of New York are being held almost weekly throughout the season. At one of these, held on July 3 and 4, a new mile record of 48 4-5 seconds was made by a White steam racer, and a new Christie machine with a motor incorporated in both front and rear axles made its appearance. One of the photos (page 49) shows the rear motor of this peculiar car. The front driving equipment was described in our last Automobile Number. Mr. Christie has built a motor in at the rear of his car in a similar manner, and with the two he gets about 120 horse-power on a straight course, although on a track the car has nearer 100 horse-power available. The rear engine has four 5 x 5¾ cylinders, while the front one has four 6¼ x 6¾. The car has 28-inch wheels in the rear, and 30-inch wheels in the front. The contact boxes of the two motors are connected, so as to advance the spark uniformly for each, but this is the only connection between the two. The front motor is started with a crank as heretofore, but the rear one is set going after the car is in motion, by letting in the clutches. When making the turns on the track, the rear motor is shut off by pressing a button in the steering wheel, which cuts off the ignition current. The cone clutches on the outer face of the motor flywheel are fitted with band brakes on their outside. It was due to the expansion of these clutches from heat developed by a sudden application of the brakes, and the consequent failure of the clutches to hold, that Mr. Christie lost the final heat of the match race between the Chicago Automobile Club and the Automobile Club of America for the Thomas trophy, on July 4. One of the photos shows Webb Jay on the White "Rocket" passing Christie on the last turn, and winning the 5.56-mile race in 5:28 1-5. Christie's time in the previous heat (which he won by 150 yards, although making the last mile on a flat tire) was 5:14 4-5, and his fastest mile 50 1-5 seconds. Another photograph which we reproduce shows Jay making the new track record and going at the rate of 73.77 miles an hour. This is the first time a steam machine of the heavy-weight type has made a world's record on the track, and it is interesting to note that the White racer is built on the same lines as the regular touring car, and is fitted with the same size compound engine, although a larger generator is used, and a pressure of 600 pounds per square inch is carried, or double that used in the ordinary White machine. The racer has a shaft drive with a disconnecting clutch, so that the engine can be run and warmed while the machine is at rest. The frame is hung below the axles, and clears the ground by but 4 inches, which accounts for the great cloud of dust raised by the suction. The weight of the machine is 1,700 pounds.

A new record for middle-weight cars was made by a 24-horse-power Fiat machine, that was specially constructed for track racing. This was a mile in 55 4-5 seconds.

These records were made on the Morris Park race track, which is a long track with a wide unbanked turn at one end and a short, insufficiently-banked curve at the other. A complete circuit of the course equals 1.39 miles. There were several accidents, owing to cars running through the fence at the sharp turn, but fortunately the drivers escaped serious injury.

PEARY'S ARCTIC SHIP, THE "ROOSEVELT."

The new Arctic ship "Roosevelt," which has been built by the Peary Arctic Club to enable Commander Peary to make another attempt to reach the North Pole, is now at New York, taking on stores and equipment for the trip. She is 160 feet long on the load waterline; 184 feet in length over all; with a beam at the waterline of 32 feet, and over the guard-strake of 35 feet 6 inches. She has a depth of 16 feet 6 inches, and at full load has a displacement of about 1,500 tons. The form of the ship and its construction have been designed to meet the severe conditions of the service for which she is built. Her cross section and her diagonals show a model that is very round below the waterline, and indeed, from the guard-strake her sections narrow down to a broad easy bilge, to which there is a very sharp dead rise from the keel. This form is chosen to enable the ship to rise when she is being nipped by the ice, pressure upon her wedge-shaped hull tending to lift her bodily upward. In construction she is certainly the strongest wooden ship, or ship of any kind, ever built; for in addition to her heavy frames, and triple planking and sheathing, she is strutted and trussed from end to end with massive horizontal and diagonal timbers. The stem, sternpost, keel, keelsons, frames, planksheer, and garboard strake are all of selected white oak, all bolted and drift-bolted with more than usual thoroughness. The frames are molded to 16 inches at the heel and 10 inches at the head, and they are placed only 2 feet apart from center to center. To give longitudinal strength, a lattice-work of diagonal straps of steel is laid for the full length of the ship, the distance from strap to strap being about 6 feet. The straps are rabbeted down flush into the outside face of the frames. The skin of the ship consists of two courses of 5-inch planking, the inner course of yellow pine and the outer of white oak. Between the two courses is laid a sheathing of tarred canvas. On the inside the frames are covered with 3-inch white oak ceiling, and it can be seen at once that these four layers of planking and waterproof material will render the ship not only water-tight and stiff, but warm in cold weather. The beams of the main deck are spaced 4 feet apart center to center, and the lower beams are immediately below the deck beams. A system of diagonal struts is worked in between the beams, the whole being thoroughly tied with through-bolts. The system of trussing is completed by a central line of tie-rod stanchions, the tie-rods running down inside the wrought-iron piping. These stanchions are constructed so that they can be tightened up at any time in the same way as the truss rods of the old wooden Howe truss bridges were, that did such good service on our early railroads.

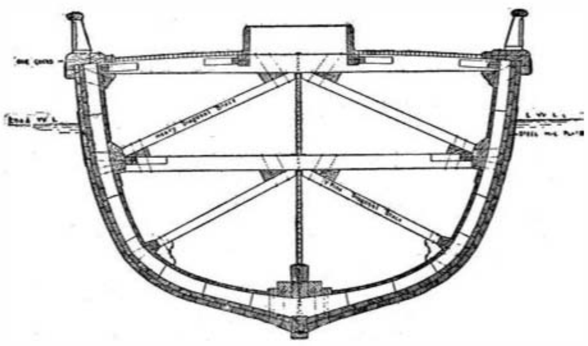
The "Roosevelt" is protected against the grinding of passing ice by special protection at the bow, stern, and waterline. At the bow, an extra thickness of 2½-inch greenheart ice sheathing is worked on from the stem well back onto the body of the ship, and extending to the keel. A belt of the same sheathing, 5 feet wide, reaches at the waterline from stem to stern. The stem and forefoot are protected by a heavy steel strap extending down the cutwater and for a considerable distance aft below the keel. The stern, which is built of white oak, is of great massiveness, and has a similar protection of ¾-inch steel plating and 1-inch strap worked on. It extends from the keel over to the sternpost, and gives great strength to this part of the structure.

The vessel is provided with two deckhouses; the forward one is portable, and it has been made of sufficient size to accommodate Commander Peary and the officers of the ship. When the "Roosevelt" has been pushed as far north as it is possible to drive her, the plan is to carry the house ashore to serve as winter quarters. The crew are housed in the forward deckhouse, and Commander Peary and his staff have their quarters in the after deckhouse. The ship is heated by steam and lighted both by electricity and oil lamps. The motive power consists of a single, inverted, compound engine, driving a 10-foot four-bladed propeller. Steam is supplied by two water-tube boilers, and, under trial, the "Roosevelt" made about 12 knots. She is expected to have a sustained sea speed of about 11 knots an hour. She will be driven north at about 7 or 8 knots to save fuel. The coal capacity is 500 tons. The ship has a peculiar-looking rig, but one that is designed for the special work she has to do. She is rigged as a three-masted fore-and-aft schooner, and spreads sufficient canvas to enable her to make a fair speed under sail alone.

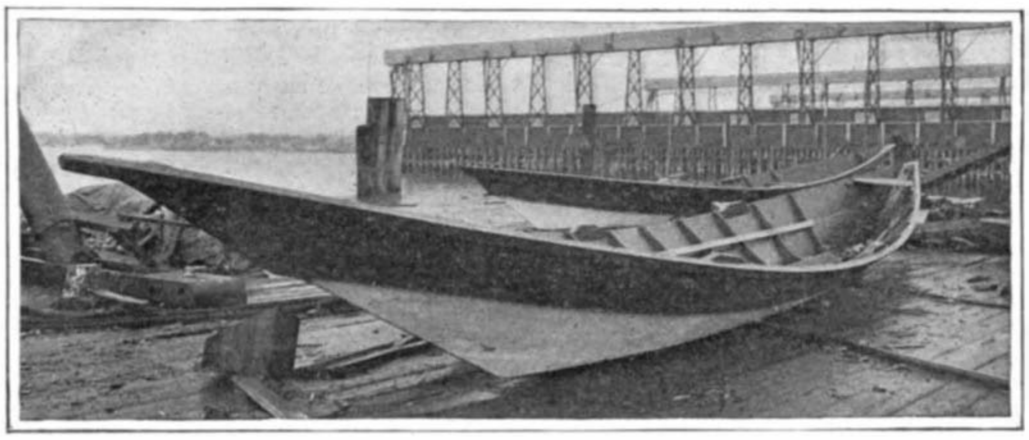
Two of our photographs show the construction by which it is possible to unship the rudder and the propeller blades while the vessel is at sea. For the rudder a large open well reaching through to the main deck is provided, of sufficient size to enable the massive rudder to be drawn up and hoisted on deck. To do away with the necessity of sending a diver down to release the gudgeons, the latter work in a vertical groove worked into the after end of the sternpost. The pintles are attached to the rudder post by heavy straps, and, in unshipping the rudder, the gudgeons, sliding in the rudder-post groove, come up with the rudder itself. The four propeller blades which, by the way, are of large sectional area and made particularly massive and strong, can also be unshipped by sending a diver down to withdraw the bolts which hold them to the boss. They are drawn up through a well which opens into the body of the ship. By this arrangement the propeller and the rudder can be removed entirely out of harm's way when the ship is in the embrace of the ice pack.

The curious boats shown in one of our illustrations are sealing canoes, which are taken along for the use of the Eskimos in hunting game. Their peculiar sheer and long overhanging bow render them particularly suitable for this work. They are dragged over the ice where it is necessary, and launched whenever open water is reached. The Eskimos propel them with their native paddles, and they are found to be admirably adapted for this work. The total cost of the ship was about $100,000.

From a very early period steam has been used expansively in marine engines, and indeed sometimes to a ridiculous extent. Some engineers as late as the civil war hardly seemed to realize that there was any limit to expansion, although Isherwood's famous experiments on the "Michigan" in 1861 had demonstrated conclusively that, with low pressures, only a very moderate expansion is permissible, beyond which any further expansion is attended by an economic loss. As pressures increased it was natural and correct that a higher range of expansion should be used, and this made practicable the compound engine, where the expansion occurs in two stages, the high pressure steam from the boiler being limited to a small cylinder from which, in turn, the steam of lower pressure is exhausted to a larger cylinder. The compound engine was invented almost as early as Watt's separate condenser, Hornblower's patent dating back to 1771, and Wolff's patent for a two-cylinder engine dating back to 1804. With the low pressures prevalent at that time the compound engine was actually at a disadvantage compared with the simple one. When pressures had gotten up to about 60 pounds, however, the compound engine began to assert itself, the pioneer in that respect being John Elder, of the firm of Randolph & Elder, which is now known as the Fairfield Engine Works. It is interesting to note that the Allan Line of steamers, which is now the pioneer in introducing the steam turbine for an ocean-going steamer, made the last scientific stand against the compound engine, going so far as to take duplicate vessels, and engine one with compound and the other with simple engines of the same power. The actual experience with these two vessels where the simple engine with the high ratio of expansion was constantly in trouble from breaking down, was a convincing proof that high ratios of expansion in a single cylinder were impracticable.



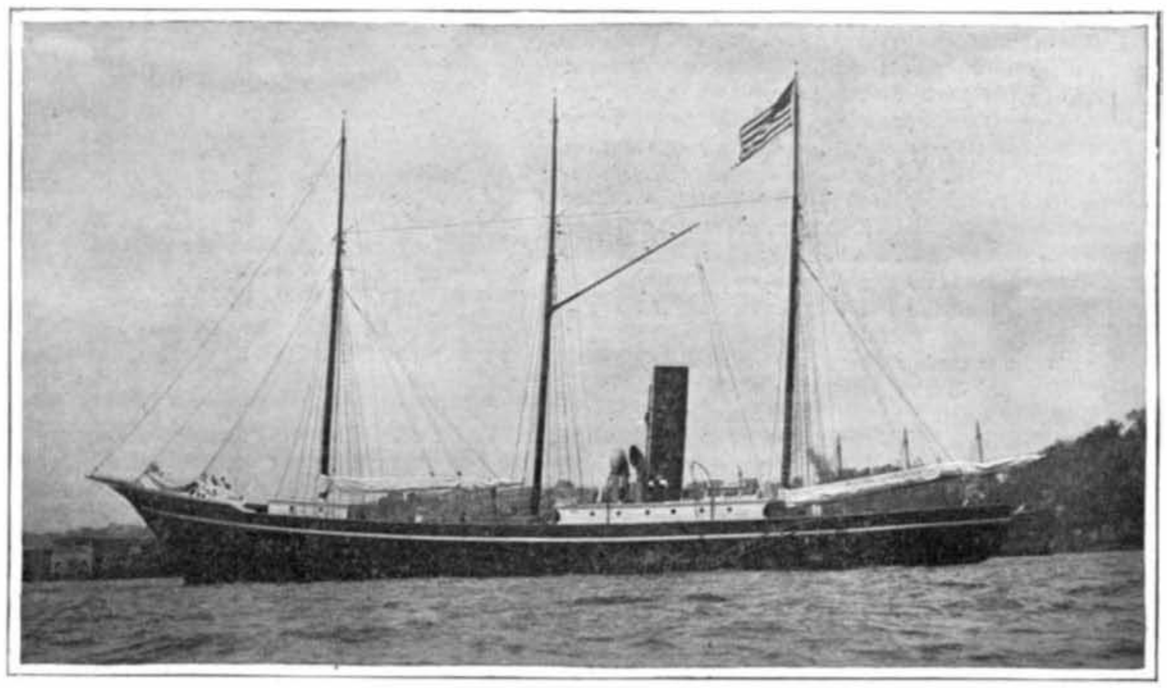
Cross-Section Showing the Strong Construction of the "Roosevelt."



Sealing Canoes for the Eskimo Hunters.

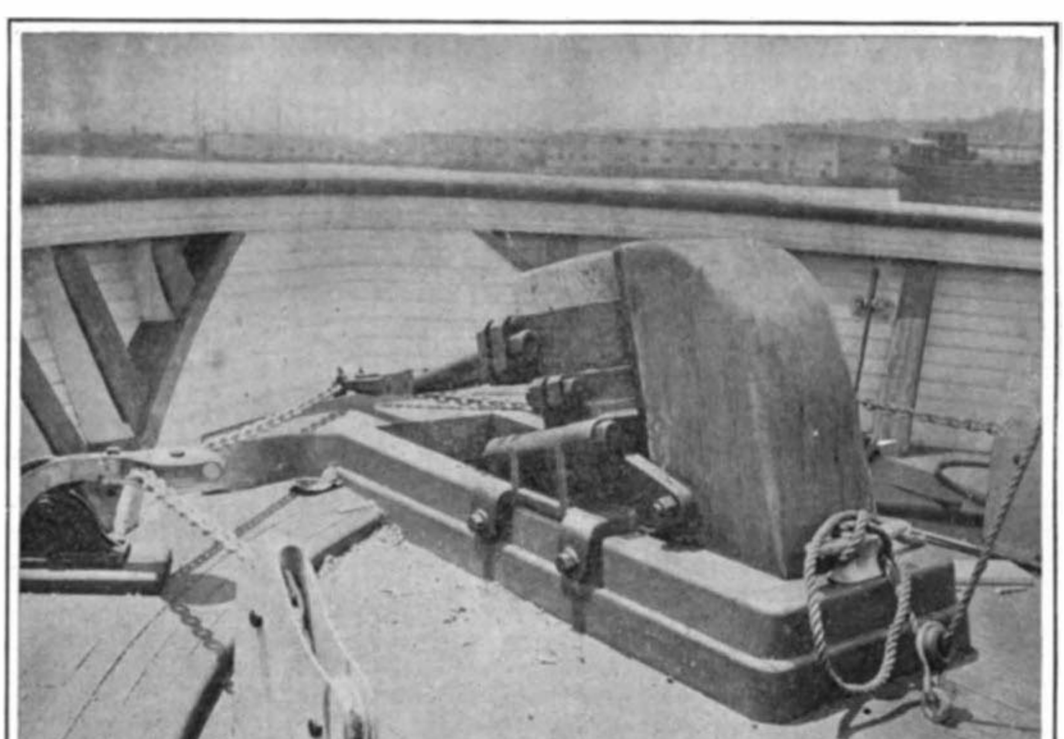
Up to 1840, there were no iron bridges in this country, except suspension bridges, in which iron links were used in the cables and suspenders, the floor-system being of wood. The first bridge in America consisting of iron throughout was built in 1840 by Earl Trumbull over the Erie Canal, in the village of Frankfort, N. Y.

View Showing the Lofty Bow.



The "Roosevelt" Afloat in the Hudson River.

Stern View, Showing the Waterline Protection and the Massive Construction of the Rudder and Propeller.



The Massive Rudder Head and Sternpost, and the Open Well Through Which the Rudder can be Drawn up on Deck Clear of the Ice.

COMMANDER PEARY'S NEW ARCTIC SHIP "ROOSEVELT," FOR THE DISCOVERY OF THE NORTH POLE.