ers—three double ended and two single ended—having a total grate surface of 685 square feet and a heating surface of half an acre—in four separate watertight compartments, will supply, at a working pressure 180 pounds, the steam needful to revolve the 16 foot propellers 120 times a minute when making the maximum contract speed of 16 knots an hour. Large fans will induce the needful forced draught, and pumps of thousands of gallons minute capacity will induce a circulation of water, feed the boilers, and clear the bilges.

Just under the pilot house there will be a conning tower ten inches thick, connected by a complex system of call bells, speaking tubes, mechanical telegraphs, and electrical telltales with every important center in the ship, bringing the captain, in action, in immediate touch with every department essential to complete control and knowledge of his ship's condition.

The least possible amount of wood will be used, light metal work being the general substitute, and where wood material is used and needful, it will be subjected to an electrical fireproofing process of established efficacy. Cork sheeting will cover the metal bulkheads in the staterooms and living spaces, to reduce the possibility of unhealthful condensation. The ships will be lighted by electricity, ventilated by natural and fan-induced ventilation, and pumped and drained in the most approved manner by steam and hand appliances; and every consideration has been studied to make the vessels comfortable and healthful habitations for their flagship complements of 520 persons.

Compared with the old time craft, this complement seems inadequate; but hundreds of mechanical devices and numerous auxiliary engines have lessened the tax upon the muscular energies of the crew, and narrowed their duties to the simple direction of those conveniences which have made manifold the output of every man's efforts and given the vessels possibilities and facilities undreamed of twenty years ago.

With 1,310 tons of coal on board, at a cruising speed of 10 knots, the vessels will be able to cover 6,000 knots, and at a speed of 13 knots will be able to cross the Atlantic and then have coal enough left to travel a thousand knots farther. There will be no speed premiums. A penalty, however, of $100,000 a knot is imposed for failure to reach the contract speed of 16 knots. The cost of these vessels, exclusive of armor and armament, is limited to $4,000,000 each, and the time of construction specified as three years from the time of signing of contract.

Trial of a New Torpedo.

The new Howell torpedo, commonly called the "Baby Howell," was tried officially December 4, at Newport, R. I., before Commodore Sampson, Chief of the Bureau of Ordnance, and Lieuts. Roy C. Smith and Brown, of the Torpedo Board of the navy. Three shots were fired from the testing station of the Hotchkiss Gun Company in the Seaconnet River. For a range of 600 yards, about all the government cares for, an average of between 27 and 28 knots was made, the torpedo being submerged 4½ feet. It appeared to hold this depth throughout its entire run of about 1,100 yards.

Each time the torpedo came to the surface at about the same spot, and the time of the several runs did not vary 3½ seconds. This regularity was as pleasing to the officials as was the speed attained. The projectile, in more favorable weather, has made more than 29 knots, and the company say that they will show 32 for 600 yards, with their regular powder charge of 200 pounds.

ALL the copper tubes in the English torpedo boat destroyers of the reserve fleet at Portsmouth are to be taken out and galvanized steel tubes substituted. The copper fittings have broken down in a number of the boats that have been tested.

THE DE LA VERGNE MOTOR DRAG.

We have given illustrations of several of the horseless vehicles which took part in the Times-Herald motocycle race on November 28, and we now present an engraving of the De la Vergne Refrigerating Machine Company's motor drag, one of which also took part in the race. The De la Vergne machine won the fifth prize in the Paris-Bordeaux race of last June, so that it would undoubtedly have made an excellent showing in the Thanksgiving Day contest, if the rubber tires had not slipped, so that the race was abandoned at Sixteenth Street, Chicago. The horseless carriages of the De la Vergne Company are of two kinds, the hunting traps which are built to accommodate four people and the drags which accommodate six people. These carriages are not on the market at present.

The drag which we illustrate weighs about 1,800 pounds and has three seats. The frame is of iron. Around this the carriage maker has constructed the vehicle. In the drags two gasoline motors, of four horse power each, are used, each motor being distinct. The engines weigh about 375 pounds each. The two cylinders are balanced so that the vibration is noticeable only when standing still. The tank for gasoline is under the front seat, and the carbureter, which is used to prepare the gas, is in the extreme rear of the vehicle. The gasoline tank holds enough for a three days' run. The motor is a modification of the well known Benz motor. The explosion is produced by a spark, the battery being also in the front of the vehicle. The cylinders are cooled by means of water jackets connected with a tank having a capacity of 250 pounds of water, which is sufficient for a run of six hours.

The noise of the exhaust is stifled by a muffler, in which is also placed a condenser, which condenses the unburned gas and products of combustion which are expelled at the bottom of the vehicle, thus preventing disagreeable odors. The power from the motors is transmitted to the driving wheels through the medium of belts and chains and sprocket wheels. The power is transmitted to the rear wheels by means of chains and sprocket wheels. Part of the spokes are secured directly to the large sprocket wheels, thus giving great strength. In the smaller vehicle the motocycle is stopped and started by shifting of the belts, which run to a countershaft. In the larger motocycles a friction clutch is used, which also controls the speed. The motor can be stopped, if necessary, by simply turning a lever, and the wagon can be reversed without stopping the engine. The limit of speed is said to be from 3 to 25 miles an hour. A powerful brake of the ordinary kind is provided. The steering wheels are pivoted at the hub, the ordinary fifth wheel is also used; the steering rod runs up to the seat. Equalizing springs serve to hold the steering connections in place and keep the lever steady. The wheels are respectively 36 and 48 inches in diameter, and are fitted with solid rubber tires of the Rubber Tire Wheel Company.

In the improved machine the lamps will be lighted by electricity, which is generated by the motor. James F. Bate, the umpire on the De la Vergne Refrigerating Machine Company's gasoline motor wagon on the day of the race, made the following report:

"Half a gallon of gasoline was used in the trip of the De la Vergne wagon from the starting point to the testing room, at 1557 Wabash Avenue. The start was made at 8:56 o'clock, but the wagon had not gone far before the wheels began to stick in the snow. The stretch from the starting point to Fifty-fifth Street and Michigan Boulevard was especially rough, and several times the Benz motor was unable to drive the wheels forward. The rubber tires slipped in the snow, and before Cottage Grove Avenue was reached Frederick C. Haas, who was operating the machine, decided not to attempt the race. Then the wagon was pushed over the bad stretch of snow-laden road. When the motocycle reached Michigan Avenue, it went along smoothly, but not at a great rate of speed. At sixteenth Street Mr. Haas turned the vehicle from the course and stored it at the testing room. The run was made in one hour and a half."

The De la Vergne Company, of New York City, in addition to making their large refrigerating plants, are now also making the Hornsby-Akroyd oil engine. They regard their motor carriages as experimental at present.

THE DE LA VERGNE MOTOR DRAG.

Destruction of Forests in California.

In the University of California Magazine Mr. Charles H. Shinn, in writing of the lavish way in which the best parts of the California forests have been cleared away, states that in the Comstock mines alone enough timber has been used to build all the houses needed for a city of 50,000 inhabitants. He has seen the bottom of a cañon crowded for miles with the trunks of pines from each one of which a few flume blocks or a log of butt timber had been cut, while the rest was left to decay. Not to mention the thousands of acres of the most magnificent coniferous timber known to man destroyed by fires which have burned out the soil itself into great pits, it is stated that the waste of timber in the redwood districts has been even more appalling than it has been in the Sierras. More than once the world's record for the number of feet cut in a day has been broken by some one of the sawmills of the coast redwoods. So much lumber is still produced by rival mill men that it has not paid for cutting, and some of the large California firms of lumbermen have become bankrupt. Enormous trees that represent from 800 to 1,000 years of symmetrical growth have been sawed up with no profit, or with actual loss, when, if they had been left to stand a few decades longer, the profit might have been a thousand dollars an acre.

At the time of the American occupation of California the forests covered, perhaps, 50,000 square miles. Half of this has been cut over or is inaccessible or consists of species of less value than those which have heretofore been cut. It is often asserted that California still has twenty millions of magnificent forest land, but the truth is that there is left hardly fifteen million acres, and much of this has been cut away.

Gelatin—Its Saline Digestion.

Gelatin is transformable into a kindred substance, gelatose or protogelatose, characterized by want of the property of forming a jelly and of being precipitated by a standard solution of sodium chloride. In cultures of liquefactive microbia it is observed in the first moments that the gelatin is changed into gelatose. Gelatin loses the property of jellifying if left in contact with an alkaline chloride or iodide. With the fluorides, the transformation is only partial. The change may be named saline digestion.—A. Dastre and N. Floresco.