

many cases of roughness of the skin of the face come from the frequent applications of water. It is a good thing to rub the face with a soft, clean, dry towel two or three times a day. If, in addition, water is used in the morning and at night the skin will be kept in a sounder, smoother, and healthier state than if, as is often the case, soap and water are used three or four times a day. Men are not often offenders in this respect, most men sparing little time for the refinements of the toilette. Women and children, whose skins are the most easily affected by superfluous ablation, are the very persons in whom such excess is too common. They should be taught that there are dry methods of cleanliness as well as wet ones.

### THE PUGET SOUND NAVY YARD.

BY A. B. WYCKOFF.

In 1878 and 1879, while engaged in the hydrographic survey of Puget Sound, the writer tried to interest the naval authorities in having a naval reserve of two hundred thousand acres of government timber lands made. A bill was introduced in Congress, but the writer was ordered to China and the matter was dropped. The timber on such a reservation would now be worth several million dollars.

In 1888 Congress authorized the President to appoint a commission of three naval officers to select a site for a naval station north of the forty-second parallel of north latitude. After an exhaustive examination it selected 1,572 acres of land on Port Orchard, an arm of Puget Sound. Congress did not act upon this report, and in 1890 authorized a second commission of two civilians, two naval officers and one army officer, to select a site for a drydock north of California. It selected virtually the same location, embracing over seventeen hundred acres, which could have been bought at an average price of about twenty dollars per acre.

Through the personal popularity of the delegation from the new state of Washington, and by a narrow majority, the naval bill of March, 2, 1891, appropriated \$10,000 for the purchase of a site, not to exceed two hundred acres, for a drydock, and authorized a contract for a dock not less than 600 feet in length, 70 feet in width at the bottom, and capable of receiving vessels drawing 30 feet of water, the total cost not to exceed \$700,000. At this time most of the navy yards on the Atlantic coast were closed, and Congress did not desire another one. The restriction upon the amount of land purchased will probably prove a very expensive mistake.

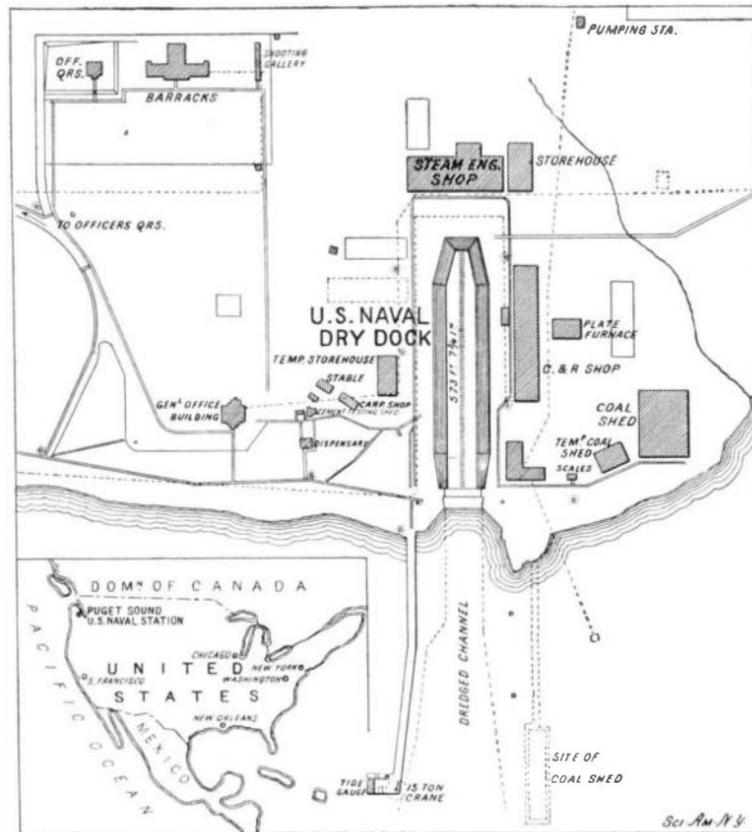
March 17, 1891, the writer was ordered out from Washington to select the lands for the drydock. Owing to some legal complications it was June 2, 1892, before the final report was made. For the sum of \$9,512,50, 190 acres was secured, and the "Puget Sound Naval Station," was established, with the writer as first commandant. Subsequently, in September, 1891, the name was changed to "Puget Sound Navy Yard."

October 29, 1892, the contract for the drydock was let to Byron Barlow & Co., of Tacoma, for \$491,465. The plans were afterward somewhat changed, making the dock 650 feet long and extending the wing walls, which increased the total cost of the completed dock to \$610,000. The drydock was begun December 19, 1892, and completed April 23, 1896, when the U. S. S. "Monterey" was docked. The drydock is located in a level basin with the entrance just inside the high-water mark. The strata show glacial deposit and the bottom is above a layer or bed of coarse gray sand. The entrance for about 70 feet is constructed of Sucia Island sandstone, while the remainder of the dock is of wood. The piles in the bottom could only be driven on an average about 8 feet. Although the "Oregon," "Iowa," and "Wisconsin" have spent six weeks at a time in the dock, it has not settled a quarter of an inch, and no repairs at all have been necessary. It was a fortunate action on the part of Congress to authorize this drydock, for otherwise our battleships built at San Francisco could not have been docked nearer than Japan. The "Oregon" was docked here and had her bilge keels put on just before starting on her race to Santiago. She is now again in this drydock to receive repairs to her bottom, which will take several months to complete.

The Puget Sound navy yard occupies a mile of water front on the north shore of Sinclair's Inlet, and is fourteen miles west of the city of Seattle. One-half of its area is embraced in two level basins just above high-water mark at the ends of the yard, while the intervening land rises in natural terraces to a height of over 200 feet, furnishing admirable sites for residences, hospital, chapel, barracks, etc. The drydock is at the eastern end of the yard, and all the working plant has grown up around it. The construction shop and pump house occupy the eastern side, the steam engineering plant the north end, and the ordnance and equipment buildings, for which appropriations have

been made, will have the west side. The other shops and storehouses are in the immediate vicinity. A careful plan has been followed in arranging and locating all the working plant in close proximity to the drydock, so that work can be carried on with the greatest efficiency. The construction and steam engineering shops are complete in every respect, with foundries attached. They have the most recent and expensive tools, and any repairs can be made to a battleship. The large tools have their own electric motors, so that they can be run independently. There is a large pier or wharf, built on protected piles, near the dock, which will accommodate two battleships. Another pier extends out to the receiving ship "Nipsic," and farther still to the westward is the ordnance pier in front of the shell house. The present water-supply is from two large springs and wells and is ample in quantity. There is complete fire protection with salt-water mains, and the railroad, electric light and telephone systems are all constructed. Five officers' quarters are completed, and others are to be built.

About one million and a half dollars, part of which is unexpended, covers all the appropriations which have been made for this yard. As an influential member of Congress remarked, after a careful inspection: "The government has received full value for every dollar expended here, and no work will have to be done a second time." Until recently the development of the yard has been very slow, largely because of lack of knowledge of its great natural advantages upon the part of Congress and naval officials. This has now been largely remedied, as several of the Bureau chiefs of the Navy Department and many Sen-



PLAN OF PUGET SOUND NAVY YARD, BREMERTON.

ators and members of Congress have recently visited Puget Sound, and, without exception, have expressed themselves as greatly pleased with the navy yard. The present able and energetic commandant, Capt. W. T. Barwell, U. S. N., is very enthusiastic over the wonderful natural advantages it possesses. The Secretary of the Navy has recommended to the next Congress appropriations approximating a million and a half dollars for its further development.

There is no lack of excellent mechanics and workmen. Several hundred are employed in the yard, and a large proportion of them have their cottage homes in the adjacent villages of Bremerton, Charleston, and Sidney. A railroad can be easily and cheaply constructed to a connection with the transcontinental roads. But it seems hardly necessary, as the navy yard has terminal rates and loaded cars can be towed on barges across the Sound, as is done at the adjacent Port Blakely lumber mill, the largest in the world.

The developments during the last three years and its favorable geographical situation seem to assure that Puget Sound will have a larger ocean commerce and greater population than any other harbor on the Pacific Coast. For these and the following reasons the Puget Sound navy yard should be made the principal naval establishment of the Pacific.

It is the nearest point of the United States to Alaska, Japan, China, and the Philippines. It is situated on a perfectly land-locked harbor, where all the fleets of the world could ride in safety at single anchor. It is perfectly defensible and can be made impregnable by forts, torpedoes, and submarine mines. It is easy of access either day or night by the largest vessels

aft. It has over a mile of water front, where the tidal current is almost imperceptible. There is no sediment in the water, and consequently no dredging has to be done a second time. There is a good supply of fresh water from local springs, and a large fresh-water lake, only three miles distant, with an elevation of 146 feet. It is in proximity to the line of outer defenses of Puget Sound and accessible by disabled vessels, where they can repair in perfect safety. It is within seventeen miles of Lake Washington, where all the naval vessels of the Pacific can be laid up when out of commission as soon as the government canal, now being built, is completed.

### A Remarkable Clock.

One of the most wonderful horological curiosities of the age has just been accomplished by a poor German watchmaker. It is a combination of an astronomical and calendar clock. The idea was suggested to the watchmaker by the famous clock at Strasburg Cathedral twenty-four years ago. The ingenious achievement of the poor German artisan represents no less than nineteen years' continual labor, and it is stated to be more wonderful than the horological monument at Strasburg, which prompted him to the effort. He was severely handicapped in his work by the lack of funds, but he devoted the whole of his savings to the task, completely ruining himself. The clock is inclosed within a glass case, so that every movement can be seen. It consists of 2,200 parts, 112 of which are wheels. The clock indicates the seconds, minutes, hours, dates, the days of the week, months, and the seasons of the year, the pictures of the signs of the zodiac, the sun, moon, and stars, and their rising and setting, as well as the exact position of the celestial bodies. It shows besides the moon's phases, and the eclipses of the sun and moon. The calendar is the most remarkable feature, since it is perpetual with perfect accuracy. At the beginning of the year it adjusts by itself the statements of the astronomical practitioners in explanation of the everlasting calendar, as well as Easter and the changeable festival days of the coming year. A glass ball, representing the spherical globe exactly, shows the movements and position of the planets Mercury, Venus, earth and moon, Mars, Jupiter, Saturn, and Uranus. The work is enhanced by over one hundred movable pictures and figures. Every quarter of an hour the figure of a guardian angel appears on the left side of the principal field. The striking of the quarters is done by two angels standing in the recess on the left, while in the sixth recess two figures at a time, representing the four ages of man, are changing alternately. On the right side of the principal field the Angel of Death advances, pointing with his scythe to the dial plate. When the full hour strikes, the center angel of the second recess appears holding an hour glass, while the angel on the right side above is sounding a trumpet. Under the roof an allegorical figure represents symbolically the right season of the year, while above in the principal field the guiding star of the year appears. On the left side of the clock cabinet stands a cock, which five minutes before noon beats its wings, stoops its neck, opens its bill and crows three times.

When the picture shows "Spring," there appears a cuckoo above; "Summer" is represented by a quail, which issues forth on the left side, both calling seven times. A bull lying at the feet of St. Luke the Evangelist roars to symbolize "Autumn," and "Winter" is indicated by a lion lying close to St. Mark. Every time the clock strikes twelve, Christ, bending his head, appears with his twelve Apostles, and a monk standing in the portal above rings his "Ave."

The clock contains a small chime which plays for five minutes after the striking of an even hour, the melodies changing and each lasting one minute. The work has twelve little bells, and on the roller there are 997 pins, which make the music.

### A New African Railway.

A dispatch to The London Times from Brussels says the decision of the Government of the Congo Free State to construct 1,000 kilometers (621 miles) of railway in the Upper Congo region marks an important stage in the development of the colony. The railway will bring the thickly populated banks of Lakes Albert and Tanganyika into direct communication with the Congo River, through a country exceptionally rich and capable of rapid development. The new line, unlike the Lower Congo Railway, will remain the permanent property of the Congo Free State.

The Shell Line, Limited, an English corporation, have eighteen of their vessels fitted to burn both oil fuel and coal; the change from one to the other in case of necessity being made in thirty minutes, the engines not being entirely stopped during the change.

# SCIENTIFIC AMERICAN

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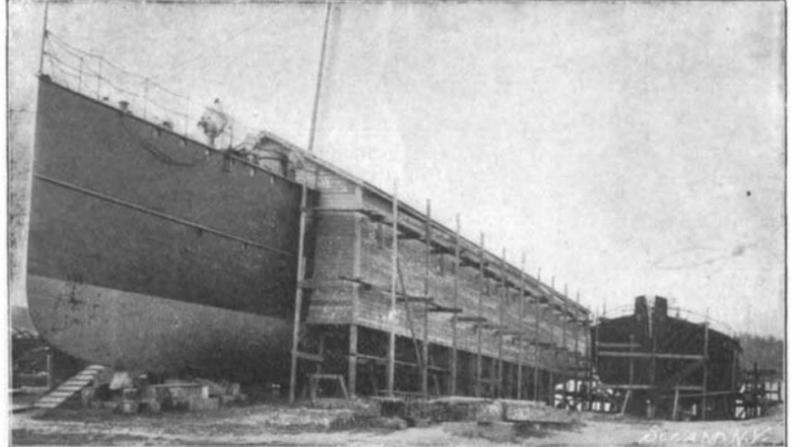
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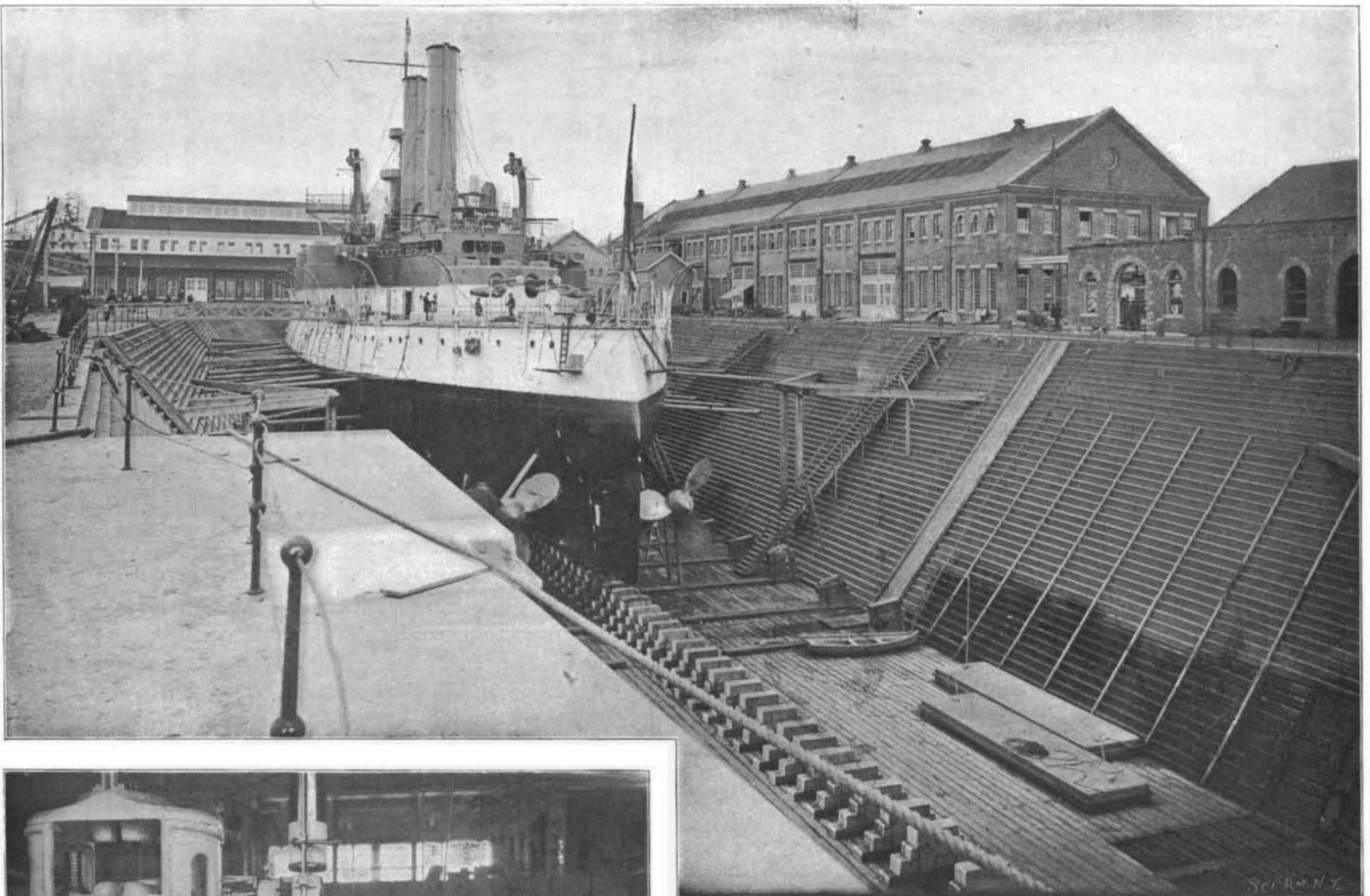
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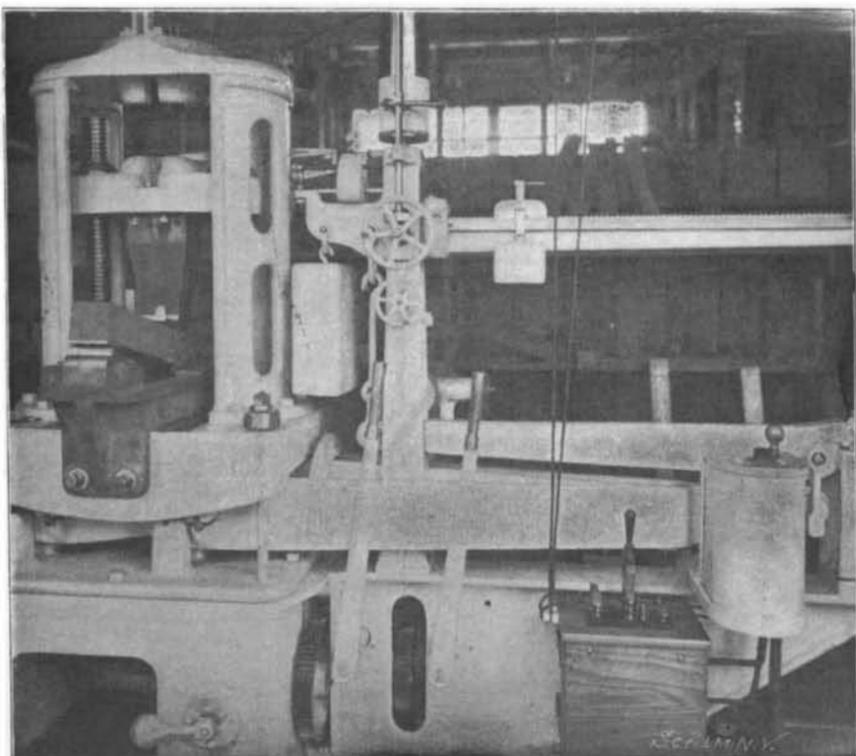
The Officers' Quarters.



Torpedo Boat "Rowan" on the Stocks.



"Iowa" in the Drydock. Length of Dock, 650 Feet; Width, 67 Feet; Depth, 39 Feet.



Testing Transverse Strength of Timber.



The Machine Shop.

## Brief Notes Concerning Patents.

William B. Green, of Metropolis, Ill., claims to have refused an offer of \$150,000 for a filter which he has recently patented.

Andrew Darius Huff, one of the pioneers of Denver, Col., and the inventor of one of the earliest forms of the revolving turret, died recently at his home in Denver.

Three patents were recently issued to Cornelius Vanderbilt in one week. Two of them are for railway appliances and the other for the machinery for making one of the new devices.

The English patent rights of the Acme Machine Screw Company, of Hartford, have been recently disposed of to the firm of P. F. Pease & Co., of London. The amount received was \$40,000.

A company has been recently formed with a capital of \$100,000 to make use of the tin-plate manufacturing method which is the invention of T. V. Allis of Bridgeport, Conn. It is claimed that the cost of making tin-plate is reduced by 30 per cent by the Allis patents, and the manufacture will be begun at once in this country and England.

Josiah M. Read, of Everett, Mass., said to have invented the first cooking range in 1846, died at his home in that city, aged ninety-two. He had been an invalid for several years. Death resulted from old age. In 1839 he came to Boston and began the manufacture of stoves on Blackstone Street, where he remained until 1888, when he retired from business at the age of eighty years.

Counsel for James P. Witherow, who has an infringement suit for damages amounting to between \$40,000,000 and \$50,000,000 against the Carnegie Company, has filed an appeal in the United States Circuit Court of Appeals. It is claimed that a saving of one dollar was made on every ton of blast metal used in the manufacture of Bessemer steel since 1888 by the use of the alleged infringement.

Charles E. Munroe has been designated by the Royal Academy of Sciences at Stockholm to nominate the American inventors and discoverers in the science of chemistry who may desire to compete in the annual distribution of prizes which is made under the will of the late Alfred Nobel. Prof. Munroe is the dean of the Columbian University. Other Americans will be named to fill similar offices in other branches of science.

Daniel Drawbaugh, whose name is connected with the early telephone work and subsequent litigation, has perfected a system of wireless telegraphy which is said to have many novel features, particularly its simplicity and ease of manipulation. He has succeeded in getting a number of people interested and a company will be formed to push it at an early date. A demonstration was given a few days ago at Eberly's Mills, near Harrisburg, Pa.

Charles E. Hopkins, of the Worcester Spy, has perfected a machine for casting plates for use on newspaper presses which he began working on in 1892, when he was employed on the Wilkesbarre Record. By this appliance it is possible to turn out duplicate plates at the rate of six a minute, and the plates are almost ready for the press. This improvement represents a great economy of time, which is quite an important consideration in the large newspaper offices.

The cable reports great activity in airship construction since the achievement of M. Santos-Dumont recently. M. Bouchet, who was the builder of the Dumont airship, has received orders from M. Roze, Baron Bradsky, M. Lisboa, Ambassador at St. Petersburg, and M. Severe, a Brazilian Deputy. M. Deutsch has been recently summoned as the representative of the Aero Club, at the instance of a resident near the club house, who objects to the odor arising from the house where the hydrogen gas is manufactured.

The great pressed steel industry, which is now one of the most formidable in the world, was founded on an almost insignificant patent granted to Charles T. Schoen for a device to hold back the doors of railway cars. After this had been successfully introduced, Mr. Schoen cast about for a cheaper way of making them, and struck on the method of pressing them from steel. Freight cars are at present made entirely out of pressed steel, and the company has more orders than can be filled in three years at the present capacity of the works.

M. Goubet, the inventor of the French submarine boat, is endeavoring to adapt that style of craft to the Channel traffic between England and Europe, and has constructed a model of a boat designed for this particular purpose. This has been shown in working order to a number of persons whom he hopes to interest in the scheme. The craft is to be fastened to a cable and thus work its way back and forth at a uniform depth under the surface. The advantage claimed for this kind of a service is that the discomforts almost invariably experienced by the trip on the surface will be avoided.

## Engineering Notes.

Certificates or licenses issued to marine engineers are graded according to class, first, second, and third, which refers wholly to the vessel they are entitled to take charge of, not to the man's qualifications. Many engineers in subordinate positions have chief engineer's licenses.

When the royal English yacht "Victoria and Albert" was put in service some years ago it was stated that she was very defective in design, rolling to such an extent that she was not only uncomfortable, but unsafe. Some changes were made in her which have made her entirely seaworthy; so much so that in very heavy weather she does not average over 11½ degrees each way.

Foreign technical journals state that the turbine steamer "King Edward" has shown an economy of twenty-five per cent in fuel over the paddle steamers in the same service, and makes better time. The German navy is to have a torpedo-boat destroyer with the same kind of engines. It is also stated that the British Admiralty will build another vessel upon the same lines as the "Cobra," lately wrecked, and equip it with turbine engines.

An Italian engineer, M. Triulzi, has devised a special instrument, the cleptoscope, whereby it is possible for the crew of a submarine boat to ascertain what is progressing on the surface while submerged. It comprises a tube fitted with crystal prisms in a special manner. Severe experiments were carried out with the apparatus on board the submarine "Il Delphino" in the presence of the Italian Minister of Marine. Photographs of objects on the surface were successfully obtained.

Remarkable developments have been made in the construction of the two latest submarine vessels, "Triton" and "Espadon," for the French navy. They are of the Narval type, but M. Labeuf, the eminent naval engineer, has introduced several important improvements. In their trials these two boats attained a speed of ten miles an hour in a forty-mile run, a hitherto unprecedented speed. A new arrangement for the supply of air, devised by Dr. Gibiat, has also been requisitioned, and by this means the "Espadon" was able to remain submerged to a depth of 50 feet for four hours without the crew experiencing the slightest ill effects.

In view of the success that has attended the pneumatic signaling on the London and South-Western Railroad in England, the North-Eastern Railroad have adopted a similar system at Tyne Dock. If the old style of mechanical locking by means of levers, cranks, wires and rods had been adopted in this instance, 250 levers would have been necessary to control the signals, etc., of this special yard, but by the electro-pneumatic signaling plant only 106 are requisite. The Westinghouse Company are carrying out the installation, which will consist of two frames, one containing seventy-one, and the other thirty-five levers. The Lancashire and Yorkshire Railroad are also adopting the same system at Bolton, Lancashire, one of their busiest stations, and it will be extended throughout the whole country within a short time.

Some useful, practical instruction is given concerning superheated steam in a paper read at the International Engineering Congress at Glasgow recently. It appears that the difficulties with it begin with the construction of the engine itself, and that existing engines are unsuited to it. The great heat, 700 degrees usually for the best economy, distorts the cylinder walls and the valves, so that allowances must be made for this heat by the use of liners arranged in a certain way. Two valves, one working inside the other, as in some expansion engines, cannot be used, and even slide-valves must be kept of as small areas as possible. Corliss valves will not work under superheated steam, and no form of packing, such as rings and springs, in piston-valves, will answer. Poppet-valves under certain forms of construction do well, but it very often happens on starting that the valve-stems get hot sooner than the bonnets, and expanding in them stick fast, unless unusual clearances are provided. Stuffing boxes do not give any trouble if they are made so as to project much more than is usual from the cylinder head, and the clearance in the bush at the head is made large, but no metals which melt under the temperature of the steam can be used for packing. The best valves are of the piston type ground in. Boiler pressures above 160 pounds should not be used, as no economy results from greater pressures, and, as less heat is lost by transmission to the cylinder walls by superheated than with saturated steam, the whole range of expansion can be carried in one cylinder, instead of two or more. It is asserted by the author of the paper that the use of triple expansion engines has no effect whatever upon the economy. Ordinary high-pressure non-condensing engines, which required 25 to 30 pounds of water with saturated steam, will deliver a horse power for half that quantity with superheated steam.

## Science Notes.

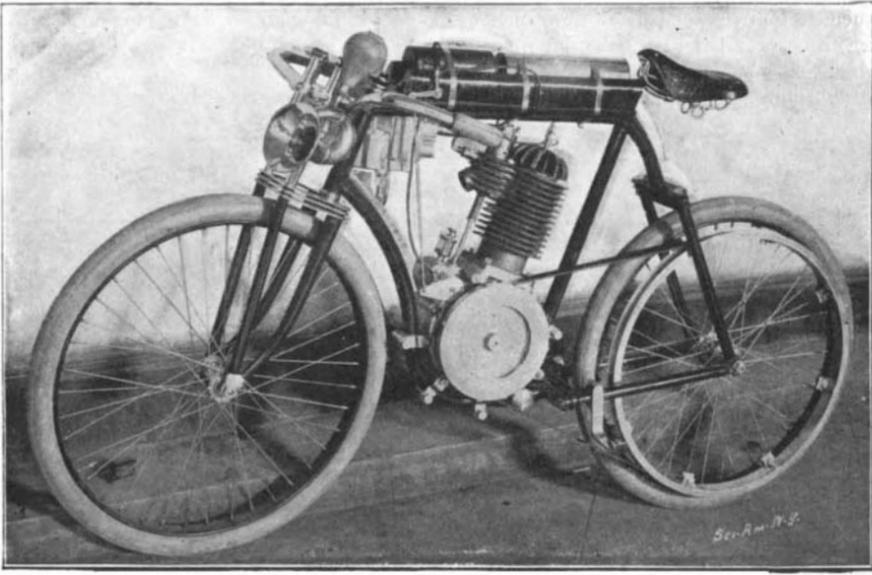
Lisbon has been suffering from a pest of rats, for which the general antidote of cats, traps and poison proved abortive. As a last resource bacilli were employed, and the municipal doctors were commissioned to inoculate some rats with an infectious disease. A suitable virus, harmless to man, was found, a few rats captured and inoculated, and then released. The experiment proved a great success, for the bacillus rapidly spread and the rats died with wonderful rapidity, so that in a very short time the city was freed from the rodents. It is now proposed to clear vessels from rats in the same way.

A striking discovery has been made during excavations which were necessary to raise one of the monoliths in the famous prehistoric group at Stonehenge, in Wiltshire, into an upright position, says the New York Sun. The men engaged in the work have found numerous neolithic implements, which had evidently been used in cutting and squaring the stones, and, when blunted, had been turned into the bedding on which the stones are supported. The discovery is held to prove that the unique spectacle of Stonehenge is anterior to the Bronze age and that the structure still visible was certainly built before 1500 B. C.

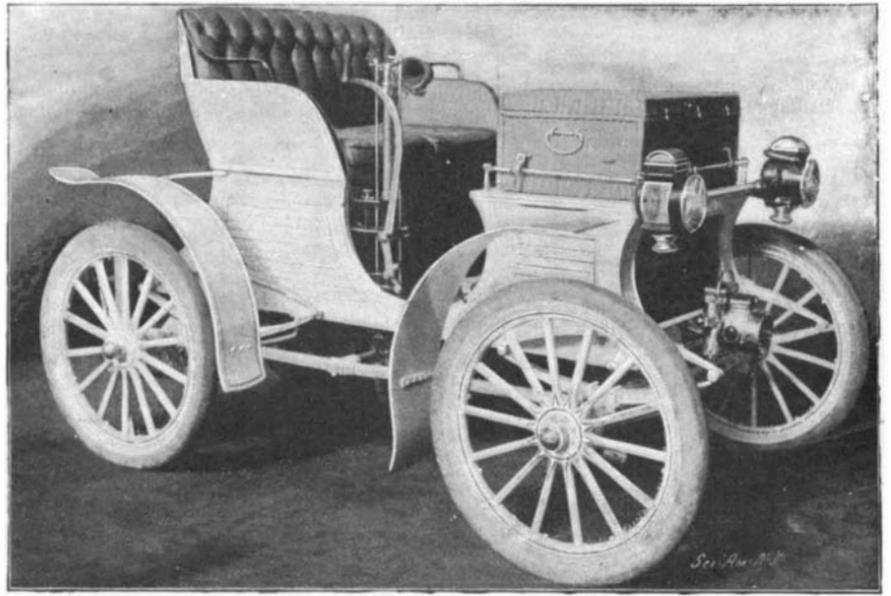
Consul-General Hughes reports from Coburg, September 24, 1901, that, according to the German press, the wool from the neighborhood of Bagdad is considered the best in Arabia; the next is from the region around Mosul, and then from Kurdistan. Wool is the most important export from Mesopotamia, and its chief point of shipment is Bagdad. Bassorah exported, in 1899, 37,650 bales of wool, of a value of 6,024,000 francs (\$1,162,632), as against 38,000 bales in 1898. All of this went to Great Britain, France, and the United States. Not one modern factory for woolen goods exists in Arabia, in spite of its large quantities of the raw material; the only use of the wool is the making of abas (a large outer garment) by hand.

Discussion of the metric system occupied the attention of the International Engineering Congress recently at Glasgow, and Mr. Arthur Greenwood was of the opinion that it would, in time, become universal. This is not a new forecast; we do not know how many years have elapsed since it was first pronounced, but the progress made does not seem to be encouraging, for about as many arguments can be adduced against the change as can be set up in its favor. Mr. Greenwood said that the most serious obstacle to the general use of the metric system was the fact that all small tools, drills, reamers, gages, etc., would have to be abandoned and new ones made, but he thought this could be easily done. This depends greatly upon the point of view—and several other things. It would not be impossible to abandon the present system if all were agreed upon its necessity, but there are many opinions as to that, and while establishments with large capital and prosperous businesses could afford to throw out thousands of dollars' worth of tools, there are many others to whom it would be a serious loss.

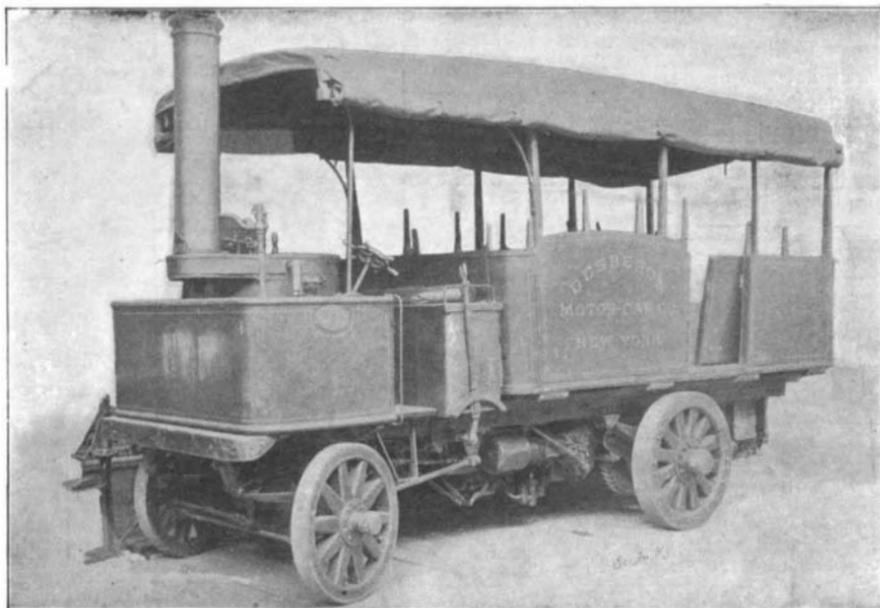
Major Austin has recently returned from his exploration tour in the north of Abyssinia, after experiencing great hardships. The result of the expedition has been the mapping out of the region between the Nasser and Murle, a district on the Oto River north of Lake Rudolph. By this achievement the whole region between Khartoum and latitude 16 deg. 11 min. north and between 33 deg. and 36 deg. longitude is mapped out. Major Austin found that although the region for the most part consisted of deserts and mountainous country, there were areas which could be utilized for cultivation. One peak north of Lake Rudolph he found was 7,000 feet high. The expedition encountered storms of almost unparalleled severity. The heavy rains either quickly entered the sandy soil or formed into foaming rivulets. The principal river, the Oto, flows into Lake Rudolph. This lake has no outlet, and its water is quite undrinkable. The maximum temperature of the region was found to be 107 deg. with a minimum of 68 deg. Two new species of antelope were discovered, but the party was compelled to abandon its zoological and other curiosities, owing to the exigencies of reducing the transport, the death of the black porters accompanying the expedition, and the hostile nature of the natives. The latter proved to be of a very low type, very warlike, and uninteresting. The Turkana tribe inhabiting the country west and south of Lake Rudolph were the most troublesome. They own large flocks, upon which they subsist, eating practically no grain. This tribe attacked Major Austin's camp on one occasion, but were repelled with heavy loss. The mortality among the members of the expedition was very high. Thirty-two black porters set out with the party, but only two returned. Half the Soudanese escort was also lost, the deaths being due to starvation and exhaustion. Nine of the party were killed by the hostile Turkanas. The expedition suffered awful privations. Food was scarce and for two and a half months they subsisted on the flesh of their donkeys and camels, and suffered terribly from scurvy.



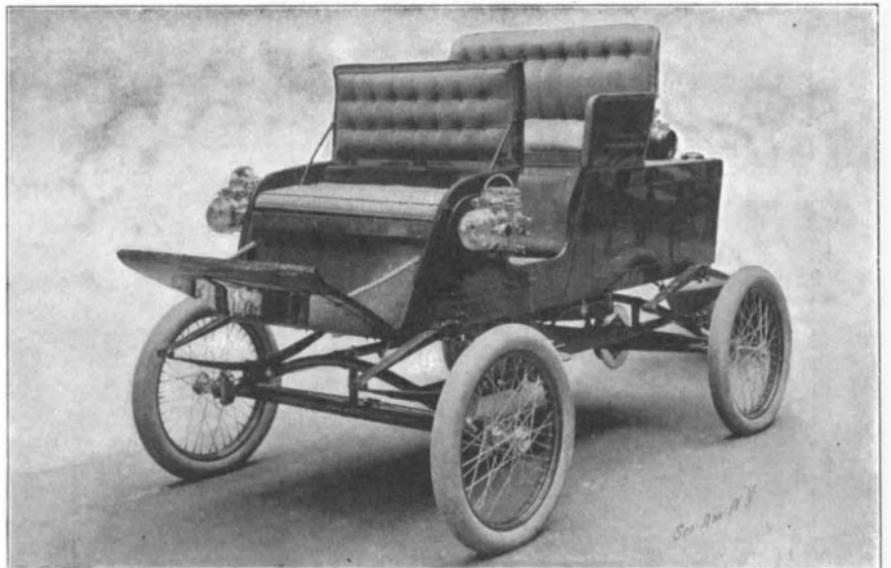
6-Horse Power Marsh Racing Motor Cycle. Mile in 1 M. 2 3-5 S.



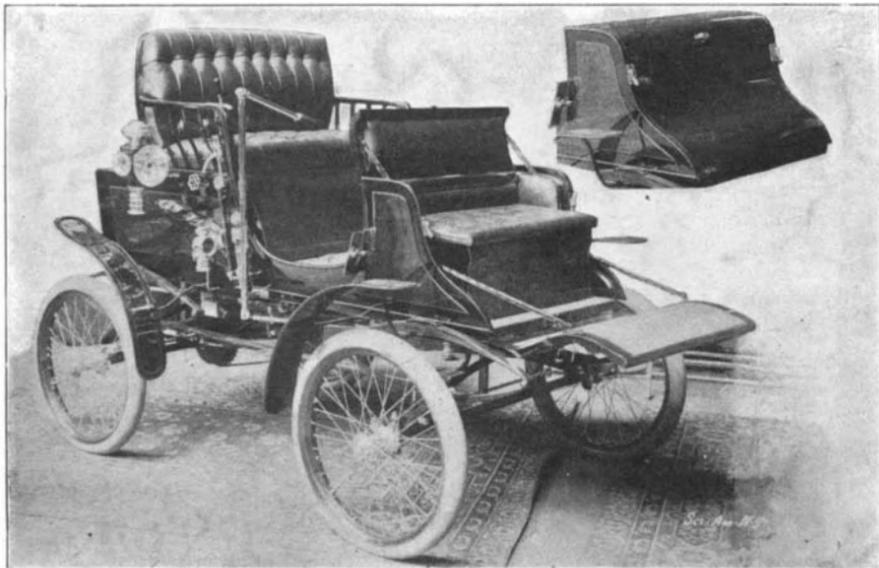
12-Horse Power Searchmont Touring Car.



25-Horse Power Desberon Steam Lorry. Weight, 4 1-2 Tons. Load, 4 1-2 Tons.



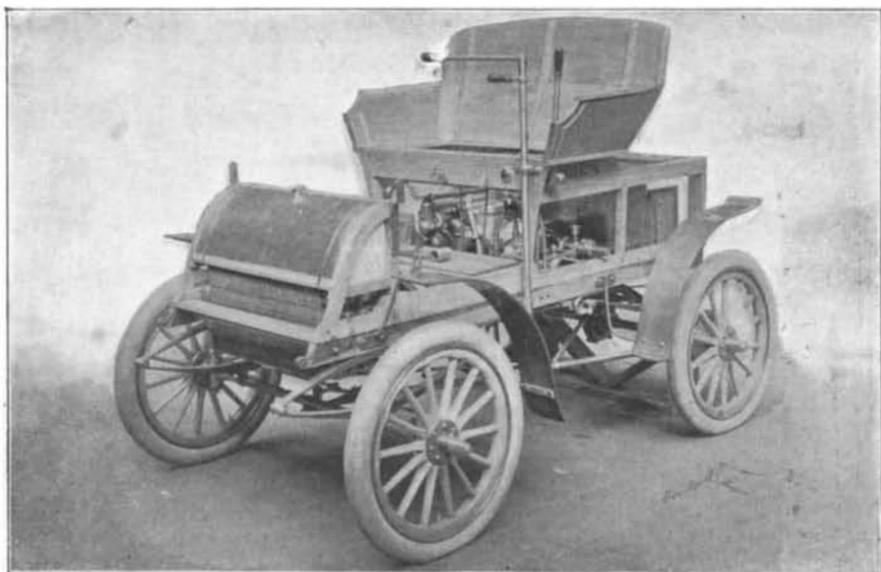
Locomobile Touring Model B With Let-Down Front.



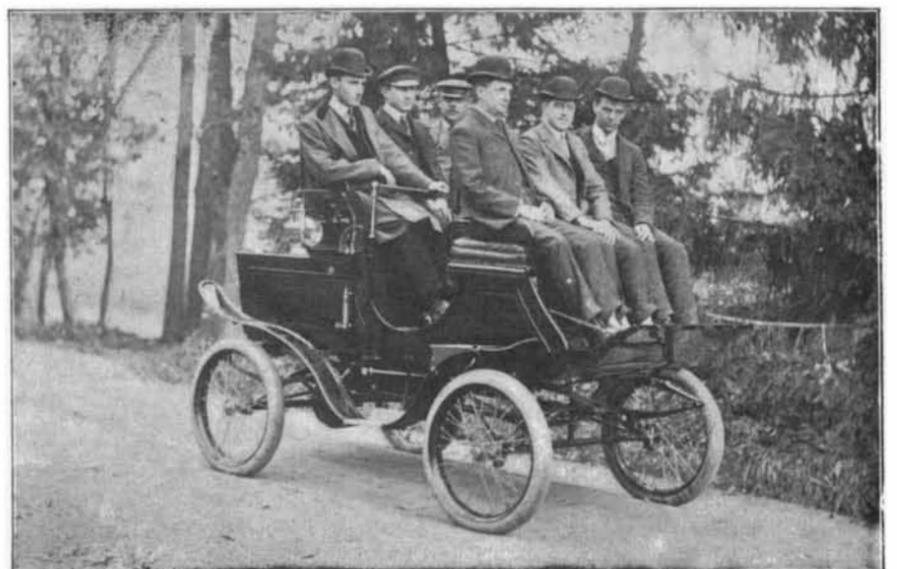
Detail showing front closed.  
Prescott 7 1-4 Horse Power Steam Automobile With Let-Down Front.



Pierce 2 3-4-Horse Power Motorette. Weight, 500 Pounds.



8 1-2-Horse Power Autocar. Skeleton View.



Mobile Touring Carriage for Six Persons.