SCIENTIFIC AMERICAN

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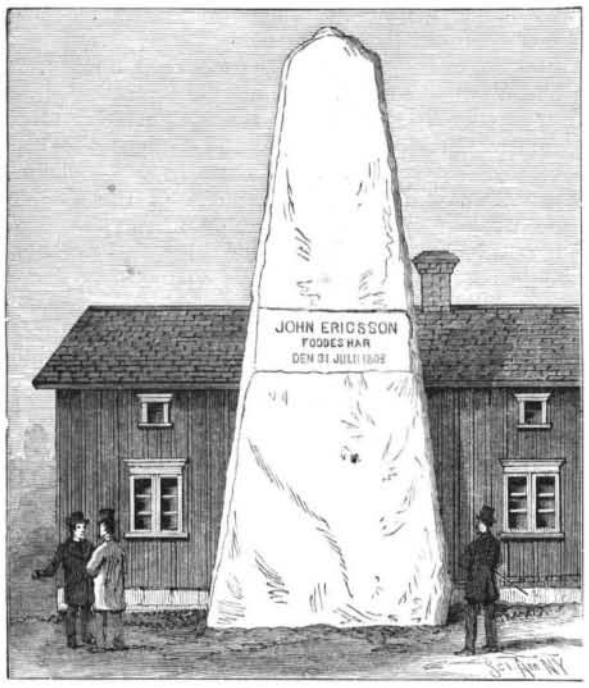
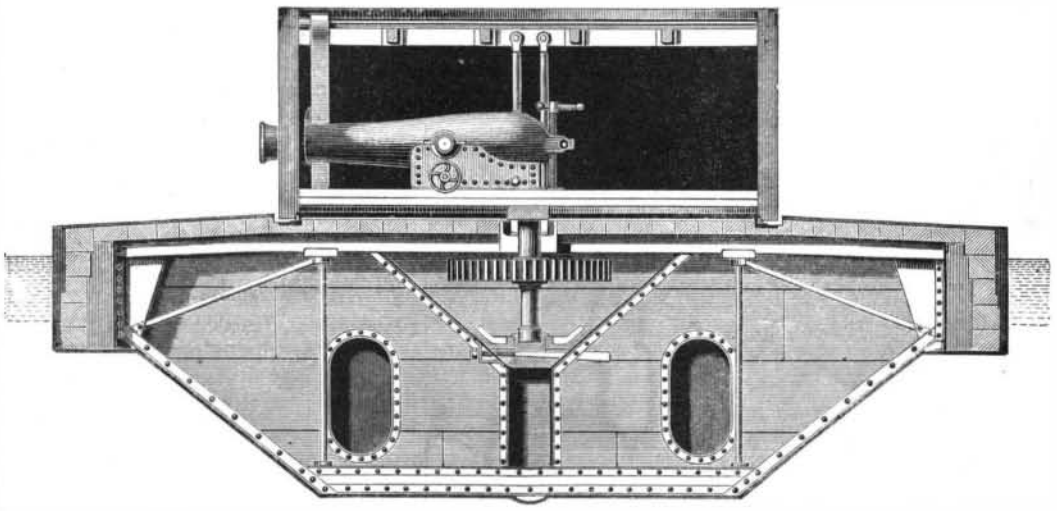
THE LATE CAPT. ERICSSON AND HIS WORK.

There are but few men who, as engineers and inventors, have been so long and so prominently before the public as the late Capt. Ericsson, whose death, on the 8th inst., was recorded in the last number of the SCIENTIFIC AMERICAN. He actually began in earnest his real life work very near the commencement of the century, when only about nine years of age, and did not lay it down until his brief final sickness, a few days ago, before which time he was apparently as full of vigor and as prolific of ideas as at any period since his childhood. It is said of William Pitt, the great English prime minister, that he used to quote from Greek and Latin authors, and gravely discuss state matters with members of Parliament, at the early age of seven years. Similar, it may be said, was the precocity of young Ericsson in the comprehension of mechanical principles and the appreciation of mathematical problems at an age when most children are occupied with their playthings.

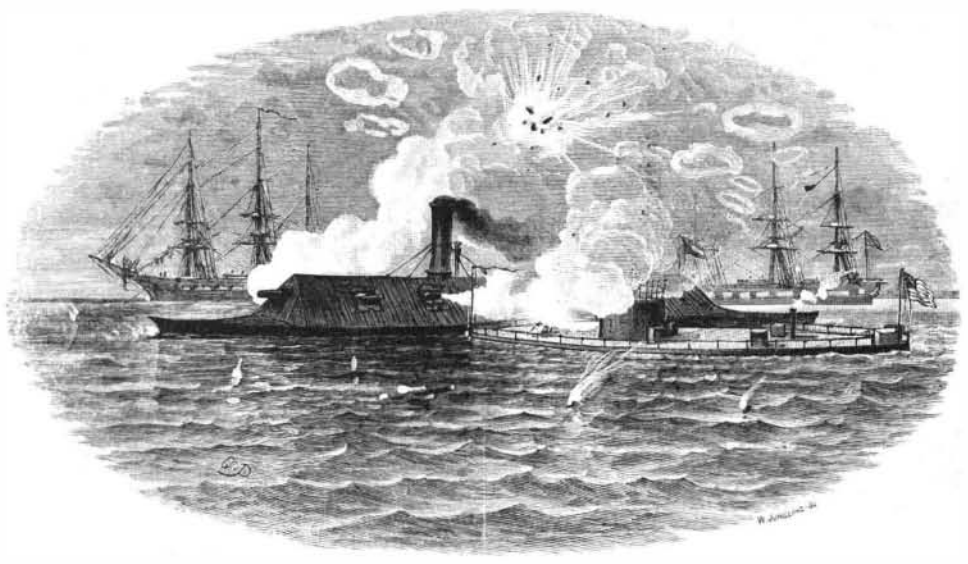


ERICSSON'S BIRTHPLACE AND MONUMENT ERECTED BY SWEDISH GOVERNMENT.

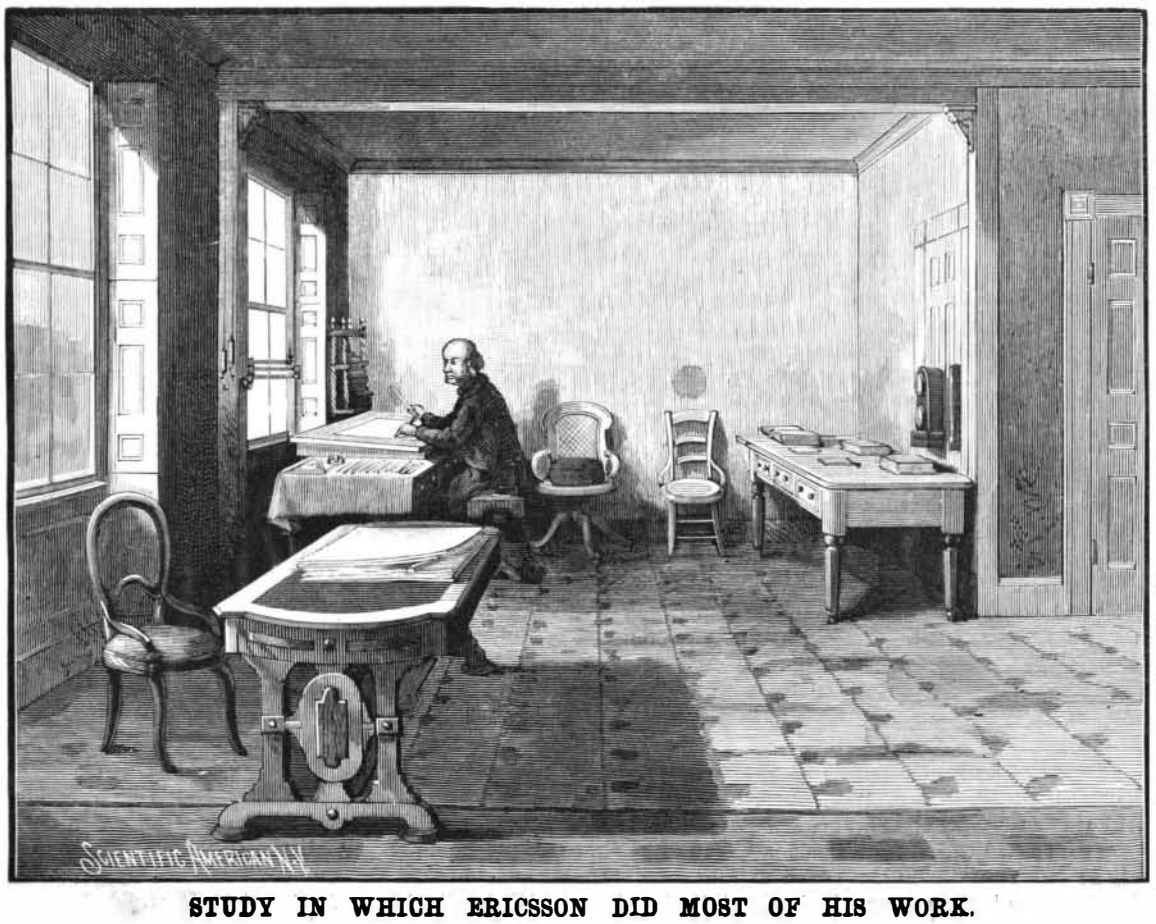
When nine years old he first learned the use of drawing instruments, and how they were employed to lay out the work of construction in advance. His father then removing to the depths of a pine forest, where timber was to be cut for the great canal of Sweden, the resources of the young artist became limited to a pen and pencil; but he made compasses of birch wood, with needles in the ends of the legs, converted a pair of steel tweezers into a drawing pen, and robbed his mother's sable cloak of enough hair for material for his brushes. Thus provided he made the drawings for a pumping engine to be operated by a windmill, and it was the drawing made under such circumstances that attracted the attention of Count Platen, the President of the Gotha Ship Canal, and resulted in his employment on that work, in the corps of Swedish mechanical engineers, when only twelve years old. While thus employed an attendant used to follow him with a stool upon which he stood to raise himself to the height of his leveling instruments. In 1815 he made the drawing of the Sunderland iron bridge, which Count Platen for years afterward delighted to show visitors, and up to 1826, when he resigned his commission in the Swedish army and took up his residence abroad, he was active in making great numbers of surveys and plans which have since been deemed models of their kind, and have formed the basis of much practical engineering work.



CROSS SECTION THROUGH TURRET AND HULL OF MONITOR.



ENGAGEMENT BETWEEN MONITOR AND MERRIMAC.



STUDY IN WHICH ERICSSON DID MOST OF HIS WORK.

He arrived in England in 1826, having resigned his position in the Swedish army, and thereafter devoted himself solely to the engineering and scientific subjects which he continued to follow with so much energy throughout the remainder of his life. His first work in England was the endeavor to perfect a "flame engine," on which he had experimented much before leaving Sweden, but English coal produced a heat so much higher than he had before obtained from pine shavings as to destroy the working parts of the engine; and, under a new plan, an engine was completed and patented, which was sold to John Braithwaite, with whom he was afterward associated in the introduction of many of his inventions. The wonderfully quick time in which, at so early a period in the practical use of steam, Ericsson made the plans and constructed the "Novelty" locomotive has been already referred to. We give an illustration of this engine, built in 1829, in seven weeks, and which is said to have made the remarkable speed of fifty miles an hour.

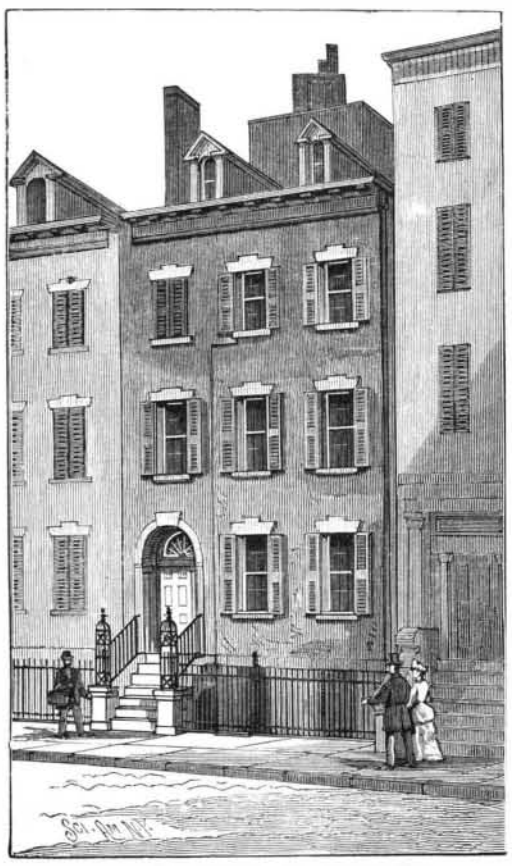
Ericsson spent thirteen years in England, and the patent office records there afford abundant evidence of his activity in bringing forward inventions during that period. We have referred in a previous article to many of these inventions—an instrument for taking soundings at sea, a hydrostatic weighing machine, an apparatus for making salt from brine, a rotary steam engine, a caloric engine, a practical system of artificial draught for steam boilers, a condensing engine, a method of superheating steam, the link motion for locomotives, etc. Perhaps one of the most important of his contributions to engineering science during this period was his plan of screw propulsion for vessels. Without claiming that he was the originator of this great improvement, it is certain that he gave to the world many new and valuable ideas as to the best

(*Continued on page* 182.)

THE LATE CAPT. ERICSSON AND HIS WORK.

(*Continued from first page.*)

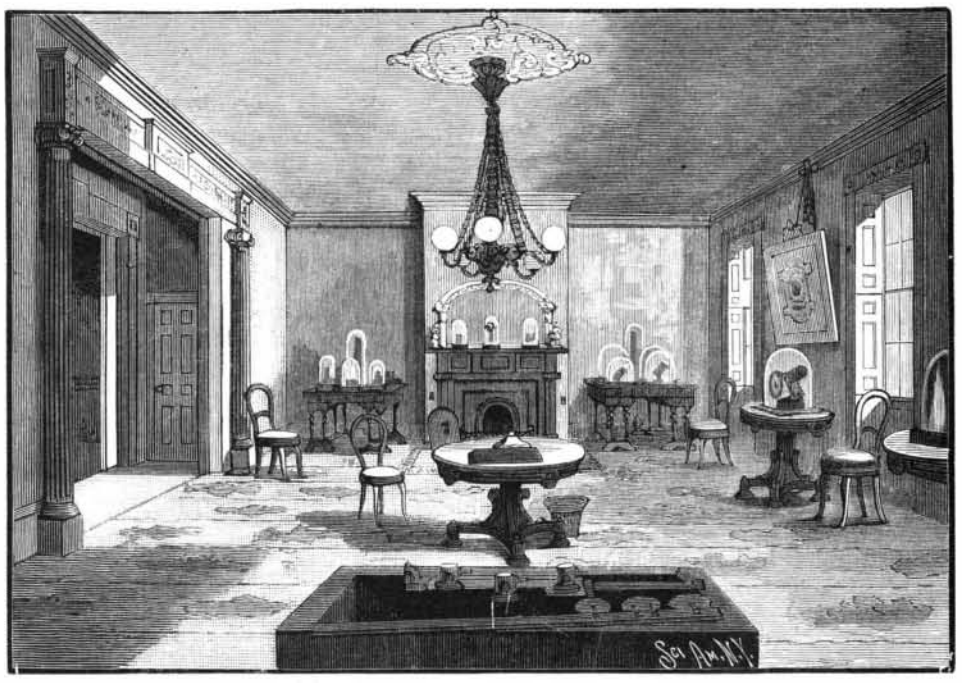
mode of its practical application, tending to hasten the day of its final adoption. He illustrated his ideas by the construction of a boat, 40 ft. by 8 ft., with two propellers, and we give herewith an illustration of this boat towing the barge of the Lords of the Admiralty on the Thames, in 1837. The rejection of his plans by the Admiralty, for the reason that "a boat propelled from the stern could not be steered," is said to have been the principal reason why Ericsson, chagrined and disappointed, determined to come to America. To this course he was largely persuaded by Commodore Stockton, of the U. S. navy, who secured his services afterward in the construction of the U. S. steam frigate Princeton, a vessel at the time considered by high naval authorities the best specimen of a war ship afloat.



HOUSE IN WHICH ERICSSON DIED.

The very next year after his arrival in America, Ericsson received the gold medal of the Mechanics' Institute, of New York, for a steam fire engine, which affords the subject of one of our illustrations. He had previously, however, made a practical demonstration of his acquaintance with this subject by building a steam fire engine that did valuable work in extinguishing a fire in London in 1829. From this time up to 1851, the inventor gave much attention to the development of his caloric engine. In the latter year a vessel made a trip from New York to Washington propelled by this motor, but it failed to come up to the ideas of the inventor in the development of large powers, and he thereafter withdrew it from the field of marine engineering.

Capt. Ericsson had already been a most busy worker for half a hundred years on subjects connected with scientific, mechanical, and engineering matters when the war for the Union broke out. It is easy to see how, after the years of study and costly experiment he had devoted to almost all branches of naval engineering, and for which he had received such inadequate appreciation, his mind at once grasped the great possibilities presented by the emergencies of the situation. When, therefore, the Navy Department at Washington advertised for plans for iron-clad steam batteries, the efficiency of which was then considered highly theoretical, he speaks of it as a subject which he had "thoroughly considered for years," and he "was fully prepared to present plans of an impregnable steam battery of light draught, suitable to navigate the shallow rivers and harbors of the Confederate States."



PARLOR CONTAINING HIS MODELS.

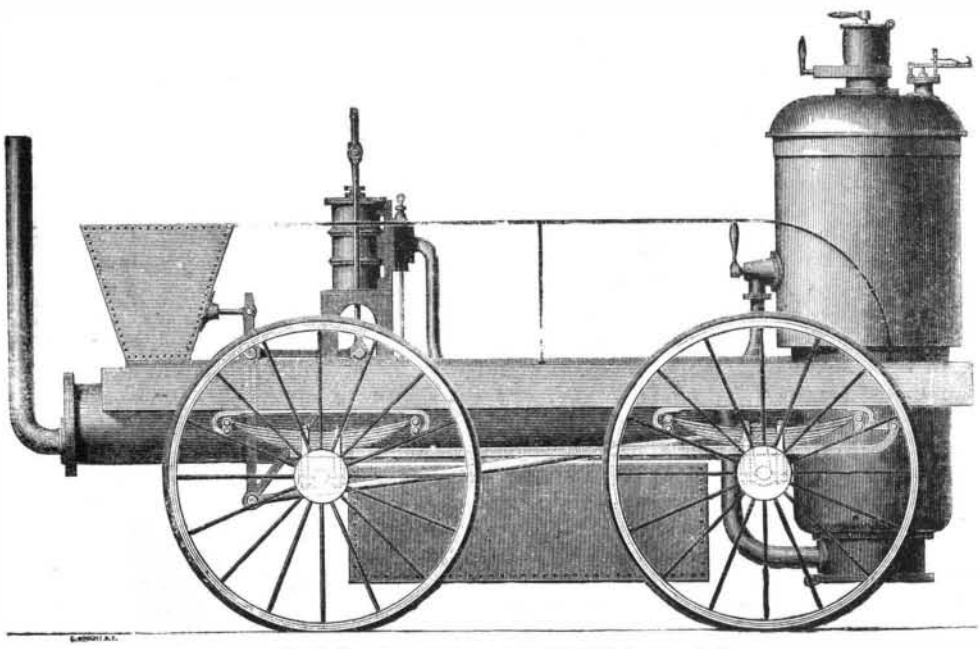
It would, obviously, be superfluous, in this place, to make any detailed reference to that memorable naval conflict between the Monitor and Merrimac at Hampton Roads, in the spring of 1862, which affords the subject of one of our illustrations. We have not yet seen the end of the revolution in methods of naval warfare which that conflict inaugurated. And as we now look upon the plans and drawings representing this diminutive and unpretending little gunboat, by the side of those called for by the great modern war ship, the comparison is the more impressive when we consider the years through which the engineer and inventor worked, without encouragement or outside countenance, to bring facts and principles now so well understood before the public.

TRIAL OF HIS PROPELLER ON THE THAMES IN 1837.

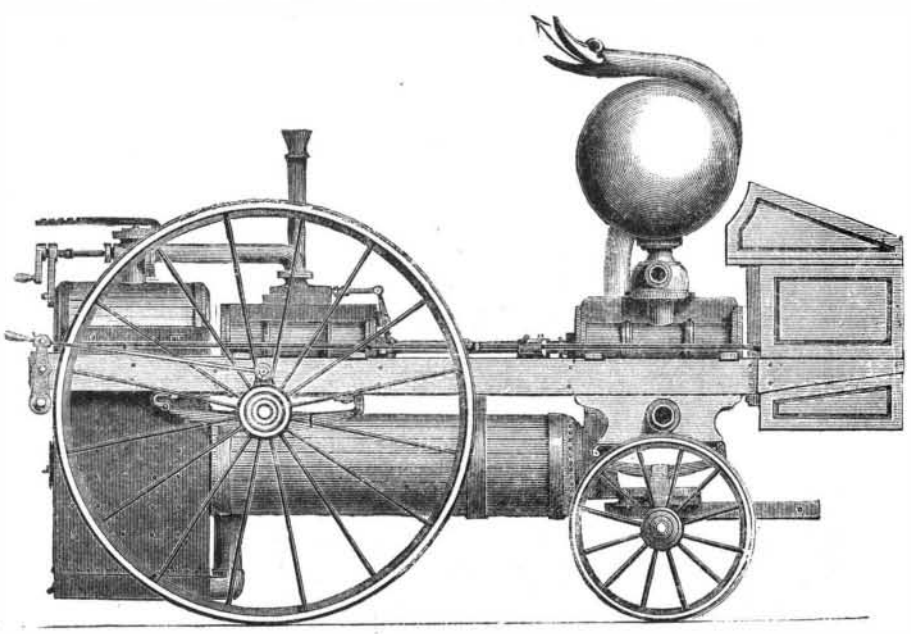
The plans of Captain Ericsson were not accepted by the Naval Board without a good deal of difficulty; but when once the direct authorization to build the Monitor had been made, he proceeded with the work with his usual energy and clearness of foresight. He divided the work among three leading establishments, with instructions that only the most skillful men should be employed, and the work continued at night whenever practicable. Each establishment was furnished with detailed drawings of every part of the structure, and so exact were these drawings, that every part sent on board fitted the place for which it was intended, and this novel craft, with battery and steam machinery complete, was launched in one hundred days from laying the keel plate.

During and after the war, Captain Ericsson continued to give great attention to the perfection of plans for subsequent Monitors adapted for sea-going, and in the latter part of 1878 his Destroyer, which forms the subject of two of our illustrations, was launched from the Delamater iron works. This is an iron vessel, 130 feet long, 17 feet wide, 11 feet deep, protected by a wrought iron breastwork of great strength near the bow, and adapted to use a submarine gun of 16 inch caliber and 30 feet length, the muzzle projecting through an opening in the stem near the bottom. The intended weight of the projectile is 1,500 pounds, including an explosive charge of 300 pounds of gun cotton. This boat is intended to supersede more costly steam war vessels, to attack bow on, and to discharge its projectile at a distance of only 300 feet from the vessel attacked. The narrow beam, almost total submergence, and great speed to be obtained in these boats would make it difficult for a great ironclad to surely guard against their approach, while it is claimed that nettings could not stop the progress of such a projectile, and armor plates two feet thick would be no protection from the shattering effects of such an explosion of gun cotton as the gun is designed to carry. In 1885, the Senate passed a bill for the purchase of the Destroyer for the United States navy, but the bill failed to become a law. The Destroyer now lies at the Brooklyn navy yard. It is said that 40 boats of this type could be built in New York City inside of 90 days, should the emergency arise calling for their use for harbor protection.

During all the later years of his life Captain Ericsson gave much attention to the production of a solar engine, making many experimental trials, but this work



LOCOMOTIVE BUILT IN ENGLAND IN 1829.

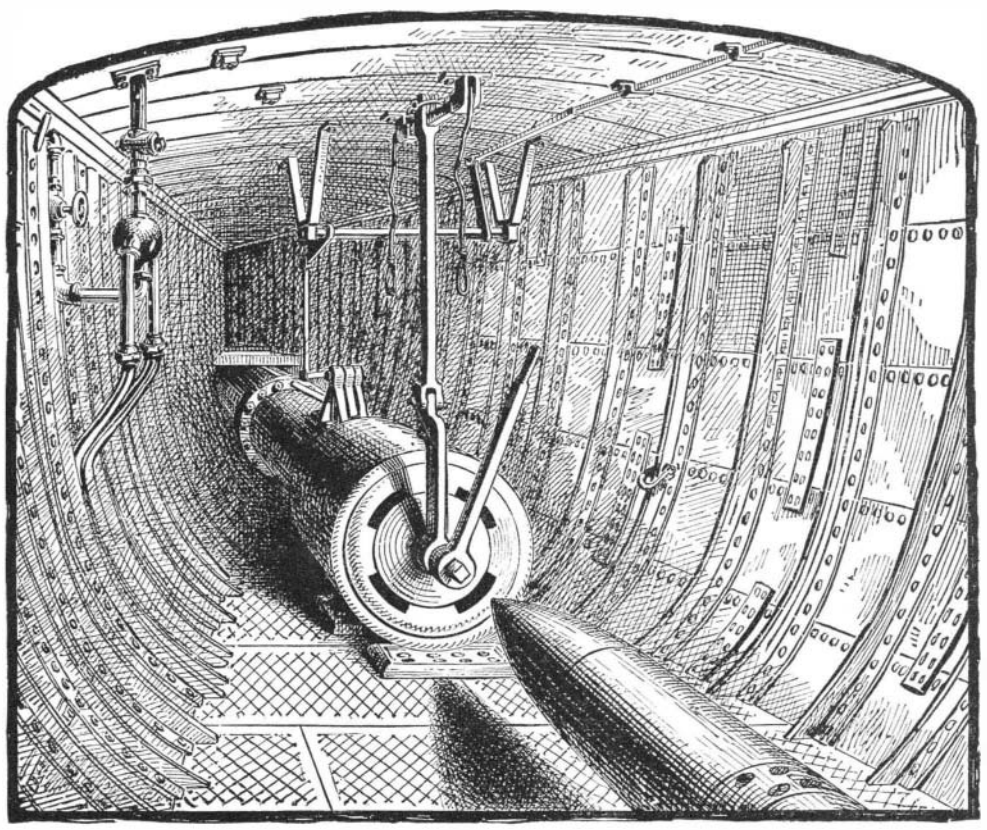


FIRE ENGINE FOR WHICH HE RECEIVED GOLD MEDAL FROM MECHANICS' INSTITUTE, NEW YORK.

was in continuation of the studies of his lifetime, in which he has principally sought to develop the theory that "heat is an agent which undergoes no change, and that only a small portion of it disappears in exerting the mechanical force developed by our steam engines." The idea has not yet been pushed to a successful solution, but in a paper published by him in 1884 he states that, with reflecting plates of 130 by 180 inches, and a steam cylinder 6 by 8 inches, he obtained a speed of engine of 120 turns per minute, with an absolute pressure on the working piston of 35 pounds per square inch. It seems quite probable that studies and experiments in connection with this sun motor occupied almost the exclusive attention of the great inventor during his last days.

The house in Beach Street, New York City, where Captain Ericsson died, and where he had lived for more than twenty years, forms the subject of three of our illustrations, one view representing the back parlor on the first floor. His workshop was the front room on the second floor, facing the great freight depot, which took the place of a beautiful park that existed there when he first took up his abode here. During his last years he was very careful of his time, having two assistants at his work, Messrs. Samuel W. Taylor and Valdemar F. Lassoe, who also carefully guarded him from the annoyance of intruders. It is said that he used to rise at seven o'clock in the morning all the year round. Exercising and bathing occupied the next two hours, and then he breakfasted, generally on dried brown bread prepared after a receipt of his own, two or three poached eggs, and tea with plenty of milk. He dined at four, the meal consisting of vegetables, tea, and bread, with not more than an ounce of meat. He took no other meal. He did not use tobacco nor drink wine, beer, or spirits, because he thought they were not good for him. He worked in his shop as a rule from ten or half-past ten A. M. to four P. M., and from about six to eleven o'clock in the evening, often taking his only outdoor exercise by long walks after the latter hour.

The funeral, from Trinity Church, March 11, called together an audience of citizens of distinction such as is rarely brought together, to do honor to the memory of one who had become great as an engineer and inventor. There were present delegations from the Mechanical Engineers' Society, the Union League Club, the Navy Yard, the Swedish Society, and the workmen of the Delamater Iron Works, large numbers of whom failed to gain admittance to the church.



INTERIOR OF THE DESTROYER, LOOKING TOWARD THE BOW.

The inventor received many honors from his native country, where he was held in high regard by the people as well as by the government officials. The picture which heads our illustrations represents a monument erected in 1867 to mark his birthplace, a cottage now occupied by an inspector of local mines. It is a simple granite shaft, eighteen feet high, and weighing eighty thousand pounds. On the day of its dedication work was suspended in the mines and iron furnaces, and workmen gathered from all the surrounding country to make a gala day of the event.

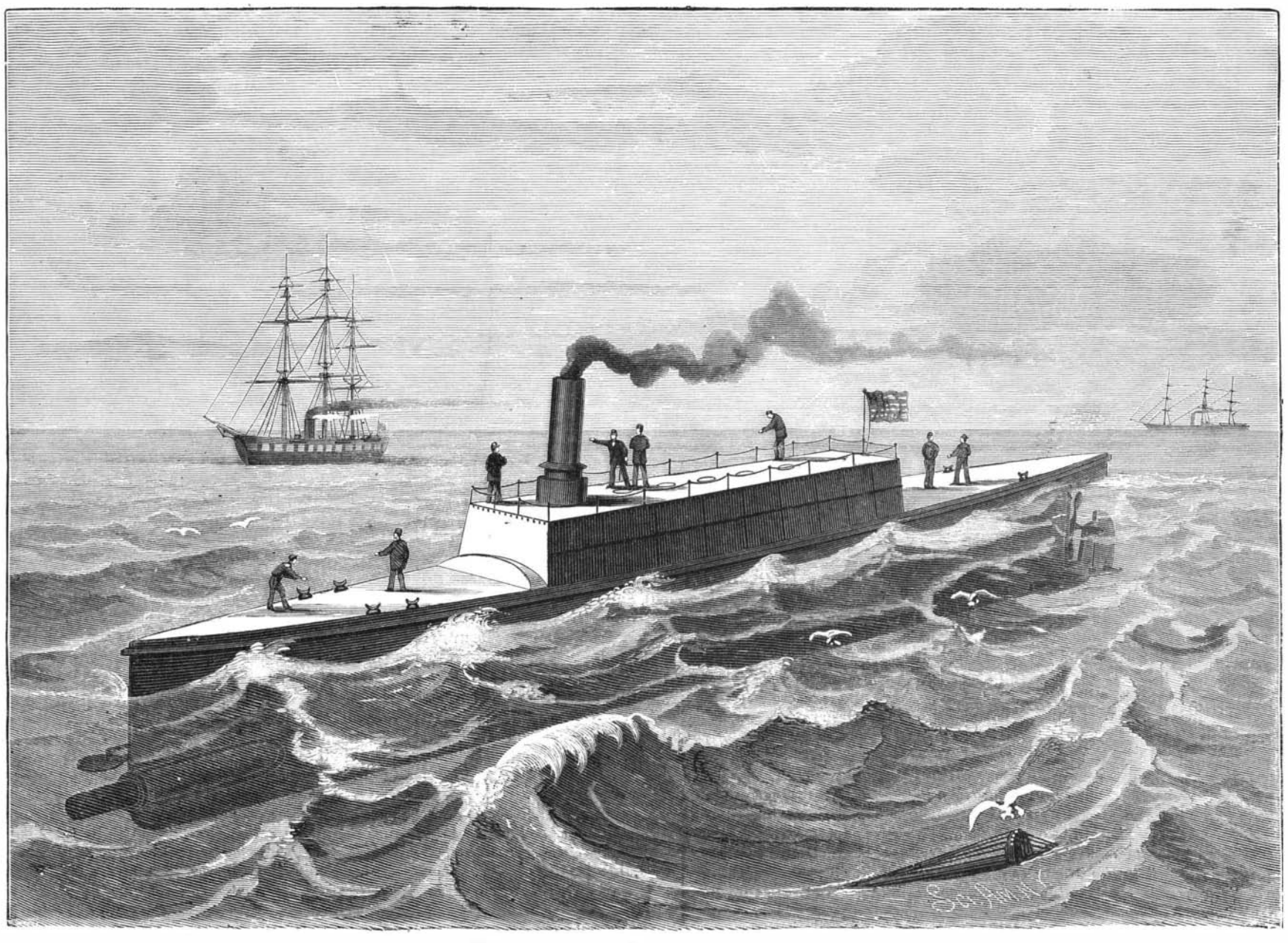
We are indebted to Col. W. C. Church and the Century Co. for some of the facts and several of the illustrations in this article.

A Mile a Minute and Faster than the Wind.

There has been splendid ice boating from Carthage Landing to Fishkill for several days on the flats, and a rattling race was sailed there recently. The course was two miles and a half from Carthage Landing to a turning stake and return. The wind was blowing strong west-southwest (velocity probably 25 miles per hour) and the ice was in splendid condition.

The starting boats were the Ranger, owned by Merritt Bros., B. W. Van Voorhees, owned by Mr. Pinkney, and the North Star, owned by Mr. Isaac Miller. The judge and starter was Robert Dunwoody. Quite a number of people witnessed the contest. The three boats got away evenly, and bore away east of south, the Ranger taking the lead right away, followed closely by the Van Voorhees, North Star being a close third. It was a lifting breeze for the two latter, but the Ranger, being a lateen, stayed down to her work, and made the turn ten seconds ahead of the Van Voorhees, North Star rounding third, five seconds later. On the run up the river, the New York express train due here at 1:58 P. M. was passed by the Ranger at lightning speed almost, the Ranger beating the Van Voorhees in handily, all three boats making the race in the following order: Ranger, 5 minutes; B. W. Van Voorhees, 5:20; North Star, 5:22.—*Poughkeepsie Eagle.*

A RECENT writer says that those nations which are given to the cultivation of vocal music are strong and vigorous, with broad, expansive chests. Vocal music is a good lung exercise; it increases expansion of the lung tissue; it calls into action the entire lung, thus making the apices less likely to develop organic disease. —*Dr. Busey, Virginia Medical Monthly.*



THE TORPEDO BOAT DESTROYER AT SEA.

Natural History Notes.

The Voice of the Lark.—Mr. J. S. Wood says, in the *Naturalist:* "The lark ascends until it looks no larger than a midge, and can with difficulty be seen by the unaided eye, and yet every note will be clearly audible to persons who are fully half a mile from the nest over which the bird utters its song. Moreover, it never ceases to sing for a moment—a feat which seems wonderful to us human beings, who find that a song of six or seven minutes in length, though interspersed with rests and pauses, is more than trying. Even a practiced public speaker, though he can pause at the end of each sentence, finds the applause of the audience a very welcome relief. Moreover, the singer and speaker need to use no exertion, save exercising their voices. Yet the bird will pour out a continuous song of nearly twenty minutes in length, and all the time has to support itself in the air by the continuous use of its wings."

The Age of Animals.—Mr. Pouchet publishes in the *Siecle* the following reflections upon the age of animals: This question, except for domestic animals, is somewhat obscure, and is full of difficulties. The example of the elephant that the Jardin des Plantes has just lost proves nothing. The animal, as well known, died of phthisis at the age of about forty years, and in the prime of life.

We know of no rule that permits of conjecturing, outside of direct experience, the length of animals' lives. The stature, which regulates in so precise a manner the length of gestation (which is so much the longer in proportion as the animal is larger), furnishes no clew to the duration of life. The horse, which surpasses man in bulk, lives to a much less age, and the same is the case with the dog and the other domestic animals. Is this a consequence of the conditions of artificial existence in which they are kept by man? This does not seem very probable, but, on another hand, we have no idea that permits us to form conjectures, even, as to the age that animals may reach in a wild state. What appears probable is that each carries in itself the faculty of living for a period of time sensibly equal (aside from accident) to that of the other animals of its species—a time that varies with each one in particular, but without there being anything that can teach us in advance upon this point. At all events, man and the warm blooded quadrupeds, even the elephant, seem in this respect far from being the best favored.

As regards insects, we are much better informed. Many butterflies see but a single spring. The egg hatches, the caterpillar develops, the butterfly takes wings, couples, lays eggs, and dies. The egg passes through the winter, and in the following year gives a new generation, which will live neither a longer nor a shorter length of time.

The Cunning of Swallows.—Birds are often said to possess instinct, as distinguished from intelligence, by which is meant, apparently, that such knowledge as they have is inherited, not acquired. "A bird always builds its nest in one way," it is said, but few statements could be less exact.

Our common cliff swallow, known also as the eaves swallow and the "Republican," formerly built against the face of a cliff, and as a protection against the weather, the nest, instead of being open at the top, was bottle shaped, the entrance being through a kind of neck at the side. Now that the country has become populous, however, this swallow has taken to nestling under the eaves of barns, where it is shielded from rain by the overhanging roof.

Little by little, therefore, the wise bird has given up its more elaborate method of construction, till now you may see, side by side, nests that are simple mud saucers, nests that are built in the old fashioned bottle method, and nests half way between the two extremes, showing plainly that a process of adaptation is going on.

A Pennsylvania newspaper lately reported a very clever piece of work by a pair of these same eaves swallows. They had built a nest in the old style under the eaves of a barn, and when it was done an English sparrow took possession.

The swallows made frantic efforts to dislodge the intruder, but could not drive her out. Then they went deliberately to work and plastered up the neck of the bottle with mud, burying the sparrow alive, after which they built another nest close by and occupied it as if nothing had happened.

The Laughing Plant.—Palgrave, in his work on Central and Eastern Arabia, mentions a plant whose seeds produce effects analogous to those of laughing gas. The plant is a native of Arabia. A dwarf variety is found at Kasum, and another variety at Oman, which attains a height of from three to four feet, with woody stems, wide-spreading branches, and light green foliage. The flowers are produced in clusters and are yellow in color. The seed pods contain two or three black seeds of the size and shape of a French bean. Their flavor is a little like that of opium, the taste is sweet, and the odor from them produces a sickening sensation and is slightly offensive. These seeds, when pulverized and taken in small doses, operate upon a person in a very peculiar manner. He begins to laugh loudly and boisterously, and then sings, dances, and cuts up all kinds of fantastic capers. The effect continues about an hour, and the patient is extremely comical. When the excitement ceases, the exhausted individual falls into a deep sleep, which continues for an hour or more, and, when he awakens, he is utterly unconscious that any such demonstrations have been made by him.

Why the Cat is not Harmed by a Fall.—It is quite wonderful to see a cat jump from a height. It never seems to hurt itself, or to get giddy with the fall. It always lands on its feet, and these are so beautifully padded that they seldom or never get broken. Why does not the animal get a headache after its jump? Why does it not receive a concussion of the brain, as a man or a dog would if he performed a similar acrobatic feat? To answer this, we must examine a cat's skull, when we shall see that it has a regular partition wall projecting from its sides, a good way inward, toward the center, so as to prevent the brain from suffering from concussion. This is indeed a beautiful contrivance, and shows an admirable internal structure, made in wonderful conformity with external form and nocturnal habits.

Preserving the Colors of Flowers.—A process of preserving the colors of flowers in dried specimens, as used in Berlin, consists in steeping the plants in a solution of sulphurous acid containing one-fourth of its volume of methylated spirit. Delicate flowers require an immersion of but five or ten minutes, and thick leaves as much as twenty-four hours. They are then removed, the fluid is allowed to evaporate, and the plants are dried between paper in the usual way.

The Hippopotamus, says *Popular Science*, seems destined to become extinct within the next twenty years. So many of the animals have been exterminated by the natives and sportsmen that they are now scarcely to be met with.

The Poison of Eels.—It appears from a communication made to the *Regii Lincei*, at Rome, that eels and murenæ possess a poison similar to that of vipers. In them, it is not found in the mouth, and they have no organ for inoculating their enemies with it. So it is usually without any effect upon man, because in the eel eaten by him as food the poison is destroyed by the heat of cooking, and also because, as is the case with the venom of the viper, it has no effect upon the digestive ways.

The Fur Dog of Mantchooria.—Miss Gordon Cumming has an interesting article in a recent number of *Blackwood's Magazine* on the various uses to which the dog is put among different peoples.

Among other varieties, she describes one which is bred in large numbers in Mantchooria for the sake of its skin and fur. The breeding of this dog on farms devoted to the purpose is carried on just as regularly there as is that of sheep in Australia. The fur of the dog attains its greatest value among the breeders when the animal is eight months old, during the winter succeeding its birth. This is the age at which the animals are killed, only those being preserved that are designed for breeding purposes. The dog farms are found in the vast territories of Northern Mongolia and Mantchooria. There are thousands of them on which hundreds of the animals are raised specially for the market. On most others, the owners are satisfied to raise only the number of dogs necessary to keep up the wardrobe and the supply of carpets for the house. The Mantchoorian race of dogs is certainly the most beautiful one that exists as regards the fineness and silkiness of its coat.

The Weather Plant.—It is a well known fact that a number of plants are more or less sensitive to present or coming atmospheric disturbances, and are consequently called sensitive weather plants. A newly discovered and very sensitive weather plant has been made a subject of special study in relation to weather probabilities by Mr. J. F. Nowack, a chemist, in Bohemia. The plant in question has been observed and tested during the last three years, and has indicated the weather fully two days in advance with surprising accuracy. This plant was originally cultivated from seeds obtained from the tropics, and, according to Professor Weiss, of Prague, its anatomical structure is similar to that of the sensitive tropical Mimosæ (to which it seems to be allied), and its leaves are provided with movable joints to permit of their bending easily in either direction. Professor Weiss finds in the upper sides of the leaves a substance which has not yet been found in other plants, and which is thought to be the actuating force. This substance is at present under observation.

The Effect of Earthquakes upon Animals is discussed by Professor Milne in a recent number of the Proceedings of the Seismological Society of Japan. It is known in a general way that animals exhibit great terror during these phenomena, even fishes taking part in the general alarm. The terrified dogs, cats, horses, and cattle endeavor to get away, knowing full well that something abnormal is taking place. Sometimes, even, they become restless previous to the earthquake. Hogs, dogs, and geese seem to be more sensitive than other animals, and according to the Japanese, moles become exceedingly active before the event. The frogs cease to croak, the horses begin to neigh, and the pheasants screech. This is not because these animals are endowed with any divinatory faculty whatever, but it is probable for the reason that they feel the first slight tremors that habitually precede the heavy shock. The inhabitants of earthquake regions so well know the susceptibility of animals that, since the great earthquake of Calabria, the inhabitants take to flight as soon as a horse neighs or a hen clucks. Sometimes, again, the shocks are preceded by a great mortality among mice, rats, or fish. This is doubtless due to the eruption of poisonous vapors. Among other precursory signs of earthquakes learned from animals, Professor Milne mentions that of the exodus of certain creatures, such as rats and dogs, and the presence of flocks of restless birds.

Classification of Ferns.—As perhaps no species of fern exists which has not, in different classifications, successively belonged to several genera, Mr. G. Colombe, confining himself to French species, has endeavored to find out whether any anatomical characters exist that permit, concurrently with the external morphological ones, of establishing more sharply defined groups. He has found that the most constant characters, and, at the same time, the most easily observed ones, are offered by the form of the transverse section of the wood in the vascular bundles of the stipe, and which, from their peculiar constitution, Mr. Van Tieghem has recently named *stelæ*.

The Ancestors of the Dog.—Mr. M. Boule, in a note to the French Academy on the predecessors of the present Canidæ, shows that, in the Miocene epoch in France, there were animals that offered some affinities with the dogs. In the Quatenary epoch, numerous species are found, and these seem to be identical with the present species. The deposits between the middle Miocene and the Quaternary furnish but a small number of data. Upon studying the remains of dogs taken from the Pliocene formation of Puy-de-Dome and Velay, Mr. Boule has found that, far previous to the Quaternary epoch, the Canidæ offered a large number of species, and that these latter already realized the types of the present wolves, foxes, jackals, and dogs. The *Canis Borbonicus* of Perrier, while offering some affinities with the civets, may be considered as an ancestral form of the foxes. The *Canis Etrascus* was a very near relative of the present wolves. Another species had the dental formula of the cuon. Finally, a jaw from the Pliocene near Puy exhibits the characters of certain races of domestic dogs.

In the presence of such facts as these, it becomes difficult to admit, as has often been done, that all our races of domestic dogs are but artificial modifications of their congeners, the wolves and jackals.

A Mammoth Elevator.

The Canadian Pacific's new grain elevator, just completed at Fort William, on Lake Superior, Elevator B, as it is called to distinguish it from the first elevator built there by the Canadian Pacific Railway Company, has a capacity of 1,400,000 bushels. There are 14 elevating legs, each capable of elevating 7,000 bushels per hour. Each of these legs is furnished with a self-cleaning boot, the invention of W. J. Loss, the company's Superintendent of Buildings. Owing to a provision having to be made for tightening the belt which carries the elevating buckets, there has always been a certain amount of grain remaining in the boot, which requires to be frequently cleaned out by hand, and always so when changing from one grain to another.

This boot has an ingenious arrangement, by which a shield is attached to the frame carrying the pulley. This shield is always just kept clear of the buckets, no matter what position the pulley takes in the boot while tightening the belt from time to time. Grain men will understand the advantages of always having a clean boot to start elevating with.

The whole of these legs are driven by friction clutches attached to the shafting, two lines of which are run the entire length of the elevator. These two lines of shafting are driven by a single massive seven-ply rubber belt 56 inches wide and over 300 feet long. This method was first tried in Elevator B at Montreal, and found to work so satisfactorily that it was decided to accept the same arrangement at Fort William. This elevating machinery, with the steam shovels, will enable a train of 16 cars to be unloaded and stowed away in the bins in twenty minutes.

MR. SYLVESTER BAXTER, lecturing recently at the Old South Church, Boston, on "Berlin," is quoted in *Modern Light and Heat* as saying: "It is the most splendid city on the Continent. It is a model city, and has everything best of its kind. It has the most brilliantly illuminated streets of any city in the world. There are over 10,000 telephones in use. The long distance telephone is being rapidly introduced. There is a pneumatic tube service for delivery of parcels, letters, etc., a great improvement over our special delivery. This, in connection with the telegraph and telephone, is run by the postal service. The city railway is elevated, and a great convenience. The street cars only stop at stated points."

Heart Diseases.

Under the title, "Is the American Heart Wearing Out?" Prof. J. W. Darling, M.D., of the New York Homœopathic Medical College, recently read before the New York State Homœopathic Medical Society a paper which is of considerable interest and value, in view of the numerous deaths attributed to heart failure that have occurred in recent years in this country.

Dr. Darling states that disease of the heart is certainly either more common among us than formerly or else the physician of the past failed to recognize this malady when it did exist. The object of his paper is to fathom the causes of the terrible mortality due to cardiac trouble, to call attention to the indiscretions that give rise to certain forms of the malady, to show how persons suffering from organic heart disease can, by their own unaided efforts, prolong their days, to account for heart failure as the cause of death in many diseases which, without this factor, would be recovered from, and to explain some of the most common forms of heart disease and correct certain misconceptions with regard to them, for it is popularly supposed that there is but one form of heart disease, and that invariably fatal.

At the outset, the author states, as the result of his long experience and special study, that cardiac disease is not necessarily fatal; that many apparently grave forms are entirely recovered from; that enlargement of the heart is not in itself a disease; that with serious valvular disease developed in childhood, patients have been known to live to be aged men and women; and that, with a large majority of those supposed to be suffering from disease of the heart, that organ is, in reality, perfectly sound, and, if affected at all, is suffering secondarily to functional disturbances of organs remote from the heart, and which are capable of proper hygienic measures.

Diseases of the heart may be divided into two general classes: those originating from an inflammatory process within the heart and those originating from without. In addition to these may be mentioned certain nervous affections of the heart which are secondary to disturbances elsewhere, which subside with the removal of the cause.

The first class of cardiac diseases are common to all periods of life; they involve almost exclusively the left side of the heart, and more frequently the mitral valve, and result from an inflammation of the lining membrane, the indocardium. This inflammation is more intense along the edges of the valves, the tips of which subsequently develop a growth of fibrous tissue which causes a permanent deformity of the valve or orifice—"valvular disease of the heart"—the result being a permanent obstruction at that point.

A person suffering from valvular disease is crippled, "but," says Dr. Darling, "if the nutrition of the heart be good, by avoiding indiscretions and adopting an occupation that does not require great physical strain, by living on a level, as it were, life may be prolonged in comfort for many years. All are liable to the diseases producing this form of heart lesion, whether their lives are good or bad, discreet or indiscreet, but not equally liable by any means.

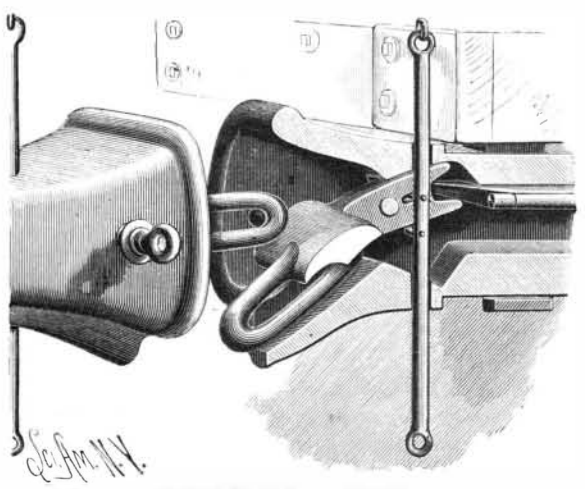
Heart diseases of the second form are, save in exceptional cases, the direct result of hereditary influences or of indiscretions in life, and by proper knowledge and precautions can, in the majority of cases, be avoided; or, if already established, be checked in their progress. The predisposing causes of this form of disease are long continued mental work, and such indiscretions as the habitual use of wine or excess in the eating of food highly charged with nitrogen (such as beef, mutton, and venison), which bring about conditions of the digestive organs, especially of the liver, that result in arterial changes which cause the heart to fail long before it should. The author unhesitatingly asserts that the forms of heart disease which kill so suddenly, and which do not result from endocarditis, or the presence of a specific poison in the blood, arise in nearly every instance directly from the pathological condition known as "gouty diathesis," or lithæmia, due to certain disarrangements of the liver. Conceding that liver disturbance is the primary cause of the premature wearing out of the heart, it is proper to ask: What mode of life will prevent these diseases? and, When they do exist, how shall a life be regulated so as to avoid sudden death, or the rapid failure of that most vital of all organs, the heart? The answer to the first question is simple enough: A discreet life, temperance in all things, and particularly the avoidance of the above mentioned indiscretions, especially the habitual use, even in moderation, of stimulating drinks, and the ingestion of too much meat. In answer to the second question, the author quotes approvingly the three following rules laid down by Dr. George Harley: (1) Take exercise without fatigue, (2) nutrition without stimulation, and (3) amusement without excitement.

Alcohol.

The death rate in the case of brewers, commercial travelers, and other classes exposed to the temptation of frequent alcoholic drinking is six times greater than in all the other industries combined.—*Medical Review.*

AN IMPROVED CAR COUPLING.

A car coupling designed to be automatic in its operation, and adapted to couple with drawheads of different heights, has been patented by Mr. Samuel Byrne, of No. 158 Robert Street, Toronto, Canada, and is illustrated herewith, our engraving showing a plan view partly in section, with two drawheads in the act of coupling. The link is held to swing horizontally in the middle of the drawhead, and is formed with an extension pivoted in the back of the drawhead. The extreme inner end of the extension is forked, and adapted to be engaged by a weight swinging from above it in the center of the drawbar, the forks of the rear end straddling the weight to hold the link in an inclined position in relation to the longitudinal axis of the drawhead. Instead of the weight, a spring may be employed to accomplish the same purpose. On one side of the link, in front of its pivot, is a curved plate, extending vertically in the drawhead opening, and adapted to be engaged by the link of the other drawhead. On top of this curved plate is an outwardly extending flange, on which rests the lower end of the coupling pin. The rear end of the link extension is engaged by a pin on the under side of a rod sliding in horizontal bearings, to the ends of which may be attached chains extending to the sides of the car. In coupling two cars, the coupling pins are placed in their uppermost position, both pins being supported on the outwardly extending flanges of the respective drawheads. The operator then, by means of the horizontal rod, swings the extension and its link into the position shown at the left in the illustration, causing the coupling pin to drop and hold the link in longitudinal position, adapted to engage the curved plate of the link in the other drawhead as the cars come together, the link of the other drawhead being thereby swung outward into its recess, while the coupling pin drops into the front end of the entering link.



BYRNE'S CAR COUPLING.

A New Deodorant.

Bromine has for a long time been recognized as being valuable in the treatment of gangrene and foul-smelling ulcers; but until recently its merits as an effectual and cheap deodorant have not been appreciated, according to the *New York Medical Journal.* It was brought into prominence a few months ago by Mr. Martin, the chemist of the Health Department of this city, who suggested its use upon the earth thrown up in laying the electric subways. As it is a by-product obtained in the manufacture of salt, and is not used extensively in the arts, it is sold at a very reasonable price—about seventy cents per pound. It has the property of precipitating the hydrocarbons of illuminating gas, and thus can be used to deodorize the earth exposed in excavations in the vicinity of gas mains. More valuable than this is its effect upon decomposing organic bodies, which it renders completely inoffensive. This property renders it particularly valuable for use in stables, privy vaults, urinals, cesspools, or in any place which may contain foul-smelling organic matters. It is soluble in about thirty-three parts of water; but a solution of this strength is not advisable, as there is a constant escape from it of the vapor of bromine, which is very irritating to the eyes and air-passages, and which may even attack wood and metals. For ordinary purposes it is used in solutions containing one part by weight to about eight hundred of water. In this strength it may be used freely without its affecting anything which it may touch. A few gallons used daily will remove all ammoniacal odors from stables, or a few quarts will thoroughly deodorize the entire plumbing system of an ordinary house. It also might be used with advantage upon ordinary house garbage, which usually becomes offensive so speedily in warm weather. There would appear to be scarcely any limit to its usefulness in this branch of sanitary science; and it will, as soon as its merits are better known, undoubtedly be adopted universally as a substitute for the deodorants now in use, which usually act by substituting one unpleasant odor for another. The only drawback in its use lies in the fact that the undiluted bromine is strongly corrosive, and, if it touches the skin, causes a painful burn. Where it is used in large quantities, this can be obviated by opening the bottle, or, what is simpler, breaking it, under water. As its use becomes more extended, it will undoubtedly be put up in pearls or tubes containing only as much as would be needed at one time in the average household.

The United States Navy.

Our readers are aware that the United States have determined upon making great additions to their navy. At the same time a navy is not built in a day, even by American energy; and it will be seen from the details which we are about to give that a good deal has yet to be done before the country will possess a navy of even respectable importance from a European point of view. The additions to the American navy may be divided under two heads, the first comprising unarmored vessels and the second armored vessels. Of the unarmored vessels, four are already in commission, viz., the Dolphin, 1,485 tons and 2,240 horse power; the Boston, 3,189 tons and 3,780 horse power; the Atlanta, 3,189 tons and 3,350 horse power; and the Chicago, 4,500 tons and 5,084 horse power.

The Dolphin carries one 6 in. rifle gun; the Boston, two 8 in. rifle guns and six 6 in. rifle guns; the Atlanta, two 8 in. rifle guns and six 6 in. rifle guns; and the Chicago, four 8 in. rifle guns, eight 6 in. rifle guns, and two 5 in. rifle guns.

Five other unarmored vessels were recently launched, and will shortly be put in commission, viz., the Charleston, 3,730 tons and 7,000 horse power; the Baltimore, 4,413 tons and 9,000 horse power; the Yorktown, 1,700 tons and 3,000 horse power; the Petrel, 890 tons and 1,100 horse power; and the Vesuvius, 725 tons. The last named vessel is a dynamite cruiser, which is expected to steam at the rate of 20 knots per hour.

The Charleston will carry two 8 in. and six 6 in. rifle guns; the Baltimore, four 8 in. breech-loading rifle guns and six 6 in. breech-loading rifle guns; the Yorktown, six 6 in. breech-loading rifle guns; the Petrel, four 6 in. breech-loading rifle guns; and the Vesuvius, three 15 in. dynamite guns. In her trial trips before a board of United States naval officers, the Vesuvius has developed a speed of nearly 21½ knots per hour, so that she has more than realized the anticipations and estimates made respecting her. Her three 15 in. dynamite guns will render her one of the most formidable vessels in the American navy.

Six other unarmored vessels are being built, viz., the Newark, 4,083 tons burden and 8,500 horse power; the Philadelphia, 4,324 tons, and to attain a speed of 19 knots per hour; the San Francisco, 4,083 tons, to attain a speed of 19 knots per hour; the Concord, 1,700 tons and 3,400 horse power; the Bennington, 1,700 tons and 3,400 horse power; and a first class torpedo boat, not yet named, 99 tons, to steam at the rate of 23 knots per hour.

The Philadelphia is to carry twelve 6 in. breech-loading rifle guns; the Concord, six 6 in. breech-loading rifle guns; the Bennington, six 6 in. breech-loading rifle guns; and the torpedo boat, eight locomotive torpedoes.

Six other unarmored vessels have only reached at present the projection stage. These vessels are a cruiser of 5,300 tons, to steam at the rate of 20 knots per hour; two other cruisers of 3,000 tons each, to steam at the rate of 19 knots per hour; two other cruisers of 2,000 tons each, the speed of which is still unsettled; and a practice ship of 800 tons.

As regards the new armored vessels of the United States navy, they are in a less forward state than their unarmored contemporaries. There are seven armored ships at present being built, viz., the Maine, 6,648 tons and 9,000 horse power; the Texas, 6,300 tons and 8,000 horse power; the Puritan, 6,060 tons and 3,058 horse power; the Terror, 3,815 tons and 838 horse power; the Miantonomoh, 3,815 tons and 1,030 horse power; the Amphitrite, 3,815 tons and 1,000 horse power; and the Monadnock, 3,815 tons and 3,000 horse power.

The Maine will carry four 10 in. and six 6 in. breech-loading rifle guns; the Texas, two 12 in. and six 6 in. breech-loading rifle guns; and the Puritan, the Terror, the Miantonomoh, the Amphitrite, and the Monadnock will each carry four 10 in. breech-loading rifle guns. Plans have been prepared, but the building has not yet been commenced, of a vessel intended for coast defense. She is proposed to be of 4,000 tons burden and 5,400 horse power. This at present unnamed vessel will carry one 16 in. 115 ton breech-loading rifle gun, one 12 in. 48 ton breech-loading rifle gun, and one 15 in. dynamite gun. An armored cruiser not yet named, and proposed to be of 7,500 tons burden, is also in contemplation, but has not yet been commenced.

In closing these details, we may add that Great Britain has now 10 war vessels of 3,000 tons and upward, with a minimum speed of 19 knots per hour; the United States, 8; France, 5; Spain, 3; Japan, 2; and Russia, 1. The United States, accordingly, now claim that in the important matter of high speed war ships they now rank second, and are not far behind Great Britain. The Americans are, in fact, going in heavily for high speed cruisers.—*Engineering.*