### THE UNITED STATES WAR SHIP ATLANTA RAMMING A DERELICT.

A prominent feature in the construction of all modern war ships, as is well understood, is the ram prow, for use in the sinking of opposing vessels in actual warfare. With this purpose in view, the stem or ram proper projects some distance forward below the water line, and is made exceptionally strong, being also strongly braced and supported in the forward compartments of the vessel. The utility of such construction for the purpose designed received a partial illustration in the ramming, on August 4, of a derelict, or floating wreck, by the United States war ship Atlanta, which forms the subject of the spirited illustration on our first page. The vessel rammed, the Golden Rule, floating at random in regularly traversed waters, was a danger to commerce, and on this account Captain Bartlett, of the Atlanta, determined to destroy her. The captain says: "We were steaming along at a fair rate of speed when the officer on watch sighted the derelict vessel. We speeded up and struck the wreck about amidships, going through her like cutting through cheese." The wreck, however, although thus cut in two, was not entirely sunk, having been very light and high out of water, her cargo having been empty barrels, but her capacity for inflicting damage on other vessels must have been greatly lessened. It was at first erroneously reported that the Atlanta herself had been seriously damaged, but on this point Captain Bartlett says:

"As is customary after ramming, we made a careful examination of the whole ship, including our engines, and it was discovered that the key in the crank shaft of the high pressure engine was loose, and was within an eighth of an inch of falling off. We immediately stopped the engines. If we had run ten—yes, perhaps five—minutes longer the crank would have slipped off. We then shut off the high pressure ports and made for Newport with the low pressure engine."

A recent report from the Naval Hydrographic Office affords some interesting information as to the large number of dangerous derelicts on the ocean. During the seven years 1887 to 1893 the office received 5,024 reports concerning a total number of 1,628 derelicts, of which number 482 were identified and 1,146 unidentified. The average number of derelicts constantly afloat is estimated to be 232 annually, or about 19 per month. Statistics compiled from the reports received show that the average period a derelict is afloat after having been abandoned is about thirty days. The dangerous character of these derelicts is illustrated by the fact that in this period of seven years there have been forty-five collisions with them, which caused the total loss of nine vessels and considerably damaged seventeen others. Seventy derelicts have been destroyed, one by torpedoes and the ram of the United States steamer San Francisco and sixty-nine by fire. Seven other attempts to destroy derelicts by fire are considered to have been unsuccessful, as the derelicts remained afloat for some time after having been set on fire. Five of these seven had cargoes of lumber that had become so waterlogged as not to be inflammable; the other two were in ballast. In the cases of the sixty-nine attempts regarded as successful the fact that these derelicts were never seen subsequent to the time they were set on fire is regarded as sufficient proof of their destruction.

The best known of all derelicts upon the ocean seems to be the schooner Fannie E. Wolston, abandoned October 15, 1891, and since reported forty-four times. She has been a derelict 1,025 days, during which she has drifted 8,575 miles, and is supposed to be afloat yet.

### Photographing the Effects of Telephone Vibrations.

A correspondent of the Manchester Guardian has written to that paper:

"The problem has been attacked in a new way by Mr. G. J. Burch, who has succeeded in making an instrument by means of which the E.M.F. of the currents generated by speaking into a telephone can be recorded photographically. These currents are too rapid to affect an ordinary galvanometer individually, and inasmuch as they flow alternately in opposite directions, their combined effect is nil. But it seems that the capillary electrometer, invented some years ago by Lippmann, has been brought to such perfection in Oxford that electrical changes occurring hundreds, and even thousands, of times in a second can be recorded by its means. The instrument consists of two glass tubes, one drawn out to a fine point and the other bent into the shape of the letter V. The latter is about half filled with mercury, and contains in one limb a few drops of dilute sulphuric acid. Mercury is poured into the other tube, and is forced, partly by its weight and partly by compressed air, into the narrow part of it, where it hangs balanced, as it were, by the force of capillarity. This tube is fixed so that its point dips into the acid in the V-tube. Platinum wires dipping into the mercury in either tube serve to connect the instrument with the circuit of the telephone.

"The smallest change in the electrical condition of the circuit instantly disturbs the balance of the capillary forces, and the end of the mercury column is driven up or down, according as the pressure of the current is toward it or away from it. These movements occur with a rapidity that the eye is unable to follow, and the instrument is perfectly dead-beat in its action—i. e., there is nothing at all resembling the oscillations of the needle, which render observations with a sensitive galvanometer so serious. In order to record these movements recourse is had to photography. The magnified image of the capillary tube is projected on to a screen in which is a narrow slit. Behind the slit a sensitized plate is made to pass with a perfectly regular motion, any rise or fall of the mercury column being recorded as a projection or a notch on the edge of its shadow. This method was introduced by Prof. Burdon Sanderson. The apparatus now employed was invented by Mr. Burch. The first photograph shown was taken seven years ago. The electrometer was connected with a telephone, near which a whistle was blown. The currents generated were so intense as to cause electrolysis, and it was evident that the movements of the electrometer had been too rapid to be properly recorded on the photograph. This led to the construction of the present apparatus, in which the plate can be made to travel at any desired rate from 6 inches to 6 feet per second.

"The next illustration was obtained by singing a falsetto note near the telephone, the electrometer having responded to the currents generated by each vibration to the number of 650 per second. From this result it was evident that the apparatus might be used for studying the sounds of the human voice in speech. The syllables 'pop-pop-pop-pop' and 'dod-od-od-od,' spoken during the passage of a plate, produced results easily distinguishable from each other and evidently characteristic of these consonants. The vowels 'a' and 'e' formed the subject of the next two photographs, and the last represented the buzzing sound of 'Z-z-z-z.' This gave a very irregular curve, and Mr. Burch stated that with the lens fine serrations could be distinguished which corresponded to from 2,500 to 3,000 double vibrations per second."

### Professor Helmholtz.

Professor Herman Ludwig Ferdinand Helmholtz, the eminent physiologist and physicist, died in Berlin September 8, from the effects of a stroke of paralysis. Professor Helmholtz was one of the foremost scientists of the century, and by his invention of the ophthalmoscope he may be regarded as a benefactor of mankind. Like Tyndall, it was not the least of Helmholtz's glory that he succeeded in popularizing the special branches of science to which he had devoted himself. Helmholtz was born August 31, 1821, at Potsdam, where his father was professor in the gymnasium. He entered the University of Berlin in his seventeenth year, and after receiving the degree of doctor of medicine at the Frederick William Institute, he became a surgeon in the Charity Hospital of Berlin and later a military surgeon at Potsdam. Medical education at the time when young Helmholtz studied was essentially a study of books, but the young student soon saw the disadvantages of the system, and a large part of his life was devoted to ameliorate these conditions. The value of the study of medicine was well expressed by Helmholtz in later life when he said: "Apart from the fact that I entered on the study of medicine at a period when any one who was even moderately skilled in physical modes of examination found a fruitful soil to cultivate, I consider the study of medicine to have been the school which taught me, as no other could have done, the eternal laws which are the bases of all scientific work."

After occupying various positions in several German universities, he was appointed in 1871 to the chair of physics in the University of Berlin. In 1887 Professor Helmholtz was invited to preside over the physico-technical institution in Berlin, founded chiefly by Dr. Werner Siemens. He accepted the call, but still retained until his death the position of professor ordinarius in the university. In 1883 the German Emperor conferred on Herr Helmholtz and his family the honor of hereditary nobility.

The greatest achievement of Helmholtz was the invention of the ophthalmoscope or eye mirror in 1851, by which the interior of the eye may be examined. This invention, which is one of the crowning achievements of the nineteenth century, has saved the eyesight of thousands. The result of his investigations was published in 1856 in a remarkable work entitled "Manual of Physiological Optics." After the ophthalmoscope, his most important work was done in acoustics and acoustic physiology. When at the University of Bonn he invented a method of analyzing sounds by the use of resonators. His great work, entitled "The Doctrine of Tone Sensations as a Physiological Basis of the Theory of Music," was published while he was professor of physiology at Heidelberg. His other works and the many papers which he contributed to scientific journals and learned societies are too numerous for mention here. Those who wish to know more of the life and works of the great scientist are referred to the SCIENTIFIC AMERICAN SUPPLEMENT 823, which contains an interesting biographical sketch by one of his pupils, Hugo Kronecker. The visit of Helmholtz to the Fair last year will be remembered by all. To-day Berlin mourns over the loss of two of her sons who died within a few days of each other. Helmholtz and Brugsch have both done much to make the learning and the educational institutions of Germany at once the wonder and envy of the world.

### Coffeeism.

The evil effects of coffee on many constitutions are matters well known. Many a case of persistent pruritus has been made to disappear by simply interdicting the use of coffee. On the other hand, coffee, taken without milk and with but little sugar, exercises the most beneficial influence in many cases of migraine, especially if a little lemon or lime juice is added to the decoction. Some weeks before his death the late Professor Charcot was in attendance upon a family composed of the father, mother, and six children, who had become the victims of an uncontrollable mental irritability upon the least provocation. Hardly a meal passed at the family board without an explosion. Upon the least pretext the father became furious, the mother scolded, and the children would give way to hysterical crying. The family were all hypochondriacal. The strangest part of the history consisted in the fact that domestics employed and residing in the family would soon partake of the general cachexia and join in the pandemonium.

In the middle ages, this house would have been considered haunted, and somebody would have been burned, or hung and quartered as having enchanted the premises. This was the nineteenth century, however, and as demons, goblins, fairies and vampires are no longer the fact, Charcot looked into the hygiene of the locality for a solution of the difficulties. On investigation he found that the father was a manufacturer and a dealer in coffee; the roasting, grinding, and packing, as well as the manufacturing of the essence and of the extract of coffee, being carried on in the lower floors of the premises. In the apartments above the odor of coffee permeated every nook; the furniture and clothing smelt strongly of coffee. The inmates were suffering from chronic coffeeism. A few weeks' residence in the purer air of the seashore and change of habitation soon brought about a change for the better.—Pacific Med. Jour.

### The Secondary Products of Combustion.

A statement has been communicated by M. Iloswa to the Bulletin de la Societe Chemique de Paris respecting certain determinations made by him of the formation of secondary products containing nitrogen by combustion in air. The author considers he has proved that, on burning in air one and the same volume of coal gas and of hydrogen, one and the same weight of nitrogen is converted into ammonia. On burning equal volumes of coal gas and of hydrogen, the nitrogen transformed into nitrous acid will also have approximately the same weight. But on burning carbon monoxide, nearly 2½ times more nitrogen is found in the state of nitrous acid than in the former case. Supposing one kilogramme of each of these gases to be burnt, the most nitrogen in the state of ammonia, and in the state of nitrous and nitric acids, is found in the product of the combustion of hydrogen; only one-fourth of the quantity being found in the case of coal gas, and about one-twentieth in the case of burning carbon monoxide. On burning wood charcoal in air, whether merely dried or heated to redness, the quantity of nitrogen contained in the nitrous and nitric acid collected is almost equal to that of the product. There is not much difference in the result of burning an equal weight of coke. The formation of ammonia during the combustion of coke or charcoal is merely a result of the decomposition of these substances. Otherwise it would be difficult to understand why the weight of the ammonia formed should vary according to the degeee of heat. On burning coal gas and hydrogen, the sum of the equivalents of the acids named is from 11 to 15 times greater than the figures of the equivalents of the ammonia. M. Iloswa remarks that hydrogen peroxide is one of the constant components of the atmosphere, and almost always accomplishes the reactions commonly attributed to ozone. He gives up as impossible the determination of atmospheric ozone upon a scientific basis.

### Wood Pavement in London.

The new Tower Bridge is paved with the wood of the eucalyptus tree, from Australia. The blocks are about the size of building bricks, and their top surface has beveled edges, thus affording horses a foothold. They are fastened together by means of pegs put through them and fitted into corresponding holes in the adjoining blocks. This wood is a dark, mahogany color, is very expensive, but heavy and durable. It was laid according to the Duffy patent system with special machinery by J. Temperley & Co., of London. Wood is replacing stone pavement in many of the London streets; but in them it is laid in a simpler and less costly manner.

### Cotton Wool in the Nostrils.

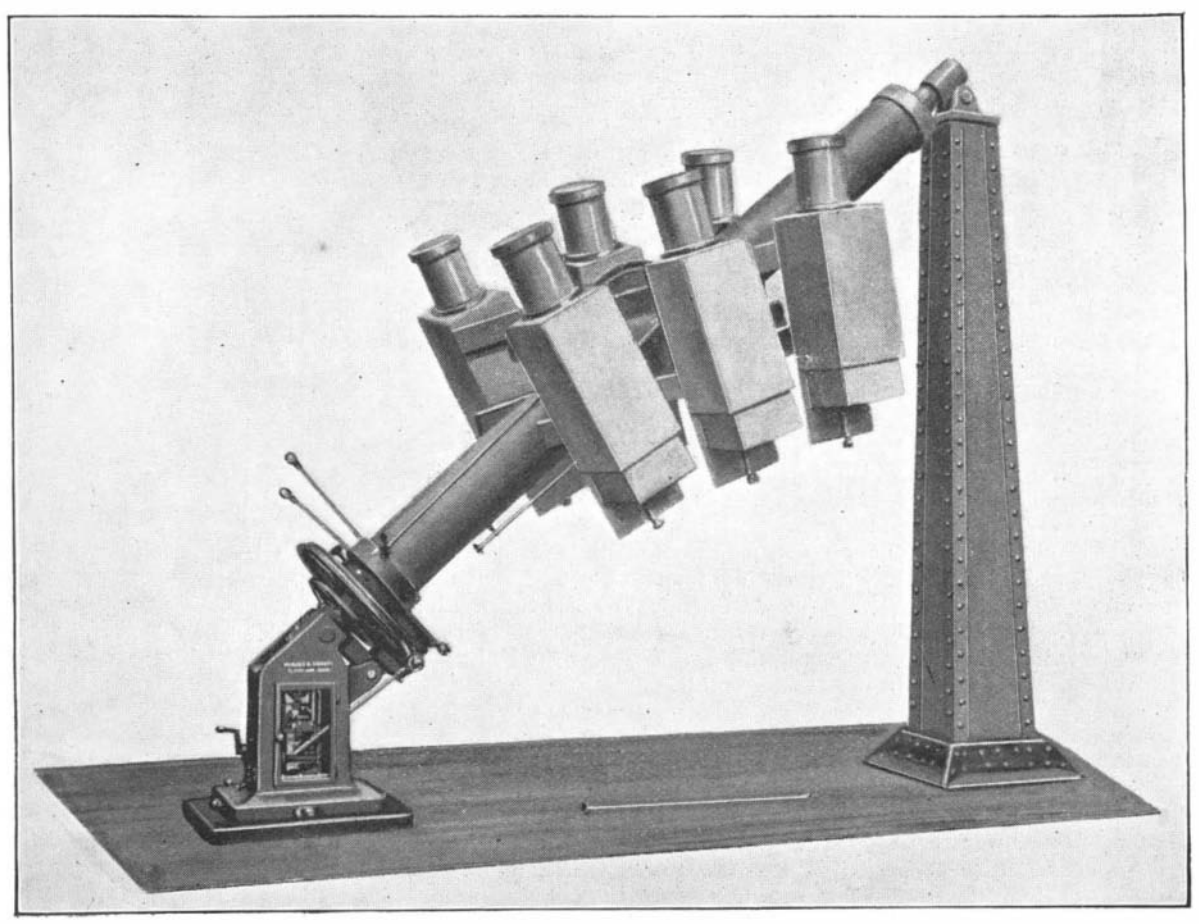
F. P. Mann, M.D., San Francisco, in the Pacific Medical Journal, writes as follows: Everybody is acquainted with the fact that nature has attempted to guard the portals of respiration through the nose by placing just within the nostrils of man or air-breathing animals a multitude of hairs. These act as a very imperfect strainer in arresting the portion of the dust and germinal matter with which the air we breathe is laden. It would also appear from somewhat extended observation and experiment that individuals whose nostrils are best supplied with hirsute growth are less susceptible to the irritating qualities of foreign material so universally distributed through the atmosphere, to say nothing of septic matter from decomposing animal and vegetable substance, bacteria, the special bacilli of various diseases, etc. Abundant experiment long ago demonstrated that cotton wool was capable of arresting germinal matter with which the air is filled. By placing within the nostrils out of sight a thin pledget of cotton not sufficiently dense to interfere with free inspiration, the air may be greatly purified. The cotton immediately becomes moistened during expiration, which adds materially to its efficiency as a filter. That thus placed it will arrest dust, particles of soot, etc., may be easily shown by introducing the pledgets and then after an hour's walk through the streets removing them, when they will be found blackened and soiled. Microscopic examination discloses quite a zoological museum of germinal matter. Prominent among the displays are found various forms of catarrhal and bronchial secretion that have been desiccated and pulverized by passing feet, thus liberating the germs which planted upon a congenial soil will produce catarrh to order.

It is not generally known that a certain variety of penicillium glaucum which often develops upon clothing stowed away in trunks or closets where dampness prevails will produce violent symptoms of influenza whenever such fungus infected articles are handled. Professor Credi, of Naples, asserts from careful observation that fifteen grains of dust from the streets of that city contains hundreds of thousands of microbic germs. Are the streets of American cities any freer from germinal matter? It is claimed for the film of cotton that it catches and holds in its meshes germinal matter. Any germs that succeed in passing through the filter are arrested by the moisture which it maintains in the anterior nares. It is probable it offers more or less perfect protection to those exposed to infectious and contagious diseases.

### INSTRUMENT FOR THE PHOTOGRAPHY OF METEORS FOR THE YALE OBSERVATORY.

W. L. ELKIN.

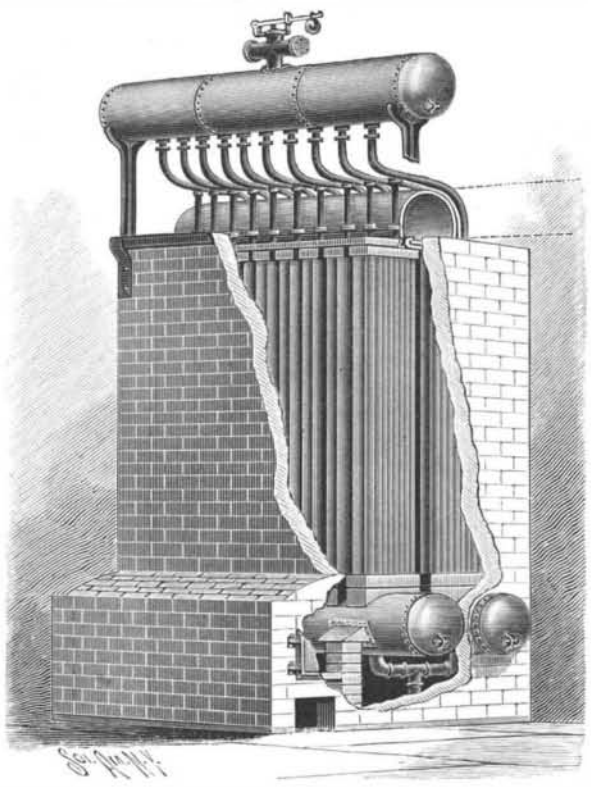
The experiments made at this observatory last year seemed to show that, if a sufficiently large field could be covered, it might be possible to secure quite a number of meteor tracks on photographic plates, during the August and December showers, at least. The incomparably greater accuracy, as against eye observations, with which these tracks locate the meteor and the radiant, has led us to consider the matter worth following up, and accordingly application was made to the National Academy for an appropriation from the Lawrence Smith fund which is to be devoted to meteoric researches From the grant awarded us the instrument represented in the cut has been constructed by Messrs. Warner & Swazey. It is a polar axis of the English form, this seeming to be the most convenient and the best adapted mounting for carrying a number of cameras, and admitting of long exposures without break. The axis is of tubular form, about 12 feet long, the ends being pivots working in bearings which are adjustable on their supports. The southern support, or base, contains the clockwork, the northern support is a column containing the driving weights, the connection being made by a cord passing under the floor. The declination axis carries arms on either end which serve as supports for the cameras. On the cut six dummy cameras are shown; it is not likely for the present, however, that we shall use more than four. Graduated aids and slow motions for both co-ordinates are provided, and the clockwork has an electric control. The apparatus is now mounted here, and will be tried on the Perseids this year.—Popular Astronomy.



INSTRUMENT FOR THE PHOTOGRAPHY OF METEORS.

### AN IMPROVED TUBULAR BOILER.

The boiler shown in the illustration is specially designed to economically produce dry or superheated



ALFONSO'S TUBULAR BOILER.

steam, and is provided with simple means for regulating the draught. It has been patented by Mr. Crecencio Alfonso, of Ranchuelo, Cuba. The furnace is at one side, and the boiler, consisting primarily of twin heaters, is supported on pillars by V-shaped flange extensions, which may be hollow and filled with water to protect them from injury by heat. A common feed pipe, with branches, supplies both heaters from below, and also serves as a brace. Casings on the upper side of the heaters have steam-tight connection with vertical water tubes in parallel rows, the upper ends of the tubes being secured to boxes forming chambers, and the water preferably covering the upper ends of the tubes, yet not entirely filling the chambers in practical operation. A steam tube from each of the boxes extends up to a steam dome, the tubes being adjacent to and a portion of them partially surrounding the smoke flue. The products of combustion from the furnace rise in contact with the heaters and tubes through a central passage communicating with the smoke flue, there being in this passage a number of apertures adapted to be partly or altogether closed by a sliding damper moved longitudinally in guides. Further information relative to this improvement may be obtained of Mr. D. Luis Casañas, Ranchuelo, via Cienfuegos, Cuba.

### Return of Dr. Cook's Arctic Party.

The ill-fated steamer Miranda left New York July 7, with Dr. F. A. Cook, of Brooklyn, and a party of scientists and sportsmen who desired to visit the coasts of Labrador and Greenland.

Among the party, which numbered about fifty, were William H. Brewer, professor of agriculture, Yale University; C. Fred Wright, of Oberlin College; Professor B. C. Jillson, Professor G. W. Dove, of Andover; L. L. Dysche, professor of zoology, Kansas State University; Professor Charles E. Hite, of the University of Pennsylvania; Professor Elias B. Lyon, of Chicago; and Professor A. A. Freeman, of Andover. The Miranda was to cruise around Newfoundland, cross Davis' Strait to the west coast of Greenland, then to Melville Bay and visit the winter quarters of Lieutenant Peary. The return was to be made by way of the coasts of Greenland and Labrador; and New York was to be reached about September 15. A series of accidents befell the Miranda. On July 17 she collided with an iceberg near the Straits of Belle Isle. The vessel returned to St. John's, Newfoundland, for repairs, and on July 27 a second attempt was made to reach Greenland. The progress of the Miranda was impeded by fogs and ice, so that she did not make harbor at Sukker Toppan, Greenland, latitude 65:20, until August 7. She started for Holstenborg August 9, and struck a sunken rock outside the harbor of Sukker Toppan. The damage was so severe that it was not considered safe to return to St. John's in the Miranda. Dr. Cook and a portion of the party set out for Holstenborg, 140 miles away, in an open sail boat, and secured the fishing schooner Rigel, of Gloucester, Mass., to transport the party to St. John's. The Miranda then started with the Rigel in tow, but on August 21, while 300 miles out, the water tank of the steamer was burst by the heavy swell, and on August 23, Captain Farrell abandoned his vessel. Ninety-one persons were now crowded in the little schooner of 107 tons burden. Only two meals a day were allowed. The passage was rendered doubly disagreeable by bad weather. At last the party arrived at North Sydney, Cape Breton, on September 5. Most of the passengers returned home by rail. Nearly all of the baggage, including natural history specimens and negatives, was lost. The escape of the party was fortunate and one of its members, Mr. J. D. Dewell, of New Haven, evidently voiced the feelings of the majority of the party when he telegraphed to his friends: "Out of the jaws of death."

### The Effect of Sulphur in Cast Iron.

In a recently issued volume of the Proceedings of the Institution of Civil Engineers there is an abstract of a paper on the above subject by Mr. W. J. Keep. The author has for six years been trying to verify the received belief that sulphur is in every way injurious to cast iron; and he has made numerous experiments with artificially sulphurized cast iron up to 2 per cent of sulphur, both gray and white, the results of which are recorded in the paper. The conclusion finally reached is that the proportion of sulphur retained by gray cast iron cannot materially injure the iron, except by increase in shrinkage, which in the extreme ends seems to be from 0·168 inch to 0·194 inch per foot. The general testimony is that most of the sulphur present in pig iron is lost in remelting, and that it is impossible it can be reabsorbed to any damaging extent from the fuel. The influence of sulphur is diminished by increase of carbon or silicon. In wrought iron, which is practically free from these elements, a small amount of sulphur is said to do great harm; and such iron will take up sulphur in considerable quantity. The influence of sulphur on all cast iron is to drive out carbon and silicon, to increase shrinkage, and in general to reduce strength; but in practice sulphur will not enter the iron in the foundry to a sufficient extent to realize these defects.

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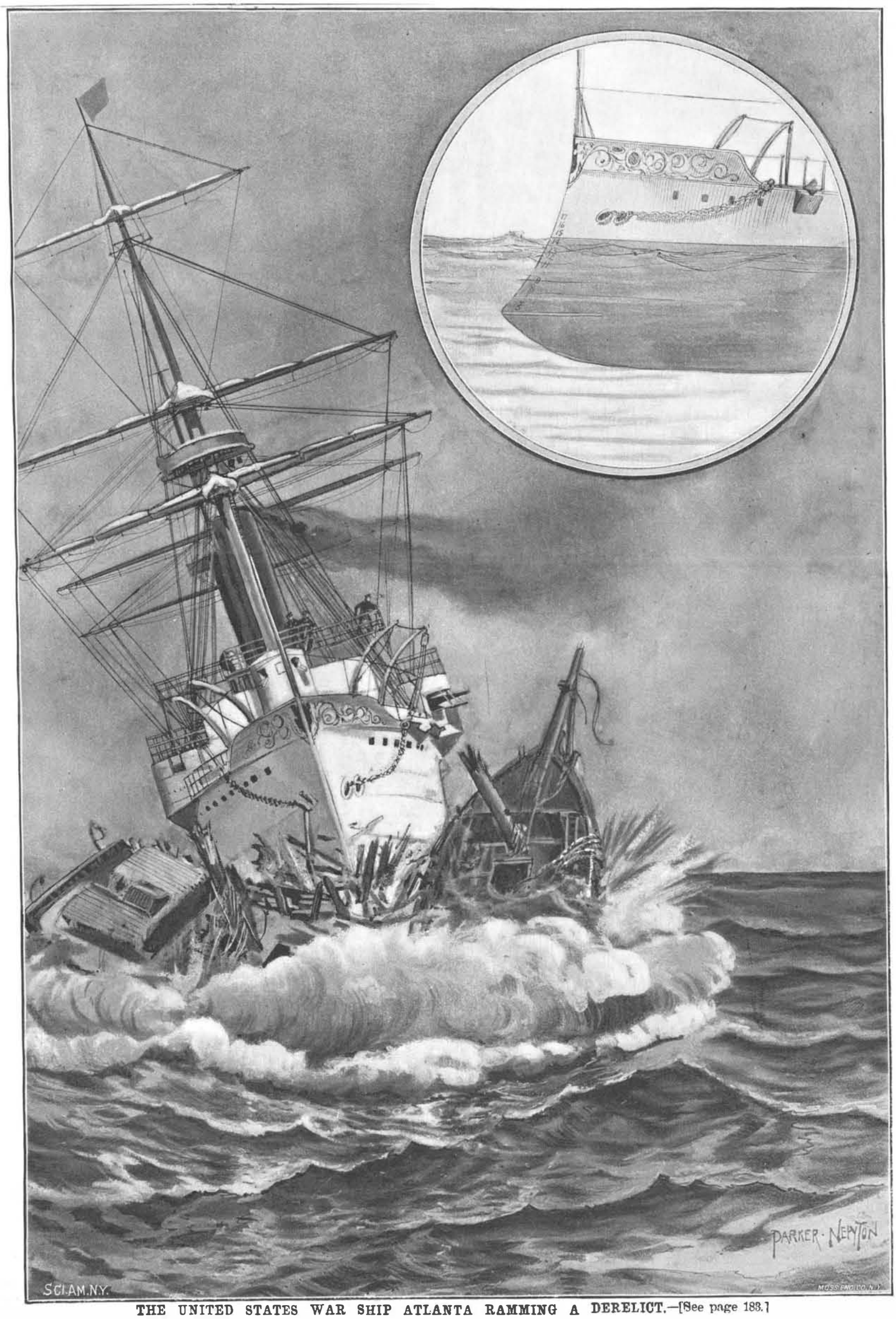


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