storage batteries are apparent, especially for lighting steamers and railway trains. They are in successful operation on the trains of the Pennsylvania Railroad and elsewhere, but are hardly adapted as yet for general use, for the reason that they require such intelligent care.

*The carbon building* is of great size. Here the carbons are made from retort coke. One crusher reduces the coke to egg size, another to the size of buckwheat. It then runs through burr mills and bolting machines until the whole is reduced to an impalpable powder. It is next conveyed to mixing tanks, where it is mixed with adhesive material, after which it is tumbled in roller tumblers until it is ready to be moulded for use. The pressure on each mould is 300 tons. After being moulded, the carbons are "burned" in a reverberatory furnace a week or more, to expel all moisture. Having been assorted for straightness, and inspected and tested for their burning qualities, they are plated with copper and boxed for shipment. The company at this time is making 50,000 carbons a day.

The company employs four expert pattern makers, who are most of the time engaged on new schemes devised by Mr. Brush. A word is here in place as to Brush's electric motor. It is designed to distribute *power* as well as *light*, and under conditions practically the same. This will be a boon to hundreds of small factories, etc., where steam is now used at a disadvantage. The consumer is to turn on electrical power, whether for a sewing machine or a printing press, or for more ponderous machinery, by merely turning a switch, just as a key is turned for starting the electric light from the same arc circuit. In this manner, also, power is to be transported to a long distance from the dynamo by which it is generated.

The last building I visited was the "power building." Here are three boilers, of 150 horse power each, and furnishing steam for a large 24 by 48 inch engine. Here is a system of Worthington pumps, Berryman heaters, water tanks, etc. This engine, besides doing other work, drives two great dynamos, the current of which is utilized in the adjacent smelting furnaces of the Cowles Aluminum Company. The smaller one has 600 amperes, and about 50 volts of electromotive force. The larger one is the largest that has thus far been built by the Brush Electric Company. The armature of this great dynamo is 26 inches in diameter, and revolves 907 times a minute, producing a current of 1,575 amperes with an intensity of 46·7 volts. The entire dynamo is 8 feet long and 32 inches wide, weighs about 7,000 pounds, is rated at 125 horse power, and would furnish current for about 1,200 incandescence lamps of 16 c. p. each. Its powerful current is conducted to the furnace room and back by a circuit of thirteen copper wires, each 0·3 inch in diameter, which, as they approach the carbon electrodes, are twisted into a copper cable an inch and a half in diameter. An ampere meter is inserted into this circuit, through whose helix the entire current flows, and on whose dial is indicated the total strength of the current being used at any given moment. A large resistance box also forms part of the circuit, over which passes a heavy copper slide, by means of which the current is readily regulated, enabling the operator to choke off the main flow before breaking it at the switch, thus preventing any serious flashing at the dynamo. Mr. Cowles gave me some astonishing figures as to the practical efficiency of this dynamo in the reduction of refractory ores, and the economical value of the process. The intention is, at an early day, greatly to enlarge their works and remove them to another locality; and in order to accomplish their aims they have contracted with the Brush Electric Company for a new dynamo of immense size, which is now being constructed, and which will be the largest in the world. The machines made on this limited area of seven acres, in the suburbs of Cleveland, have illuminated nearly every city on this continent, and have even been lagely used in other lands than our own. Their brilliant arcs shine in Canada and China, South America and South Africa, Mexico and Madagascar, New Zealand and Australia, India, Egypt, and Japan, and in every kingdom of Europe, and, indeed, have lighted every prominent country of the world.

The officers of the Brush Electric Co. are: President, G. W. Stockly (who is also business manager); Vice-President, J. J. Tracy; Secretary, W. F. Swift; Treasurer, J. Potter; Superintendent, N. S. Possons, and Assistant Superintendent, W. J. Possons, besides a board of directors.

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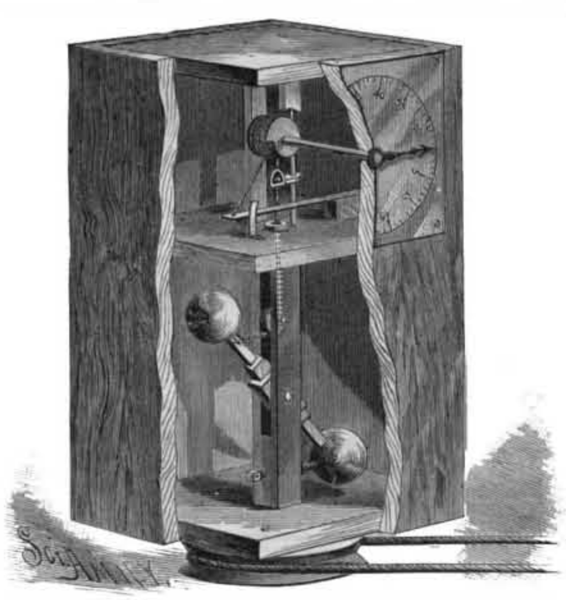
A RESIDENT of Minnesota, who has seen several severe tornadoes, says that their most peculiar feature is the singular sucking movement. Buildings are sucked up into the clouds entire, and come down soon in fragments. After the great Rochester tornado, a farmer twelve miles from town found an uninjured marble top table in his field. Another found a very large sheep that had come from no one knew where and had been deposited in his yard unhurt. The Minnesota man further said that he had seen a board into which wheat straws had been driven until they stuck through on the other side.

## CENTRIFUGAL SPEED INDICATOR.

Journaled in a transverse partition and the bottom of the case in which all the parts of the indicator are contained is a shaft, the lower projecting end of which is provided with a pulley. This shaft is slotted to receive a pivoted lever, the arms of which upon opposite sides of the shaft are of equal length and are provided with weights. The journal of the shaft in the partition is made hollow, to receive a rod whose lower end is connected by a cord passing under a pulley hung in the slot with the arm of the lever. The upper end of the rod is attached to a slide moving along a guide rod secured in the casing parallel with the shaft. A cord attached to this slide is wound once around and secured to the drum on the spindle of the indicator. A cord from the free end of a flat spring secured to the partition is attached to the smaller part of a snail secured to the spindle, so that as the cord is wound upon the snail it is received on a continually increasing diameter. A spring, projecting from the partition at right angles to the main spring, bears against the side of the latter with sufficient friction to modify its movement and that of the lever, when the indicator is used for indicating low speeds; but the small spring, being of less length than the distance through which the other moves, the two do not touch during the latter part of the outward excursion of the main spring. Upon the



HERDEN'S CENTRIFUGAL SPEED INDICATOR.

outside of the casing is a dial, in front of which the pointer carried upon the end of the spindle moves. The indicator receives its motion through a belt passing from the machinery whose speed is to be indicated around the pulley. As the shaft revolves, the centrifugal action of the weights tends to bring the lever into position at right angles with the shaft. This action of the weights is opposed by the spring through the connections as described. When the speed is increased, the action of the weights tends to put the spring under greater tension, and by unwinding the cord on the drum and winding the cord on the snail, the spring secures a greater advantage over the weights. When low speeds are indicated, the tendency of the lever to vibrate under the light pull of the spring is opposed by the bearing of the small spring against the side of the other.

This invention has been patented by Mr. Henry Herden, of Wellsboro, Tioga Co., Pa.

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### What Work Is.

I was riding up town in a Third Avenue car the other day when a butcher's boy, a lad some 14 years of age, in a hickory shirt and with a battered Derby hat on the back of his head, stepped airily upon the back platform and hung his basket on the handle of the brake. He had sandy hair cut close to his head. He was very much freckled, his eyes were pale blue, but keen in their expression, and his nose was of the genus pug. He was smoking a cigarette. For some time he shared the privileges of the platform alone with the conductor, who began talking to the boy about the wrongs of the conductors and their right to strike.

"What are you givin' us?" said the boy; "yer call it hard work to stand out here on the platform and yank a bell? When you ain't doing that, you are inside taking fares, and knockin' 'em down, too. That ain't no work. Jest you begin at 4 o'clock in the morning, like me. Open the shop, sweep it out, clean ice-cold fish out of the refrigerator, and never get no chance to warm yourself; then lug big baskets of meat up to the top of flats all day long, and be cussed by the boss because you don't move round faster. That's work. You fellows have struck it soft, you have. You can't talk to me. I ain't no greenhorn." And he jumped off the car and went down the street whistling "The flowers that bloom in the spring."—*Phil. Record.*

## Correspondence.

### How to Prevent Anvil Noise.

*To the Editor of the Scientific American:*

I notice an item in your paper of April 17, on noiseless anvils. It is advised to set in lead or sand. I find by setting the anvil on a piece of plank say two feet square, and hanging that by the corners to the wall above with small ropes, you will get scarcely any noise and no jar, and the anvil is as solid as if placed upon a block. J. L. P.

Owego, N. Y., April 25, 1886.

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### A Home-made Ash Sifter.

*To the Editor of the Scientific American:*

I send you this bit of information for the women who, like myself, read the SCIENTIFIC AMERICAN.

To sift cinders, cover your sifter with an old apron or rag. Seize it thus covered, and shake without lifting the edge of the rag.

In case of wind, tread on the edges to keep them down. A few stones applied at the corners will do as well.

I have found the above device a thousand times more practical than any of those cumbersome and dear apparatus which are found in most hardware stores. J. A.

Washington, D. C., May 4, 1886.

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### A Texan Meteorite.

*To the Editor of the Scientific American:*

The article on the "New Mass of Meteoric Iron, from Independence County, Arkansas," which appeared some time ago in the SCIENTIFIC AMERICAN, was read with great interest by the officers stationed at this fort.

The appended postscript, requesting readers to communicate through your paper any knowledge they might possess of the existence of masses similar in nature to the one described, and also to report all meteorites that may fall in their vicinity, accompanying their information with specimens, prompted me to send to you a sample of a mass of meteoric iron which I secured while serving in Texas in 1882.

As to the history and manner of discovery of this rare specimen, I will here give it to you as briefly as possible.

On the morning of June 10, 1882, being stationed at Fort Duncan, Maverick County, Texas (a military post situated on the left bank of the Rio Grande), as I was returning to the garrison from a trip in the vicinity, I casually noticed a round bowlder that presented a very metallic appearance. I examined it closely, found it in truth to be a metallic body and a specimen worthy of careful preservation. It being on the land of a Mr. Wieste, I did not remove it at the time I discovered it, but later I persuaded Mr. Wieste to visit with me the place where the mass lay, and inquired if he knew anything concerning it, or of its nature. He stated that "he did not know what it was or where it came from, and if I wanted it, I was welcome to it." It was then that I, for the first time, attempted to lift it, and found it exceedingly heavy for its small bulk. Unlike the plan of the boys who "rigged up a drag of poles and bark" for the removal of the Arkansas 94 pound meteorite, as stated by Mr. Hindman, I had one of the privates (Mr. Brand) of our company carry the mass to our camp. After his task, which was a very tiresome one, was completed, he remarked that "he would not care to carry about with him many such specimens of Texas rocks." I early arrived at the conclusion that the mass was meteoric iron, as it possessed all the characteristics of such bodies.

The photograph which I send to you shows a broad view of the meteorite, and also its resemblance—as expressed here at the camp—to the "shape of a ham."

I have found it to weigh ninety-seven and one-quarter pounds, and to be twelve inches long, ten wide, and six inches thick. Its specific gravity is equal to that of wrought iron, *i. e.*, 7·522. Small pieces cut with a chisel from a pointed and much abraded part of the mass were malleable to a high degree, whether heated or cold.

Like all meteoric irons, this mass is also isometric in crystallization, which is proved by etching a smoothed surface.

Its color when polished is unusually white, more like that of quicksilver; much whiter than is common to meteoric iron.

Owing to the presence of a small percentage of nickel, it has thus far resisted all corrosion or oxidation. A surface of five inches length, which I polished nearly four years ago, remains at this time very free from rust.

The outer surface has the commonly observed black coating, or crust, always found on meteorites.

C. C. CUSICK, U. S. A.

Fort Lyon, Bent County, Colorado.

[We duly received the specimen. It is a very interesting example of meteoric iron.—ED.]

**The Obelisk in Central Park must be Inclosed.**

In a paper given in the Transactions of the American Society of Civil Engineers, Prof. Thomas Egleston says: It is expected, now that the obelisk is supposed to have been waterproofed, that the disintegration will cease, but this appears to me to be founded on an altogether mistaken theory, which is, that the cracking is alone due to the expansion of the ice formed in the cracks. The rapid and extreme changes of temperature in this climate in a stone which, from its mass alone, must have but a feeble conducting power, would be sufficient to cause the disintegration already begun, in a stone weakened by exposure to great heat in a dry climate, to continue with comparative rapidity without the intervention of ice, but simply from the continued expansion and contraction going on on its weakened surface. But in a moist climate like our own, where it was subjected to both extremes of heat and cold, it would take place rapidly, as it has done.

As it was a matter of interest to ascertain how far moisture had to do with the cracking under heat, I made the experiment of submitting pieces of granite, which had become quite dry from having been kept housed many years, to as high a heat as could be obtained in the laboratory without melting, and to my surprise found that no spalling or even cracking occurred, although the pieces were subjected to the heat suddenly and for varying periods of time. It is well known that granite in buildings, when subjected to fire, spalls. This is owing to the moisture it contains; to the expansion of gas and liquids contained in microscopic bubbles in the quartz; and to the want of conductivity of the stone itself. Perfectly dry granite does not spall unless exposed very suddenly to a very high temperature. No granite, however, exposed to the weather in this climate is ever dry. Fresh granite contains about one per cent of moisture. That weakened by age, like the surface of all the obelisks, may contain many times that amount, consequently all granites on the outside of structures do spall when exposed to fire. From the fact that the stone of the Central Park obelisk is already weakened and probably full of fissures, which, in this climate, will tend to develop year by year, and from the very fact that the disintegrated stone will absorb more moisture than stone which is fresh, it seems probable that no protection or coating given to the stone will arrest the process of disintegration already commenced in it, if it is left exposed. Even if the surface was entirely waterproofed, the cold of winter and the heat of summer would act below the surface both of the coating and of the stone, causing the coating to break or fissures through it to occur, so as to let in the moisture, and then both causes would operate together as before. But in any case, heat and cold will act altogether independently of moisture, whether the outside be coated or not, and further disintegration must take place under the same circumstances and conditions as that which has already so much weakened the stone. Placing the obelisk in the Central Park, where it is exposed to nearly every agency that could tend to destroy it; allowing the surface of a stone already so much weakened by disintegration to be heated, thus causing further cracks to be made in it; is a greater monument to public indifference and ignorance than the shaft ever was to the dignitary who first erected it or the events chronicled in its hieroglyphics.

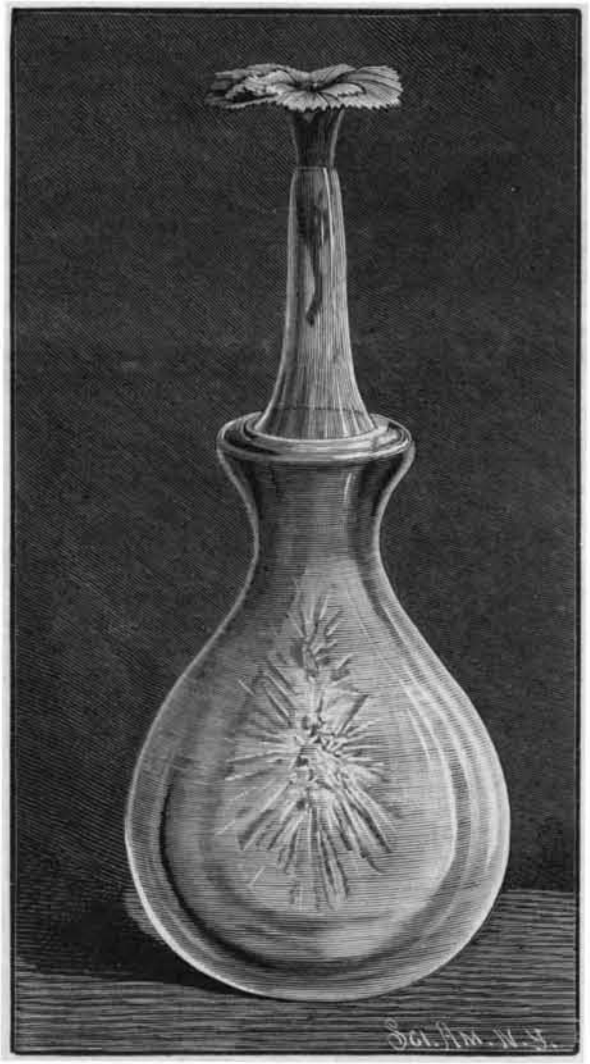
The same dangers, if the reports about it are true, threaten the obelisk on the Thames embankment, although not to the same extent. The climate of England is much less severe than ours, both in winter and in summer. The causes for disintegration, being the same in both cases, will affect the London obelisk less than ours, and there seems to be, so far as any examination of it has been made, no great present danger in leaving it exposed where it is. The obelisk in the Place de la Concorde, in Paris, is reported as cracked all over its surface. Both the European obelisks are therefore in danger of being seriously damaged within the next hundred years. Housing seems to be the only thing left for the obelisk in Central Park.

**Fishing with Dynamite.**

By special invitation we were permitted to witness a novel experiment one afternoon recently, which was intended to test the efficacy of dynamite bombs in the capture of fish in deep water. The objective point was found to be a hole about twenty-five feet deep in the upper end of the bight, where the fish are known to congregate in large numbers. Arriving at the spot, a cartridge about six inches long, charged with dynamite, to which had been attached a heavy piece of iron in order to make it go to the bottom, was thrown in the water. A suspense of a few seconds ensued, and then a faint report like the discharge of a small pistol was heard, the water became agitated and was raised about two feet, and immediately thereafter, within a radius of about sixty feet, the fish were strewn in all directions. A scene of the wildest excitement followed. Scoop nets were brought into speedy use, and over 1,000 fish of varieties, from the large gray snapper, over three feet in length, to the small but succulent sailor's choice, were secured.—*Key West Democrat.*

**A SINGULAR EFFECT OF THE ACTION OF FROST.**

The accompanying illustration represents an ice formation that occurred at a private residence in New York city, in February last. A small vase was left on the bedroom window one night, filled with water, in which was a carnation, and in the morning it was found that the water in freezing had



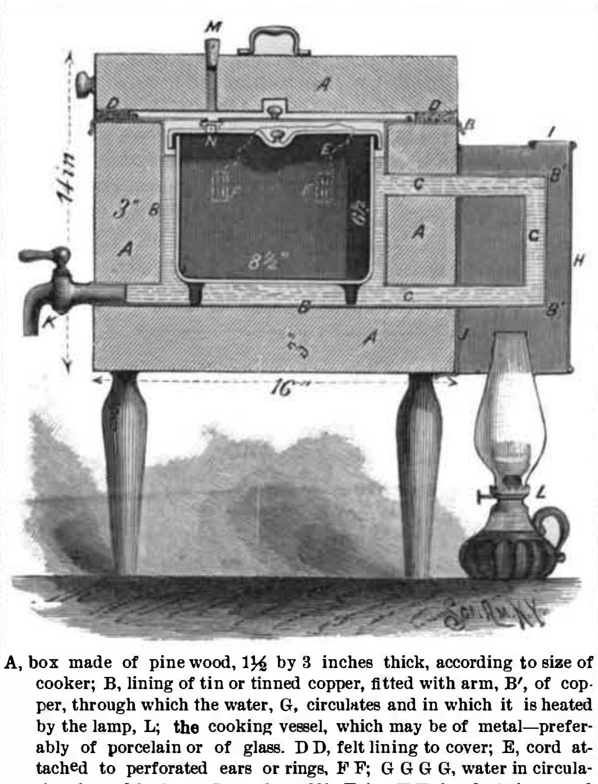
A CURIOUS ICE FORMATION.

raised the flower (which, of course, was wilted by the frost) in a column of ice nearly two inches in height above the mouth of the vase. There was a beautiful crystallization in the center of the vase, but otherwise the ice was clear and solid.

**THE ALADDIN COOKER.**

BY EDWARD ATKINSON.

The theory of this cooker is to accumulate heat from a common hand lamp inside a pine box, the walls of



A, box made of pine wood, 1½ by 3 inches thick, according to size of cooker; B, lining of tin or tinned copper, fitted with arm, B′, of copper, through which the water, G, circulates and in which it is heated by the lamp, L; the cooking vessel, which may be of metal—preferably of porcelain or of glass. D D, felt lining to cover; E, cord attached to perforated ears or rings, F F; G G G G, water in circulation, heated by lamp, L, to about 200° Fah.; H H, hood of tin around the arm, B′ B′, to concentrate the heat upon it; I, vent to tin hood for draught; J, tin guard to keep heat from wood; K, faucet to draw off water; L, lamp with wick, ½ to 1 inch wide, according to size of cooker; M, orifice for thermometer; N, orifice to cooking vessel, with screw cap, for thermometer; B′ B′, arm, 3 in. by 1 in. deep. Rounded corners desirable inside for convenience in keeping clean. Begin with tepid or cold water if glass vessels are made use of.

which are thick enough to retard radiation, so as to cook such food as may be placed in the cooking chamber or oven, in a thorough manner. All meats, birds, or fish may be thoroughly cooked in their own juices, only a little water being added so as to make a good gravy. Oat meal, corn meal, and farina can be cooked with a suitable quantity of water. Fruit, cheese, and such vegetables as do not require heat above the boiling point, may also be cooked in the apparatus. The juices of meat may be drawn for soup or broth by immersion in cold water in the chamber, before the heat is applied.

If the cooking chamber be 6×4×4½ inches, it will hold about three pounds of meat, which can be well cooked with a half inch wick in about one hour, the water being warm at the beginning. For such a vessel the pine walls need not be over 1½ inches thick.

In a cooking chamber 9×9×10 inches deep, surrounded by a half inch sheet of water in a pine box, of which the walls are 2 inches thick, ducks and grouse have been well cooked in about two hours, mutton in three hours, chickens or small turkeys in about four hours, with a one inch wick, beginning with hot water. A longer time makes meat more tender.

In a cooking chamber 12×12×12 inches, surrounded by a half inch sheet of water, in a box of which the walls are 3 inches thick, 20 to 25 pounds of solid meat can be thoroughly cooked in six to eight hours; a longer time serves for very tough meat. An 18 pound ham or a 20 pound tough old turkey have been made very tender between 10 P. M. and 8 A. M.; 1 inch wick.

In this large cooker the heat of the lamp is more fully saved by the following arrangement: In place of the projecting metallic arm, from which much heat is radiated and lost, the arm connects with a metallic water jacket, surrounding the lamp chimney, which jacket is incased in wood. The same work may be done by jacketing the metal hood, H H, with fossil meal in a wooden case. The meal will protect the wood where it comes near the lamp.

Clear pine appears to be the best non-conductor. Experimenting might be tried with slabs made of wood pulp, which would be less liable to crack or shrink.

The fuel required is about one cent's worth of oil to 20 or 25 pounds of food. This quantity has sufficed for a very old 20 pound turkey, for 22 pounds round of beef, for 20 pounds shoulder of mutton, and for 18 pounds of ham. A very old gander, weighing 12 pounds, was cooked for 15 hours, at a cost of 1½ cents. The meat became so tender that it could not be carved. It was therefore minced.

Several different cooking vessels can be used in the same box. At one time 15 pounds of mutton bouillon, 7 pounds of beef, and 2½ pounds of oat meal with water were cooked a little too much in six and a half hours with one pint of oil.

These are the first crude results. A professed cook may attain much better ones, with greater economy of fuel. The lamp wick should be very carefully trimmed; and in order to avoid smell and smoke from the oil, the flame should not be put up to its full height until a few minutes after it is lighted. The food chamber being practically air tight, there is no loss by evaporation, and no odors of cooking are given off.

**The Nation's Health.**

The report of Dr. John S. Billings, Surgeon of the United States Army, on the mortality and vital statistics of the United States has been received by the Secretary of the Interior. Dr. Billings divides the country into twenty-one districts, the physical characteristics of which are more or less distinctive. The total population in 1880 was 50,155,783, an increase of 11,597,412 in ten years. Of this increase, 281,219 per annum may be taken as due to immigration, which would make the mean annual increase due to excess of births over deaths, 878,522. The mean annual birth rate for the United States is given at 36 per 1,000. During the census year there was a comparatively low death rate and a high birth rate.

As among the different classes of citizens, the report shows the death rate to have been larger in the colored than in the white population, and among the latter higher in the foreign element than among those of American parentage. The death rate was also greater in cities than in rural districts. The most important causes of disease and death were consumption, pneumonia, diphtheria, typhoid fever, malarial fever, and the various ill-defined forms of attack to which children under one year of age are particularly subject. During 1880, the detachment added to the great army of the dead amounted to 756,893. Of all causes, consumption was the most fatal. Its victims numbered 91,270. By localities, and in proportion to the population, more deaths occurred from consumption at Charleston, S. C.; from pneumonia, at New York; from homicide, at Richmond; and from suicide, at San Francisco.

THE Spanish Government have contracted with Messrs. Yarrow & Co., of Poplar, for the construction of two first-class torpedo boats of the "Falke" type. The speed in fighting trim, carrying 17 tons on board, is guaranteed to be 23 knots, and when running light 25 knots, or about 26¼ and 28½ miles per hour. These are believed to be the highest speeds hitherto contracted for.