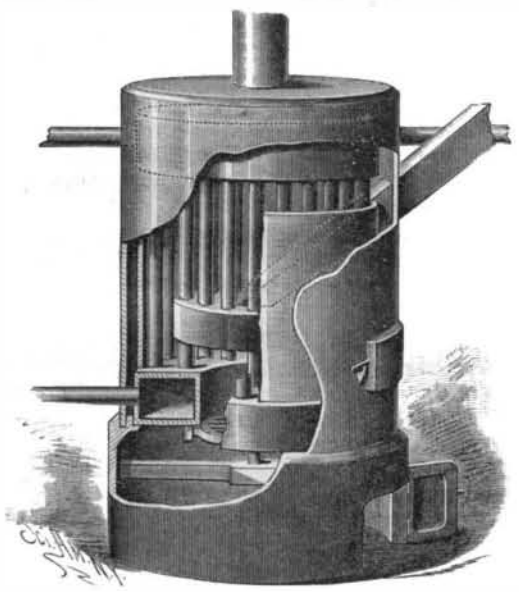
IMPROVED STEAM HEATER.

Resting upon the base is a sheet iron casing, to the center of the top of which the smoke pipe is connected. Upon the inner part of the top of the base rests an annular water chamber, beneath the central aperture of which the grate is supported. With the outer part of the top of this chamber are connected tubes that lead to a circular water chamber, so placed a little below the top of the casing that the products of combustion will have a free passage around the



BRONSON'S IMPROVED STEAM HEATER.

sides and at the top of the chamber. A third chamber is connected by pipes with both the upper and lower ones. A chute connected with a central aperture in the middle chamber passes through an opening in the upper part of the casing, and serves as a magazine for coal, making the heater a self-feeder. The circles of pipes are interrupted for the passage of the chute and to give access to the fire chamber. A feed pipe is connected with the lower chamber, and from the upper one leads one or more pipes, through which steam is conducted to the rooms to be heated. Within the casing, close to the outer circle of tubes, is a second one, whose lower edge rests upon the lower water chamber. The upper edge does not extend quite to the upper chamber, a space being left for the passage of the products of combustion, which pass through the aperture in the middle chamber, between the tubes, and thence around the upper chamber, heating the water and generating steam very rapidly. The inner casing keepsthe products of combustion close to the pipes, and prevents waste of heat by radiation.

This invention has been patented by Mr. William C. Bronson, of Saratoga Springs, N. Y.

LEVESQUE'S DIPLOGRAPH.

Every one knows how easy it is to write double with two pens fixed to the end of the same handle; but, in order to make a useful application of the process, it is necessary to find some means of writing upon two different sheets of paper at the same time. The problem has been solved by Mr. Levesque, through a desk which he has just constructed, and which he calls a "diplograph."

The apparatus consists of a board which, through two lateral rabbets, slides in a frame inclined toward the writer. A tablet, placed transversely at a few fractions of an inch above the board, is fixed by its two ends upon two small brackets fastened to the sides of the frame.

The lower sheet of paper is laid flat upon the board, and is held by the pressure of a strip of steel. The upper sheet is grasped at its upper edge by a long clip, whose extremities are fixed at will to the head of two small supports which are themselves fixed at the height of the board.

When a page of writing is begun (the board having been brought to the lower part of its travel), that part of the upper sheet that is to receive the first line rests upon the tablet. The lower portion of this sheet is folded back, and is pressed against the bottom of the tablet by a strip of wood covered with velvet. One of the two pens writes upon that part of the upper sheet that rests upon the tablet, while the other traces the same characters upon the corresponding part of the lower sheet.

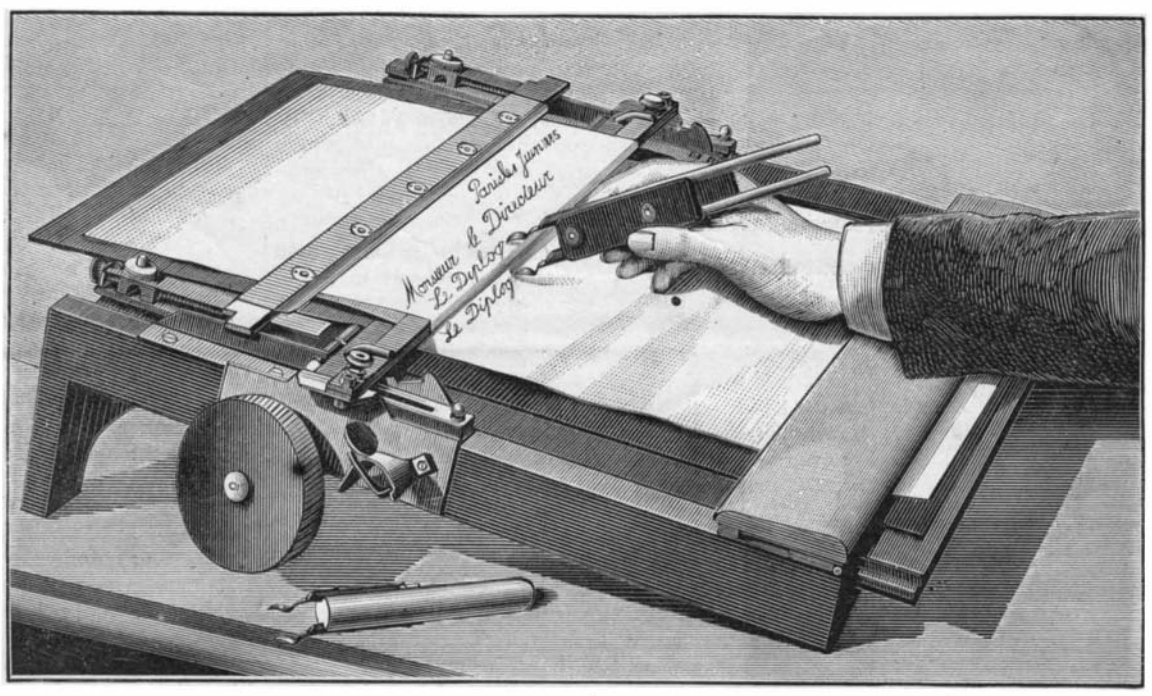
After each line has been written, the tablet is shoved forward. This carries along the two sheets, the upper one of which, being thus drawn upward, and held below by the paper press, remains tightly stretched upon the tablet, while at the same time moving the same distance upward that the lower sheet does. It is thus possible to write the following line upon both sheets at once.

A sheet of stiff cardboard is interposed between the two sheets of paper, so as to prevent the upper one from confusing the writing traced upon the lower.

The board is moved by means of a cord running over a pulley which is placed beneath the frame, and the axle of which is provided at one extremity with a wheel that the writer revolves with his left hand, without having to pay any attention to it. The forward motion is, in fact, regulated line by line by a gearing that may be set at will in such a way as to have differently spaced lines.

As the instrument contains no delicate parts, it is very strong. Those that a violent shock might break can, moreover, be easily replaced by any one who has ever seen the apparatus.

This desk is certainly ingenious, and can be used in public o private offices, and everywhere where a person needs to obtain, at once and without preparation, two copies exactly identical, word for word, line for line.—*La Nature.*



LEVESQUE'S DIPLOGRAPH.

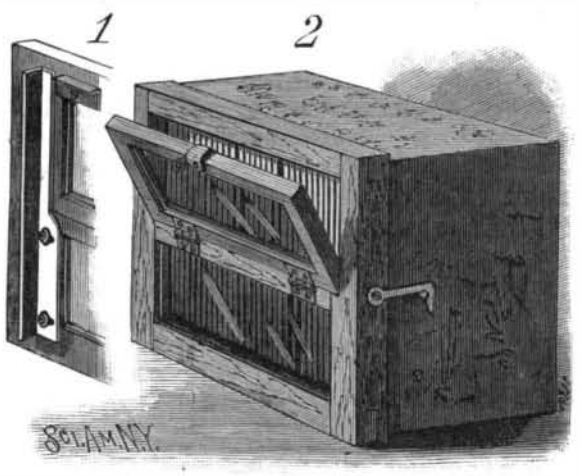
The Manchester Ship Canal.

The Manchester Ship Canal will extend from the deep water of the Mersey at Eastham—a point on the Cheshire shore just above and almost opposite to Liverpool—and will proceed thence by Ellesmere Port, Runcorn, Warrington, and Barton to Manchester, being in length about thirty-five miles. It will have a miuimum depth of 26 feet of water, and will be wide enough for the largest vessels to pass each other at any point, and may be compared with the Suez and Amsterdam canals, in width and depth as follows: Suez, depth 26 feet, bottom width 72 feet. Amsterdam, depth 23 feet, bottom width 89 feet. Manchester, depth 26 feet, bottom width 120 feet. The estimates include docks in Manchester, Salford, and Warrington, as sanctioned by the company's act, with a water area of 85½ acres, containing more than four miles of quays. There will also be a mile of quay space and extensive shed accommodation near Manchester on the ship canal, in addition to wharfs at many places alongside its course. The level of the docks at Manchester, which is 60 feet 6 inches above the ordinary level of the tidal portion of the canal, will be reached by four sets of locks. The locks will, it is asserted, be of a size sufficient to admit the largest merchant steamers.

Each set comprises a large lock, 550 feet by 60 feet; a smaller lock, 300 feet by 40 feet, for ordinary vessels; and one lock 100 feet by 20 feet, for small coasters and barges—and all capable of being worked together. Each set of locks will be worked by hydraulic power, enabling, it is contended, vessels to be passed in fifteen minutes. It is hoped that the rivers Irwell and Mersey—which will be diverted into the upper reaches of the canal—will supply more than sufficient water for the locks even in the driest season. Vessels will, it is expected, be able to navigate the canal with safety at a speed of five miles an hour, and it is estimated that the journey from the entrance at Eastham to Manchester will be accomplished in eight hours.

CRACKER BOX COVER.

This cover may be readily applied to or removed from the box, and may be adjusted to fit boxes of different sizes. The frame of the cover is provided with a glass panel and a hinged glass door. In the inner edge of the upper crossbar is a staple, and to the inner surface of the door is secured a flat spring, bent around the edge and made convex, so that, when the door is closed, the spring will be brought into engagement with the staple. This spring serves the double purpose of a buffer, preventing the door from being closed too hard, and of a fastener. Along one edge of the under side of the frame, as shown at the top of Fig. 1, is secured an angle plate, and to the ends of the frame



SANDBERG'S CRACKER BOX COVER.

are secured angle plates formed with slots for receiving clamping screws. These plates may be moved in or out, to adapt the distance between them to the length of the box. On the ends of the frame are hooks for engaging nails or eyes in the ends of the box, for holding the cover in place. This cover permits of displaying the contents of the box, while effectually excluding dust and moisture.

This invention has been patented by Mr. C. G. Sandberg, whose address is P. O. Box 103, Helena, Arkansas.

The Dangers of Dust.

Darkness, damp, and dust are potent agencies of disease. Everybody recognizes this; but how many fail to adopt its precepts! If there be sermons in stones, surely the summer dust and its dangers would prove a fruitful subject for medical discourse. There is as great a difference between London and country dust as there is between the corresponding muds. Pulverized matter would be harmless enough if it were deprived of its physical property of ready diffusion. The atmosphere is laden and swarms with particulate matter of highly complex nature. Its chief peril to living beings resides in the organic constituents; largely this organic material consists of minute forms of life in a state of latency, only waiting for a spell of heat and moisture and a favorable amount of light, or it may be darkness, to awaken it into activity. The habits of individuals in every class of society, including the "masses," are not calculated to diminish, but rather to augment, the amount of organic matter in our atmosphere. Mucus, saliva, and humor, popularly known as "matter," must be discharged from the mouth and nostrils to the extent of many gallons daily, and not a little of this comes from infective sources; while we venture to think that the bulk of it mingles with the dust of our streets and courts. If, as seems not unlikely, consumption is largely caused by "germs," then a very ready theory may be advocated concerning the mode in which contagium is caught. Who can estimate the amount of mischief that the shaking of mats may have caused? How many young girls early in the morning on their way to business have, so to speak, received their death blow while inspiring, all unconscious of harm, some of the clouds of dust that always greet them? Who can tell? The abatement of this danger and nuisance is a difficulty that almost seems insurmountable. Much may be done by personal habits of prevention.—*Lancet.*

THE greatest length of Lake Huron is 250 miles; its greatest breadth, 190 miles; mean depth, 800 feet; elevation, 578 feet; area, 21,000 square miles.

Animal Power vs. Steam.

Mr. A. Sanson, in an article in a recent number of the *Revue Scientifique*, states that, from a comparison of animal and steam power, in France at least, the former is the cheaper motor. In the conversion of chemical to mechanical energy, 90 per cent is lost in the machine, against 68 in the animal. He finds that the steam horse power, contrary to what is generally believed, is often materially exceeded by the horse. The cost of traction on the Montparnasse-Bastille line of railway he found to be for each car, daily, 57 francs, while the same work done by the horse cost only 47 francs; and he believes that, for moderate powers, the conversion of chemical into mechanical energy is more economically effected through animals than through steam engines.

American Industries.—The Quality of Our Labor.

American mechanics are, as a class, says the Rev. W. V. Davis, in Cleveland *Plaindealer*, the most intelligent, ingenious, and instructive in the world. In 1884 our American Patent Office issued 20,297 patents. At the recent International Electric Exposition in Paris, five gold medals were given for the greatest inventions or discoveries, and all five crossed the ocean to the United States.

Even so strong a Britisher and calm a writer as Mr. Herbert Spencer says we have the best mechanical appliances and mechanics in the world. Now, any one of these advantages would insure ultimate supremacy if it be rightly used. What, then, if all three coincide? Plainly, it ought to give us the markets of the world. Already, six years ago, in 1880, we had surpassed in manufacture by $650,000,000 Great Britain, hitherto the imperial mistress among nations. So soon did Mr. Gladstone's keen forecast come true that we should ultimately become the head servant in the world's great household. From 1870 to 1880 the manufactures of France increased $230,000,000, of Germany $430,000,000, of Great Britain $580,000,000, and those of the United States increased $1,030,000,000. And think of it! We are just beginning to develop ourresources, while many of these nations find many of theirs well nigh exhausted. Even now, the superior intelligence of our mechanics can compete against the cheaper labor of Europe. Even now, in spite of their cheap labor, we can lay down our steels in Sheffield, our certain lower grades of cotton in Manchester, our electroplate in Birmingham, our watches in Geneva, and undersell European manufacturers at their own doors. If this is the beginning, what, then, of the possible future? And then add to this how just now our markets are being rapidly extended under the impulse of electricity and steam as never before.

We are next neighbor to all the nations; to South America, just quivering with its new life; to Japan and China, just waking up from the sleep of ages; to Africa, with its wonderful and mysterious future greatness. Within these twenty years it was as if the dead bones of the nations had been flying into place and a living soul had entered them. It is the dawning of Christian civilization for a billion of people who do not yet enjoy it. And Christian civilization means higher, nobler material as well as intellectual and spiritual wants. After the missionary always goes commerce. Five hundred American steel plows went to the native negro Christians of Natal, South Africa, last year. All the millions of Asia and Africa are going to have their civilized cravings, as we do, some day. India, just beginning to be a little Christian, took $12,000,000 worth of cotton goods last year. What may all Asia want 100 years hence? What may Africa want 100 years hence? With those vast continents added to our market, and all our natural advantages realized, what is to prevent our country from becoming the mighty workshop of the world?

Realize the resources of our agriculture, and feed 1,000,000,000 souls! Fully develop our mining and manufacturing industries, which would be enough to sustain the whole billion; gain the pre-eminence in every market around the globe, and become the handmaid of the nations. Did not Mr. Matthew Arnold say right in his lecture to us a year and a half ago, that "America holds the future"?

Diminutive Mail Matter.

The postal service at Liverpool, England, recently had an experience which, if often repeated, would prove the reverse of amusing. Some one whose ingenuity or economy was searching for new fields wrote a message of twenty-six words on the back of a two cent stamp, which was duly posted and delivered. This success led to a second experiment and then to a third. But on the last occasion, a one cent stamp was chosen, and was accordingly held as an insufficiently prepaid letter.

THE STATUE OF LIBERTY NEARING COMPLETION.

Even those unacquainted with the details of such work may, by carefully considering all the conditions involved, form a tolerably accurate idea of the labor expended and the patience and skill exercised in the erection of such a structure as the Statue of Liberty. The last operation before the figure left France was the assembling of all of the many pieces comprising the shell or statue proper and the final fitting of each piece to each of its surrounding neighbors. Each piece was then marked with a particular number or figure, and every two meeting pieces were designated by the same character marked upon their adjoining edges; this of course was to serve as a guide when reassembling the statue upon its pedestal at Bedloe's Island. Surrounding each separate piece at a short distance from the edge is a row of small holes; when two pieces are joined together, the holes in one coincide with those in the other, so that the two may be firmly united together by rivets.

When the statue was taken down, in France, the pieces were packed in frames of wood, to prevent as much as possible their being bent by handling and during the passage to this country. But it was impossible to prevent a certain amount of distortion from taking place, so that the reassembling now in progress is to some extent also a work of refitting. This, together with the drawbacks under which the men labor, particularly the great height above ground, renders the otherwise simple work of erection one of great magnitude. The thousands of rivets add most materially to the labor, as they must be so driven as not to disfigure the statue by presenting conspicuous and unseemly lines.

The copper of the shell, being only about three thirty-seconds of an inch thick, lacks rigidity, so that it was necessary to increase the stiffness of every piece, particularly those of a large size, by means of iron bars secured to the interior surface. These bars are three-quarters thick by two inches wide, are bent to closely conform to the curves in the copper, to which they are fastened by copper bands whose ends are riveted to the shell, and are so disposed and united to each other as to form a most intricate network of bracing, covering and strengthening the entire statue. The interior view of the face, upon our first page, clearly illustrates the extent of this bracing and the manner of securing it to the shell.

This bracing is connected by bars with the main

STATUE OF LIBERTY.—VIEW AT TOP OF PEDESTAL, SHOWING THE SHELL AND BRACING.