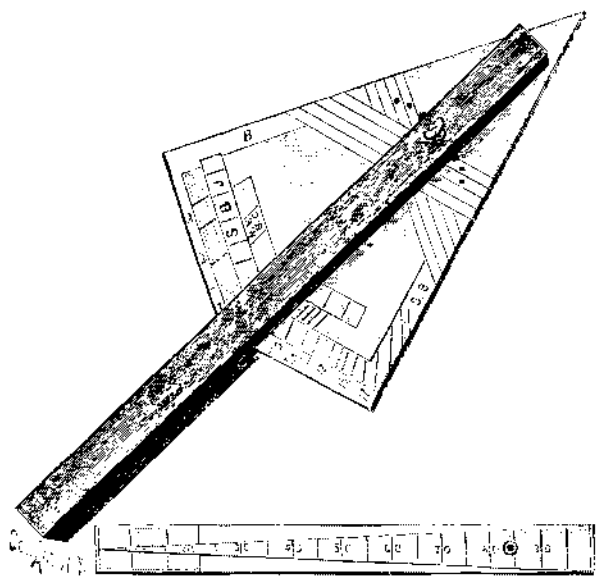
A MEASURING AND DRAWING TOOL.

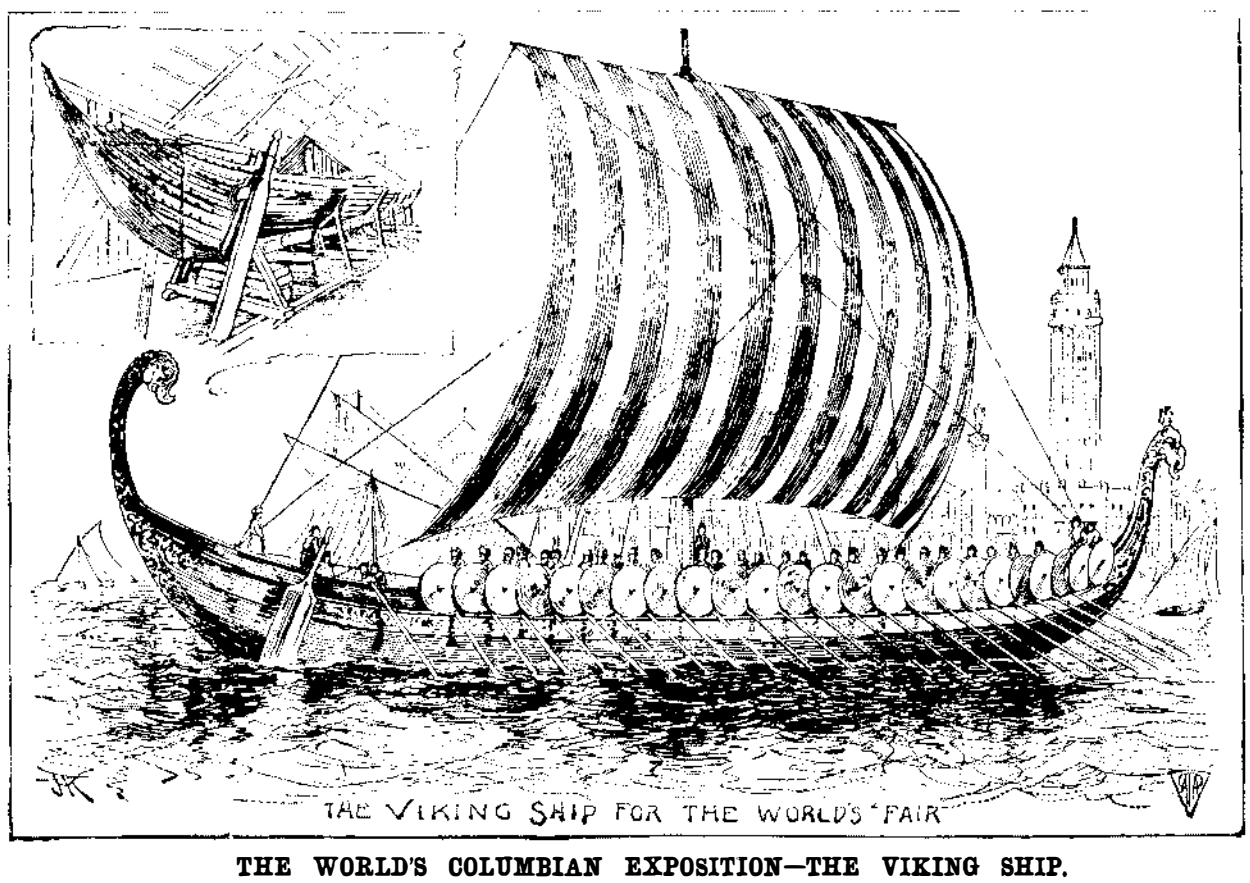
A readily adjusted and easily applied tool for conveniently finding bevels, pitches, degrees, and lengths in framing roofs and similar purposes, is shown in the accompanying illustration, and has been patented by Mr. L. O. Allred, Palestine, Texas. The larger view is a partial representation in perspective, and the smaller one is a plan view of the straight edge. Pivoted in a slotted bar which forms the straight edge is a plate made in the shape of one-eighth of a regular octagon, with two sides of equal length intersecting at the acute angle and two other sides of equal length intersecting at the obtuse angle, the long and short sides forming a right angle or square at their intersections on either side. The plate has a series of apertures to receive the pivot bolt connecting it with the straight edge, and the upper edge of the latter indicates on various graduations and scales on both faces of the plate. On the faces of the plate are also arranged tables for figuring lengths. The edges of the sides of the plate have marginal lines marked B, SB, T, ST, for blade, sub-blade, tongue, and sub-tongue, and the margins are divided by lines indicated by even and uneven numerals, the lines being drawn from the centers of correspondingly marked apertures in the plate forming pivotal points of the straight edge, by means of which the rise, pitch, and run of a roof may be indicated. Numbers on the tongues and sub-tongues, and in rise columns, have the same meaning as corresponding figures at pivotal points or centers, and when the tool is set for a certain pitch of roof or rafter, the blade shows the bottom or lower end cut of the timber, and the tongue the upper end cut. Every pivotal point on either face of the plate is a center from which the tool can be set and used for laying off correctly a square, square miter, octagon, octagon miter, degrees, etc.



ALLRED'S MEASURING AND DRAWING TOOL.

A VIKING SHIP.

Within a comparatively recent period the remains have been dug up, at various places in Norway, of ancient Scandinavian vessels, models of which are to be exhibited at Chicago. Our illustration represents one of these models, which has recently sailed for America, after visiting most of the towns on the Norwegian coast. It is an exact copy of an old Viking vessel, the remains of which were discovered in 1880, near Sandefjord, Norway. The model is splendidly built, of the best materials; but it is said that the modern work in no way surpasses the original, so far as that has been preserved. Not a little apprehension has been felt at the risk of an Atlantic voyage with such a vessel, the original Viking vessels having been intended only for cruising along the European coast and in the Mediterranean, where they made numerous voyages during the ninth, tenth, and eleventh centuries. The great lug sail has been made in four parts, laced together, and reefing consists in removing one portion and lowering the sail accordingly. The men have to sleep on the bottom boards, and provisions are carried in tinned iron cases. All decorations, such as the shields, dragon's head and tail, etc., were stowed away, and fenders were fixed along the sides. The rudder, which is placed at the side, is said to prove quite as effective as a modern one placed at the stern. The vessel is 74 feet long between stem and stern, 16 feet broad amidships, and draws 5 feet of water, its original being by far the largest craft found from the olden times. Local tradition in the neighborhood where the remains of the ancient vessel were dug up had it that here was the last resting place of a mighty king, who had been buried with costly treasures near his body.



THE WORLD'S COLUMBIAN EXPOSITION—THE VIKING SHIP.

SIMPLE HYGROSCOPE.

BY GEO. M. HOPKINS.

In the sultry days of summer we hear a great deal about humidity. This means great discomfort to almost every one.

To be really comfortable on a hot summer's day we do not need shade, cooling drinks, and fans so much as dry air. When the air is dry, nature's method of cooling by spontaneous evaporation of moisture from the skin is carried on to the comfort and satisfaction of those who are compelled to spend the heated term in a warm climate; but when the air is overcharged with moisture nature's cooling process ceases and discomfort results.

To determine by observation how thermal and hygroscopic conditions are related to the enjoyment of existence in hot weather, it is necessary, in addition to a thermometer—which nearly every one possesses—to have a hygroscope or hygrometer of some kind that will either indicate the hygrometric state of the air or afford a means of actually measuring the percentage of moisture in the air.

The annexed engravings illustrate a hygroscope—which may be used for measuring the moisture in the air with tolerable accuracy, and which might therefore be called with equal propriety a hygrometer.

The instrument depends for its action on the expansion and contraction of a strip of cardboard (Bristol board), formed into a helix and rendered impervious to moisture on the outer surface. The helix is rigidly held at one end while the opposite end carries an index which moves over a graduated dial.

The simplest form of the instrument is shown in Fig. 1. In this the upper end of the helix is glued to a cork which fits tightly on the wire projecting from the center of the dial. The lower end of the helix is cemented to a paper index which is perforated to receive the wire. To reduce friction, the hole in the index is black-leaded by twirling in it the point of a very soft lead pencil.

The form shown in Fig. 2 (in which parts are broken away) is like that already described, except in the manner of supporting the helix and in the arrangement of the index. The index in this case is attached to a common needle or pin, which passes through hole in the center of the dial and is inserted cork in the end of the helix. In the end of th farthest from the dial is glued a cork, which i ported by an angled wire projecting from the ba the dial.

When the cardboard helix is as dry as it can made a zero mark is drawn opposite the point of t index, and on a very damp and sultry day the instrument is placed in a steamy atmosphere until the index has moved as far as it will go from the zero mark; the coil is then inserted in the mouth without bringing it in contact with the tongue or lips, when it is breathed upon until the index stops moving and a mark is made opposite the point of the index. This mark is numbered 100, as it is assumed that the atmosphere surrounding the helix at the time of making the 100 mark was saturated. The space between the 0 and 100 marks is now divided into 100 equal parts. The helix must be fixed so that it will not change its position relative to the scale, otherwise the adjustment may be lost.

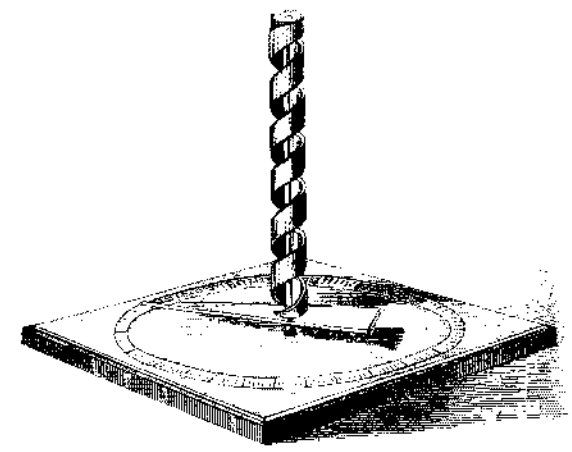


Fig. 1.—SIMPLE HYGROSCOPE.

The percentage of moisture in the air will be indicated by position of the index on the dial. If it points to 75, the air is within 25 per cent of saturation. If 80, 20 per cent, and so on. The index makes something more than a half turn between 0 and 100.

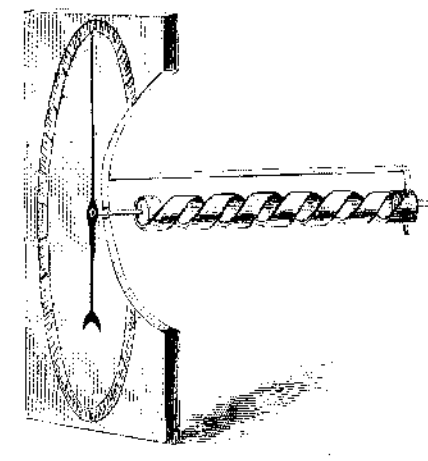


Fig. 2.—SENSITIVE HYGROSCOPE.

The important part of the instrument is the paper helix, but its preparation is very simple. A strip of thin Bristol board, ¼ inch wide and 6½ inches long, is wet on one side and wound on a lead pencil or similar object, with the dry side next the pencil. The ends are secured by winding a small rubber band several times around the pencil, as shown in Fig. 3.

When the paper helix thus formed is perfectly dry and before it is removed from the pencil the outer surface only of the cardboard is covered with two coats of shellac varnish, the first coat being allowed to dry thoroughly before the second is applied.

Fig. 3.—FORMING THE HELIX.

The helix is now allowed to remain in a warm dry place for a week or more, to allow the varnish to become perfectly dry and hard. Neglect of this last precaution will insure failure, as the paper will not return to its original form after being expanded unless the varnish is hard.

A SOLDER FOR ALUMINUM.—R. Heaton.—The solder is an alloy of aluminum and tin, suitable proportions being 45 parts tin to 11 parts aluminum. The metals are melted separately, poured together, and then cast into suitable strips or ingots. No flux is required.

First Public Exhibition of Edison's Kinetograph.

At the regular monthly meeting of the Department of Physics of the Brooklyn Institute, May 9, the members were enabled, through the courtesy of Mr. Edison, to examine the new instrument known as the kinetograph. The instrument in its complete form consists of an optical lantern, a mechanical device by which a moving image is projected on the screen simultaneously with the production by a phonograph of the words or song which accompany the movements pictured. For example, the photograph of a prima donna would be shown on the screen, with the movements of the lips, the head, and the body, together with the changes of facial expression, while the phonograph would produce the song; but to arrange this apparatus for exhibition for a single evening was impracticable. Therefore, a small instrument designed for individual observation, and which simply shows the movements without the accompanying words, was shown to the members and their friends who were present.

Mr. George M. Hopkins, president of the department, before proceeding to the exhibition of the instrument offered a brief explanation, in which he said: "This apparatus is the refinement of Plateau's phenakistoscope or the zootrope, and like everything Mr. Edison undertakes, it is carried to great perfection. The principle can be readily understood by any one who has ever examined the instrument I have mentioned. Persistence of vision is depended upon to blend the successive images into one continuous ever-changing photographic picture.

"In addition to Plateau's experiments, I might refer to the work accomplished by Muybridge and Anschuetz, who very successfully photographed animals in motion, and to Demeny, who produced an instrument called the phonoscope, which gave the facial expression while words were being spoken, so that deaf and dumb people could readily understand. But these instruments, having but twenty-five or thirty pictures for each subject, could not be made to blend the different movements sufficiently to make the image appear like a continuous photograph of moving things; the change from one picture to the next was abrupt and not realistic. In Mr. Edison's machine far more perfect results are secured. The fundamental feature in his experiments is the camera, by means of which the pictures are taken. This camera starts, moves, and stops the sensitive strip which receives the photographic image forty-six times a second, and the exposure of the plate takes place in one-eighth of this time, or in about one-fifty-seventh of a second. The lens for producing these pictures was made to order at an enormous expense, and every detail at this end of the experiment was carefully looked after. There are 700 impressions on each strip, and when these pictures are shown in succession in the kinetograph the light is intercepted 700 times during one revolution of the strip. The duration of each image is one-ninety-second of a second, and the entire strip passes through the instrument in about thirty seconds. In the kinetograph each image dwells upon the retina until it is replaced by the succeeding one, and the difference between any picture and the succeeding one or preceding one is so slight as to render it impossible to observe the intermittent character of the picture. To explain in a very imperfect way the manner in which the photographs are produced, I will present the familiar dancing skeleton on the screen. You will notice that the image appears to be continuous, but the eye fails to observe the cutting off of the light, and the image simply appears to change its position without being at all intermittent; but when the instrument is turned slowly, you will notice that the period of eclipse is much longer than the period of illumination. The photographs on the kinetograph strip were taken in some such way as this. I will exhibit an ordinary zootrope adapted to the lantern, which shows the principle of the kinetograph. In this instrument, a disk having a radial slit is revolved rapidly in front of a disk bearing a series of images in different positions, which are arranged radially. The relative speeds of these disks are such that when they are revolved in the lantern the radial slit causes the images to be seen in regular succession, so that they replace each other and appear to really be in motion; but this instrument, as compared with the kinetograph, is a very crude affair."

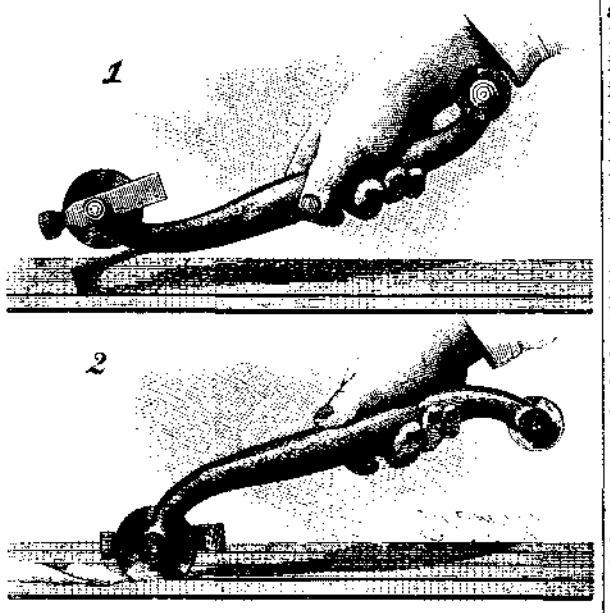
After projecting upon the screen a few sections of the kinetograph strip, the audience—which consisted of more than 400 scientific people—was allowed to pass by the instrument, each person taking a view of the moving picture, which averaged for each person about half a minute. The picture represented a blacksmith and two helpers forging a piece of iron. Before beginning the job a bottle was passed from one to the other, each imbibing his portion. The blacksmith then removed his white hot iron from the forge with a pair of tongs and gave directions to his helpers with the small hand hammer, when they immediately began to pound the hot iron while the sparks flew in all directions, the blacksmith at the same time making intermediate strokes with his hand hammer. At a signal from the smith, the helpers put down their sledge hammers, when the iron was returned to the forge and another piece substituted for it, and the operation was repeated.

In the picture as exhibited in the kinetograph, every movement appeared perfectly smooth and natural, without any of the jerkiness seen in instruments of the zootrope type which have heretofore been exhibited.

The machine in this case was not accompanied by the phonograph, but nevertheless the exhibition was one of great interest. The kinetograph in this form is designed as a "nickel in the slot" machine, and a number of them have been made for use at the Columbian Exhibition at Chicago.

AN IMPROVED CALKING TOOL.

To calk the seams of vessels, tanks, or any article which is to be made watertight, the simple and inexpensive tool shown in the illustration has been devised and patented by Mr. Joseph O. Walton, the tool being also adapted to dig out the calking from old seams when necessary. The handle is shaped to fit the hand nicely, and in its outwardly curved ends are pivoted rollers adapted to run in a seam and jam the calking material into place. One roller has a smooth face and is preferably slightly convex, and the other roller has a grooved or concaved face, forming sharp edges on opposite sides of the groove, enabling it to pack the calking very snugly in a seam, as shown in Fig. 2. The rollers may be made in different sizes to fit different seams if desired. In a longitudinal groove and depression at one side of the handle is pivoted a hook, which lies within the groove when not in use, or may be moved into the position shown in Fig. 1 for use in removing old packing. The pin which forms the pivot of one of the rollers has also pivoted upon it an auxiliary tool or chisel, having at one end a chisel edge and



WALTON'S CALKING TOOL.

at the other a head which may be struck by a hammer, to force calking into a short or transverse seam where the rollers cannot be conveniently operated. This tool may be fastened in the desired position by a thumb nut, and is ordinarily held nearly parallel with the handle, as shown in Fig. 2. The edges of the grooved roller also act somewhat like a chisel, packing the calking as firmly as if a chisel were used, and much more rapidly. Further information relative to this improvement may be obtained of Messrs. Robbins & Graham, Titusville, Fla.

Electrical Process for Boiler Preservation.

Demonstrations of the efficiency of a new method of cleansing and preserving steam boilers against pitting and general corrosion were made on board the steamship Tenasserim, Glasgow, by the Electric Anticorrosion Company, of Cardiff. The process consists of fixing electrodes in the boilers and sending periodically currents of electricity through them under definite conditions, adjusted and controlled by apparatus which is automatic in its action. When the current is passing from the anodes suspended in the boiler to the shell, hydrogen is liberated on the shell and tubes, and oxygen on the anodes; then by means of the depolarizing apparatus the action is changed, and most of this hydrogen and oxygen recombine, the result being that during the first period the hydrogen performs two distinct functions; first, it disintegrates mechanically by its volume the scale formed on the shell and tubes; and, secondly, some of the hydrogen combining chemically with the oxygen of the oxide of iron on the shell and tubes reduces this oxide to metallic iron, thus doing away with the oxidation of the boiler without wearing away the metal. The secondary action, in short, is to facilitate the disintegration of the scale, hasten the mechanical action of the hydrogen in bursting it off, and prevent polarization of the shell and tubes. Oxidation, it is well known, cannot take place in presence of hydrogen gas; consequently, the patentees contend that it will be impossible for corrosion or pitting to take place on the interior surfaces of the boiler so long as this electrolytic action is maintained; and, further, the mechanical action of the hydrogen, which is capable of disintegrating the scale, will likewise prevent its reformation.

The practical result of the application of the process is that after the apparatus has been working in an old boiler for a few months, the scale is said to be completely removed, and the surface of the iron is brought into sound and healthy condition by a deposit of metallic iron being formed on the shell and tubes. Where no lighting installation exists, the patentees fix a suitable dynamo, which may be driven from the screw shaft, and be of sufficient capacity not only to supply the boilers, but also to light up the engine room. It would seem to us, says the *Engineer*, that the dynamo had better be employed all the time in this lighting, and the boilers would be best preserved by feeding them with pure water.

Joseph Francis—Inventor of the Life Boat.

Joseph Francis, inventor of the metallic life boat, the life-saving marine car, and other useful inventions, died at Otsego Lake, N. Y., on the 10th of May, at the ripe old age of more than 92 years. He was born in Boston, Mass., March 12, 1801. When quite a lad he exhibited mechanical talent, and later on was the author of various mechanical novelties.

His greatest achievements were in the construction of life-saving appliances. These consisted of life boats, life cars and surf life boats. Of the life boats, the first that he made was of wood, and was called the hydrogen life boat. The interior was fitted with copper air tubes, and the invention proved successful. As a result of later experiments, the use of wood in the construction of his boats quickly gave way to iron, although the use of iron in the manufacture of vessels of any kind was practically unknown at that time. To Mr. Francis may be conceded the first use of iron floating vessels. Another improvement was added by having the spaces at the bow and stern of the boats made into reservoirs of air, as well as the spaces at the sides, thus enabling the boat to sustain a great load in the heaviest sea.

The New York *Sun* says: "The venerable inventor who died at Otsego Lake on Wednesday morning, in his 93d year, had rendered a conspicuous service to mankind, which was long since fittingly honored in foreign countries and more tardily in our own. In the Blue Parlor of the White House, just three years and one month ago, Joseph Francis received at the hands of President Harrison, after an address by Mr. Evarts, a gold medal which had been voted to him by Congress. It was a massive and handsome tribute, the largest medal, we believe, ever given by our government. Three pounds of solid gold were in it.

"That medal told the great work of Joseph Francis' career, in its representation of the metallic life car which rescued the passengers of the Ayrshire. 'You have made it possible,' said the President, in giving it, 'for the shore to send succor to the ship. You have invented and suggested appliances that have saved many thousands of human lives.'

"It is a little odd that Francis as a lad, before he had reached his teens, playing on the wharves of Boston, had fitted up a small boat with cork in bow and stern, which has been not unfairly called the first life boat built in America. The attention given to it, with his subsequent devotion to boat building, set all his faculties at work in that direction.

"When as a young man he came to New York with an unsinkable rowboat, containing cork at the ends and air tubes along the sides and under the thwarts, and gave an exhibition of it in the river at the foot of Wall Street, his career was determined. England, Russia, and Brazil bought such boats of him. But he had another idea working in his mind for saving life on wrecked vessels, and as early as 1838 constructed a wooden car to run forth and back on a hawser, between ship and shore. That, however, did not work well, being dashed to pieces on its trial; and then, in 1842, Mr. Francis achieved his great success of a corrugated iron water-tight car.

"Years passed in attempts to interest the government in this device, with the result only of obtaining permission to try it at the life-saving stations. On the 12th of January, 1850, the British ship Ayrshire came ashore at Squan beach, on the New Jersey coast, with about 200 souls aboard. The life car was near by and was hauled out to the ship. Five persons entered it and landed safely; then another five, and another, till about twoscore trips were made, and every person was saved, except one man who had attempted to ride outside the car and was washed off.

"Honors to Mr. Francis followed from France, Austria and Russia, and from that time forward his life cars and pontoon wagons yielded a comfortable livelihood. In 1885 the New York Chamber of Commerce urged a testimonial to him from Congress, and this was at length secured. In former years a familiar figure at the Stevens House, in lower Broadway, he has passed away at a good old age, after a life made happy by thoughts of the good he had been able to do to his fellow men."