NEW INVENTIONS.

Messrs. Edward W. Chambers and Thomas P. Burnett, of Springfield, Ohio, have patented an improved chair for theaters, churches, halls, etc., which can be folded very easily and compactly. The invention consists in a chair in which the back is pivoted to the rear end of the seat, which is pivoted to two standards and to the arm rests, which are pivoted to the tops of the standards, so that the back will move toward the standards and the arm rests will be inclined downward, thus occupying very little space when the seat is raised.

An improved washing machine, patented by Mr. Alexander Fleming, of Orleans, Iowa, washes clothes by pumping or forcing water through them.

Mr. James Rankin, of Fairlee, Md., has patented an improvement in guano distributers arranged on the frame of a seed drill; and it consists of a guano hopper provided with a series of openings or slots in its bottom, in each of which slots projects a part of the circumference of a revolving wheel provided with a central groove, which receives and carries the guano to the seed spout, a roll provided with arms and staples and passing longitudinally through the hopper being employed to force the guano into the grooved wheels.

An improved trip hammer has been patented by Mr. Solomon Shetter, of New Cumberland, W. Va. This invention relates to a means for regulating the force of the blow given by the hammer, and for entirely stopping the motion of the hammer with ease and celerity without stopping the engine or other motive power by which the hammer is driven, and without the necessity for shifting a belt from a fast to a loose pulley.

An improved stop-cock has been patented by Mr. John Flanagan, of Newburg, N. Y. The invention consists in constructing a stop-cock with an inclined or slightly curved branch pipe, so that a steam tube can be readily inserted through or a force pump connected with the stop-cock for thawing out or removing obstructions from pipes.

Mr. William T. Hall, of Fayetteville, Ind., has patented a charge holder for firearms, a device for use in loading shot-guns and rifles, which can be more conveniently used than an ordinary powder flask and shot pouch, and by which the arm can be rapidly loaded. The invention consists in a shell or tube of a suitable size for holding a single charge and wad, and fitted with a finger slide for pressing out the wad, so that the charge can be poured into the gun.

Elegant New Western Steamer.

The Louisville *Courier Journal* says of the new Anchor Line steamer: Again the famous Howards, of Jeffersonville, come to the front by building as handsome and fleet a steamboat as ever graced the waters of our rivers. They have built a number of magnificent side-wheel passenger steamboats for the St. Louis and New Orleans Anchor Line, among which we may mention the more recent of which are the Belle of Memphis. City of Helena, City of Greenville, and City of Providence—all of which are noted for their speed, beauty, and elegance. Now they have finished and sent home the new City of Vicksburg, a twin of the steamer City of Providence—an exact copy of the last named steamer. The dimensions of the City of Vicksburg are as follows: Length of hull 280 feet, depth of hold 8½ feet, with 44 feet beam, all oak, well ironed, and fastened extra strong. The guards are 17 feet in width, giving the boat an extreme width of 78 feet and a carrying capacity of 1,600 tons. She has an easy model, with draught light, in running trim, of only 43 inches, making her a great business boat, and a real beauty. The machinery, from the foundry of Ainslie, Cochran & Co., of this city, is a perfect specimen of their handiwork. It is high-pressure, embracing cylinder 26 inches in diameter, with 9 feet stroke; working water wheels 34 feet in diameter, with 15 feet length of buckets. The steam power lies in five main boilers, each 30 feet in length and 44 inches in diameter, with four return flues in each, which give her an abundance of steam, and with her good model and light draught gives an assurance of being very fast. All the appliances required by the steamboat law, as well as those suggested by the advance of the age for safety, are in this boat, including extra boilers for the auxiliary engines—doctor, donkey, and steam pumps. The main saloon is 190 feet in length, 16 feet wide, and 13 feet 6 inches in height, exclusive of the arches. The interior is painted a pure French zinc white in gloss, requiring nine coats, which, together with the gold etchings and reliefs, taxed the utmost skill and patience of the artists in completing its beauties. In contrast or relief the state room doors are of hard wood, polished walnut, decorated or embossed in gold. The texas or upper cabin is 110 feet in length, and admirably furnished for passengers and the officers of the boat.

LATCHINOFF'S OPTICAL DYNAMOMETER.

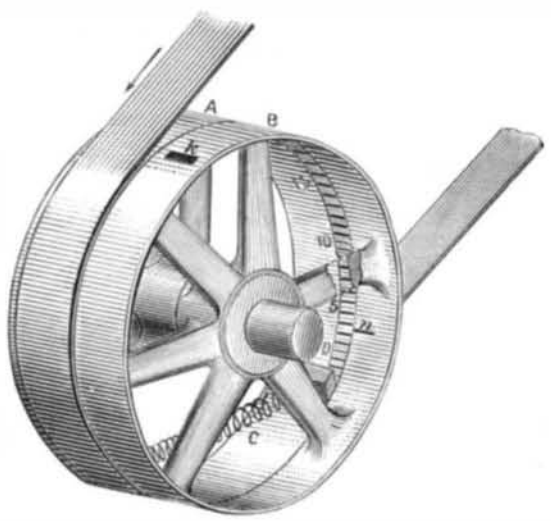
Among the dynamometers employed for measuring the work absorbed by any machine, the one oftenest used is that of Morin, which traces a curve representative of the work.

This instrument gives precise indications, but takes up much space.

I have undertaken to construct a dynamometer sufficently simple to be adapted to any kind of a machine whatever.

The improvements that have recently been made in machines for the production of light and in electric motors are rendering more and more necessary an apparatus which shall permit of measuring the effective power expended in setting in motion any given dynamo-electric machine. It is only with a like apparatus that can be determined the best conditions of performance; be compared the value of

Fig. 4.



the different apparatus; and be resolved a host of questions which, up to the present time, have been only approximately answered, their solution demanding a measurement of the work, and the Morin dynamometer being too costly, and too difficult to mount to be readily used.

My dynamometer is applicable to all swiftly revolving machines, and especially to dynamo-electric ones. The following is a description of it:

Upon the driving shaft are placed two pulleys, A and B (Fig. 1), connected with each other by the springs, C (Figs. 2, 3, and 4). A is a loose pulley, and B is fixed to the shaft. The belt, D (Fig. 1), moves the pulley, A, which, in revolving, first stretches the springs, C, and then puts the machine in motion. The stress exerted is measured by the tension of the springs. For estimating this tension I have made practical use of the principle of the phenakisticope, which is based on the persistence of luminous impressions upon the retina.

In the rim of the pulley, B, there is a slit, *k* (Figs. 1 and 4), and opposite to it, on the inside of the same rim, there is traced a very heavy line, *n*, in such a way as not to be hidden by the axle. If, while the pulleys are rapidly revolving, we look at the line, *n*, through the slit, *k*, it appears to be immovable.

Figs. 1 and 2.

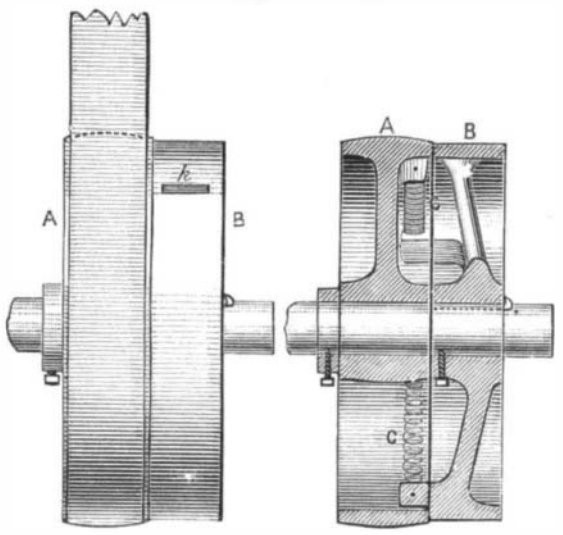
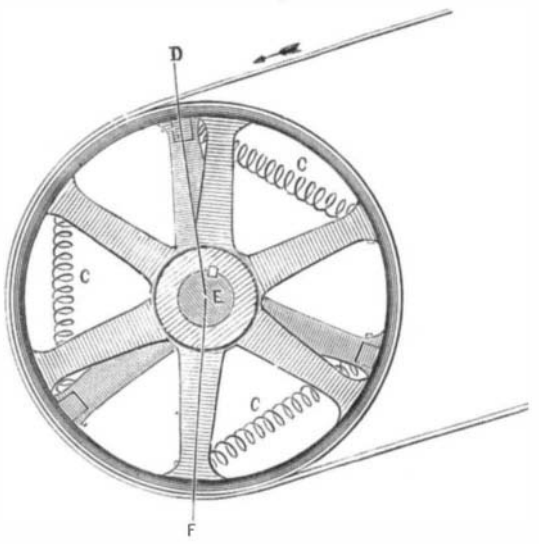


Fig. 3



LATCHINOFF'S OPTICAL DYNAMOMETER.

The inside of the rim of the pulley, A, is provided with a scale, which is made in the following way:

The pulley, B, is made immovable, and against the line, *n*, there is traced on the pulley, A, a zero mark; then, from the loose pulley there are suspended, by means of a cord, weights of five, ten, fifteen, etc., kilogrammes. At the different positions of *n*, corresponding to these weights, there are traced marks which constitute the scale.

During the working of the machine this scale will appear to be stationary, and one may distinctly see what division of the scale the line, *n*, is opposite. In this way it is easy to ascertain in kilogrammes the stress exerted on the pulley.

In order to calculate the work absorbed by the machine it is necessary to know the diameter of the pulleys and the number of revolutions of the machine. If a mechanical counter had to be employed, the process would be inconvenient and not very exact; but fortunately we have excellent trochometers at present which are based on centrifugal force, and which allow of the number of revolutions of the machine being directly read upon a dial, so that a glance through the slit in the pulley and at the dial of the trochometer gives the elements that are necessary to calculate the work. For greater convenience, the scale inside the pulley should be well lighted by a lamp having a reflector.

During the working of the machine the scale will not be absolutely immovable, but will have a backward and forward motion corresponding to that of the steam-engine, because the fly-wheel does not render the working of the machine entirely regular.

I shall not describe in this place the mode of fixing the pulleys, springs, and other parts, since such details are sufficiently indicated by the accompanying figure. I will only remark that the dynamo-electric machine is placed to the left of the pulley, A.

We might also measure the tension of the springs in a purely mechanical way, by causing an index needle to move over a dial by the aid of a screw passing along the shaft. I did at first think of adopting this method, but it seemed to me too complicated, so I abandoned it.

The advantages of my dynamometer are the following: (1.) It is very simple and of small dimensions, and may always remain fixed to the machine.* (2.) It requires no preliminary installation nor any calculation, a glance being sufficient to determine the work. (3.) It may be easily verified by suspending from the pulley, A, different weights, and seeing whether the divisions of the scale correspond with the latter.

The springs, by stretching through long use, may cause a deviation of the zero of the scale; but the divisions will not perceptibly change, even after the apparatus has worked for a long time.—*M. Latchinoff, in L'Electricité Russe.*

ENGINEERING INVENTIONS.

An improvement in car coupling has been patented by Mr. John H. B. McCray, of Blossom Prairie, Texas. This invention relates to self-couplers, and it consists of an open-top hook-shaped draw bar provided with a pivoted T-shaped vertically moving coupling bar, and provided also with an end socket for using the ordinary coupling link.

Mr. George E. Whipple, of Fort Edward, N. Y., has patented an improvement in that means for propelling vessels in which the water is drawn in through a longitudinal channel at the bow by a pump or other device and is discharged at the stern.

An improved direct-acting pumping engine has been patented by Mr. Edward G. Shortt, of Carthage, N. Y. The invention relates to certain improvements in that class of direct-acting steam pumps in which a single plunger is constructed at its upper end in the form of a piston to be acted upon by steam, while its lower end acts within a pump cylinder in connection with suitable ports and check valves, and in which the steam cylinder is in one and the same piece with the pump cylinder and in the vertical line of the same, with a valve chest and gear mounted upon the top of the same and operated through a connection with the piston.

Mr. Charles E. Macarthy, of Forsyth, Ga., has patented an improved car coupling, designed to couple the cars easily and securely by a lever under the car, and projecting at the side of the same, whereby all danger involved in going between the cars is avoided.

An improved packing for piston rods, pistons, etc., designed to secure a greater durability, to take up wear as fast as it occurs, and at the same time to form a tight joint, has been patented by Mr. Edward G. Shortt, of Carthage, N. Y.

An improved locomotive engine has been patented by Mr. Ephraim Shay, of Haring, Mich. The invention consists of a locomotive having its bogie wheels formed with bevel gear teeth combined with a horizontal and longitudinally arranged shaft, also having bevel-gear wheels, the shaft being rotated by a direct connection with the engine; also, in novel means for providing for the horizontal and vertical adjustment of the connecting shaft between the crank shaft and the bogie wheels, and in novel means of conveying the power of the engine to said bogie wheels.

An improved machine for passing logs over dams has been patented by Mr. David B. Weaver, of Hopewell Township, Huntingdon County, Pa. This invention consists principally in providing the top of the dam with a strong beam or shaft having any suitable number of radial arms, the beam or shaft being adapted to be turned in its bearings by any suitable means for throwing logs over the dam.

* In order that the springs may not be strained too much, the belt should be kept constantly on the pulley, B, and shifted to the pulley, A, only during experiments.

Professor Sainte-Claire Deville.

The London *Chemical News* gives the following concise sketch of "one who, for the past thirty years, has had few equals and no superior in the fields of mineral chemistry and inorganic analysis." Etienne Henri Sainte-Claire Deville was born March 18, 1818, in the island of St. Thomas, in the West Indies. At an early age he manifested an ardent passion for the study of chemistry, which at that time found in France so many of its most distinguished professors. His abilities were manifested so early that at the age of twenty-six he was commissioned to organize the Faculty of Science, newly created in Franche Comté, and to preside over it as its dean. Here he undertook the analysis of the waters of the Doubs, and of the springs around the town of Besançon, and greatly improved the methods then known for water analysis. Shortly after, he succeeded in preparing nitric anhydride, which previously had been attempted in vain. Toluol was another of his discoveries. In his thirty-third year he succeeded Balard in the chemical chair at the Ecole Normale Supéricure, at Paris. Here his emoluments only reached the modest sum of 3,000 francs; chemistry in France, as well as in England, being supposed to be its own reward. His next researches related to the properties and the industrial preparation of aluminum—discoveries which attracted public attention throughout the world. He then turned his attention with signal success to the metallurgy of platinum, and its separation from its associated metals. His investigations on boron and silicon are also well worthy of notice, and his production of sodium at a cheap price has placed a powerful reagent in the hands of chemists, and has led the way to valuable results, both in the laboratory and in industrial establishments. His highest achievement, from a strictly scientific point of view, was the establishment of the laws of dissociation. Previously, decomposition was regarded as a simple phenomenon, effected and completed, in the case of every substance, at a fixed temperature. Deville showed that in some cases it is effected within certain limits of temperature, being arrested at a given heat by the equilibrium established between the decomposing body and the products of decomposition. A most admirable characteristic of the deceased *savant* was his strict accuracy—an attribute all the more deserving of honor in a man of his ardent and impetuous temperament. Among his pupils may be counted not a few of the most meritorious among the younger French chemists, such as Debray, Troost, Hautefeuille, Grandeau, Gernez, and others. M. Deville died on July 1st, at Boulogne-sur-Seine, and was buried on the 5th. His old friend, M. Pasteur, pronounced an eloquent and impressive *éloge* at the funeral. All honor to his memory, and may his experimental accuracy, which M. Pasteur calls the "probity of the chemist," find abundant imitators.

W. Milnor Roberts.

We are in receipt of the sad intelligence of the death by typhus fever, at Rio Janeiro, on the 14th of July, of Col. W. Milnor Roberts, past President of the American Society of Civil Engineers, and late Chief Engineer of Public Works of Brazil. We are indebted to *Engineering News* for the following:

Colonel Roberts was born in Philadelphia, February 12, 1810. His aptitude for mathematics early introduced him to the then new profession of civil engineering, and in the spring of 1825 he received his first appointment as a chainman of the Union Canal, of which Canvass White was chief engineer, and Sylvester Welch, locating engineer. At 18 years of age he was appointed engineer in charge of the most difficult division of the Lehigh Canal, from Mauch Chunk down, sixteen miles, and from that time forward he was always intimately connected with great canal and railway enterprises, principally in Pennsylvania and New York States, with intervals in Brazil and in the Western States. He held important offices under the United States Government, was Chief Engineer of the Northern Pacific Railway, Associate Chief Engineer of the St. Louis Bridge, and an active and important member of the Mississippi Jetty Commission. In 1879, shortly previous to his departure for Brazil, Colonel Roberts was elected President of the American Society of Civil Engineers, a society of which he was a very active and always interested member, and which will very keenly feel his loss. Though so far advanced in years, Colonel Roberts was an unusually active and energetic man, and some idea of the extent and difficulty of his labors in Brazil may be gathered from letters which have been published in this journal during the past two years. Colonel Roberts was possessed of a most genial and kindly disposition, and the news of his death will be received with feelings of great sorrow by the entire profession of which he was a member, as well as by a very large list of friends in this and other countries where he was known.

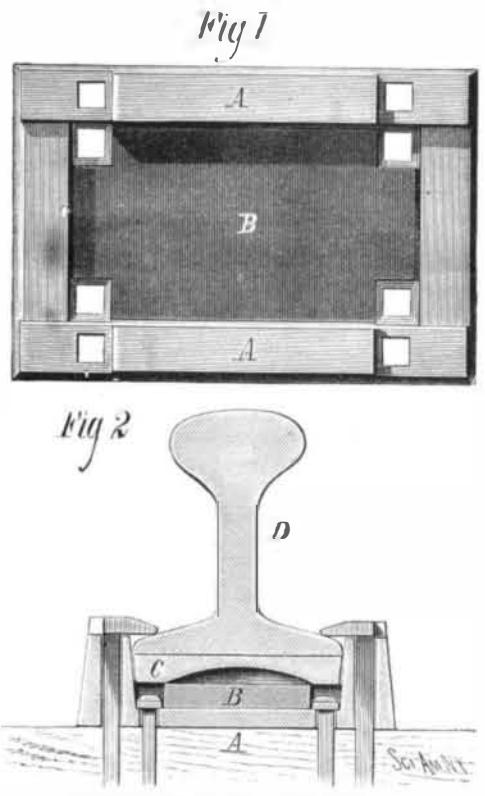
Improvement in the Paper Trade.

From statistics presented to the meeting of the American Papermakers' Association, which met at Saratoga on the 27th of July, 1881, it appears that 307 manufacturers had offered 897 tons for export without limit as to price. The increase, according to the report of the committee on export business, in the export of paper in 1880 over 1879 had been 16,500 tons. Statements were also made by prominent members to the effect that the out-put of the paper mills had been fully 25 per cent over that of the previous year, and paper is now sold as low in New York as in London

The total capacity of all the mills in the country is now 2,500 tons per day of all kinds of paper.

NEW RAIL FASTENING.

The engraving shows a new fastening for securing rails and chairs to the railway ties and sleepers recently patented by Mr. Isaac K. Bennett, of Moosup, Conn. Fig. 1 is a plan view of the chair and cushion, and Fig. 2 is a vertical transverse section of the chair, showing the rail in position. The chair, B, is secured to the tie or sleeper by square-headed spikes passing through holes in the bottom into the timbers. A rubber pad, B, is placed in the cavity of the



BENNETT'S RAIL FASTENING.

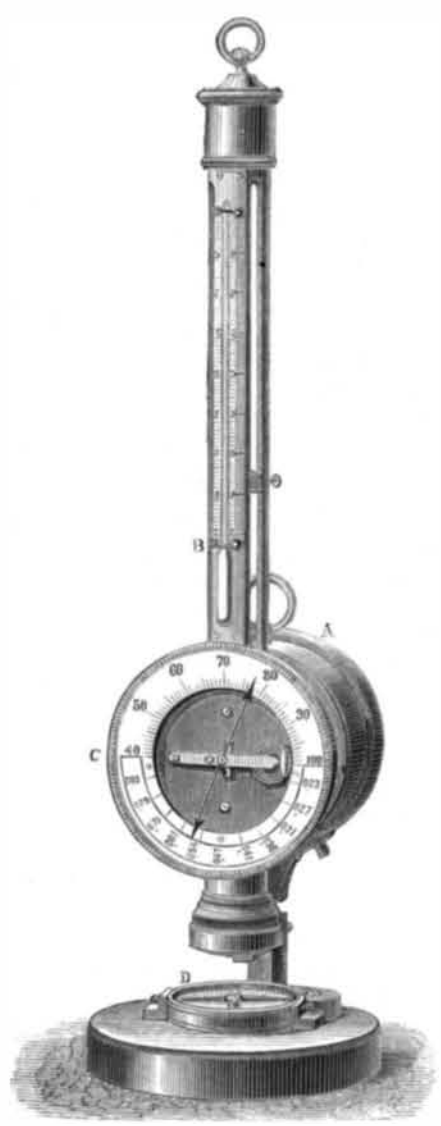
chair and covered with a metal plate, C, which fits the cavity in the chair, and is concaved on its under surface, forming an air cushion. The rail, D, rests on the plate, C, and is secured by hook-headed spikes passing through square holes in the chair into the timbers.

This method of fastening gives great elasticity to the joint and prevents hammering the rails end and bruising the ties.

This device may, with advantage, be applied to the middle or other portions of the rail.

PORTABLE METEOROLOGICAL STATION.

Under this name is designated an instrument especially adapted for the use of travelers in mountain excursions in



PORTABLE METEOROLOGICAL STATION.

order that they may be able to observe and accurately register the different atmospheric phenomena they experience, and so fill the gap that generally exists in the history of Alpine and other ascensions.

This instrument is so arranged that it can, in any place, conveniently and exactly determine the most important meteorological phenomena, the pressure and temperature of the air, and its degree of humidity. It is a combination of a barometer, thermometer, hygrometer, and compass, arranged in a small case that can easily be carried, as it weighs only one kilogramme.

The different parts are so perfectly balanced that the instrument can be used in any position and can stand without injury the rough usage of mountain traveling.

The barometer, A, is the aneroid, a well known instrument, and is especially adapted to show the pressure of the atmosphere and the elevation of the place of observation above the sea level.

The temperature is shown by a mercurial thermometer, B, fixed on a copper tube, that forms a general support for the whole apparatus. The thermometer registers the centigrade system from 25° below zero to 40° above.

The degree of humidity in the atmosphere is determined by a Saussure hair hygrometer, which is slightly modified in this apparatus. A well constructed hair hygrometer gives results sufficiently accurate for general meteorological observations, as the hairs work regularly, and their small bulk causes them to be easily affected by the surrounding air, which is a great advantage when there are only a few moments to make an observation.

This hygrometer is the only one available for those altitudes where the temperature is below zero, and where, consequently, neither the psychrometer nor the condensing hygrometer could be used.

Another advantage is that it shows immediately the degree of humidity, for a table, inscribed on the semi-circumference, C, of the circle, gives in a moment the equivalent of the degrees of the hygrometer in the fractions of saturation of the air.

By this method we can make most interesting comparisons of the humidity of the fogs and mists that are encountered on the mountains and in the vicinity of elevated lakes.

It is easy to see the utility of the compass, D, which shows the position of the country, and is especially useful to the traveler, when exploring an unknown place or surrounded by a heavy fog. The direction of the wind can also be easily ascertained by tying a piece of ribbon to the ring at the top of the instrument, and so making it still more useful.—*La Nature.*

STEAM-BOILER NOTES.

It will be remembered by those who gave attention to the subject of steam-boiler construction, how the steel plates used by Messrs. Elder & Co., of Glasgow, in the construction of the boilers of the Livadia, the Russian war yacht, behaved in the most capricious manner, after having passed the tests that are approved by Lloyds, the Admiralty, and the Board of Trade, and how since that event the attention of civil, metallurgical, and mechanical engineers throughout the civilized world has been drawn to the subject of so-called mild steel as a structural material for engineering works.

According to a recent report on the behavior of the steel plates above mentioned, by W. Parker, Esq., chief engineer surveyor of Lloyds' Register, which was read at a meeting of the Institute of Naval Architects of England, it appears that, up to the date of the Russian event, Mr. Parker and his colleagues of the Lloyds' Register had never observed a single instance of brittle steel plates during their manipulation of 17,000 tons that entered into the composition of no less than 1,100 steel boilers now in use in steamships.

The report shows that, during the construction of these Russian boilers (which were 14 feet 3 inches diameter, with triple-riveted lapped longitudinal seams, plates ¾ inch thick) a plate fell from the slings on to a piece of metal, the shock of which cracked it between the rivet holes at a distance from the place that received the blow; thereupon all the plates were annealed in a furnace specially adapted for the purpose.

The first boiler that was tested after completion gave way in three places before the required pressure, 140 pounds, was reached, and the second gave way in anticipation of the test; in other words, it was found to be cracked by those who were about to test it in a similar manner behind the rivet holes.

In the general chemical analysis which followed their failure nothing seems to have been found to warrant such conduct on the part of these plates. But the appearance of the fracture indicated that the metal was not of uniform structure throughout the thickness of the plate, and a series of special analyses performed on successive layers, each $\frac{1}{16}$ thick, planed off, showed that there was a notable difference in the chemical composition of the middle as compared with the surface layers of the plate. There was more carbon, more phosphorus, and more sulphur in the intermediate layers; of carbon and sulphur they contained nearly double, at the middle, the average quantity of all the layers. Mr. Parker concludes from his investigation that there is nothing but the want of uniformity of structure to account for the singular freaks of these plates. He says: "The tensile strength was not reduced by the punching, but the plates, where punched, were *extremely brittle.*"

In 1848, the ex-Commissioner of Patents, in his report, which was published in the SCIENTIFIC AMERICAN of May 19,