Extraordinary Performance of a Turbine.

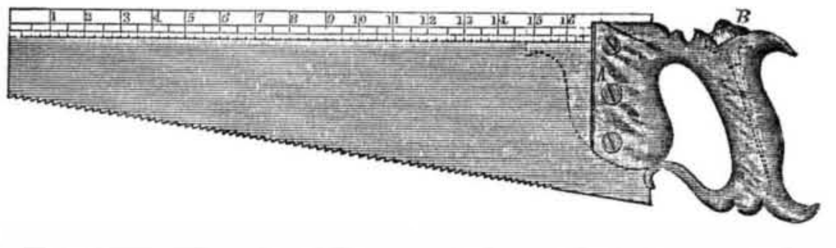
A paragraph, headed "Philosophy in Court," has been going the rounds of the papers for nearly a month, claiming for a turbine water wheel constructed by Uriah A. Boyden, of Boston, the realizing or utilizing 96 per cent of the whole power of the water. The labor involved," it remarks, " in this result may he imagined from the fact that Mr. Boyden spent more than $5,000 in the mere mathematical calculations." The wheel, it alleged, was constructed for, and is now running in, the Atlantic City Mills, of Lawrence, Mass. The pay was to depend on the econ my of the wheel, and the 96 per cent is alleges in the paragraph to have been the decision of the scientific parties to whom the matter was referred. The case is one about which more or less has been said in engineering circles for four or five years, and it is important that it should go on record correctly.

In 1846, Mr. Boyden, known as a very successful designer of Fourneyron turbines, entered into a contract with the Atlantic Cotton Mills at Lawrence, Mass., by which he undertook to convey to them his patent rights for important improvements in turbines for a sufficient number and size to use a specified amount of water, and to furnish designs and superintend the construction of the same. The Corporation was to pay the expense of measuring the water used by, and the power derived from, the turbines, and if the power obtained was seventy-six per cent of the power of the water expended, two thousand dollars was to be paid, and for every one per cent above seventy-six, a further sum of three hundred and fifty dollars. Misunderstandings arose between Mr. Boyden and the officers of the Corporation, and it was not until the summer of 1851 that one of the turbines was tested. The apparatus for testing consisted of a friction pulley and brake, constituting a Prony Dynamometer for measuring the power furnished by the turbine, and of a weir to guage the quantity of water expended. The principal difficulty lay, in computing the flow over the weir, or, in other words, in measuring the quantity of water used. In the absence of positive proof, the parties were not able to agree upon a formula for computing this, and, of course, could not agree as to the per centage of useful effect furnished by the turbine on which depended by Mr. Boyden's compensation. The contract provided that each of the turbines should be tested, but the Atlantic Cotton Mills found that to test more than one would subject them to great inconvenience, if not loss, and declined testing more than one. Mr. Boyden, however, insisted on his rights under the contract. The natural result of this state of things was a suit at law, brought by Boyden against the Corporation, in the Supreme Court of Massachusetts. The case came on for trial in Boston, in January, 1856, but very little progress had been made, before the Judge came to the conclusion, which he stated emphatically, that a board of competent referees would be a more suitable tribunal than a judge and jury. A reference was accordingly agreed to by the parties, the referees being Joel Parker, Professor of Law in Cambridge University; Benjamin Peirce, Professor of Astronomy and Mathematics in the same institution, and James B. Francis, the experienced hydraulic engineer, of Lowell. Eminent counsel were employed by both parties, and a most thorough investigation was had before the referees. It was claimed for Boyden that the turbine tested gave 96 per cent; this was attempted to be proved by the experiments, and also by a prodigious mass of calculations based upon very profound mathematical principals, by which, from the form, dimensions and motion of the turbine, it was attempted to ascertain exactly the quantity of water discharged. These calculations were made by Mr. Boyden and his assistants, at a cost to him of over $5,000, which it was claimed should be re-imbursed to him by the Corporation. His whole claim was about eighteen thousand dollars, besides damages for breach of contract.

On the part of the company it was contended that the per-centage did not exceed 88 1-2 per cent, that being the result obtained by their engineer, who used the formula most suitable according to his views, for computing the flow over the weir; they objected also, on several grounds, to paying the $5 000 for the calculations, and also to paying damages for breach of contract.

The referees awarded Boyden about $16 600 and costs of court and reference, but made no award as to the per centage furnished by the turbine. The actual economy of the wheel—undoubtedly *one* of the best, and probably the very best, adapted to its work of any ever constructed—will therefore always remain an open question, the maker claiming 96 and the user acknowledging 88 1-2 per cent.

GORHAM'S MEASURING SAW.



The engraving represents very distinctly a simple yet obviously important improvement in hand-saws, which enables one tool to perform the functions of a saw and square with tolerable exactness. The blade of the saw is perfectly straight on the back, and the front edge of handle A is made perfectly straight, faced with metal to prevent becoming bruised or incorrect with use, and is finished up after being fixed to the saw, so as to be exactly at right angles to the back of the blade. The blade is graduated, as represented, so that it may be used to measure, and scratch-awl B is fitted in a suitable socket in the handle so as to be always at hand. It is, of course, necessary to make the fastening of the handle to the blade very secure against even the slightest play. The edge of the handle being applied to the edge of any work to be marked, the back of the blade serves in exactly the same manner as the edge of the ordinary try square. Its great convenience should ensure it a rapid introduction.

This invention, one of the simplest ever produced, was secured by Letters Patent, May 12, 1856. For further particulars, address H. Williams, assignee, Atlanta, Georgia. Jackson Gorham is the inventor.

Photographing on Wood.

In preparing wood engravings—such as are employed in all books and newspapers where the pictures are printed on the same sheet and at the same time with the types or letter-press—the picture is first drawn by hand on the smooth block of wood, and the lines and shades are subsequently raised, or rather the white surface is *sunk* by the skill of the engraver. A patent was issued on the 5th of May last to R. Price, of Worcester, Mass., for a process of photographing on wood in lieu of drawing by hand, which has since been so far developed by the proprietors, C. J. B. Waters & Co., of No. 90 Fulton street, this city, as to be pronounced successful by some of our best engravers. The surface is so prepared as to be sensitive to light like the glass or paper employed in the ordinary photographic processes, and the image of any object is thus impressed upon the block with greater accuracy than it is possible to accomplish it by human skill. We have seen some wood blocks bearing very fine pictures produced by this means, and a number of such pictures have been engraved and printed showing that it is practicable so to use them. The principal defect of such "sun pictures" for this purpose is their too great delicacy and faintness. If this can be overcome, and the pictures be produced with the vigor and strength of ordinary India ink work, the invention will very greatly facilitate the production of illustrated books and newspapers, and it is quite portable that, with practice, engravers can accustom themselves to work from these drawings as now produced, without difficulty. Another defect, that all objects beyond the focus of the instrument are represented but hazily, is probably a serious one in taking views from nature; but this may be ultimately overcome to a great extent by placing the object to be represented at a great distance, and employing an equivalent to a telescope to magnify and strengthen the image before it is thrown on the block. This latter would reduce the difference in distance of the various parts of a machine for example, and enable all parts to be equally well delineated by the action of the light. At present the invention is most successful in reducing engravings from copies. It is now in daily use for this purpose.

Our Cotton Manufactories.

The steam duck mill at Rockport, Mass., has a large surplus of goods on hand, and has suspended operations for the present. Nearly all the cotton mills of Manchester, with the exception of the Print Works, have been for some time discharging help and manufacturing less than usual, and have lately commenced working only five days a week. The same has been done in a number of other mills throughout the country. It is thought that course is better and more satisfactory to the operatives than stopping work in some rooms, and consequently turning some hands out of employ. The design is to make the cotton they now have on hand last till the first of January, when, it is hoped, they will be able to get new cotton at lower rates. The high price of cotton and the low price of fabrics are the causes universally assigned for this partial suspension. The same system of curtailing the manufacture and reducing the labor and the wages of the operatives has been adopted in England for several months past. The mills producing shirtings, sheetings and print cloths, have been operated only forty hours per week.

This expedient was very generally adopted in the year 1850, when the price of cotton advanced to about the present rate. It may prove useful to gather information from past experience, to govern operations on a recurrence of similar events. The Providence *Journal* publishes a list of seventy mills—including many of the largest in the country—which were entirely stopped in 1850, while others were worked half time to enable prices to assume a better shape. The price of cotton was then about 15 cents per pound, and the price of printing cloths averaged 5 1 2 cents for 60×64 picks. The price is now about 17 cents per pound, and of the same style of printing cloths, 6 cents per yard.

Preserving Fresh Meat.

As supplemental to our remarks in No. 46, this volume of the Scientific American on the importance of some device for the successful preservation and transportation of fresh beef from new and distant sources to supply the markets of our Atlantic cities, we translate the following from the *Polytechnische Journal*, which appears under the heading of Robert's Process for Preserving Meat :—

By this process, all vegetable and animal substances can be preserved without losing any of their peculiar qualities, and without change in form or appearance. As regards meat, it must be observed that the meat must be freed from blood and all the watery parts, and then exposed to a current of air until it has lost its surplus natural humidity. Whole members of the animal, or large pieces, are better fit for the process than thin slices. After the meat has been sufficiently dried in the open air, it is suspended by a rope in a reservoir, and care must be taken that the several pieces are so far separate each from the other as to give free access to the air from all sides. Any box, cask or apartment made of boards, or a common room, may serve for the reservoir, if the walls of the latter have been covered over with boards or sized paper. This reservoir has to be closed hermetically against the external air; the doors have to be lined with felt or india rubber, so as to close up air tight. On the upper part of this reservoir a lead pipe is provided, by which the air escapes—a similar contrivance is provided on the lower part. After the pieces of meat or other substances have been suspended in the reservoir, a current of sulphurous acid gas is let into the lower part. This effect is produced by driving into the reservoir, by a pair of bellows, a current of air, whi h in its passage, goes through a closed vessel wherein sulphur (brimstone) is kept burning. If the plug on the upper part, which must also be of lead, be opened, the atmospheric air is driven out of the reservoir by the sulphurous acid gas, and as soon as the latter is seen to escape freely from the same pipe on the top, the reservoir is closed. The substances have to be kept in the reservoir filled with the gas for a time, which is in proportion to their volume or weight. Pieces weighing four or five pounds only require about ten minutes, while large pieces of one hundred to two hundred pounds weight require twenty to twenty-five minutes. After the pieces have thus been penetrated by the gas they are taken out of the reservoir and dried in the open air. After this, the substance is covered by a very thin layer of varnish, prepared from two pounds of albumen dissolved at a temperature of 136 to 140 degrees in one quart of a strong decoction of marshmallow root, to which a little molasses has been added. This varnish is applied with a fine hair brush, and care must be taken to reach all the corners and crevices of the substance.

Meat treated by this process remains perfectly fresh and good, and can be used as if just received from the butchers. Fowl, (with or without feathers), fish, fruit, and all kinds of vegetables can be preserved by this process.

Substances prepared as described may be sent to any distance if packed up in barrels and covered over with tallow or lard, which latter article, however, must be kept at as low a temperature as possible. If heated too much, it generates fermentation.

Bole-Ammoniac.

As this substance is extensively used for coloring several comestibles, sauces, &c., particulary anchovy sauce, it is but justice to the public that they should be made acquainted with its nature and composition; they can then use their own discretion as to eating it, or merely regarding it as an adulteration. Although this article is generally distinguished by the name at the head of this paragraph, its proper title is Armenian-bole. The word "bole" is no doubt derived from *bolus*, a pill. because it was formerly used in medicine; and Armenia is the country that supplies it. Armenian bole is a mixture of whiting, or chalk, and the oxyd or rust of iron. When artificially prepared, it is made of chalk and red ochre, the ochre being a compound of iron. The resulting mixture has a coloring power almost equal to the natural product. When eating substances which are colored with bole, we should remember that we are devouring a certain quantity of iron. Now, iron in any form, when taken into the stomach, has a powerful medicinal action, and when administered by a physician's advice it is rarely given in doses of more than from half a grain to three grains. How far, therefore, we are justified in swallowing ten or twenty times this quantity at a meal, we must leave the reader to decide; and although we do not wish to influence any man's taste, yet in holding up the colored veil of his food to the light of science, we may perhaps properly influence his judgment as to " What to eat, drink, and avoid." SEPTIMUS PIESSE.

United States Residence Registry.

We have received a circular describing a plan by which lost friends may be enabled to find each other. The project is to establish an office in Washington, D. C., where anybody who chooses will register his or her name, at an expense of twenty-four cents, or will be informed of the whereabouts of any other person whose name is registered. The circular adds that it is proposed to be made a government affair. The scheme seems worthy of attention.