



ing rod and crank, deducted from the sum of the lengths of the two, gives the distance which the piston has receded from the end of the cylinder opposite the crank shaft." When we test this rule by adopting the length of the connecting rod as 4 and the crank 3, we find this hypotenuse 5, this deducted from their sum, 7, leaves 2, which is only one-third of the length of the stroke, as in reality it moves more than two-thirds of the stroke, exactly 4/36 from the end of the cylinder. The editor's indifferent reply, page 115, is at least correct in stating, "that for a short rod and long crank it will never be midway, but for a long rod very near to it," in fact it will be always nearer to the crank shaft than half way the cylinder, but your correspondent's rule brings it always further than this point, which is evidently absurd.

The best test is always to take an extreme case; let the connecting rod be equal to the crank, say four feet, it is clear that the piston rod will be at the end of the cylinder nearest to the crank shaft when the crank is vertical, and will not move during one-half revolution of the crank; after your correspondent's rule the pistons would be at only about one-third of the length of the cylinder. The true rule is this, call the length of the piston rod, m , and the crank n , then the distance of the piston to the opposite end of the cylinder will be represented by this expression—

$$(m+n) - \sqrt{m^2 - n^2}$$

this expression indicates also that the problem becomes impossible when the crank is longer than the connecting rod, as then $m-n$ becomes negative, and the square root of a negative quantity is impossible.

If the reader desires this formula transposed in words, nothing is simpler. Take the square root of the difference between the squares of length of piston rod and crank and subtract this difference from the sum of these lengths, the result will give the distance of the piston from the extreme end of the cylinder.

Any person who understands elementary geometry may easily demonstrate this rule by drawing the triangle made of the different positions of crank and connecting rod.

P. H. VANDER WEYDE, M. D.

Philadelphia, 1866.

POLYTECHNIC ASSOCIATION OF THE AMERICAN INSTITUTE.

THE Association held its regular meeting at its rooms at the Cooper Institute, on Thursday evening, Oct. 12, 1866, Prof. Tillman presiding.

PRELIMINARY TOPICS.

After a brief epitome of the latest European scientific news, furnished by the chairman, Dr. Bradley introduced a combined rheostat and tangent galvanometer, which he termed the Anthistometer, a full description of which is reserved for some future notice. The economical extraction of arsenic from mispickel, an ore extensively found in some sections of the country, was touched upon, but not exhaustively treated.

PETROLEUM.

Prof. P. H. Vander Weyde, formerly of Girard College, presented the important subject of petroleum and its products; and first as a lubricator. The rapid falling of the old sources, and the necessity for some new supply, make this a subject of the greatest importance. The requirements of a good lubricator are somewhat severe: an article is required that will neither freeze nor evaporate so as to leave a gum; the oil must never become rancid, which is the fault of all lubricators composed of fatty acids and glycerin; lastly, it should be neither too thick nor too thin. Petroleum fulfils all of these conditions, and is alike beneficial for the most delicate mechanism and the heaviest machinery. In composition this substance is a mixture of oils having different volatilities capable of being distilled off in succession. The first product is the peculiar odor from the crude oil; a great proportion of this gas escapes at the wells. By condensation of these first gases, the Professor has obtained a liquid, boiling at a temperature as low as 40 degrees, the evaporation of which produces most intense cold, and has re-

ceived the name of Chimogene. At a low heat, gasoline, an inflammable explosive liquid, is produced. This may be safely used in metallic lamps filled with sawdust moistened with this liquid. By further increase of heat, naphtha, benzine, kerosene and paraffin are successively given off, till coke alone remains. The analysis of this last product, as compared with coal coke, presents a striking difference; while the latter gives evidence of having been formed of land plants, the former shows conclusively the composition of sea plants. By long continued distillation at a low temperature, hair oil, liniment, and a petroleum castor oil have been obtained. The product of benzole, treated with fuming nitric acid, is now sold for a flavoring extract, under the name of bitter almonds.

UTILIZATION OF REFUSE MATTER.

At the wells, large quantities of acid are employed for deodorizing, one carboy of sulphuric acid being used for every thirty barrels of oil. The combined oil and acid is a worthless material, from which fifteen or twenty per cent of oil may be abstracted; the acid being left may now act upon scrap tin, also a refuse material, resulting in the formation of stannate of soda from the tin, and several valuable substances from the iron; resulting finally with green vitrol.

Belladonna an Antidote for Opium.

A correspondent, a professional physician, in a letter to the *Medical and Surgical Reporter*, details the circumstances of a case where the patient had taken three ounces of opium tincture, or laudanum, which had exerted its effects three and a half hours. Fluid extract of belladonna was then administered in doses of twenty drops every ten minutes, which, in twenty minutes, arrested the progress of the opiate, and in about eight hours the patient was so far recovered as to sit up and converse. The writer says he is sure that belladonna saved this man's life.

SWEDISH MONITORS.—Captain Ericsson, himself a Swede, has designed three monitors which have been built at Motala, in his native country. They are of the latest American pattern, and one if not all, mounts two 15-inch guns in a turret plated with twelve 1-inch plates.

NEW PUBLICATIONS.

COPYRIGHT AND PATENT LAWS OF THE UNITED STATES, FROM 1790 TO 1866, with Notes of Judicial Decisions thereunder, and Forms and Indexes. By Stephen D. Law.

The necessity for some general summary of Statute Laws and Decisions, which should be accepted as authority in Patent and Copyright cases, led the author of the present volume, a few years since, to the preparation of the American Digest, a book that has admirably satisfied the demand, and has since been recognized as a standard. The volume to which we now refer is not designed to supplant the larger one, but is to be regarded more as a compendium, having the leading points of the latter presented in a convenient form, and referring to it for unimportant explanatory decisions.

For the purpose of comparison and convenience of reference, and for the more perfect understanding of those now in force, the laws which have become obsolete are inserted in full. The incorporation of annotations and notes referring to Judicial Decisions serves to explain the Statutes, and make the work invaluable for Patentees and Inventors. Bound in flexible covers and half-law binding. Published by Messrs. Baker, Voorhis & Co., No. 66 Nassau street.

REPORT OF THE COMMISSIONER OF PATENTS FOR 1865.—We have received from E. R. Jewett & Co., Buffalo, N. Y., advance sheets of the illustrations for the Patent Commissioner's Report for 1865. Messrs. Jewett & Co. have made a valuable improvement in this edition, by adding to each cut the name of the patentee, and the title of the patent, as well as the number. Heretofore the number only was used, and to ascertain the subject of the engraving and the name of the patentee, it was necessary to refer to the volume of descriptions. The engravings, themselves, also appear to be superior to those of former years. We are pleased to learn that the work will be prosecuted vigorously until completed.

SOCIAL SCIENCE REVIEW.—This valuable Quarterly comes to us in an enlarged form, and containing a number of admirably written articles. A review and criticism of William B. Scott's Essay on Taxation and Reconstruction is an unanswerable defense of the rights of governments to levy taxes on those they defend. A notice of Herbert Spencer, with a portrait, is a just tribute to one of England's most earnest and honest men. The Review is published at 84 Nassau-st., New York, at four dollars per year in advance.

SPECIAL NOTICES.

Robert W. Andrews, of Staffordville, Conn., having petitioned for the extension of a patent granted to him the 18th day of January, 1853, for an improvement in operating the treadles of looms, it is ordered that the said petition be heard on Monday the 31st day of December next.

H. C. K., of Mass.—The conducting power of copper, as compared with other metals, shows that it is superior to brass, iron or zinc; the proportions being, copper, 89.82; brass, 44, iron, 37.41; zinc, 36.37. Zinc, therefore, will form a more effective sheathing to your boiler than any other of the above metals.

O. B., of N. Y.—If you use onion juice for ink, the writing will be invisible, but will plainly appear on subjecting it to heat. Dilute sulphuric acid and many other substances have the same property. We do not know any sympathetic ink which turns red on heating.

M., of Pa.—We are aware that wine is in high favor with some as a medicinal agent, but we doubt if it is ever prescribed by an intelligent physician. It is not a deplatory.

D. L., of Ohio.—We know of no specific to prevent the foaming of boilers. The best remedy is to pump often and fire evenly. Your boiler is probably new, and this treatment will cure it in time.

S. S. H., of Mass.—The only advantage we believe double cylinder engines to have over the single cylinder engines, is a greater ease and uniformity of working. We consider the working of steam expansively a system of doubtful economy; at least its benefits have not been satisfactorily demonstrated.

P. P. C., of Pa.—As the overshot wheel is propelled solely by the gravity of the water, it is apparent that the less of the power is expended in friction the more there will be available for other purposes. The lighter wheel is, therefore, the most efficient.

L. G., of Colorado.—The pressure of the atmosphere and the weight of all bodies is greater at the sea level than at an elevation of 8,500 feet. The water wheel at the first mentioned locality will be more effective than at the altitude of Central City, Colorado.

J. A. D., of N. H.—Your suggestion in regard to the employment of compressed air for city railroads is not new. This system has been long thought of, and frequently discussed among other propositions.

J. P., of Ohio.—We are not acquainted with the appearance or qualities of the "sea grass" to which you allude, and cannot say whether it is an indigo-producing plant or not. An experiment of macerating and fermenting the leaves in water, would easily determine the question.

J. H. W., of N. J.—Brass work, after stamping or casting, should be cleaned in a pickle of sulphuric, or nitric acid and water, to remove all surface impurities, washed in water and dried, preparatory to receiving a lacquer. Then for a gold color take seedlac, three ounces, turmeric, one ounce, digested in alcohol, one pint, for a few days, frequently shaking the mixture. Then decant and filter. If not dark enough add anotta or dragon's blood.

A. I. D., of Pa.—There is no metallic substance which will entirely intercept the electro-magnetic current. Lead is the lowest conductor you can use. Glass is so low in its conducting power as to be considered a non-conductor.

J. McG., of Ky.—There is no method known to us by which a cracked circular saw can be made whole. It depends, however, where the crack appears. If near the center a dovetail of steel might put it into shape for further service.

M. K. W., of N. J.—The paints used by toy makers are the ordinary pigments, spirits of turpentine or benzine being employed as a vehicle instead of oil. A coat of thin varnish gives brilliancy and protects the paint.

C. W. J., of Ill.—Light and heat have always been regarded as imponderable forces by the advocates of both theories—that of vibration and that of emanation. Newton, who held that light is an emanation of matter flying outward in all directions from luminous bodies, supposed that this matter differed from other matter in not being subject to the force of gravity; while those who hold that light is the vibration of an ethereal fluid, as sound is a vibration in air, regard this fluid as being free from the attraction of gravity. The passage of light in perfectly straight lines near by the edges of the moon and the stars, without being bent in the least from its course, is absolute proof that it is imponderable.

W. I. J., of Mass.—We are not aware that wood is "saturated" previous to being japanned. On the contrary, it should be perfectly dried in a kiln, or oven, before it is varnished. A white size or priming is made of parchment size two parts, isinglass one part, laid on thin and smooth, two or three coats. Seedlac and resin, equal quantities by weight, dissolved in alcohol, and strained, make a good coating or priming. Shellac dissolved in alcohol, is the best vehicle for all colors except white.

J. B., of N. Y.—You say your mill is on the north side of a ridge with a generally prevailing southwest wind. We judge from this statement that the ridge is interposed between the wind and your mill. If so, to insure a draft, your chimney should rise above the ridge. The data you furnish are, however, not definite enough for us to give a positive opinion. The distance of your mill from the ridge would affect the result. An ordinary fire-box will burn sawdust if the draft is good. Perforated plates should be used instead of grate bars. A fly wheel four feet diameter running 200 turns per minute would give but 400 turns to the two foot wheel; hardly sufficient, we think, to drive a small saw efficiently. If run by friction the small wheel should have a perfectly smooth face and the driver, or large wheel be covered with leather. Better use a belt; you will get more power.