A NEW METHOD OF MAKING SURFACE PLATES.

BY JOSHUA ROSE.

It has been for many years accepted as an indisputable fact that a true surface plate could only be produced by means of hand scraping. Now the hand scraper in reality makes a series of shallow cavities, the tops between the cavities having a surface bearing. The finer the scraper, the greater is the number of cavities, and therefore the greater is the number of bearing spots; so that a finely fitted pair of surface plates present the appearance of closely dotted bright bearing surfaces combined with adjacent scraper marks which had no bearing. The depth of a majority of these marks is undoubtedly veryslig ht; but any one who has used a surface plate for any length of time is aware that, while after a time most of the scraper marks become effaced, yet many of them remain, demonstrating that some of them were deeper than others: and this is sure to be case, no matter how carefully the scraping be performed, because the scraper is not at all times equally sharp, and hence cuts deeper at some times than at others. The difference may, it is true, be very slight, but still it exists, and is a detriment to the amount of its extent. Scraped surface plates may be made so nearly true that a plate, say 12x8 inches, will lift 2 lbs. per inch on a small surface applied to a large one, or the two plates of the size mentioned will have between them a vacuum of about ½ lb. per inch of area when one completely covers the area of the other, and of about 1½ lbs. per inch when one surface only covers one half of the other: while, when one surface covers one third of the other, the vacuum will be increased to about 1½ lbs. per square inch of the surface in contact. It must, however, be a well scraped surface to give results of such a standard of excellence.

In the early days of the mechanic's art, surface plates were finished by grinding them together with fine emery; this, however, was found objectionable, in that the softer parts of the iron would grind away more quickly; and as no method of overcoming this defect was discovered, the practice of scraping was introduced, and it has held its own to this day as the most perfect method of obtaining a true surface, notwithstanding that it produces simply an area of fine hills and hollows. These hills and hollows may be sensibly leveled by well rubbing the plates together, it is true; but cast iron, of which it is found most desirable to make surface plates, wears under such conditions, so that a very hard skin is formed upon the contacting high spots, and they finally get very bright and so hard that it is impracticable to wear away the high places. If a plate of cast iron, after having been finished, is well rubbed upon a wrought iron or brass true surface, the high spots upon the cast iron will abrade much more rapidly, but still not sufficently to render it practicable to abrade the surface so as to efface the scraper marks, and still keep the surface plates practically true.

Surface plates of wrought iron may be scraped true, and then rubbed together until the scraper marks are very nearly all effaced; but such plates are very subject to wear, and consequently soon get out of true. Scraped surface plates of cast iron have therefore, hitherto, been the only ones made. Some three weeks ago, however, a mechanical correspondent of the SCIENTIFIC AMERICAN wrote to the editors a letter enquiring what were the specific objections to getting up surface plates with files and emery paper; and the enquiry was handed to me to answer in the columns of "Answers to Correspondents." The first impulse was to reply that true work could not be produced by the use of files and emery cloth or paper. Upon further consideration, however, the conclusion was reached that it was practicable to make, with such tools, surface plates superior to those produced by the scraping process. Having then in my possession a little surface plate made at the Freeland tool works, which plate was one of a pair exhibited at the American Institute Fair in 1873, and having also the mate to the above, which had been in use for some time, and was deeply scratched all over and indented in several places by careless use, I took the latter and smooth-filed it all over until the indentations and scratches were effaced, and then commenced the truing, using the new plate to test with. When the marks showed that the plate under operation bore about equally all over, a superfine smooth file was used until the previous file marks were obliterated, and the test marks again showed about evenly in all parts of the plate. Here it may be well to observe that it is not to be supposed that the flat surfaces of these files were used indiscriminately upon the surface under operation. Each file was chalked before being applied to the work, and then a few light stroke of the file were made; after which the teeth of the file were closely examined for the dark spots, which spots indicated which teeth stood the highest. Then only such parts of the file were used as showed the teeth in the middle of the width of the file to be cutting, and which were cutting without any action of the teeth beyond them after passing an area of teeth which were not cutting. By this means I could so place the file that the cutting teeth had contact with the part of the surface requiring to be filed, and yet be assured that no other part of the file was doing execution. An 8 inch Grobet file, of the finest cut, was the next one used, a dead smooth not being at hand. The advantage of using a Stubs' dead smooth would have consisted in that Stubs' and other dead smooth files are made harder than the superfine dead smooths of Grobet, which latter, applied upon a cast iron surface, soon lose their grip, because they are not made sufficiently hard for such duty. They are, however, the truest cut files I have ever handled, and suited my purpose admirably. After having, with the Grobet file, effaced all the marks made by the superfine smooth file, and fitted the plates until the marks showed evenly all over. No. 1 French emery paper was applied, first lengthwise and then crosswise of the plate. The paper was wrapped, in not more than two folds, around the file, which was done to preserve the edges of the plate from becoming rounded from the action of the emery paper. Care was also taken not to rub the emery paper too much upon the edges of the plate, for fear of rounding them; because rounding these edges would have rendered it impracticable to have finished them without scratching the surfaces, for the following reasons: No matter how much care is exercised, two plates having very smooth surfaces cannot be put together by placing one on top of the other, and then worked without scratching their surfaces; because the very dust in the air will be sufficient, upon such fine faces, to deeply score them. The proper way is to clean the face under operation with an old linen rag, and the test plate with a piece of rag about two inches square that has had two drops of oil put on it. After cleaning them, the palm of the hand should be passed all over the test plate, and then it must be wiped with a piece of clean rag and again applied to the test plate, this process being repeated several times, so that the amount of oil upon the test plate shall be barely sufficient to tarnish it. Then we pass the hand over the plate under operation to remove any particles of dust, and apply the test plate, putting it on one corner of the other, balancing it until its surface is level with the other (the two faces contacting over about an inch of area); and then, while pressing the faces together, we slide the top plate horizontally over the lower one. Then, if the edges of both plates are true and sharp, they will remove from the surfaces of both plates those particles of dust which would slide under a rounded edge, and get between the surfaces and scratch them. Our next operation is to move the test plate upon the lower one, backwards and forwards as well as sideways, until the marking spots which were at first dark have become bright through abrasion. The emery-papering process is to be continued until the file marks are effaced all over the plate; while at the same time the test surface plate marks are distributed evenly all over, that is to say, in spots of about equal area and at equal distances apart.

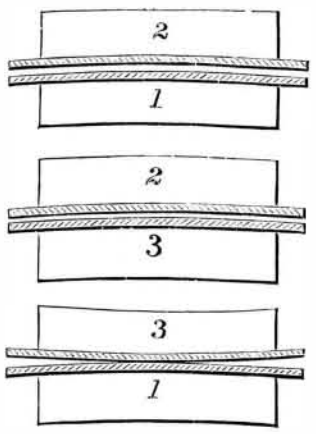
The next procedure is to find a means to apply the emery, cloth to the high spots, where the test plate marks showed without touching the unmarked spaces between them, which is to be accomplished by wrapping small pieces of No. 1 French emery paper around a small piece of round wood, of about ¼ inch in diameter, the sharp corner being chamfered off for a distance of about ⅜ inch. The emery paper should not make more than two complete circles of covering around the wood, and should be brought to bear upon the plate at the chamfered edge of the wood. To prevent the emery paper from cutting in lines, it is moved in circles, say ⅛ inch diameter, and pressed firmly upon the plate upon the bright marking spots. By this motion, I find the emery paper is less liable to cut out the softer parts of the grain of the iron; while at the same time, another advantage is gained in the fact that, the surface of emery paper in contact with the plate being less than ¼ square inch, it cuts very freely at first, but becomes glazed very rapidly, and polished after the first few strokes, an action which renders necessary a frequent moving of the paper upon the wood but is in every way desirable. After the whole of the marks left by the test have been operated upon in this manner, care being taken to operate more freely on those spots where the test marks were the heaviest, the process is continued with No. 1 French emery paper, and subsequently with numbers 00, 000, and 0000, commencing by using the 0 grade upon a file and rubbing it lengthwise and crosswise of the plate, and finishing by the piece of wood and circular motion. Grade 00 is first applied in very short strokes of the file, taking care that the paper near the end of the file only is used, so that it can be brought to bear upon the required spots only, the finishing being performed as before. During the use of the 000 and 0000 emery paper, the test plate is not supplied with any lubricant whatever, but is kept bright and clean and rubbed until the marking upon the plate under operation has a shining area only; until at last it becomes impossible to detect that the test plate bore any harder on one place than another, the vacuum between the two being but little greater than that obtained between two finely scraped surfaces. A fine film of oil is then to be placed upon the test plate, which is then freely applied in order to give it a better bearing if possible. This object was, in the first case, only partially successful, however, since it was too tedious. After some little consideration I determined to pass a piece of fine oilstone over the surface; and selecting a piece with an unusually fine grain, I filed its surface flat and beveled off one edge to a broad bevel; then taking a separate piece of cast iron, I wore the bevel and the face of the oilstone true, and applied first the flat face of the oilstone to my surface plate. But I found that it had no effect whatever, although applied with considerable pressure. The beveled edge of the stone was then applied, and it had the effect of slightly dulling the polished surface. Upon again applying the test plate, I found the vacuum was increased; but the surface did not work quite so evenly, and 0000 emery paper moved in circles was again brought into requisition, with the result that the vacuum became so great that it was only with great difficulty that the upper plate could be moved horizontally upon the lower one, that is, providing that they were put together as before described. If, however, they were put together without being pressed one to the other, the film of air between them would cause the upper one to glide about like a piece of ice placed upon smooth ice.

It now became a problem as to how to finally finish the surface. The marking appeared as a continuous glaze all over, there being apparently no high or low spots; and yet the color of the metal appeared slightly varied in places, notwithstanding that the surface was bright and smooth to a high degree. Continuous rubbing of the plates together was at first tried, but without apparent effect, since the bearing seemed equal all over. The plates were then put together, allowing a film of air to be between them, and one plate to, as it were, float upon the other; the top one was then touched sufficiently to set it in motion, in all directions; and if any one part of the plate was found to act as a center of motion more frequently than the others, out of a test of about twenty motions, that part was very lightly touched with worn emery paper of the 0000 grade.

The result thus obtained is as follows: The plates in question are 12 by 8 inches; and placed one fairly over the other, it takes 200 lbs. to pull them apart vertically and about 150 lbs. to move one horizontally upon the other. A small piece of cast iron surfaced on an area of 7 inches will maintain on either of the plates a vacuum of 5 lbs. per inch of area.

These plates are now in the Machinery Hall of the Centennial, and may be seen in the space occupied by the Putnam Machine Company.

For the benefit of those who may desire to make a surface plate, it may be as well to here describe the method by which it may be obtained. First, then, the plates should be provided on the back with three resting points, two being at one end (one near each corner of the plate) and the other being at the opposite end and in the middle of the width of the plate. By this arrangement, the plate will lie on the bench resting at all times on three points, without rocking, even though the surface of the bench be uneven: which plan will protect the plate from the deflection due to its own weight. Between these resting points, there should be ribs to support the plate and to prevent still further deflection. In the Whitworth plates, these ribs run straight from each resting point to the others, thus forming a triangle, and cross ribs are also introduced. The plates, three in number, which we will designate as Nos. 1, 2, and 3, should be placed first on the three resting feet, and then on the edges and lastly on the faces. Nos. 1 and 2 are first fitted together and then No. 2 is fitted to No. 3. Now it is obvious that, in fitting No. 1 to No. 2, we have had nothing to guide us as to



making either surface true. One plate may bear upon two diagonal corners only, while the other may bear upon all four corners or all round the edges. In this case, we know that the one bearing upon two corners only is atwist, but the other may be hollow, or both may be hollow. Still we have no alternative but to fit them together. We may, it is true, test both surfaces with a straight edge, which must be used as follows: It should be wiped quite clean and placed upon the surface plate in various positions, as lengthwise, crosswise, and across the corners of the plate; and while in each position, we must take hold of one end, and, without placing any vertical pressure upon it, move it laterally back and forth a little, say about two inches, to see where it takes a fulcrum on the surface of the plate. If the center of its movement is at the center of the surface plate, then the surface of the plate is rounded, or highest in the middle. If it moves on the plate, first most at one end and then most at the other, the surface is hollow; while if it moves with an irregular and shuffling movement, it denotes that the surface is as true as the straight edge will test. Plates 1 and 2 having been fitted together, we take No. 2 and fit it to No. 3, not operating upon No. 2 at all. We next take No. 3, and try it to No. 1. Now if 3 and 1, when tried together, show each other to be rounded, it is proof that No. 1 is rounding to half the amount of difference between it and No. 3, as shown in our engraving, from which it will be observed that the two nearest together faces of Nos. 1 and 2 may fit together, one being rounded and the other hollow. No. 2 may be taken as a gage whereby to fit No. 3, their surfaces being made to fit perfectly. But if we take No. 3, and apply it to No. 1, they will disagree to twice the amount that No. 1 varies from a true, flat surface. We next refit Nos. 1 and 3 together, taking, as nearly as we can judge, an equal amount off each of them; and then taking No. 1, we recommence and fit No. 2 to No. 1, No. 3 to No. 2, and finally No. 3 to No. 1, taking half the amount of difference, between them, off each; and we then repeat the whole operation until all three plates applied indiscriminately fit each other perfectly.

REPEATED applications to copper or brass of alternate washes of dilute acetic acid and exposure to the fumes of ammonia will give a very antique-looking green bronze.

The Civil Engineers' Convention at Philadelphia.

The eighth annual convention of the American Society of Civil Engineers is now in session in the Judges' Hall at the Centennial. The meeting opened on the 13th of June, Mr. G. S. Greene, C.E., of New York, presiding. Among the papers thus far read is one by Mr. T. G. Ellis, of Hartford, on the Centennial History of Engineering, in which he reviewed progress in this science over the past century. All the facts presented by Mr. Ellis have been fully noted by us in the series of editorials in American progress which recently appeared in these columns. The first regular business transacted by the members was the discussion of a previously published essay, by Mr. C. Bender, on the theory of continuous girders in relation to economy in bridge building. Mr. Pettit, architect of the Main Exhibition Building, read a paper on the character of the engineering work, therein giving the reasons for the adoption of the plan selected. The peculiarity of construction is that it is like the framework of a table. The long iron supports carry the dead weight, and the trusses resist the side pressure. A good test of its stability was made in February last, when a wind having a pressure of 18 lbs. per square foot caused no perceptible vibration. The amount of iron used was 8,340,000 lbs. The iron, flat, angle, and round, measures 141 miles in length and if made into a cubic block, it would measure 25 feet 10½ inches on each edge. There is 1 square foot of glass for each 4 square feet of surface covered. Mr. Pettit also described the general plan of installation of exhibits; and Mr. Schwartzmann, architect of Memorial Hall, explained his construction of that edifice. Complete abstracts of all papers read will appear in the SCIENTIFIC AMERICAN SUPPLEMENT.

Correspondence.

The Locust Pest.

To the Editor of the Scientific American:

The facts mentioned by your correspondent J. F. Dunwoody, of Louisiana, Mo., are interesting, and, for one, I am always glad to get such exceptional facts; but they do not invalidate the other facts recorded by me in the article on locust prospects from which you condensed in a recent number. That locust eggs are destroyed by excessive moisture, and especially by alternately soaking and drying, I have abundantly proved by experiment; and I do not doubt the correctness of the observations of the Minnesota Commission. My conclusions as to locust injuries in 1876 are also most thoroughly substantiated by the experience of the past two months, which, considering the contrary opinions very generally entertained and promulgated last winter, is very strong proof of the correctness of the statements upon which my opinions were based. It is not improbable that eggs in a tenacious slough bottom, continuously covered with water for months, would suffer less than those alternately soaked and dried in a porous soil, on the same principle that vegetation under like conditions would rot sooner in the latter case; and if Mr. Dunwoody were to state the circumstances attending the fact he mentions with more explicitness, so that we could know the nature of the slough bottom, and feel confident that the locusts observed subsequently to its drying up actually hatched there from eggs laid before it was overflowed, we should without doubt find that his observation admits of an explanation in harmony with the opinions which he thinks it invalidates.

As to freezing, the eggs, as I have shown in my own writings, will withstand with impunity almost any amount of it, and the young locusts may also be frozen in solid ice and yet live; but the fact nevertheless remains, and is supported by such extensive experience as not to be gainsaid, that, when the young of the Rocky Mountain species prematurely hatch in fall or during mild winter weather, they are subsequently destroyed by continued severe freezing, or by continued freezing and thawing.

St. Louis, Mo. C. V. RILEY.

Remarkable Example of Spontaneous Combustion.

To the Editor of the Scientific American:

A singular instance of spontaneous ignition took place in my house some time ago. On entering the house about noon, I detected the smell of something burning. An immediate search was made, and upon entering the parlor I noticed smoke rising from a center table that was placed near a south window. I stepped up to the table and noticed some pieces of cotton goods on fire, which I smothered out with my hand. Alongside of the goods that were on fire lay a stereoscopic instrument that was exposed to the direct rays of the hot noonday sun. It so happened that such was the position of the two lenses that they caused a burning focus on the goods and set it on fire. Had we been absent till an hour later, the fire would have extended itself, to the destruction of the house and all that was in it.

Round Mount, Texas. G. P. HACHENBERG, M. D.

[Accidental fires produced by lenses have frequently come to our notice. The glass globes filled with water and used to contain gold fish will converge the sun's rays to a focus of sufficient intensity to ignite light materials, and have thus started incipient conflagrations. The heavy glass bulls-eyes sometimes used for dead lights in ships have also produced similar effects; and we once called attention to a remarkable case where a bulb of glass, formed in a large sheet used as a window pane in a store, and due to a defect in the manufacture, proved the means of setting fire to objects displayed inside. Druggists' show globes of colored water also form powerful lenses, and we once knew of an enterprising apothecary who employed them as a cheap source of heat for his distilling apparatus. Of course there have been many attempts to utilize the high temperature of the sun's converged rays. Huge mirrors have been built to melt refractory substances. Ericsson has devised a solar engine, and probably the latest invention of the kind is M. Mouchot's solar boiler, where the steam generator is placed in the focus of a concave reflector.—EDS.]

THE *Scientific Farmer* says that the best way to prevent overheating of compost is to pack the surface down solidly, by simply treading upon the heap with the feet (after pulverization), or, still better, to spread a little earth over the pile, taking care to pack it somewhat. Either method tends to exclude air, and thus prevents too rapid oxidation.

NEW BOOKS AND PUBLICATIONS.

ELEMENTS OF PHYSICAL MANIPULATION. By Edward C. Pickering, Thayer Professor of Physics in the Massachusetts Institute of Technology. Part II. Price $4. New York city: Hurd and Houghton, 13 Astor Place.

Professor E. C. Pickering's first volume was received with general favor. He has now largely extended the scope of the work, and has introduced subjects not usually considered to belong to the domain of pure physics. The new volume contains an admirable chapter on mechanical engineering, including details of boilers, steam pipes, and indicator diagrams, as well as articles on speed and friction of shafting, belts, and pulleys. The friction brake and transmission dynamometer are fully explained: and some valuable methods of testing speeds of piston rods, shafts, and fly wheels, which are, we believe, entirely new, are described and illustrated. The apparatus employed in the growing science of meteorology occupies one of the most interesting chapters in the book; and the section headed "Practical Astronomy" contains a clear description of the instruments in common use for nautical and stellar observation. Tables of squares, cubes, powers, logarithms, tangents, and sines, and of the properties of metals, liquids, gases, and vapors, are added in appendices, with full explanations. The description of a good physical laboratory and a list of test experiments for students' use complete the work. The laboratory described is that under the charge of the writer, in which about 100 students are instructed every year. We cordially commend the work to all teachers of science classes, as one which they should study themselves and place in the hands of their pupils.

HANDBOOK OF ELECTRICAL DIAGRAMS AND CONNECTIONS. By Charles H. Davis and Frank B. Rae. Price $1.50. New York city: The Graphic Company, Park place.

The authors of this work are employees of the Western Union Telegraph Company in this city; and by their joint labor, they have produced a book of the highest value to the telegraph profession. It contains engravings of all the instruments (single, duplex, etc.), relays, batteries, etc., in ordinary use, with well written and detailed descriptions. The historical portions of the book are especially commendable for their accuracy, and for their fairness to the many claimants to the credit of originating the telegraph and its details, who are frequently so numerous and so contradictory as to bewilder the reader. Thirty plates and a map of the world showing all the telegraph cables in existence are added, all being executed by photolithography, in the best style of the art. The work is one of the most complete and useful handbooks we have seen for some time.

THE INFLUENCE OF THE BLUE RAY OF THE SUNLIGHT AND OF THE BLUE COLOR OF THE SKY, IN DEVELOPING ANIMAL AND VEGETABLE LIFE, ETC., as Illustrated by the Experiments of General A. J. Pleasonton and others. Philadelphia, Pa.: Claxton, Remsen, and Haffelfinger.

A good description of the purport and matter of this remarkable work appears in an article on p. 388 of our volume XXXIV. We have little to add to the description there published, except that the book itself is more eccentric than we could have believed, unless guided by a perusal of its contents. The incidents of the cure of rheumatism in a mule by putting panes of blue and colorless glass in the transom window of its stable, the cure of a woman suffering from a complication of undescribed disorders by a similar application, the cure of spinal disease by use of a bath of blue light, and many similar cases cited by the author, remove this book beyond the sphere of legitimate criticism, and place it among the many melancholy burlesques of science and inductive investigation, by the publication of which certain authors are now trying to obtain notoriety.

PRACTICAL TREATISE ON THE CONSTRUCTION OF IRON HIGHWAY BRIDGES, with a Short Essay on the Application of the Principle of the Lever to the Analysis of Strains. By Alfred M. Boller, A. M., Civil Engineer. Price $2.50. New York city: John Wiley & Sons, 15 Astor Place.

The author states in his preface that he intends this work for the use of town committees; and he has succeeded in producing a work that will be useful to any such bodies having to provide for the construction of bridges. The points to be regarded in designing an efficient structure are enumerated and fully described; and the author's cautious advice regarding specifications and contracts will, if followed, relieve local authorities from much responsibility as to the security of the work. The book is likely to disseminate some practical knowledge of great value and importance.

THE CENTENNIAL NEWSPAPER EXHIBITION, in Fairmount Park, Philadelphia. New York city: George P. Rowell & Co., Park Row.

The publishers of this volume own the well known extensive advertising agency in this city, and the admirable display of American newspaper literature at the Centennial is due to their zeal and enterprise. A description of the very large and varied exhibit of our newspapers and the statistics of American journalism will be found in this handbook, which should be read by every visitor to the Centennial Exhibition, who will find in the Newspaper Building one of the most attractive displays to be found in the whole show.

CHEMISTRY, THEORETICAL, PRACTICAL, AND ANALYTICAL, as Applied to Arts and Manufactures. Parts V. to X. Philadelphia, Pa.: J. B. Lippincott & Co., 715 Market street.

The publication of this work was announced when the first four numbers reached us; and the subsequent ones need no comment, being printed in similarly handsome style, with the same characteristics. We must, however, again protest against the concealment of the names of the compilers. Twenty dollars is too much to pay for a book which does not establish its authenticity and accuracy by giving information as to its authorship.

PRINCIPLES OF APPROXIMATE COMPUTATIONS. By Joseph J. Skinner, C. E., Instructor in Mathematics in the Sheffield Scientific School of Yale College. New York city: Henry Holt & Co.

This treatise is likely to prove of especial value in solving those numerous problems which involve repeating decimals, as well those in which occur measurements with instruments capable of giving only a limited degree of precision. These difficulties are dealt with by the author in a very practical manner; and his method produces results which are little at variance with those obtained by continued calculation.

THE AMERICAN SYSTEM, GERMAN. A Record of Professor C. C. Schaeffer's High School Test Course. Philadelphia, Pa: Charles, Brother, & Co.

This book is the record of a vast amount of information, imparted to the pupils of the Philadelphia Central High School, in six lessons of 45 minutes each. Although published without any evident order or arrangement, it contains several excellent features, among which may be mentioned the construction of German sentences, the explanations of gender and *Umlaut*, and a quaint lecture on "The Philosophy of the English Language."

PRICE LISTS OF GOODS MANUFACTURED IN THE BIRMINGHAM DISTRICT, ENGLAND. Part I. London, England: Published by the Proprietors of "Iron," 12 Fetter Lane.

HIGH MASONRY DAMS. By John B. McMaster, C. E., Author of "Bridge and Tunnel Centers." Price 50 cents. New York city: D. Van Nostrand, 23 Broadway and 27 Warren street.

A practical and valuable little treatise, being No. 22 of Mr. Van Nostrand's Science Series.

SEVENTH ANNUAL REPORT OF THE STATE BOARD OF HEALTH OF MASSACHUSETTS, just published, is replete with useful information. Most of the legislative publications of the Old Bay State are so; but this cannot be said of many statistical reports issued by some other States, or of a great number which are authorized and published by approval of Congress. We are indebted to the State Board of Health, each year, for an early copy of their report, from which we are enabled to extract much useful information for our readers. The document before us leaves no branch of the subject of sanitary science untouched; and the statistics, especially those affecting population and mortality, are sufficient to convince any one of the national importance of the compulsory observance of health regulations. The report, moreover, furnishes to other State and city boards an excellent model for the preparation of such volumes, and a guide for the investigation of the subjects, which it would be well for them to follow.

DECISIONS OF THE COURT

Supreme Court of the United States.

PATENT ERASER PENCILS.—JOSEPH RECKENDORFER, APPEL ANT, *vs.* EBERHARD FABER.

Appeal from the Circuit Court of the United States for the Southern District of New York.

Mr. JUSTICE HUNT delivered the opinion of the Court.

This is an appeal from a decree of the United States Circuit Court for the Southern District of New York, dismissing the bill of complaint which was filed to restrain the infringement by the respondent of certain letters patent, and for an accounting and damages.

These patents relate to the manufacture of combined pencils and erasers.

1. The first was granted to Hymen L. Lipman, March 30, 1858, and was extended for a further term of seven years from the 30th of March, 1872.

The material parts of the specification are as follows:

"I make a lead pencil in the usual manner, reserving about one fourth of the length, in which I make a groove, of suitable size, A, and insert in this groove a piece of prepared india rubber (or other erasive substance) secured to said pencil by being glued at one edge; the pencil is then finished in the usual manner, so that on cutting one end thereof you have the lead B, and on cutting one end you expose a small piece of india rubber, C, ready for use, and particularly valuable for removing or erasing lines, figures, etc., and not subject to be soiled, or mislaid on the table or desk.

"In making mathematical, architectural, and many other kinds of drawings, in which the lines are very near each other, the eraser is particularly useful, as it may be sharpened to a point to erase any marks between the lines; and should the point of the rubber become soiled or inoperative from any cause, such cause is easily removed by a renewed sharpening, as in the ordinary lead pencil."

The claim is as follows:

"I do not claim the use of a lead pencil with a piece of india rubber, or other erasing material, attached at one end for the purpose of erasing marks; but what I do claim as my invention, and desire to secure by letters patent, is the combination of the lead and india rubber, or other erasing substance, in the holder of a drawing pencil, the whole being constructed and arranged substantially in the manner and for the purposes set forth."

The drawings forming part of the specification exhibit a continuous sheath of uniform size, with interior grooves of different sizes: the eraser groove being larger than the lead groove.

2. The second patent is for an improvement upon the invention of Lipman, and was granted to Joseph Reckendorfer, the complainant, the 4th of November, 1862, and reissued on the 1st of March, 1872.

The material parts of the specification are as follows:

"My invention is intended to provide a means whereby articles of greater size or diameter than the lead may be securely held in the head of a pencil of otherwise ordinary or suitable construction without making the body of the pencil cumbrous or inconvenient. To this end my invention consists:

"First.—Of a pencil composed of a wooden sheath and lead core, having one end of the sheath enlarged and recessed to constitute a receptacle for an eraser or other similar article, as hereinafter stated.

"Second.—Of a pencil, the wooden case of which gradually tapers from the enlarged and recessed head towards its opposite end for the whole or a portion of the length, as hereinafter set forth.

"The receptacle for the eraser or other article is formed in the head, without too much weakening the wood, owing to the form of the sheath, while for the same reason the end of the pencil which contains the ordinary lead is not cumbrous nor clumsy, but can be readily held between the fingers, just as an ordinary pencil is."

Having thus described his invention, Reckendorfer claims—

1. A pencil composed of a wooden sheath and lead core, having one end of the sheath enlarged and recessed to constitute a receptacle for an eraser, or other similar article, as shown and set forth.

"2. A pencil, the wooden case of which gradually tapers from its enlarged and recessed head toward its opposite end for the whole or a portion of its length, substantially as shown and described."

HOW THE PATENTABILITY OF AN INVENTION IS DETERMINED.

The points we propose here to discuss are two:

First. Is the article, patented by the plaintiff and his assignor, and for the infringement of which patents this action is brought, a patentable invention within the laws of the United States?

Second. Is it within the power of the courts to examine and determine this question, or is the decision of the Commissioner of Patents, when, by issuing a patent, he decides that the invention is patentable, final and conclusive on the point?

The plaintiff contends that the decision of the Commissioner is conclusive upon the point of invention, and that the question, as distinct from that of want of novelty, is one not open to the judgment of the court. In the natural order of things this question is the first one to be examined. For if it shall appear that the contention of the plaintiff is correct in this respect, the question in regard to the patentability of the instrument now before us will not arise. The point will have been decided for us, and by a controlling authority.

The "act to revise, consolidate, and amend the statutes relating to patents and copyrights," passed July 4, 1836, (5 U. S. Stats., 118,) is the act regulating this case.

By the 6th section thereof it is enacted "that any person having invented or devised any new and useful art, machine, manufacture, or composition of matter not known or used by others before his invention or discovery thereof, and not at the time of his application for a patent in public use, or on sale with his consent or allowance as the inventor or discoverer, and shall desire to obtain an exclusive property therein, may make application in writing to the commissioner expressing such desire, and the commissioner, on due proceedings had, may grant a patent therefor. * * He shall make oath that he believes himself to be the first inventor or discoverer thereof, and that he does not know or believe that the same has ever before been used."

Looking at this section alone it may be safely said no one is entitled to a patent unless (1) he has discovered or invented an art, machine, or manufacture, (2) which art, machine, or manufacture is new, (3) which is also useful, (4) which is not known or patented as therein mentioned. It is not sufficient that it is alleged, or supposed, or even adjudged by some officer to possess these requisites. It must in fact possess them, and that it does possess them the claimant must be prepared to establish in the mode in which all other claims are established, to wit, before the judicial tribunals of the country.

The 7th section of the act (p. 120) provides that on the filing of any such application, etc., and the payment of the duty required by law, the commissioner shall make, or cause to be made, an examination of the alleged new invention or discovery, and if on such examination it shall not appear to the commissioner that the same has been invented or discovered by any other person in this country prior to the alleged discovery, or patented or described in any foreign publication, or been in public use or on sale with the consent of the applicant, and if he shall be of the opinion that the same is sufficiently useful and important, the commissioner shall issue a patent therefor.

Before the commissioner is authorized to issue a patent it must appear to him that the claimant is justly entitled to a patent, that is, that his art, machine, or manufacture possesses all the qualities before mentioned. The commissioner must also be satisfied that if it possesses these qualities it is sufficiently useful and sufficiently important to justify him in investing it with the *prima facie* respect arising from the governmental approval. These restrictions are wise and prudent, are intended to secure at least a probable advantage to those who deal with the favorites of the government, for they may justly be so termed who receive the exclusive right of making or using, or vending particular arts or improvements.

THE JUDGMENT OF THE COMMISSIONER OF PATENTS NOT CONCLUSIVE.

It is nowhere declared in the statute that the decision of the commissioner as to the extent of the utility or importance of the improvement shall be conclusive upon that point, but in the section just quoted it is placed in the same category with the want of novelty and the other requisites of the statute, and it is expressly conceded by the appellant that the judgment of the commissioner on the question of novelty is not conclusive, but that that point is open to examination. On that subject the practice of the courts is uniform in holding it to be subject to enquiry.

The plaintiff's counsel, in his brief, put his argument in this form: "The commissioner, then, passes on these questions: 1. Did the applicant himself make the invention? This question is settled by his oath." This is true to the extent and for the purpose of issuing a patent, and to this extent only. When the patentee seeks to enforce his patent, he is liable to be defeated by proof that he did not make the invention. The judgment of the commissioner does not protect him against the effect of such evidence. "2. The counsel says: was the invention new? This question is solved by the examination required by the act." To the same extent only. The defence of want of novelty is set up every day in the courts, and is determined by the court or the jury as a question of fact upon the evidence adduced, and not upon the certificate of the commissioner. "3. The counsel says again: Is the invention sufficiently useful and important? This the commissioner settles for himself by the use of his own judgment. It is a question of official judgment." These questions are all questions of official judgment, and are all settled by the judgment of the commissioner. His judgment goes to the same extent upon each question. He determines and decides for the purpose of issuing or refusing a patent. When the patent is sought to be enforced, the questions, and each of them, are open to judicial examination. We see many reasons why all the questions of invention, novelty, and prior use should be open to examination in each case, and such we believe to be the course of the authorities and practice of the courts.

A reference to some of the most recent cases, and to those decided by this court will be sufficient. A review of all the cases in this court and the various circuit courts where this question has been alluded to will not be profitable.