

In regard to this diagram, the author remarks: "Notwithstanding this extraordinary speed the lines are all well defined showing distinctly the points of cut-off and release. A remarkable point in the diagram is, that though the pencil passed over it certainly twice or more, the lines are very near to each other, showing that even under this unprecedented speed of piston, the instrument was uniform and reliable in its action. This is not a selected diagram, all others taken on the same trip show the same characteristics.

Leaving the interpretation of these diagrams to engineers, we pass to the appendix, which contains much useful information.

We shall also make a single extract from this portion of the work, which will sufficiently show its practical character. The extract relates to the measuring of steam used for heating.

"The engineer is often called to determine the amount of steam that is used to heat apartments, liquids, etc. This the indicator does not reveal directly, no further than it shows how much steam it requires for a horse power; varied, of course, by the point of cut-off and its efficiency.

"Under these circumstances we have followed the rule of Watt, which is to allow one cubic foot of water per hour for each horse power; hence we measure the water condensed in the heating pipes in a given time, and estimate accordingly."

"If it is inconvenient to reduce the water to cubic feet, it may be weighed, allowing 62.5 lbs. to the cubic foot, or it may be measured by the gallon, or 7.48 gallons per cubic foot.

"When the steam pipe enters the vessel, and it discharges the steam directly into the liquid to be heated, the water then cannot be caught to be measured; in that case we measure the increment of its contents, and thereby find the quantity of steam condensed."

On the whole, the work is one well adapted to the use of scientific and practical engineers, and cannot fail to be an important help to any who seek a complete knowledge of steam and its applications.

TO KEEP CELLARS FROM FREEZING.

An agricultural friend, at our suggestion, has tried an experiment with a cellar of an out-house, in which on several occasions vegetables have frozen, although the cellar was fortified against frost by a process known to farmers as "banking." The walls and the ceiling were pasted over with four or five thicknesses of old newspapers, a curtain of the same material being also pasted over the small low windows at the top of the cellar. The papers were pasted to the bare joists overhead, leaving an air space between them and the floor. He reports that the papers carried his roots through last winter, though the cellar was left unbanked, and he is confident they have made the cellar frost-proof.

We do not counsel the special use of old newspapers for this purpose. It is just as well or better to use coarse brown paper. Whatever paper is employed, it will be necessary to sweep down the walls thoroughly, and to use a very strong size to hold the paper to the stones. It is not necessary to press the paper down into all the depressions of the wall; every air space beneath it is an additional defense against the cold.

ANNOUNCEMENT FOR 1870.—A SPLENDID WORK OF ART AND CASH PREMIUMS TO BE GIVEN.

The SCIENTIFIC AMERICAN enters its twenty-fifth year on the first of January next, and to mark this period of a quarter of a century in which it has maintained its position as the leading journal of popular science in the world, we have purchased from the executors of the estate of the late John Skirving, Esq., and propose to issue on New Year's day, the fine steel engraving executed by John Sartain, of Philadelphia, entitled

"MEN OF PROGRESS—AMERICAN INVENTORS."

The plate is 22x36 inches, and contains the following group of illustrious inventors, namely, Prof. Morse, Prof. Henry, Thomas Blanchard, Dr. Nott, Isaiah Jennings, Charles Goodyear, J. Saxton, Dr. W. T. Morton, Erastus Bigelow, Henry Burden, Capt. John Ericsson, Elias Howe, Jr., Col. Samuel Colt, Col. R. M. Hoe, Peter Cooper, Jordan L. Mott, C. H. McCormick, James Bogardus, Frederick E. Sickles.

The likenesses are all excellent, and Mr. Sartain, who stands at the head of our American engravers on steel, in a letter addressed to us says "that it would cost \$4,000 to engrave the plate now," which is a sufficient guarantee of the very high character of the engraving as a work of art.

The picture was engraved in 1868, but owing to the death of Mr. Skirving, a few copies only were printed for subscribers at \$10 each. A work embracing so much merit and permanent interest to American inventors, and lovers of art, deserves to be much more widely known. We propose, therefore, to issue, on heavy paper, a limited number of copies at the original price of \$10 each, to be delivered free of expense. No single picture will be sold for less than that price, but to any one desiring to subscribe for the SCIENTIFIC AMERICAN, the paper will be sent for one year, together with a copy of the engraving, upon receipt of \$10. The picture will also be

offered as a premium for clubs of subscribers as follows to those who do not compete for cash prizes:

For 10 names one year	\$30	one picture.
" 20 " " "	50	" "
" 30 " " "	75	two pictures.
" 40 " " "	100	three "
" 50 " " "	125	four "

In addition to the above premiums we also offer the following cash prizes:

\$300	for the largest list of subscribers
250	" " second do do
200	" " third do do
150	" " fourth do do
100	" " fifth do do
90	" " sixth do do
80	" " seventh do do
70	" " eighth do do
60	" " ninth do do
50	" " tenth do do
40	" " eleventh do do
35	" " twelfth do do
30	" " thirteenth do do
25	" " fourteenth do do
20	" " fifteenth do do

Subscriptions sent in competition for the cash premiums must be received at our office on or before the 10th of February next. Names can be sent from any post office, and subscriptions will be entered from time to time until the above date. Persons competing for the prizes should be particular to mark their letters "Prize List" to enable us easily to distinguish them from others.

Printed prospectuses and blanks for names furnished on application.

NEW PUBLICATIONS.

A MANUAL OF THE HAND LATHE. Comprising Concise Directions for Working Metals of all kinds, Ivory, Bone, and Precious Woods; Dyeing, Coloring, and French Polishing, Inlaying by Veneers, and various Methods Practiced to Produce Elaborate Work with dispatch and at a small expense. By Egbert P. Watson, Late of the SCIENTIFIC AMERICAN, Author of "The Modern Practice of Machinists and Engineers." Illustrated by Seventy-eight Engravings. Philadelphia: Henry Carey Baird, Industrial Publisher, 406 Walnut street. London: Sampson, Low, Son & Marston, Crown Buildings, 138 Fleet street. Price \$1.50.

This work is eminently practical, and the information given is based upon the experience of the author. A brief extract from the work on the "Gluing in of Veneers," published in another column, will give a good idea of the plain and practical character of the book, and when we add that the subjects enumerated in the title above set forth are treated in the same clear and practical manner, we have said enough to convince the common-sense mechanic of the value of the work.

THE CHEMICAL FORCES—HEAT, LIGHT, ELECTRICITY. With their Applications to the Expansion, Liquefaction, and Vaporization of Solids; the Steam Engine, Photography, Spectrum Analysis, the Galvanic Battery, Electro-Plating, the Electrical Illumination of Light-Houses, the Fire Alarm of Cities, the Atlantic Telegraph, an Introduction to Chemical Physics. Designed for the Use of Academies, Colleges, and Medical Schools. Illustrated with numerous Engravings, and containing Copious Lists of Experiments, with Directions for Preparing them. By Thomas Ruggles Pynchon, M. A., Scovill Professor of Chemistry and the Natural Sciences, Trinity College, Hartford, Conn. Published by O. D. Case & Co.

A scientific book adapted to the student as well as the general reader is difficult to prepare. The author of this work has, however, shown himself skillful in meeting the difficulties of his task, though we think he displays something too much of caution in his discussion of modern views of the nature of molecular forces. In fact he can hardly be said to discuss them, contenting himself with their enunciation merely. In a work of this kind it would have been more satisfactory to have seen some more space given to this important subject. The correlation, convertibility, and equivalency of the physical forces are, however, well discussed. As the title promises, the industrial application of the chemical forces are noticed at considerable length, and it has been the aim of the author to produce a book not requiring of its reader an extensive knowledge of mathematics; it is well adapted to the use of the general reader. We notice that points liable to give difficulty to those not familiar with the subject are treated with special care, and are elucidated as only a teacher who has been accustomed to show pupils the way out of such difficulties could elucidate them. This is a valuable feature of the work, and one which will be appreciated by Mr. Pynchon's readers. We recommend the work as one of the best text-books we have met with upon the subject of which it treats.

STUDIEN I GRUFBRYNINGSVETENSKAP NO. 2. UEBER GESTEINSBOHRMASCHINEN. Von Dr. phil. F. M. Stapff, Assultant in der Bergabtheilung des Commercecollegiums. Mit Atlas enthaltend 11 theils Lithografie theils ueberdruckte Tafeln. Stockholm: A. Bonnier, 1869. [A TREATISE ON ROCK-DRILLING MACHINERY. By F. M. Stapff, Assultant in the Mining Department of the Royal Commercial College. With an Atlas containing 11 sheets of Lithograph Plates. Stockholm: A. Bonnier, Publisher, 1869.]

This is a very copious and comprehensive treatise in the German language on rock drilling and cutting, with especial reference to mining, tunneling, etc., etc. The methods employed in the most celebrated works of this character are described, and the machinery discussed and illustrated in detail. The atlas sheets are large folio, each containing a large number of finely-executed drawings. The work is one admirably adapted to the use of engineers, and well merits an English translation.

THE AMERICAN BUILDER. Published by Charles D. Lakey, Chicago, Ill. Terms, \$3.00 per annum.

The above is one of our most interesting exchanges, and we are pleased to learn that it is meeting with well deserved success.

Caveats are desirable if an inventor is not fully prepared to apply for his Patent. A Caveat affords protection for one year against the issue of a patent to another for the same invention. Patent fee on filing a Caveat, \$10. Agency charge for preparing and filing the documents from \$10 to \$12. Address MUNN & CO., 37 Park Row, New York.

Inventions Examined at the Patent Office.—Inventors can have a careful search made at the Patent Office into the novelty of their inventions, and receive a report in writing as to the probability of success of an application. Send sketch and description by mail, inclosing fee of \$5. Address MUNN & CO., 37 Park Row, New York.

MANUFACTURING, MINING, AND RAILROAD ITEMS.

The losses by fire in the United States, from last January to October, inclusive, amount to the large sum of \$33,584,000.

M. Delaurier states that oxygen may be obtained very economically from manganese of lime, as this salt when heated gives off that gas very abundantly.

A surveying party of the San Diego, El Paso, and Memphis Railroad have passed the summit of the range of mountains between San Diego and Fort Yuma. They report the grade to be less than 100 feet per mile.

A writer in *Comptes Rendus* says that if articles made of copper be immersed in molten sulphur having lamp-black in suspension, they assume the appearance of bronze, and can be polished without losing that aspect.

It is stated that Mr. A. T. Stewart has purchased the block lying between North Twelfth and North Thirtieth streets, and First street and the East river, Brooklyn, for \$300,000, and that he intends to build thereon a depot for the proposed railway to Hempstead.

Water collected from roofs or kept in tanks covered with zinc has been found by M. Zurek to be so much contaminated by that metal as to prove detrimental to health, when used for domestic or industrial purposes. He recommends that such tanks or roofs be painted with asphaltic varnish.

Chicago is going into the iron manufacture on a large scale, and with Lake Superior ores. A number of capitalists there have formed a company and contemplate the erection of a large mill at Joliet. Wrought iron gas and water pipes will form one feature in the production of the establishment.

The miners of the Wilkesbarre (Pennsylvania) Coal and Iron Company have a fund of five thousand dollars for the use of those of their number who may be disabled in any way. It was raised by each miner and the company giving the earnings of one day; one thousand dollars is to go to Avondale, and the balance in the above manner.

The Darien canal project is reviving. The United States steamer *Nipstic*, attached to the South Atlantic squadron, is under orders to proceed to the Isthmus of Darien to make surveys and explorations, with a view to determine the best location for an inter-oceanic canal. A similar survey on the Pacific shore of the Isthmus will be made at a future day. It is asserted that President Grant will recommend the early construction of this Darien ship canal in his forthcoming message. What truth there may be in the statement it is difficult to say, as never before has a president been so successful in preventing a premature publication of the contents of the annual communication to Congress.

M. Méne says that when woods of a naturally white color are painted over with a concentrated aqueous solution of permanganate of potassa, they assume the appearance of walnut wood. Different woods behave in a different manner when acted upon by this solution. The woods of the pear tree and the cherry tree are readily stained, while the white woods (the acacia, for example) resist a longer time, and resinous woods, as the fir, are still more difficult to affect. The rationale is that the permanganate of potassa is decomposed by the woody fibers; brown peroxide is precipitated and fixed by the potassa, which is afterwards removed by washing with water. The wood when dry is varnished, and is not easily distinguished from woods of a naturally dark color.

Components of the *Chemical News* give two methods of constructing foot-paths: (1) One part of Portland cement mixed with seven or eight parts of gravel, or old, hard rubbish, such as brick-bats, broken stones, etc., will make a neat, cheap, permanent garden walk, impervious to wet, and not readily affected by changes in the weather. (2) A very good, and comparatively cheap foot-path may be made by laying down, first, a layer of coarsely broken-up old bricks, next, some middling coarse gravel, and over that a layer, from two to four inches in thickness, of small sea-shells. If care be taken to beat or roll the broken-up bricks and gravel into a somewhat solid mass, the shell-covered surface may be advantageously rolled in with a heavy iron roller, and will form even on soft sub-soil, a durable and inexpensive roadway.

GROOVED WHEEL RAILROAD BRAKE.—A novelty in railroad brakes, which seems to us to possess much merit, is the subject of a recent patent granted to R. Heuresse, whose address is Box 684, New York. Grooved wheels are employed between the running wheels of the truck, raised just enough to clear the rails, when it is desired that the speed be unimpeded; but when the motion is to be arrested or retarded, the grooved wheels are depressed upon the rails and the brake blocks forced down into the grooves, thus quickly effecting the purpose. This system of brake is operated by either hand or steam power, and with but a small expenditure of force. A model exhibited at the late American Institute Fair, worked well, and seemed to be a step in the direction of improvement. As the grooved wheels are arranged in the middle of the truck, the weight of the car would be sustained by them, in the event of an ordinary running wheel or its axle being broken, and many of the accidents so frequently occurring would thus be prevented.

Recent American and Foreign Patents.

Under this heading we shall publish weekly notes of some of the more prominent home and foreign patents.

IMPERMEABLE PAPER COLLARS, CUFFS, ETC.—It is proposed to make these of paper which has been partially converted into vegetable parchment. It is well known that water has little or no effect on paper so prepared, and colors and patterns can be applied with the greatest facility.

PRESERVING ANIMAL AND VEGETABLE SUBSTANCES, ETC.—Mr. G. W. Perry, of Melbourne, Australia, treats the substances to be preserved as follows. They are first washed in a solution of bisulphite of lime and magnesia, and then dipped into a boiling solution of gelatin and bisulphite, and so, when dry, the substance is coated with an air-tight covering. In order to preserve animals, without removing the skin or feathers, a hot solution of bisulphite of lime and magnesia, with the addition of ten per cent of common salt must be injected into the blood vessels as soon as the blood is drained from the body, and before the carcass has become set. The viscera may then be removed, and the inside thoroughly cleaned and washed with the bisulphite solution. Fish, to be preserved, should be cleaned, the viscera removed, and then packed in barrels, filled with a pickle composed of salt and bisulphite solution. Liquids, too, such as ale and wine, or other fermented liquors, it is said, can be preserved in vessels, the inside of which have been washed with bisulphite of lime and magnesia.

MANUFACTURE OF SULPHURIC ACID.—This invention consists in the employment of ammonia, or carbonate of ammonia, to condense the nitric acid vapors escaping from the exit of the vitriol chambers. To accomplish this, ammonia, or carbonate of ammonia, is caused to come in contact with the escaping fumes, either in a cone tower or chamber. The fluid, thus resulting, is again afterwards decomposed with sulphuric acid, and the escaping nitrous fumes are returned into the vitriol chamber for the oxidation of the sulphurous acid. The patentee of this invention is Mr. Konrad Walter, Wicklow, Ireland.

MACHINERY FOR MANUFACTURING SEMOLINA AND FLOUR.—G. A. Buchholz, Shepherd's Bush, England.—The invention relates to a novel arrangement of apparatus for reducing hulled wheat to semolina, which apparatus by slight modifications, may be used to reduce the same to flour, the object being to effect such operations rapidly, and, when designing to manufacture semolina, to produce it with concurrent formation of a minimum proportion of flour or wheat dust. It is also designed to economize space in the mill by rendering the apparatus more compact than heretofore.

GRINDING MILL.—G. A. Buchholz, Shepherd's Bush, England.—This invention consists in the use of pairs of grooved rollers which are nicely adjusted to their work, and are speeded so that one roller will rotate from five to six times as fast as the other roller, and thereby reduce by a cutting in contradistinction to a crushing action, the ripped corn into particles of the required size.