A WEEKLY JOURNAL OF PRACTICAL INFORMATION, ART, SCIENCE, MECHANICS, CHEMISTRY AND MANUFACTURES.

Vol. XLII.—No. 6.

NEW YORK, FEBRUARY 7, 1880.

[\$3.20 per Annum. [POSTAGE PREPAID.]

FLOATING DERRICKS OF NEW YORK HARBOR,

There is no harbor in the world so crowded with shipping of all kinds, propelled in so many different directions, and under so many trying conditions of time and tide, as the harbor of New York; and it is not strange that occasionally Oliphant to the Warren, the latter being only slightly injured. a vessel should meet the fate of the Oliphant. It is simply wonderful that accidents are so exceedingly rare, when, in spite of wind and tide, huge ferryboats are constantly crossing the paths of river, Sound, and ocean steamers and sailing craft of all kinds.

The steamboat Oliphant, better known as the Wall street annex boat of the Long Island Railroad, while on her way | Collins, of the Morgan Iron Works, having its tackle at-

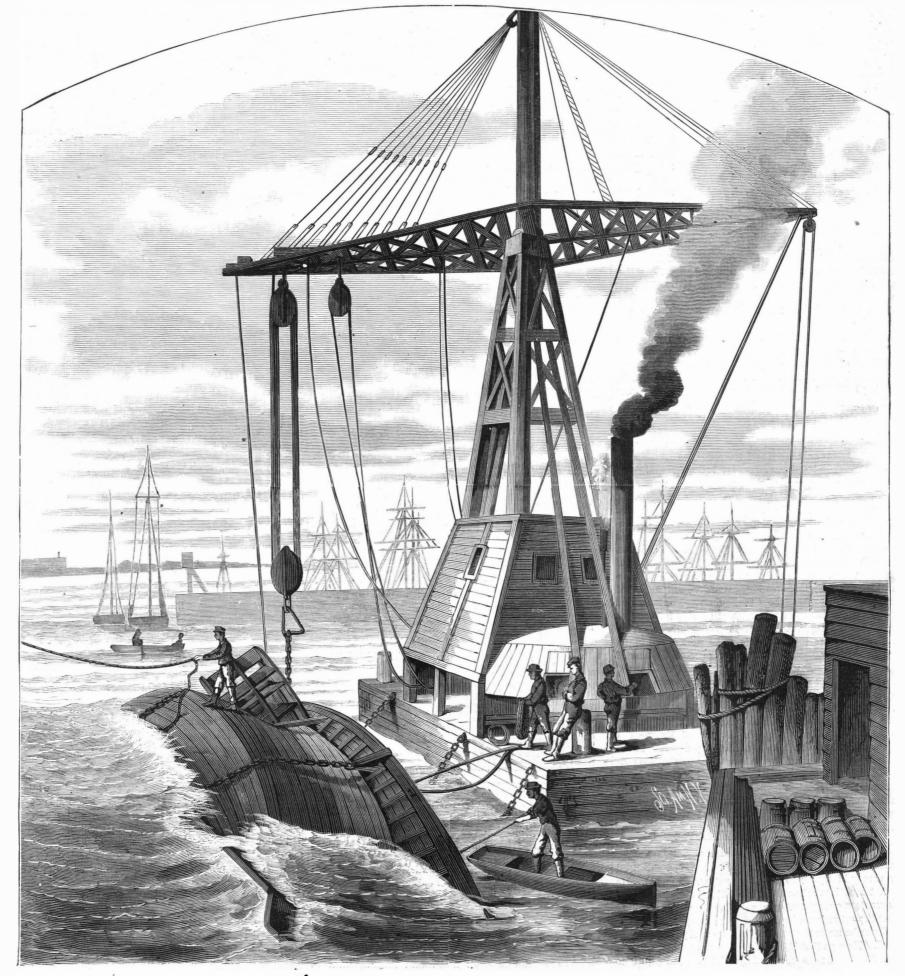
from the pier at Pine street, to connect with a train at Hunter's Point, was run into by the ferryboat Warren, plying between Grand street, Brooklyn, E.D., and Grand street, New York. The passengers and crew escaped from the An effort was made to tow the Oliphant to a pier to make her fast, but she capsized before this could be accomplished. The Oliphant was 146 feet long, 146½ tonnage, and was licensed to carry 400 passengers. She was a short time since furnished with new engines and boilers.

Our engraving represents the floating steam derrick E. K.

tached to the Oliphant preparatory to righting and raising her. These huge derricks are capable of raising bodily boats of ordinary sizes. Captain McDonald, of this derrick, says he has raised sixty-five sunken vessels with it. Not long since one of the Harlem steamers was sunk on Saturday, was raised on Sunday, and was running again on Monday.

There are in this harbor four floating derricks, ranging in lifting and carrying power from 65 to 100 tons. Two of them are owned by private individuals, one belongs to the Department of Docks, and another to the Brooklyn Navy

The raising of vessels is but a small part of the work per-



FLOATING DERRICK-RAISING THE WRECK OF THE OLIPHANT, EAST RIVER, NEW YORK.

formed by these huge machines. They are used for transferring heavy freight from vessels to the docks and from the docks to vessels, for placing boilers and machinery in steamers, for lifting and carrying blocks of granite and artificial stone for engineering works, and for handling other bodies too heavy and too bulky to be handled by other

The derrick is carried by a large rectangular float well braced and stiffened by trusses. The tower which supports the king post and booms is about sixty feet high, and is built of large timbers well framed and bolted together. The boom is supported by a number of diagonal rods which converge near the top of the king post and are secured to it by heavy forgings which straddle the iron cap at the top of the post. All of the hoisting machinery is placed on the float under the tower and controlled by the engineer.

IRON LIGHTHOUSE FOR MEXICO.

The Keystone Bridge Company, of Pittsburg, are putting the finishing touches to an iron lighthouse ordered for the Mexican Government by Don Vincente Riva Palacia, late Minister of Public Works of the Mexican Government. The work was carried on under the Supervision of Don J. Ramon de Ibarrota, Engineer to the same government. The structure presents an unfamiliar sight to the inhabitants of the smoky city, rearing its graceful proportions high into the air near the banks of the Allegheny River. When completed the lighthouse will be taken apart, shipped by rail to New York, and thence by sea to the mouth of the Tampico River, where the structure is to be put up.

This house is a skeleton structure, made up of seven series or stories of cast iron columns, braced and tied by struts and tie rods, the whole arranged about a central stair cylinder of cast iron, so as to form a hexagonal tower, 146 feet 7 inches high from weathercock to base. The latter is 46 feet in diameter, tapering to 18 feet 10 inches at the lantern room. The lantern and revolving apparatus are awaiting the lighthouse at Tampico, having been made for this structure at Birmingham, England. Just below the lantern is the "service room," for the use of those in charge of the light. This space is roofed with the castings forming the floor of the lantern room, and a neat railing surrounds the hexagonal space embraced in this floor.

The "stair cylinder" forming the central portion of this lighthouse is of cast iron, 7 feet diameter and 1/2 inch thick, and composed of 14 sections, bolted at the joints through flanges. The spiral stairway inside the cylinder comprises 173 cast iron steps, spaced by six landings, at each of which a window is let into the cylinder. The weight of this whole structure is 150 tons, and its cost at Pittsburg about \$15,000. Another will be built for the Mexican coast by the same

Before taking down the lighthouse its stability was thoroughly tested. A pressure was brought to bear against one side equal to a wind strain of 40 pounds per square foot. The area so subjected being 360 square feet, the test was equivalent to 1,800,000 pounds wind strain needing to upset the structure. The momentum of the lighthouse to resist this being 1,840,000, the surplus in favor of stability was still 40,000, and this without any anchorage whatever.

---Prosperous France.

France is affording fresh proof that she is one of the most wonderful nations on the face of the earth. The disasters of the Franco-Prussian war, and the payment of five milliards of francs as the further penalty for entering upon that war, would have crippled an ordinary nation. But France is not an ordinary one, and the result is that she has not only cast off her burden, but contemplates an outlay in internal improvements such as the most prosperous country could alone entertain. It will be remembered that M. de Freycinet, the new Prime Minister of France, before leaving his old department, drew up an elaborate report embodying a gigantic scheme for the creation, extension, and union of railways and canals throughout the country. The estimated cost of these improvements is nine milliards of francs, or £360,000,000 sterling; but France is not deterred thereby, and in twelve years the scheme is to be worked out in its entirety. Already France is noted for the completeness of her railway system, which, with her rivers and canals, afford a means of communication a pparently leaving little to be desired; but she is impressed with the belief that improvement is possible, and she is going to add 16,000 miles to her railways, and 900 miles to her rivers and canals This fresh burst of enterprise on the part of France can have but one effect, and that is increased prosperity in the great industries already stirred into activity by the demands of India, America, and the colonies. Rumor is already busy, says our excellent English contemporary Capital and Labor, with the names of English firms about to contract with the French. Government, while the iron and steel trades in America and Belgium must also benefit.

----Interesting to Patentees.

Senator Hoar strongly advises patentees not to spend their money in trying to get their patents extended. He says that experience shows that no bill for the extension of any seventeen year patent can pass Congress. The feeling against the extension of patents is very strong. Bills have passed one house or the other, but they are always beaten in the end. The grave that if he had a heather always beaten in vein yet discovered. 1 illus. Cross section of Basslet Mine 3407 the end. He says that if he had a brother who had a patent worth \$50,000, he would not advise him to spend \$1,000 to get it extended.

Scientific American.

ESTABLISHED 1845.

MUNN & CO., Editors and Proprietors.

PUBLISHED WEEKLY AT NO. 87 PARK ROW, NEW YORK.

O. D. MUNN

A. E. BEACH.

TERMS FOR THE SCIENTIFIC AMERICAN.

One copy, one year postage included...... \$3 20 One copy, six months, postage included Clubs.—One extra copy of The Scientific American will be supplied

gratis for every club of five subscribers at \$3.20 each; additional copies at same proportionate rate. Postage prepaid. Remit by postal order. Address

MUNN & CO., 37 Park Row, New York.

To Advertisers.—The regular circulation of the Scientific AMERICAN is now Fifty Thousand Copies weekly. For 1880 the publishers anticipate a still larger circulation.

The Scientific American Supplement is a distinct paper from the Scientific American. THE SUPPLEMENT is issued weekly. Every number contains 16 octavo pages, with handsome cover uniform in size with Scientific American. Terms of subscription for Supplement, \$5.00 a year, postage paid, to subscribers. Single copies 10 cents. Sold by all news dealers throughout the country. Combined Rates.—The Scientific American and Supplement will be sent for one year, postage free, on receipt of seven dollars. Both papers to one address or different addresses, as desired.

The safest way to remit is by draft, postal order, or registered letter. Address MUNN & CO, 37 Park Row, N. Y.

Scientific American Export Edition.

The SCIENTIFIC AMERICAN Export Edition is a large and splendid periodical, issued once a month. Each number contains about one hundred large quarto pages, profusely illustrated, embracing (1.) Most of the plates and pages of the four preceding weekly issues of the SCIENTFIC AMERICAN, with its splendid engravings and valuable information; (2.) Commercial, trade, and manufacturing announcements of leading houses. Terms for Export Edition, \$5.00 a year, sent prepaid to any part of the world. Single copies 30 cents. [27] Manufacturers and others who desire to secure foreign trade may have large, and handsomely displayed announcements published in this edition at a very moderate cost.

The SCIENTIFIC AMERICAN EXPORT Edition has a large guaranteed circulation in all commercial places throughout the world. Address MUNN & CO., 37-Park Row, New York.

NEW YORK, SATURDAY, FEBRUARY 7, 1880.

Contents.

(Illustrated articles are marked with an asterisk.)

Accident on board the Greece. 89
Air, compressed, in coal mining 81
Astronomical notes 89
Benzoate of sodium; 87
Blue vitriol, to clean (7) 93
Bottle, medicine, Earle's 83
Canada balsam, crystallization 85
Cotton goods to imitate wool. 81
Cotton size and cotton sizing 90
Delaware ship canal, the 83
Derricks, floating, N. Y. harbor 7
Diamonds, artificial, Mactear's 88
Egg tongs, new* 85
Engineers, their value 83
Engineers, their value 83
Engines, portable, improved 85
Fire risk in factories 84
France, prosperous. 88
France, prosperous. 89
France, prosperous. 87
Enymastics, scientific 87 Fish skins, industrial uses of France, prosperous.
Gymnastics, scientific
Ink, email.
Innovations, American.
Inquisitiveness, Yankee.
Inventions, agricultural.
Inventions, miscellaneous.

99 | Inventions. new.
11 | Jugs, improvement in*.
129 | Light. action of on plants.
130 | Light. action of on plants.
140 | Light. action of on plants.
151 | Light. action of on plants.
152 | Light. action of on plants.
153 | Light. action of on plants.
154 | Mississippi river survey.
155 | Mississippi river survey.
156 | Olives in California.
157 | Patent bills before Congress.
158 | Patentees interesting to.
159 | Patents, recent decisions, etc.
150 | Patents, recent decisions, etc.
151 | Patents, recent decisions, etc.
152 | Patents, recent decisions, etc.
153 | Pumping engines, novel*.
150 | Saliver plating on steel (5).
151 | Telephoning, long distance.
152 | Telephoning, long distance.
153 | Torpedo boats, Mang'se bronze.
154 | Tunnel, Hudson river.
155 | Vantand wages, system of*.
155 | Work and wages. Vase, Oninese*..... Ventilation, new system of*..... Work and wages

TABLE OF CONTENTS OF

THE SCIENTIFIC AMERICAN SUPPLEMENT

No. 214.

For the Week ending February 7, 1880.

Price 10 cents. For sale by all newsdealers.

he Tunnet Unice the Comment of the Comme Notes on Iron work, by deadless showing how and why ice-boats can sail faster than the wind. 10 figures, with mathematical demonstrations.

Improved Drop Hammer. A novel and powerful hammer of figures, invention. 3401 II. TECHNOLOGY AND CHEMISTRY. -Oxidation Product of Chlo-

TECHNOLOGY AND CHEMISTRY.—Oxidation Product of Chloric Acid.

Photographs of Microscopic Objects. Simple methods of taking microphotographs.—Conditions
On the Preparation of Gelatine Emulsion with Glycerine. By W. DE W. ABNEY, F. R. S.
Recovery of Tin from Template Scraps.

3404
Firing Terra Cotta.
3405
Early Use of Fish as Manure in Peru.
3406
Progress of Industrial Chemistry. (Continued from Supplementation in the Household Relations. A practical paper of 1879. The Sodium chloride. Calcium chloride. Magnesium sulphate. Ammonium chloride. Calcium chloride. Magnesium sulphate.
3407
The Supposed Artificial Production of the Diamond. By Nevil.
3408
Story MASKELYNE.
3409
Story

WORK AND WAGES.

We have been surprised that the volume published a few months since by the National Government on the "State of Labor in Europe," has not received more general attention than it seems to have attracted. The statistics, as furnished by the various United States consuls, purport to cover the rates paid for labor in all the leading industries, together with the cost of living in Great Britain and in nearly every country on the continent of Europe. Elaborate tables are also given comparing the averages thus obtained with the rates of wages paid and the cost of living in this country. In addition to the above, our accomplished Secretary of State, who himself obtained the home statistics relative to labor and the cost of living, carefully edited the volume, and, in an extended introduction, gives us a synoptical résumé of its contents, together with some general conclusions of his

Now every one will concede that Mr. Evarts, with his wide and varied culture, is a close reasoner, and there is hardly a subject of general interest on which he cannot write or speak so as to command the attention of all thinking men. In treating of this subject, however, it may well be doubted whether he does not carry his generalizations much too far; for, certainly, the tenor of his whole discourse is to point out that our workingmen must accept lower wages in future. The mechanics and artisans in the housebuilding trades, and in every local as well as general occupation, must, according to his argument, in the near future be content to accept for their remuneration wages more nearly approximating to those obtained by European workingmen. The principal ground on which this reasoning is predicated lies in the much higher rates per day now paid to American workingmen, which, the Secretary argues, cannot be permanently maintained when we are exporting largely of domestic manufactures, in competition with the products of the cheap labor of Europe; yet, in another place, he says: "The average American workman performs from one and a half to twice as much work, in a given time, as the average European workman." It is quite a different thing, as every employer knows, to compare the wages per day or hour of different sets of work men, from what it is to estimate the cost of labor under differing circumstances, as shown in the completed work. The former method is the one generally adopted by those who talk or write on the subject; the latter must control the operations of all who succeed in every line of business. The English workman who receives the highest average wages in Europe comes nearest to doing as much as the American workman, but on the Continent, where wages are lowest, so also is the quantity and quality of the work. The consul at Leipsic writes that "an active American workman will do as much work in a given time, at any employment, as two or three German workmen," and the volume abounds with such remarks, which do not put the case a whit more forcibly than we have often heard it stated by American manufactu. rers who have investigated the matter in personal visits to foreign workshops. The fact is, in making comparisons of this kind, so many things have to be taken into consideration to make the conditions equal, that they seldom give one more than an approximate idea of the situation.

But if it is inevitable that we are to have a sort of leveling process in the rates of wages in "the world of educated and progressive labor," why is there not good reason to suppose there will be some "leveling up"? The average rates of labor throughout Europe have advanced from 25 to 30 per cent since 1850. The upward movement was checked when the speculative era following the Franco-German war reached its climax, and since then, contemporary with the extreme depression which was felt here from 1873 to the commencement of 1879, all branches of productive industry have been undergoing a severe strain. This, however, has not caused any very material reduction in the rates paid for labor, and with the first indications of returning prosperity it is probable that wages will at once be advanced in proportion there, as they already have been in many kinds of busi-

was a common thing for English cotton goods to be loaded IV. ASTRONOMY — Working the Speculum for the 37 inch Reflector 3411
Celestial Objects Viewed with the Naked Eye 3411
The Sun. By S. P. LANGLEY. A total eclipse. 6 figures Limits of shadow. Region of total eclipse July 29, 1878. "Eclipse Encampment." Solar protuberances in inner corona. Outer corona 3412
The Sun. Professor Young's summary of the results of recent studies of the sun. Professor Young's summary of the results of recent studies of the sun. do not so regard it.

DHYSIOLOGY AND MEDICINE.—The Effects of Aluminum Salts on the Gastric Juice in the Process of Digestion. Experiments on twenty-two living animals, by Henry A. Mort, JR. Ph.D. A remarkably thorough and valuable series of tests bearing on the baking powder question, described in detail.

3407

do not so regard it.

We have before us a large and well made octavo volume of some three hundred pages ("Sizing and Mildew in Cotton Goods." Manchester: Palmer & Howe), about half of which is devoted to the art of sizing. Its authors are three Manchester chemists of good repute; and in a letter com-VIII. OBITUARY.—James R. Napier, F.R S...... 3414 *assure us that this is the first time the subject has been

treated in such an exhaustive manner. That portion of the low, and so on. The authors considerately remark that this become somewhat acquainted with the difference between work devoted to mildew is certainly valuable. The first practice "cannot, of course, be defended upon any ground part is—well, instructive, to say the least, though we sin save that of cheapening the fabric. Some merchants, howcerely trust that the art, as practiced in England, will not ever, find this to be necessary;" though it is not easy to see find favor in the eyes of American manufacturers.

their preface that it does not concern them immediately; clay can be palmed off upon the consumer as cotton. It still, if there be a demand for weighted cottons, and they are properly described, they see no reason why the demand a year ago, that the cost of the sizing compound was just 3 should not be met. The practice of regarding heavy sizing | farthings a pound, or about one-tenth the cost of cotton. In as an adulteration, they say substantially, in another place, the case in question the cotton in dispute had 4 pounds of they do not consider at all logical; as they 'fail to grasp a size to 4 pounds 3 ounces of fiber parallel that a man commits a fraudulent act who coats a white metal tea service with silver, or plates a set of harness (1) Starchy matters used to strengthen the yarn and faciliwith nickel." They argue that as the manufacturer does tate the weaving; (2) fatty substances used to soften, that is, not sell direct to the consumer, but to the trader, and simply makes such a line of goods as the trader calls for, therefore ganic substances, and (4) mineral matter used to increase the practice of making three pounds of shirting out of one the weight of the goods. To prevent mildew a large numpound of cotton and two pounds of clay and other materials, is perfectly legitimate, or as much so as plating white ware articles are described at great length, with their special

were in all cases well aware that their goods were to be imconsumers; and the loss of favor which English cottons table waxes, paraffine, etc. In the third class are glucose, have experienced in China and elsewhere, rather goes to glycerine (which gives a nice soft feel to the cloth, especially and that in the long run the practice of overloading cottons dextrin and alum makes the dressing for fine muslin it, but rather to describe the materials used and the way Irish moss, glue, old lant, or urine, and various soaps. they are applied.

To a limited extent sizing is a process not only legitimate but really necessary in cotton weaving with single yarn. Its sulphate of lime (plaster of Paris, gypsum, terra alba, etc.), object is to bind, the fibers together to strengthen the warp sulphate of magnesia (Epsom salts), sulphate of baryta, or to enable it to withstand the strain of the loom, and to di- heavy spar, sulphate of soda, or Glauber's salts, silicate of minish the fraying action of the reed by giving the thread a soda, or water glass, and ultramarine blue. All these serve smooth and even surface. This is especially necessary when to increase the weight of the fabric. To them are added named. Its use is regarded with such disfavor by the minthe staple of the cotton is short and the fibers but loosely chloride of calcium mixed with the chlorides of magnesia ers as to warrant the supposition that as a digger it is a pracbound together in the spinning of the yarn. For this legitimate purpose starch paste is quite sufficient. With pure starch size it is easy to add 20 per cent to the normal weight serves the purpose of keeping the china clay moist during bus, Ohio. In appearance it resembles a Woodworth planer of the cotton. By adding other ingredients the loading can be and is increased tenfold or more. To describe the elaborate machinery used in sizing would carry this article beyond the space allowable, besides diverting it from its in tended purpose.

The various systems of sizing are classed as follows: 1. Sizing the yarn when on the loom. 2. Sizing in the hank. 3. Sizing the yarn in the warp or chain. 4. Sizing the yarn when spread out so as to represent a sheet, each thread being as nearly as possible at an equal distance from its neighbor. The first method is exclusively practiced by the hand loom sizing and the drying. In the first the yarn is run between (sow-box) filled with size, then between another pair of roll. do." ers to squeeze out the excess of size. The drying is done over steam heated cylinders. The fourth and most important method of sizing is chiefly practiced on the Slasher sizing machine, which sizes and dries the yarn, and otherwise prepares it for the loom by one continuous though complex

The authors give an analysis of a sample of heavily sized warp, as follows:

arp, as rono.		
Cotton fiber.	Pure cotton	35.88
Size.	\ Starchy matters	27.01
Mineral.	$ \begin{cases} \text{Natural ash.} & 1.00 \\ \text{China clay.} & 32.07 \\ \text{Chloride of magnesium.} & 3.25 \\ \text{Chloride of zinc.} & 0.84 \\ \end{cases} $	37:16

100.00

Thus it appears that in every hundred pounds of such warp there are about 36 pounds of cotton fiber, 27 pounds of size, and 37 pounds of mineral "loading." In other then started to make knit goods with it in Cohoes, N. Y., words, for every pound of pure cotton there is a pound and seven-ninths of foreign matter. A little further on the authors say that "common eight and a quarter pound shirtings are usually very heavily sized," and give analyses of two samples, one showing 3 pounds 6 ounces of size to 4 pounds 13 ounces of cotton, the other giving 3 ounces more of size and so much less of cotton.

The authors are careful to say that sizing and weighting should be considered as two distinct processes. former is a necessity, the latter not necessarily so." There is still another loading operation carried on by people called woolen fabrics. The experienced housekeeper, or ladies "stiffeners," who take the cloth, after it has been sold by the manufacturers and give it an additional load of clay, gypsum, heavy spar, Epsom and Glauber's salts, starch, tal-

how a finished fabric can be made cheaper even by adding Touching the practice of heavy sizing, the authors say in to it so cheap a substance as clay-unless a portion of the was shown in the somewhat famous Manchester goods case.

The various materials used in sizing are of four classes to allay the harsh and dusty feel of dry starch; (3) other orber of antiseptic substances are also employed. All these properties and the manner of preparing and using them. The argument would be more convincing and the parallel For pure sizing the starches most generally used are those juster if it were assumable that the makers of plated articles of the potato, sago, and wheat. Farina gives a harsher feel than sago, making a more liberal use of fatty matter necesposed upon unintelligent buyers as pure silver, and took sary. Deliquescents are also required, especially when clay pains to abet the frauds by marking their wares accordingly. has been used, to keep the clothes from becoming dusty. The fact that for a time such dishonest products have been Tapioca, corn starch, rice flour, arrow root, and other disposed of in enormous quantities, as our authors frankly starches are often used. In the second class fall tallow, assert, is no proof that there is a real demand for them from cocoanut oil, palm oil, castor oil, olive oil, animal and vegeshow that many buyers of such goods have been swindled, in conjunction with much china clay, and which with will be found the reverse of profitable. But we did not set | yarn), dulcine (a mixture of glycerine, gum, and Chinese out to discuss the morality of heavy sizing, or the policy of wax, introduced into Manchester by two of our authors),

In the class of mineral substances we find china clay (disintegrated feldspar), steatite (soapstone or silicate of magnesia), and zinc for purposes of adulteration.

the weaving process. The authors say that it should never be used for weighting purposes. "Weight can be much running on rails. The mission of the Lechman machine is than by deliquescent substances." Chloride of magnesium that without an admixture of chloride of zinc it will not prevent mildew.

These various materials variously mixed are applied by the makers of cotton goods to the warp only. The weft is not sized for the weaving process. But this leaves too much unloaded fiber to suit the English merchant. Accordingly, weaver, and is of slight importance, very little weaving of as the authors remark, "it is an established custom to stiffen that sort being done now except in China and India. For already heavily sized goods after they have left the manupower loom weaving sizing in the hank is exclusively con- facturers' hands. Ordinary 7 pound gray shirtings are filled fined to colored goods. This method, like the former, is with size, Epsom salts, Glauber's salts, or mixtures of these, falling into disuse. The sizing of ball warps and chains is so as to make them weigh and resemble, as far as possible, more largely practiced, and consists of two operations, the 84 pound shirtings." This adulteration is easily seen, since both the warp and the weft threads, and also the interstices, squeezing rollers to exclude the air, then through a box contain foreign matter, "exactly as bleached and filled goods ters. The shaft is driven at 700 to 1,000 revolutions per min-

MAKING KNIT COTTON GOODS TO IMITATE WOOL,

When knit shirts and drawers were first introduced, a large proportion of the substance of the goods was wool. The great extent to which cotton is now used in the manulous to speak of these articles of apparel as "flannels." It is now nearly fifty years since the first successful power be interesting to remark that, although a hand machine had been in use in England for nearly two centuries, and numerous efforts had been put forth to adapt it to run by power, it was reserved to an American to succeed in this direction. purchased on old hand frame for \$55, in April, 1831, on and subsequent repairs involved by machine labor. and the old "reciprocating frame," then first put into use, not only made the fortunes of the storekeeper and the inventor, who set out in so business-like a way to accomplish their vast magnitude.

At first, as we have said, the material used consisted distance to the cutting device. largely of wool. It was not until after several years that it was found that one half cotton would make a good serviceable article, but then and ever since it has been customary to sell these knit undergarments, wherever possible, as

* Marten's " History of Cohoes."

cottons and woolens, probably know better, but the great majority of customers for the goods do not. There are few people, however, we venture to say, who suppose that, in purchasing these goods, they are buying fabrics with absolutely no wool in them. Yet such is really the case in a large proportion of the goods made. It is probable that fully one half of all the knit shirts and drawers made in this country are manufactured from cotton exclusively, and, where any wool is used, it forms a very small proportion of the total weight of the fabric. We know of one manufacturer who, two years ago, made up a lot of goods in which he put twenty per cent wool; but he found it difficult to get more for them than others obtained for an all-cotton article; his conclusion was that fabrics containing so much wool were 'too good" for the general market, and he has since used cotton only.

But, with the substitution of cotton for wool, the manufacturers have constantly been making strenuous efforts to produce goods which would look as though they were made of wool. Great attention has been paid to the bleaching and dyeing, and, in making white goods, two or three particular shades of white are given to the fabrics, according as it is desired to represent Texas, Ohio, or California wools, etc. In the dyeing of colored goods, the dyes used are especially intended to give effects which might lead a customer to suppose the goods were made of wool, and colors which will not take well on cotton are avoided. Of course, it is not to be supposed that those who buy and sell the goods are deceived, unless it may be among the small dealers; among those who wear the goods, however, we doubt whether one in fifty would acknowledge wearing undergarments made of cotton alone, and most of them would be extremely indignant at having this fact brought home to them, although every manufacturer knows that hardly one in fifty of those who wear these goods have garments with any appreciable proportion of wool in them.

COMPRESSED AIR IN COAL MINING.

The only mechanical coal digger that ever obtained a foothold in the great Pittsburg coal fields is that now at work in the mines of Henry B. Hays & Bro., near the city tical success. This machine is driven by compressed air, Chloride of calcium is a deliquescent pure and simple, and and is a recent invention of Mr. M. H. Lechman, of Columplaced low upon the ground and borne upon small wheels more easily and safely introduced by means of china clay not, strictly speaking, to mine coal, but to "bear in." This operation by the ordinary method requires the miner to asis often used as an antiseptic, but the authors are confident sume a most trying position in order to properly undermine the overhanging mass of coal, which is afterwards dislodged by wedges. Two and a half feet is the extreme "bearing in" distance by hand, and to accomplish this reduces a large amount of coal to an unmarketable state.

The construction of the machine in question is peculiar. The oblong steel frame is double, and capable of elongation, like the joints of a telescope. The forward end of the sliding portion bears a cutter shaft similar to that of a planer. This shaft is armed with serrated cutters resembling in action and form the cutting arrangement of a moulding machine. The shaft bearing these cutters is revolved by means of an endless chain taking power from the driving shaft located across that end of the machine furthest from the cutute by a pair of upright cylinders located one on each side of the machine. These are 5 inches in diameter and 6 inch stroke, taking air at 60 pounds. Being brought with its forward end against the face of the coal, and 1 foot from the bottom-to clear the stratum of "ground coal"-the machine is ready for action. Air being turned on the cutter bar soon facture of knit undergarments makes it almost ridiculdives out of side as the sliding portions of the digger are moved forward by a suitable screw feed. The cut made is 4 inches deep-perpendicularly-3 feet wide, and extends knitting machine was made. And here, by the way, it may into the coal seam 5 feet. This cut has been made in four minutes, but usually occupies ten minutes.

Suitable scrapers attached to the endless chains clear away the coal dust produced. When it is considered that a day's work for two able-bodied miners is the "bearing in" 21/2 An enterprising storekeeper in Albany, N. Y., saw the need | feet across 15 feet of coal, the relative speed of the machine of such an invention, and hired a young man then working undermining to twice the depth of the miner's pick will be in a cabinet shop there to make the attempt. The latter noted. As an offset to this is placed the weight, first cost, which he commenced his experiments, and in six days had Lechman machine weighs nearly a ton, costs \$500, and needs so arranged the apparatus that it would knit by turning a frequent repairing. The Pittsburg coal seam is a trying test, crank at the side.* In the fall of 1832, the invention had however, inasmuch as the 4 inches taken out by the cutters become so far a practical success that a small factory was includes a double strata of extremely hard slate overlying the bottom or ground coal. As compared to the pick the action of this machine is as the saw to the ax in the felling of a tree or the cutting of a log. There would seem to be a wide field for inventive genius in the matter of a mechanical object, but started an industry which has since become of device that would be free from the objections noted above, and that would not require the conveyance of power from a

EMAIL INK.—The drug house of Louis Muller, in Leipsic, has put on the market colored inks which may be used for writing labels on glass, porcelain, ivory, marble, mother-ofpearl, and metal. The writing is done with a goose-quill, who purchase their own dress materials sufficiently to and, when dry, adheres so firmly that it cannot be removed by any liquid. Four different colors are made-black, white, red, and blue.—Drog. Zeit.

IMPROVED PORTABLE ENGINES.

We give on this page two views of a compact and simple

they have hundreds of them doing work in printing offices, shops of all kinds, cheese factories, and dairies, in elevators and mines, and on the farm and plantation. These engines in more than ten years of use have earned a reputation for durability and economy, and they are very well and favorably known in many places outside of the United States. The salient features of this engine are its boiler and accessories, its stop-motion governor, its self-oiling connecting rod, and the drip catching devices.

The boiler, which is horizontal, is made of the best CH No. 1 iron in cylindrical form, and provided with return flues of the best lap welded iron. and is well arranged for economy and safety. The fire box has a movable bridge wall to adapt it to different kinds of fuel. The grate surface is ample for coal, wood, or shavings, and admits of the use of fuel which could not be used in most small engines in market. The bridge wall is made hollow to admit air to the gas and flame which pass over it, and thus complete the combustion of the fuel, avoiding smoke and the loss of heat generating material.

The stop motion governor, which is fitted to all of these engines, was suggested by the danger and annoyance which follows the breaking or running off of the governor belt. This, we believe, is the first instance of the application of a governor of this kind to portable engines. In case of the breakage of the governor belt, the weighted lever attached to the governor immediately drops and stops the engine. This lever may be adjusted by moving its weight, so as to change the running speed of the engine. The governor needs no readjustment when stopping or starting the engine. It is only in case of the breakage of the governor belt that it requires attention, and then the readjustment is accomplished

The connecting rod used with this engine is of steel and of new and peculiar construction. It is provided with bronze boxes of the best quality, which are made hollow in part to receive oil. This forms a very efficient oiler, which does not require filling oftener than once in two or three days. The device for taking up the wear of the connecting rod is both novel and effective.

All of the parts of these engines are made to steel gauges, and may be easily replaced if broken or a small, convenient, and safe power.

AGRICULTURAL INVENTIONS.

Mr. James H. Tanner, of Waco, Texas, has patented a that the seed dropping appliances can be readily detached moderate in price. Another piece of furniture manufac- because it must be pretty widely known that this trade has and the machine adjusted for use as a

An improved fertilizer distributer, patented by Mr. Samuel H. Everett, of Macedon, N. Y., consists of a box in which a spoked wheel is revolved horizontally, by suitable mechanism, under a hinged adjustable shelf or cut-off and over a diagonally arranged opening in the bottom of the box, so that the delivery of the phosphates is made continuous and uniform by the passage of the spokes of the wheel over the diagonal opening.

cultivator.

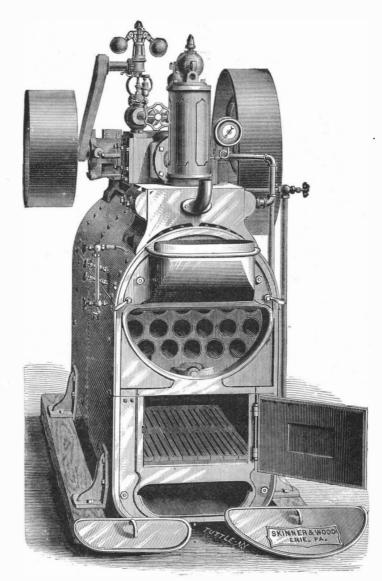
Mr. Daniel Unthank, of Spiceland, Ind., has invented an improved twohorse cultivator, which is so constructed that the plows may be moved laterally and vertically without changing their pitch. It may be adjusted to give the plows any desired pitch to cause them to work deeper or shallower in the ground and to work closer or farther from the rows of plants.

Mr. Richerson W. Spencer, of New Lexington P. O., Ala., has patented an improvement in that class of cultivators by which both sides of a row can be cultivated at the same time; and it consists of certain novel features which cannot be described without drawings.

Mr. Edward N. Griffith, of Irvington, N. J., has patented a spading fork adapted for use in any soil. It consists in a spading fork having tines as usual, and formed between the tines at the head with knife edges, whereby the fork may be used to cut grass, sod, or roots, or to take the place of a spade in addition to its ordinary use as fork.

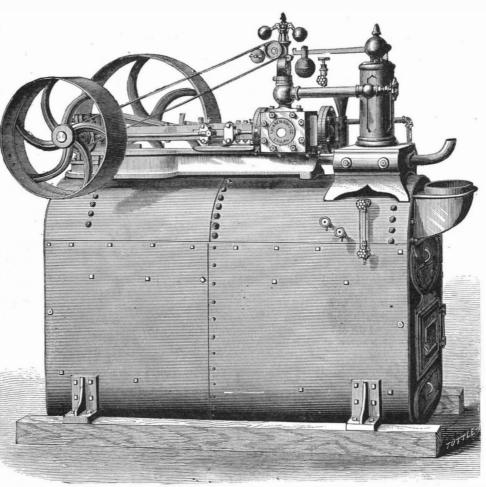
American Innovations.

portable engine manufactured by Messrs. Skinner & Wood, fashionable in the United States. It is a question whether not in use this washstand has every appearance of a well of Erie, Pa. They are made in various sizes, from 21/2 to 15 such beds would "take" in England, where the preference finished and handsome desk, and is useful for that purpose. horse power inclusive, and special pains have been taken to is given over wooden bedsteads to those of iron and brass. The washstand is a fit adjunct to the folding bed. The same adapt them to the smaller industries, also to domestic and but in many other countries where it is customary to use company have some other novel and useful articles of agricultural purposes. The manufacturers inform us that the sleeping room as a day or living room, the folding bed, house furniture which we may notice at another time.



PORTABLE ENGINE.—SIDE VIEW.

injured. The makers have studied to give these engines | if known, would be a boon. Thoseknown as the "Cham- | handy, they satisfy the eye, and they give the young occuthe good qualities of the larger engines, and at the same pion" automatic folding beds and cribs are really handtime to keep the prices within the reach of those requiring some articles of furniture, are easily manipulated, and of largely adopted in the States that one seldom sees a child in most simple construction. When open and ready for use they are most like an ordinary bed, and when closed or not parative cheapness of these carriages will command a large in use they exhibit all the ornamentation and finish of a demand for them out of the United States. superior cabinet. Economy of space and appearance are combined planter and cultivator which is so constructed not their only merits, for besides these advantages they are ture of boots and shoes by machinery would be difficult,



SKINNER & WOOD'S PORTABLE ENGINE,

tured by the patentees of the "Champion" folding bed is a The use of folding beds and cribs is becoming very reservoir washstand in the form of a writing desk. When

> Another description of folding beds, known as the "Burr," is designed to be serviceable for other than sleeping purposes. For instance, besides the ordinary cabinet bed, the "Burr" Company make the wardrobe bed, with a mirror 20 inches by 52 inches; the bookcase bed, with three drawers, three mirrors, and bookcase top; the buffet bed, with a sideboard top and shelves; and the desk bed, all of which are extremely elegant.

> In designs for refrigerators American makes are fast leaving the beaten track. In all hot countries it has become a necessity to plan means for keeping articles of food in a fresh and cool state, and being themselves the inhabitants of a portion of the globe which is pretty hot in summer, the Americans have been compelled to combine experience with invention in this branch. Refrigerators are now in common household use in America, and they are not unknown on the railways, in the shape of specially constructed cars for the transport of produce, dead meat, fruit, etc. But we have to do at the present with smallrefrigerators for domestic use. These are the common chest refrigerators of the "Excelsior" pattern, suitable for the uses of a small household; the "Excelsior" and "Diamond" upright refrigerators with three or four shelves, the "Excelsior" double upright refrigerators of larger dimensions; beer refrigerators, and others too numerous to mention. With improved ice chambers, channels for the free current of air, etc., these refrigerators are now about as perfect as could be conceived. In South America, Australia, the Cape, and India, there ought to be an immense market for these goods.

> The old fashioned three wheeled perambulator, which yielded Punch a rich harvest of jokes and cartoons, is not known in America; but, instead, the nursemaids and young mothers have the delight of driving out their charges in carriages of the most beautiful shape and finish. These baby carriages, the manufacture of which has become quite an industry in the States, are modeled upon the lines of the most exquisite Victorias or the neatest of broughams and phaetons. They are got up in the best possible manner, C and elliptic springs, electroplated mountings, and the finest upholstery. All have four wheels, some with carriage tops, and others with adjustable sun shades. It is a pleasure

to wheel these carriages, they are so light and pant ease and comfort. The baby carriage has been so arms now. Undoubtedly the very elegance and the com-

To write anything particularly new about the manufac-

assumed enormous proportions in the Northeastern States.

So large has this industry become, it would not surprise many to learn that the home demand is too small for the production, and that the overplus must therefore find a market for itself in countries outside of North

These remarks, however, are beside our present intention; what we desire more especially to point out is the immense demand for steel shoe shanks or springs, for the making of boots and shoes. These shanks are cut by dies from sheet steel, into strips of about four and a half inches long and of various widths, which are placed on the instep between the leather. These give strength and elasticity to the

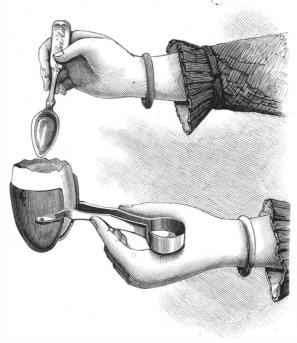
We know of three or four firms using in the aggregate about 1,500 tons of steel yearly in the manufacture of these shanks. Most of this steel comes from England.

We now refer to another kind of shoe—the horseshoe—and the very needful horseshoe nail. The rage for machinery in the States for all purposes, and the consequent education of the workmen up to the point of disliking the old form of manual labor, have made the introduction of machine-made horseshoes and nails an easy task. There are few blacksmiths now who do not prefer to use the ready-made article, which may be had of all shapes and sizes. Of course there is a saving in this, and the time

will come when none other but the machine-made goods may be had. The manufacturers, some of whom are named, are said to be now exporting largely, and thus in foreign markets they are cultivating the American liking and preference for these goods. This is not to be wondered at. because the quality, the appearance, the fit, are all they ought to be to win and keep customers.-British Trade Journal.

NEW EGG TONGS.

The annexed engraving represents a neat and inexpensive egg tongs recently patented by Mr. R. P. H. Koska, of East Saginaw, Mich. It is one of those devices that, is likely to come into general use, as it is as simple as anything well



KOSKA'S EGG TONGS.

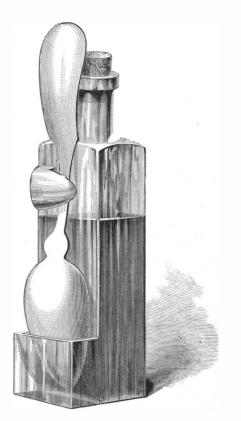
could be for the purpose; it forms a handsome article of table furniture, and will be of great utility, as eggs are now generally eaten soft boiled. This device does away with the egg cup and with inconvenience in handling and breaking the egg, and it affords a simple means of holding the shell while its contents are eaten with an egg spoon, the egg shell forming the cup.

The construction of the device will be readily understood from the engraving. The concave receptacles at the end of the spring handle are of such shape and size as to inclose something more than half of an egg. Each cup carries a small spur, which pierces the shell and assists in holding

Further information concerning this invention may be obtained from Mr. R. P. H. Koska, Bancroft House, East Saginaw, Mich.

IMPROVED MEDICINE BOTTLE.

The accompanying engraving shows an improved medicine bottle designed to receive and support the spoon used in taking the medicine.



EARLE'S MEDICINE BOTTLE.

The bottle has upon one side a socket or cup of suitable size and shape to receive the greater portion of the spoon bowl, and near the top of the bottle there is a clip for holding the spoon handle. This device is the invention of Mr. J. H. Earle, of Fall River, Mass.

Engineers.-Their Value.

Under this heading the Boston Journal of Commerce com ments on the engineer who solves problems-not the man, adds the editor, who opens the throttle valve of a locomotive that goes racing over the track from one city to another. or of him who sets in motion one of the Corliss monsters that drives its thousands of spindles and looms or other machinery-but the civil engineer, who lays out the work that employs the others, deals either in one or the other of two separate and distinct realms-absolute fact or supposition. In the first he is often made to doubt his own sagacity and capability, for he must often change his course of action by reason of deductions drawn from experiment in which all his ideas of strength, elasticity, or economy have strangely departed. If he deals in the second he becomes, as too many have done, egotistical, and by very lack of knowledge or through force of circumstances, is constantly taking up untenable positions, making expensive, unsatisfactory, and unsuccessful experiments-in other words, father of failures. Too much of this has been and is done. In many cases the parties are sooner or later involved in an outlay of thousands of dollars, and then comes the legitimate outgrowth of an attempt at the impossible—disagreement, disappointment, law suits, bitter feeling, loss of time, money, production, loss to every one involved; and yet it is a matter of every-day occurrence, and one which would have been avoided by the employment of a competent engineer for a day or two at the cost of fifty or a hundred dollars. Men who know nothing of proportion, strength, elasticity, pressure, torsion, volume, or density, get out an idea and patent it, or advise it and get it introduced, and then users get the effect by adoption.

Engineers are not always consistent, we had almost said not honest. They deal sometimes in vagaries or in elements of uncertainty without careful consideration or consultation of authorities who have preceded them, and give opinions or make out tables or results from preconceived ideas of matters to which they never give an hour's sonsideration in an honest, careful way. In this way they have in a measure detracted from their usefulness and the respect due them. Such a one, however, is always found out sooner or later, and finds his level. A man to do his work in a successful way should be careful in all his statements, and if he does not know a thing for a sure thing, say so, and not assume one thing or the other, for it is in engineering as with lawcommon sense is a pretty sure guide, and will lead you right a thousand times where it leads you wrong once.

In dealing with earth, iron, water, steel, steam, or any of the natural elements or created forces, we must remember that we are only capable, at least, of an approximation; that we must reason and investigate-and if we live to the extreme allotment of life, we are still learners. The profession has in the last decade done much to attract the attention and merit the admiration of men who never think deeply. clearly, or upon forces or matter other than to see results that are the outcome of close reasoning. There is too much of the superficial, too little of the real; to progress we must look closely at all elements, simple or compound; and when we have learned our own insignificance, we have commenced building upon a "bed rock" that does not "heave or settle."

The Delaware Ship Canal.

Delaware Ship Canal were completed in December last. Six routes have now been estimated for, as shown in the following table:

Name.	Length in miles.	Length of canal proper.	Cost in millions of dollars.	Relative time of transit in hours.	Saving in distance in miles.
1 Choptauk 1 Choptauk (inland 2 Wye. 3 Queenstown 4 Centreville 5 Southeast Creek. 6 Sassafras	149·81 138 91 128 42 107 29 106 38 115·78 129·25	37.67 30.00 42.99 53.78 50.95 38.35 16.20	1614 1814 2616 3714 4116 25	191/2 18 173/4 17 161/2 153/4	175 186 196½ 217½ 219 209¼ 195¾

The lengths given are respectively from Baltimore to a common point at sea, twelve miles outside of the Delaware breakwater. The distance from Baltimore by the route now used to the same point is 325 miles, or 331/4 hours, allowing a speed of 10 miles in open water and 8 miles in dredged

Mr. N. H. Hutton, under whom these surveys were made, reports that the Sassafras route is the shortest in time and the cheapest; but it has very expensive approaches to maintain and very serious conditions to be overcome if it is to be used during the winter. The Centreville and Queenstown routes are the most direct, rate second as to time, but cost largely in excess of other routes; have expensive approaches to maintain on the Chesapeake side, and are, as the Sassafras route, liable to obstruction by ice during the winter. The Choptauk route rates slightly below the Sassafras as to time of transit, and rates third in this respect, while it is second on the list in point of cost, its greatest advantages being jug, air enters the vent and fills the space as the liquid in the matters of freedom from obstruction by ice and economy of maintenance of approaches.

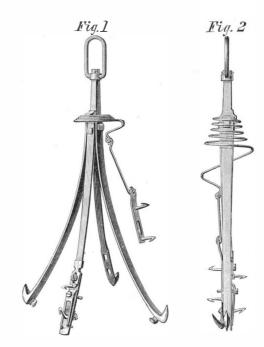
More recently Major W. P. Craighill, of the Engineer Corps, has made a new survey of the Sassafras route and estimates its cost at half a million dollars more than Mr. Hutton's estimate. Major Craighill's estimate is for a canal 100 feet wide on the bottom, 26 feet below low water, side slopes | cinity.

one and one-half to one, with a berme on one side 12 feet wide and 30 feet above the bottom,

The other estimates are for a canal 100 feet wide at the bottom, 26 feet below low water. The width is to be 178 feet at low water; the locks to have chambers 600 feet long and 60 feet wide; tide locks only to be built, and these will probably be generally open and only exceptionally used.

IMPROVED ANIMAL TRAP.

The annexed engraving represents a novel animal trap, recently patented by Mr. William J. Taber, of Lookout Station, Wyoming Ter. It is especially intended for catching bears, wolves, and other large animals, and it consists of four curved spring bars provided with hooks, and having a catch and trigger which hold them together when the trap is set, as shown in Fig. 2.



TABER'S ANIMAL TRAP.

Fig. 1 represents the trap after it is sprung. In setting the trap the outer ends of the spring bars are pressed together and held in place by the catch or trigger. The latter is engaged by a bait plate connected with the spiral spring at the top of the trap. The bait is attached to this plate, and when the animal seizes it, the trigger is disengaged and the curved bars spring outward, thrusting the hooks into the sides of the animal's mouth.

The inventor states that the barbs or points cut the mouth of the animal so that it soon bleeds to death.

IMPROVEMENT IN JUGS.

A stone jug is almost the last thing we would expect to see improved, and yet our engraving shows an improvement in this article which possesses the merit of being both simple and efficient. It consists of a passage or vent formed lengthwise in the handle, commencing inside the jug and terminating near the mouth of the jug. In filling the jug air is permitted to escape through this vent, thus allowing The surveys of routes for the proposed Chesapeake and the liquid to enter the jug with greater rapidity than it



IMPROVED JUG.

otherwise would, and in pouring the contents from the

This invention was recently patented by Mr. Samuel A. Conrad, of Terre Haute, Ind.

This has been a bad winter for fur dealers, sleigh makers, ice monopolists, and coal retailers in New York and vi-

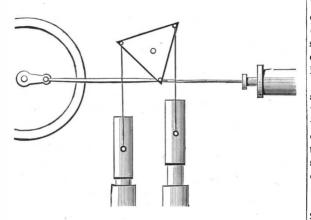
Correspondence.

Novel Pumping Engines.

To the Editor of the Scientific American:

The recently completed new water works of Pittsburg, Pa. include a series of pumping engines of novel design, and whose construction has cost that city \$500,000, with an additional \$200,000 in litigation. Their general plan and operations are so widely at variance with preconceived ideas as to what constitutes economical and effective pumping machinery, that engineers throughout the country generally denounce the Pittsburg engines as mechanical monstrosities. Their construction was begun several years ago, and as yet, owing to a succession of mishaps, they have not been taken off of the contractors' hands.

The inventor, Mr. Jos. Lowry-Mechanical Engineer to the city of Pittsburg-calls his invention the "graduating plunger" pumping engine. The Lowry engine resembles the Cornish pumper in having a walking beam which operates the pumps. In all other respects this engine differs from the Cornish. Each steam cylinder operates two equally



heavy plungers, and the momentum of a heavy flywheelaids in reaching the results attained. It is a horizontal engine, operating its flywheel on a level with its cylinder, but between cylinder and main shaft of the flywheel, about midway, are placed the novel features in the Lowry engine. These features in chief comprise a triangular, equal-sided walking beam, swinging on trunnions resting upon pillow blocks supported upon the bed plate, and 10 feet above the center line of the cylinder. This beam has a motion in a plane parallel to the vertical plane passing the center line named. This motion is taken directly from a pitman connecting the crosshead with the lower corner of the beam. To the upper two corners of the triangle are attached the pitmans leading downward to the pump plunger, which latter, with the pump barrels, air chambers, valve chamber, etc., are located directly beneath the walking beam and bed plate of the engine. To actuate the flywheel another pitman leads from the lower corner of the beam to the crank of the wheel shaft.

Regarding these features the inventor has this to say: "The great novelty in this engine consists in the manner of connecting the plungers and the steam piston, both piston and plungers being connected to a triangular walking beam and at an equal length of lever from the beam shaft or center, but at such angles that the following result is attained. When steam is admitted, and is at its maximum pressure, the steam piston is operating on the short lever of the beam. and the plunger is suspended on the longestarc of the same; and as the steam grows weaker by expansion the beam leverage increases, permitting a proportionate increase of speed by the piston. Meanwhile the corner of the beam connected with the pump plunger is shortened as to leverage. The result shows that, although the connecting points of both cylinder and plunger pitman are equidistant from the fulcrum, or center of the beam shaft, the steam piston travels 14 feet while the pump plungers travel 11 feet. But the great peculiarity of the engine is the continual varying of the relative speeds of steam piston and plungers. At the beginning of the stroke, when the steam is at its greatest pressure, the lowest plunger is lifted one-fifth faster than the travel of the steam piston actuating such plunger. At the end of the stroke, when the steam is weakened by expansion (cutting off at one-sixth the stroke), the steam piston is given leverage in proportion to this decreased force, permitting the piston to travel three times faster than the plunger. Again, on the descending stroke, the plungers first mov slowly, traveling but one-third the rate of the piston, until, at the end of the stroke, it is traveling one-fifth faster."

This plan will be more clearly comprehended by inspecting the subjoined diagram, showing the principle only of the engine. The triangle, etc., are depicted in the position assumed at the beginning of the stroke, and when the crank of the main shaft is on the center nearest the cylinder. The valve chambers occupy the space just beneath the pumps and plungers, and the air chamber is located between the

As to labor performed, dimensions, etc., the following are the salient points: The water is taken from the Allegheny River and forced to the height of 356 feet into a reservoir 2,800 feet distant. To accomplish this requires the loading of each plunger to 220,000 pounds dead weight. The engines are four in number, coupled in pairs, each pair operating four such plungers as are described above. One pair is provided with compound cylinders, using the exhaust

plungers is 11 feet 3 inches. Diameter of small cylinder, 64 ceding year, notwithstanding it included the period of the inches; large, 106% inches. Diameter pump barrels, 40 inches. The engines have been found to give best results freight for the trunk lines. It was also then asserted by the when running at a speed of 8 revolutions per minute, though they have been worked all the way from 1 to 91/2 revolutions in that time. Diameter flywheel, 32 feet; weight of each, 160,000 pounds. Estimated weight of the 4 engines and pumps, 5,600,000 pounds. In operation these great engines behave handsomely, working without apparent jar or strain. As to their actual duty no thorough test has as yet been made. The inventor states, however, that "in a partial test under many disadvantages, uncovered boilers and steam pipes, etc., the engine raised 4,682,000 gallons of water 356 feet high with the consumption of 300 bushels of coal, equal to a duty of 62,000,000 pounds raised 1 foot per 100 pounds coal used." G. F. M.

Scientific American.

Long Distance Telephoning.

To the Editor of the Scientific American:

Noticing an article in your issue of January 17, 1880, entitled "Long Distance Telephoning," I would like to say that nearly six months ago, in connection with the Western Union Managers of Marion, Fort Wayne, Ind., and Defience, Ohio, I talked with as much ease and clearness as ordinary conversation is now carried on in this city and suburbs by the instruments mentioned in your article, the distance being 166 miles; after which Toledo, Ohio, was put were those of the Western Union Telegraph Company's, and with in nearly any part of the country. The instruments were the Edison carbon transmitter and the Phelps pony special adjustment or preparation being made. The future of long distance telephoning is now waiting at our doors.

LONG-LINES.

New York, January 16, 1880.

Railroading Reduced to a Science.

We are indebted for the following facts, says the Railroad Journal, to an official whose connections with the New York Central and Hudson River Railroad are such as to give him an intimate knowledge of the practical management of that property. From these it will be seen that railroading is fast may be enforced." being reduced to a practical science by Mr. Vanderbilt, as well as by Col. Scott, who was the first railroad president in this country, we believe, to employ scientific experts in the practical management of railroads. The series of experiments by which the results below enumerated were obtained and said facts demonstrated, were commenced under Commodore Vanderbilt, when he laid the two extra tracks, making the first four track road in the world the basis of these experiments.

Under the old two track system the New York Central with its heavy traffic had the maximum switching expenses, which is well understood among railroad men to be the greatest pertaining to the maintenance of a double track road. With four tracks this expense is reduced to the minimum, as well as that for maintaining the track and road bed. This is upon the recognized principle in railroading, that the most economically maintained and operated road is a single track road running only one train from one end of the road to the other and back without switching or switches. Every additional train running in opposite directions requires an additional switch, with additional expense for attendance and maintenance. Hence, the New York Central, with its 20 passenger and 30 freight trains daily, is run much cheaper on what is practically four single track roads, than formerly on its double tracks. There is now no switching or delay by switching and passing of trains from one end of the four tracks to the other, except to local freight trains which gather up and distribute all local freight between the larger stations without hinderance to the through trains which are run with the same engine from Buffalo to Albany or New York as the case may be, without stopping, except 1875 or 1876, an engine is kept fired and running until it neer slept. Now three sets of engineers and firemen are assigned to one engine for each 24 hours, or eight hours each. A locomotive is sent to the shops only once for repairs, it being found cheaper to sell and build new, than repair the econd time. In this way the rolling stock of the road is antiquity. and is never delayed by waiting for other trains to meet and pass, with the men who run them. It has been demonstrated also, that upon this road even, with its straight tracks, 15 miles per hour for a freight train is the most profitable speed, as above that the increase in wear and tear is greater than the saving in time.

As to the cost of attending and maintaining its tracks, the expense with four as compared with two tracks is as 1 to 8; that is, one man to 8 miles of track now against one man to 1 mile of track formerly. Thus, with more than double the capacity it is able to maintain and attend four tracks for one quarter the former cost of two tracks. This expense was formerly \$750,000 per year, or \$250,000 more than the present interest on the cost of the two extra tracks. The results upon the traffic of the New York Central for the first nine months after the opening of these extra tracks were that it hauled 75,000 more loaded freight cars and steam expansively. Their stroke is 14 feet, while that of the 750,000 tons more of freight than for the same time the pre- The Neolithic peoples used oval spoons made of baked clay;

fierce railroad war of 1876 when there was a scarcity of officers of the company that the road earned its 8 per cent dividends which were daily ascertained and set aside, to the dividend fund, notwithstanding what were then called "ruinously low rates of freight." From the foregoing it will be seen what a few years of scientific and practical experiment produced in economy of railroad management and also what may yet be done in the same direction.

The Avoidance of Fire Risk in Factories,

The art of constructing houses so as not to burn was described as follows by Mr. Edward Atkinson, in a recent address in Boston:

"The modern factory has no place in it, if we know it, where a rat can build a nest and not be found, or where fire cannot be reached by water. The factory properly consists of a brick wall, with the floor timbers 8 feet apart. These are about 6 inches by 12, and on them is laid 3 inch plank, and sometimes two thicknesses of tarred felt, and then the top floor. The whole construction is open; the spaces between the beams are wide, not narrow; water can be sent in great streams crosswise or lengthwise. The roof is built in the same way, nearly flat, so that whatever happens, there is a standing place upon it for the firemen. There is not a great mass of gables and cornices and concealed spots which in the circuit, making in all over 200 miles. The lines used | modern architecture so many times requires, and which public opinion imposes upon architects, who know better. as such subject to same conditions as are likely to be met In the factory we don't allow any furrings or plaster on the walls. There is another thing which we never permit in the factory, but which, like iron shutters, is, I believe, required crown telephone as receiver, the same as now provided by by the building law of Boston, that the timbers should be the Gold and Stock Telegraph Company, of this city, no connected with the walls, so that when the beam burns off or is torn off, it brings the wall down. We have the beams laid on an iron plate, with their top corners arched off and the bricks immediately above them laid dry, so that if anything happens to those beams they roll out of their places and do not tear the wall down. But the great secret is cleanliness and order and the means of putting out small fires. When the secret is discovered how to make the interest of the assured and the interest of the underwriter identical, and to give the assured an interest in the success of the insurance company, as it is in the mutual company, then discipline

> The practical economy of this sort of construction was shown by the following facts:

"Forty-five years ago the Hon. Zachariah Allen, of Rhode Island, having a cotton factory with some of the appliances that are now known to be effective, went to an underwriter of that day and asked that in consideration of those appliances the rate of insurance upon his factory should be reduced. The answer which he received was, 'Oh, we can't send our men around to look into all these little improvements that may amount to something and may not. The rate on cotton factories is 2 per cent, you may take it or leave it.' That induced Mr. Allen to found the system of the mutual insurance of factories, with a system of inspectors who did go around to look into these little appliances and see whether they made any difference in the risk or not. The result of that is a combination of companies, now insuring \$200,000,000 a year, each insuring the other. The company of which I am president insured last year \$43,000,-000; it was a disastrous year in other lines; a year of excessive losses; we have lost less than \$14,000. The mutual alliance of companies which Mr. Allen founded 40 years ago returned to their members this year on the 1st of January, on the risks then expiring, an average of 90 per cent of their premiums, and their average premiums on the mills which they insured, instead of being 2 per cent, is nine-tenths of 1 per cent; the sending around of a few young men to see whether these appliances were good for anything or not has reduced the cost of the insurance of those extra-hazardous properties to 9-100 of 1 per cent the past year. Compare that with the other method of insurance which is called stock insurance. Eighty-three New York companies, tabufor fuel and water. Under the present system, adopted in lated by the Superintendent of Insurance of New York, disclose the following facts: That their expenses had been needs repairs, and not cooled off as formerly while the engi- 50 per cent of their premiums, and their losses 70 per cent."

THE ANTIQUITY OF THE SPOON.

The use of our common table utensil, the spoon, is widespread, and its invention, as it appears, dates from remote The form which we use at the present day idle (except for want of business) only when under repairs, small oval bowl provided with a shank and flattened handle -is not that which has been universally adopted. If we examine into the manners and customs of some of the people less civilized than we—the Kabyles for example—we shall find that they use a round wooden spoon. The Romans also used a round spoon, which was made of copper. might be led, from the latter fact, to infer that the primitive form of this utensil was round, and that the oval shape was a comparatively modern invention. But such is not the case; for M. Chantre, in making some excavations on the borders of Lake Paladru, the waters of which had been partially drawn off, found, in good state of preservation, wooden spoons which in shape were nearly like those in use at the present day; the only difference being in the form of the handle which was no wider than the shank lacustrine station where these were found dates back to the ninth century, and we therefore have evidence that oval spoons were already in use during the Carlovingian epoch. . M. Perrault has also discovered a number in a Neolithic de caliber to dispassionately consider the interests of both parposit in Burgundy This gentleman found, in addition, a ties. pot ladle. "The table spoons," says he, "are elongated and exactly resemble the wooden spoons in use in our kitchens. Their bowls vary from 3 to 14 mm. in depth." The portions of handles which he collected were too fragmentary to allow it to be determined whether or not they terminated in a flattened handle like the modern forms.

It might be pertinent to inquire to what possible use a spoon could have been put in the Reindeer Age, when raw meat was eaten, and when skin bottles were the only water vessels. Yet a genuine spoon made of reindeer's horn has been discovered in the Grotto of Gourdan. It is oval, very long, and quite shallow. Its handle is very elegant, being covered with engraved figures. Unfortunately it is broken so that it is impossible to say whether the handle was flattened. The slight depth of the spoon should not surprise us, for the men who made it knew neither soups nor sauces, and they could only have used it for the purpose of extracting the marrow from the long bones of large animals, or for eating the brains of the latter, and for such uses depth of bowl was of small consequence. M. Piette has likewise found other well characterized spoons in deposits of the Reindeer Age. One of these, more delicate, narrower, deeper, and less elegant than the one just mentioned, was found in one of the lowermost strata. At a still greater depth in the same deposit he came across a thick rudely made spoon, which appeared never to have had any handle. It was made of rough dressed bone, with polished edges, and its shape was oval. Before the invention of such an implement as a spoon, man of the Reindeer Age employed the spatula; and this is found at all depths in the Gourdan and Lortet deposits. M. Garrigan discovered in the Grotto of Alliat a fragment of reindeer's horn hollowed out in its whole length, and apparently designed for holding liquids; and similar utensils were found by M. Piette at Gourdan. itiful arborescent forms are anything more than cohesion These, however, were probably only temporarily used as spoons, the only genuine spoons which have been discovered being those described above, and which served as models for Neolithic man who afterwards appeared on the scene.

The Hudson River Tunnel.

The Engineering News says that in consequence of certain newspaper reports of a sensational style going the rounds, it has obtained the following information regarding the progress thus far made in the construction of the Hudson River Tunnel which is reliable.

A shaft 30 feet in diameter has been sunk in Jersey City, 80 feet west of the Hudson River, to a depth of 55 feet below mean high water.

A horizontal air lock has been placed in position, penetrating the side of the shaft, and the necessary machinery for compressing air has been provided and is now in good working order.

To ascertain as early as possible the effect of the air on the mud, the experiment was tried of driving a heading from the shaft, instead of commencing the tunnel in an open cut. The opening was made 25 feet below high water, the roof consisting of mud 10 feet in depth, underlying loose ash filling 18 feet in depth, the size of the excavation being 15 feet x 6 feet x 4 feet, and the air pressure applied amounting to 12 lb. per square inch. This pressure was kept on four days, during which time no air escaped through the mud. At the end of the second day, the surface of the mud around the air spaces and thus fixed the arborescent forms. which had been exposed to the air pressure became dry and began to crumble and crack open in places, and at the end of the fourth day these cracks had extended sufficiently through the mud to allow the air to commence to escape. Thereupon, the sides and roof of the opening began to give way, and twelve hours later the whole had fallen in.

The loose filling above was then removed to a depth of 9 feet below high water, the bottom of the trench covered with canvas and timber and the loose filling replaced. A new heading is now being driven in such a manner as not to allow any given surface of the mud to be exposed to air pressure for more than twenty-four hours.

Patent Bills Before Congress.

In alluding to the bills before Congress for changing the patent laws, to which we referred a few weeks ago, the Milling World in referring to Mr. Converse's bill, concludes that it appears to meet every possible requirement of those opposed to the granting of patents; but is it not a little singular, the editor adds, that such legislation should be attempted in face of the fact that the United States owes its remarkable growth and prosperity to the genius and skill on a screen. Fig. 2 shows this device. The slide, which is of its inventors, more than to any other source? Take away the incentive (fortune and fame) from our inventors, and we shall soon lose them. It is a mistake to think an inventor can be nothing else than an inventor, and whether protected or not, that he will still invent. He is actuated by the same desires and aspirations as other men; he invents because in that way he thinks he can more quickly realize a competency (how often he fails is, alas! too well known); and the attempt at this time to wrest from him all protection should be frowned down by all who have the real interests of the World would suggest the advisability of having such modi- from the ends of the glasses.

several fragments of such have been found in the Seine, and fications presented by gentlemen of sufficient intellectual

ON THE CRYSTALLIZATION OF CANADA BALSAM.

BY GEO. M. HOPKINS.

On reading Professor Barker's interesting paper on the crystallization of Canada balsam I was reminded of having observed a similar phenomenon long since. I did not then attribute it to crystallization, nor do I now think the beau-

Fig. 1.



figures. There is before me at this moment an achromatic objective, the two lenses of which were separated some months ago by first warming them and then introducing between their edges the point of a knife; as the lenses began to separate the arborescent forms appeared, and were so like the forms shown in Fig. 1 (a reprint of Professor Barker's engraving) as to be at once recognized as the same thing. I have again separated the lenses, only partly, however, and there are figures having precisely the same characteristics as those shown in the cut.

This experiment may be readily repeated with two pieces of plate glass pressed together with an interposed film of Canada balsam. By separating the plates with a thin edge instrument the adhesion of the two surfaces is overcome. the balsam recedes, and air enters. Now this, I think, is precisely what happened to the objective referred to in Professor Barker's article. It was exposed to the action of the elements for three years, it probably became wet, then frozen. Some of the water entering between the edges of the flint and crown lenses, on freezing separated them, producing the arborescent forms. Upon the thawing of the ice the lenses approached each other, and in so doing inclosed a small quantity of air in the balsam. The next freezing separated the lenses and expanded the air spaces, giving them the beautiful forms shown in the engraving.

Of course it is not known how many times the lenses were separated and allowed to come together in the manner described; it is probable that the balsam after a time dried

I cannot leave this interesting subject without referring to a lantern slide, to which I applied this principle, and which forms one of the most beautiful objects that can be projected

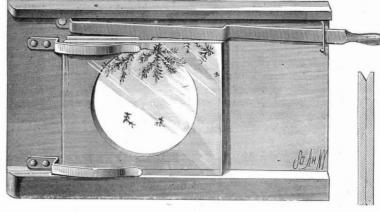


Fig. 2.-LANTERN SLIDE FOR PROJECTING ARBORESCENT FORMS.

fitted to the lantern, has a circular aperture for the pass- a durable and efficient device for hanging gates. It consists, age of light, and is provided with two springs for holding essentially, of an adjustable roller hinge, by which the gate two pieces of plate glass cemented together with Canada is attached to the gate post, and which admits of the verti-

The upper and inner corners of the glass are beveled up to within a short distance of the ends, forming a groove or trough for the reception of an aqueous solution of some of the aniline colors. A lever carrying a pointed knife for separating the glasses is pivoted in the upper portion of the slide. At the ends of the glasses the two adjoining edges country at heart. That certain modifications of our patent are beveled—as shown in the small detail view—to receive a system can be judiciously made with advantage alike to portion of the surplus balsam pressed from between the the inventor and the public, is no doubt true; but the Milling glasses. This extra balsam prevents the entrance of air

The groove formed between the upper edges of the glasses being freed from balsam is filled by means of a pipette with a strong aqueous solution of one of the more brilliant aniline colors, and the slide is placed in the lantern. Now, by gradually pressing down the lever, the glasses are separated by the entrance of the knife between their edges. The arborescent forms grow downward in the slide, and the aniline color fills them, while upon the screen huge ferns and cacti grow up with great rapidity. Any of the brighter aniline colors will answer and look beautiful; but green seems the most appropriate, as the exquisite forms that appear on the screen resemble leaves and vegetation more than anything

Without the application of color the balsam yields images on the screen which closely resemble richly embossed white satin, the form of the figures being substantially like those shown in the engravings. Any viscid liquid will exhibit this phenomenon, but the balsam gives the best results.

What the New York Fair Should Be.

Discussing the favorable prospects for a World's Fair in this city in 1883, the Tribune makes a good point in saying that there should be no striving after mere magnitude, but rather an effort to compress the Exhibition into an area of moderate proportions by excluding advertising shows and crude and commonplace articles. The world is weary of colossal displays of objects that may be seen in the shop windows of every town. For a time it was curious to see what each nation produced, without regard to the quality and inherent merit of the articles themselves; but it got all the information it wanted in that direction at Vienna and Philadelphia and twice at Paris, and now it only cares to see the things that are most useful and most beautiful. Let us therefore have an Exhibition in New York that will surpass all its predecessors for real attractiveness and will not appal visitors by its enormous size. Let every square yard of its area contain something to please the eye or instruct the mind, and let the whole Fair be a condensed typical representation of the latest and best achievements of civiliza-

The Mississippi River Survey.

The Mississippi River Commission report three triangulation parties, one topographical party, three observation par ties, and one boring party in the field at work. These parties comprise a total working force of about 200 men, of whom about 20 are assistant engineers. The triangulation has covered a length of 125 miles between Cairo and Memphis. The topography has reached a little below Tiptonville, nearly ninety miles below Cairo. One of the observation parties is stationed at Fulton, Tenn.; another at Lake Providence, and another at Carrollton. The boring party is below Memphis at work.

NEW INVENTIONS.

Mr. Adelbert O. Müller, of Fremont, Neb., has patented a bushing that will protect the bung hole against charring during the operation of pitching the barrel, and which is also adapted to be tightened up as the stave shrinks, and thus prevent leakage. It consists in making the bushing in two parts, with an internal and external screw thread, to adapt them to be screwed together. The two parts are provided with flanges, which bear against the stave around the bung hole.

Mr. Henry Hartman, of Fort Douglas, Utah Territory, has patented an improvement in carbine holders, which consists of a metal spring clasp having straps attached thereto in such manner as to adapt them for attachment to the saddle. An improvement in fan attachments has been patented by

Mr. Walter M. Vestal, of Marcella Falls, Tenn. The object of this invention is to construct and arrange rods and levers by which motion can be given to a number of fans suspended over a table or elsewhere, for driving away flies and imparting an agreeable motion to

Mr. Lemuel D. Dobbins, of Camden, N. J., has patented an improvement in apparatus for treating celluloid bases for artificial teeth. It consists of a top plate, from which the press and clamp are suspended by means of screw bolts, the plate resting on the upper edge of a cylindrical chamber. It consists in an improved press and clamp, arranged so that the clamp can be readily removed from the press for cooling.

Mr. Bernard T. Murphy, of Marengo, Iowa, has invented cal adjustment of the gate and its swinging in one direction laterally.

An improvement in tags has been patented by Mr. Clarence E. Sackett, of Garden Prairie, Ill. The invention consists in securing the wire to a tag in a novel manner, and so that it will not cut it, and so that the tag will lie flat and not turn edgewise when attached to an article.

Mr. James Robertson, of East Cambridge, Mass., has patented an improved system and apparatus for slaughtering animals for food, whereby the work may be done with great facility and economy.

NEW SYSTEM OF VENTILATION.

means relying upon the wind to operate them, must necessarily fail at times, as in a calm, or with but a slight movement of the external air, they lose their motive power and by eminent engineers, and approved by many of our governfail to operate, and these failures usually occur at the very ment officials, time when an active ventilation is most needed.

Those who advocate the use of ordinary fan blowers for ventilation, do not seem to get the full idea of the subject of ventilation and do not realize that a positive and constant power to the place to be ventilated. This is absolutely circulation must be obtained to secure a perfect ventilation. Such a circulation, it is claimed, cannot be realized except by a system in which an injection of fresh air into the room and an ejection of the heated foul air from the room may be secured, with the ability of operating both at the same time and by the same power. The use of the blower during the summer (only injecting fresh air into the rooms) may create a tolerable circulation when the weather will admit of opening the windows and doors to allow the heated foul air to

used only to send in neated air, and the windows and doors cannot be opened as in summer, there will be an accumulation of heated foul air until the atmosphere becomes oppressive, and then, to get a circulation, the windows are usually thrown open, and a draught of cold air is allowed to enter, to the discomfort and often to the injury of many.

The ventilating system, represented in the accompanying engraving, overcomes all of these difficulties and presents a simple means of thorough ventilation. The motive power is a steam air compressor, which furnishes a comparatively small supply of compressed air to the nozzle, in which the degree of compression is automatically regulated, so that whether larger or smaller quantities of air pass the nozzle, it cannot exceed or fall below certain limits of pressure, which have been determined by careful experiments as most economical in their results. The air ejected from the nozzle, with some thirty or forty times its bulk of other air, is carried through proper channels to the rooms to be ventilated.

The nozzle, A, is provided with a valve, B, having an elongated tapering portion, b, and a stem, a, furnished with a spring which is set or compressed to a given pressure. The valve is surrounded with a series of short radial ribs having grooves between them, which increase in depth toward the inner end of the valve. It will thus be seen that as the valve is pushed out by an increase of pressure, the volume of the escaping air jet is increased while its pressure remains the same.

In Fig. 3, C is the fresh air supply pipe which discharges through openings, c c, into the apartments of the building. Below a funnel, connected with the pipe, C, an injecting nozzle, A

in the ventilating shaft, E, at the top of the building, and the ventilating shaft communicates with registers in the through a pipe ten times the diameter. ceilings of the different apartments. The air supplied by the direct acting air pressure pump being forced through the lower injecting nozzle, A, induces a flow of air from the air shaft into and through the pipe, C, to the apartments, and the ejecting nozzle, A, in the ventilating shaft, E, creates a strong upward draught, which draws the foul air from the apartments connected with the ventilating shaft. Fig. 3 shows the application of this system to the ventilation of steamships. For this service it is eminently adapted, as the air under pressure may be conveyed in small pipes, and the necessarily small, close apartments may not only be supplied with fresh air, but the foul air may be removed fed, by simple contrivances, directly against each other, effectually. For steamships carrying cattle and perishable fruits, and to maintain a thorough circulation of air in the hold, it is especially adapted.

For the ventilation of public and private buildings, court All natural methods of ventilation, and all mechanical houses, school houses, hospitals, public halls, hotels, banks, etc., and for any purpose requiring a complete circulation of air, this system seems very desirable. It has been indorsed

> The great advantages of this method are, that it is ren dered entirely unnecessary to construct for ventilation wide air channels for the whole distance from the ventilating necessary when fan wheels are used, or other contrivances propelling all the air used for ventilation, resulting in very little pressure and moderate velocity. By employing a very small amount of air, equal to two or three per cent of all of the air to be propelled, and giving it a high pressure and velocity, it may be conveyed in tubes of less than one tenth the diameter, thus reducing the size of the pipe from twenty inches to two inches.

This tubing may lead to the place to be ventilated, and escape; but when, as in cold weather, the blower can be there blow the air through the proper nozzle into the funnel-

An improvement in medicated belts has been patented by Messrs. William W. Vaughan and Joel J. Thom, of Brownsville, Mo. The object of this invention is to furnish a remedy and preventive of fever and ague. It consists in saturating hemp, jute, cotton, or other material, in rope form or otherwise, with tar, and inclosing it in a casing of cotton, linen, or the like, in the form of a belt, band, or strap, so that it may be conveniently secured around the body.

An improvement in combined washing and wringing machines, patented by Mr. Thomas J. Baldwin, of Pacific, Mo., consists of a box for receiving the clothes provided with a lid, which is secured by means of an eccentric bar and lever and rings, this box being supported between two standards and rotated by a crank, the shaft of which passes through one of the rollers of a clothes wringer, mounted on the frame of the machine, and provided with a lever for regulating the pressure. The box contains a number of wooden balls, which are thrown about during the revolutions of the box, and pound and wash the clothes.

An improved medicine spoon, invented by Mr. Barclay T.

Trueblood, of Hadley, Ind., consists in a bowl provided with flanges, in combination with a cover fitting over the bowl and sliding under its flanges. With this spoon medicines can be easily and without waste administered to infants and others who resist their administration, and also to those who cannot be raised to an upright posi-

An improvement in pressing irons, patented by Elvira A. Russell, of Minneapolis, Minn., is adapted to be placed over a lamp burner like a chimney, and, while serving the same purpose, be heated by the flame of the lamp. It consists in making the iron of the general form of a conical lamp chimney, having one of its exterior sides flattened to form an ironing surface, an extension at the smaller end on the flattened side to serve as a point for the iron, and at the large end a round portion to fit over the burner and hold the iron on the lamp top.

Mr. William H. Huston, of Chauncey, Ill., has patented a guard for doors or windows, formed of a number of sections composed of vertical and horizontal iron or steel bars, these sections hanging on L-shaped hooks in the casing of the door, in such a manner that no section can be removed unless the uppermost section is first removed.

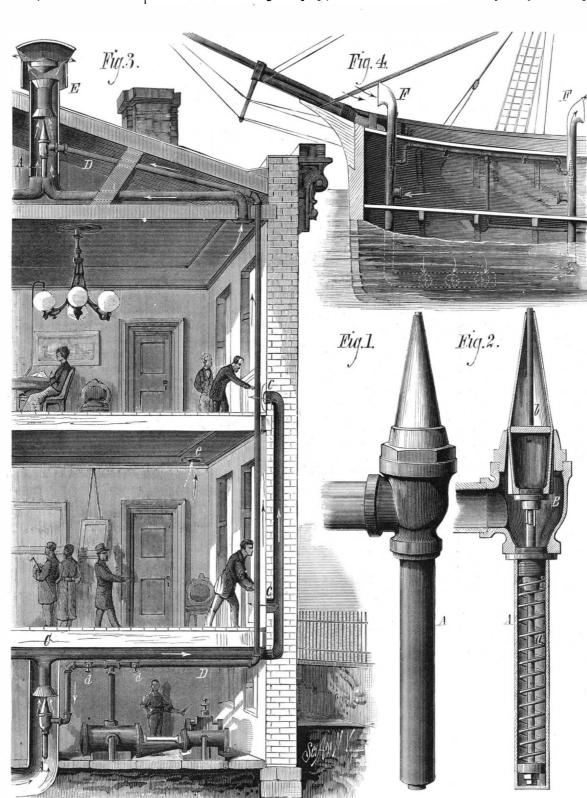
Mr. George W. Ellis, of Philadelphia, Pa., has patented an improvement in the class of trusses for reducing hernia, in which the pad is attached to a slotted bar whose head is held in a clamp that allows adjustment of the pad in various positions.

Mr. William Wilmington, of Toledo, Ohio, has patented an improvement in chill moulds for casting car wheels, the object of which is to facilitate the moulding of car wheels and provide a suitable arrangement for the gas to escape, at the least cost, and

an annular groove in the face of the flange portion of the chill to receive sand, or its equivalent, preparatory to casting the wheel. The reason for filling the groove with sand is to prolong the cooling of the outer portion of the flange of the wheel cast therein, thereby preventing the fracturing of the flange of the wheel which is incident to its rapid cooling and contraction

Mr. Casper Marti, of New Albin, Iowa, has invented an improved trap for catching rats and other animals, which is simple in construction and convenient and effective. It is capable of catching the animal without leaving any trace or scent to frighten others that may come after him.

Mr. William Osmond, of New York city, has patented an improved device for attachment to the tops of fences, especially in back yards, to prevent cats from crossing or walking upon them, and thus prevent annoyance from the collection of cats by night in the yards.



GREEN'S SYSTEM OF VENTILATION.

by a pipe, D, with a pressure air pump in the base-+shaped opening, and the three per cent of compressed air | without materially impairing the strength and durability of ment. The pipe, D. also extends to the ejector nozzle, A, will carry ninety-seven per cent of ordinary fresh air into that class of car wheel chills that have in their construction a building as effectively as a fan wheel would carry it

> Further information regarding this system of ventilating may be obtained from the D. C. Green Ventilating Company, 88 Liberty street, New York city.

MISCELLANEOUS INVENTIONS

Mr. Elisha Depue, of Silvara, Pa., has patented an improved tool for upsetting tires, carriage braces, and stays, iron rods, and other forgings. It is simple in construction, inexpensive, convenient, and effective.

Mr. Richard A. Kipling, of Roselle, N. J., has patented an electric lamp with carbons crossed so that they can be point to point, in such a manner that the luminous arc will be formed around the carbon points where they meet, and shall cast no shadow below them.

ONE OF NATURE'S GLUTTONS.

BY DANIEL C. BEARD.

It was one sultry day last summer that I sent a messenger boy down on Fulton street to secure me a model for a picture I was to paint. After a short time the boy returned, bringing with him a most peculiar individual.

A pair of bright gem like eyes and a blunt nose, together with a broad, tightly-closed mouth, made up a countenance not easily to be forgotten; and his odd shaped head rested closely upon the shoulders. Add to this a pair of short arms terminating in hands of but four fingers each and disproportionately long legs, to which were attached very broad feet, and you have before you a picture of my model.

A musician by birth and occupation, he belongs to the genus Rana, known to naturalists as the Rana pipens, but to the schoolboy as the bullfrog! The particular batrachian whose portrait adorns this sheet is quite a favorite, in spite of his previous bad character. Although atyrant and cannibal, he now numbers among his personal friends many well known artists and noted engravers, who gladly drop their brush, pencil, or graver for the pleasure of seeing the frog devour some crab; bug, or insect that has been captured for him. An old fish globe has been brought into requisition, and through its transparent wall the green prisoner now stares at me as I write. The frog had fasted in this crystal prison for over three weeks before it occurred to me that he might be hungry. To make amends for my neglect I spent almost half a day chasing blue-bottle flies around the room with but indifferent success. However, I captured twenty- | hind legs and pawed with his fore legs with such vigor that | than an ordinary mortal.

all of which he swallowed tail foremost, keeping up a lively kicking and scratching with fore and hind feet to prevent his prey from curling up and biting. Enough water is always kept in the globe to keep its inmate moist, but too shallow for a mouse to drown in. The wily batrachian is well aware of this fact, for it is not until nothing but the head and fore feet of the mouse protrude from between his jaws that he bends his head down, holding it and the mouse under water until the latter is suffocated before it is finally gulped down. Partly to make a more even fight and partly as an experiment to see what the frog would do under the circumstances, a little over a month ago, before putting in a large male mouse, we emptied all the water from the globe. Then ensued a chase; round and round went the mouse, trying in vain to scale the glassy walls, but never missing an opportunity to give the frog a savage nip with its sharp teeth. Round and round plunged the batrachian after him. Once he caught the mouse by the tail, whereupon the mouse turned and mounted the slimy back of his enemy and bit him severely; but quicker than thought the powerful hind leg of the frog swept the mouse from his back and dashed it violently against the side of the globe.

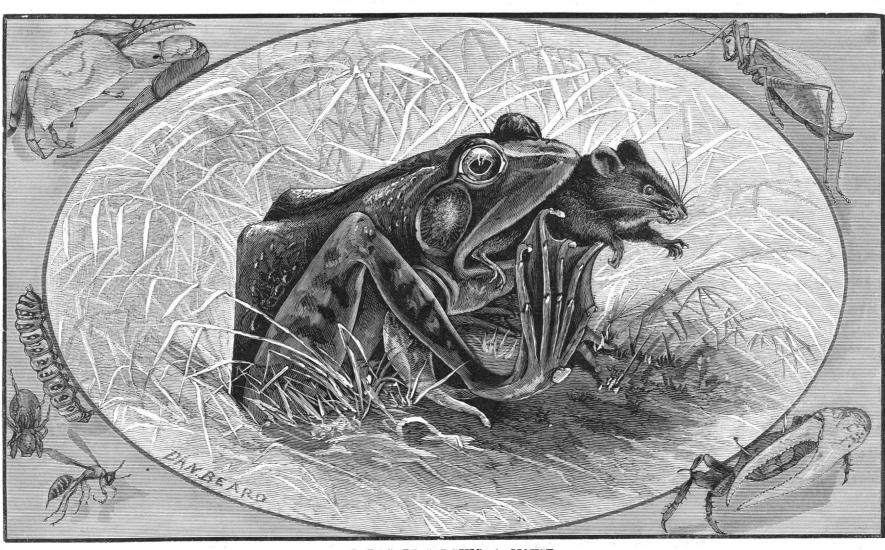
The battle had commenced and lasted about five minutes, when by a lucky snap the frog got the mouse by the hind quarters; the little mammal buried his sharp teeth in the frog's nose. Then again did the mill-pond croaker exhibit an intelligence and activity which I had always been led to

ted from the central organ to the muscle with the utmost rapidity, but the contraction of the muscle is just so much and no more than the designed effect demands for its accomplishment. This is what we mean by responsiveness.

Endurance is the capacity of repetition of the same act, the reiterated discharge of the same amount of nerve force to produce equal muscular contractions for an indefinite period. It is the "staying power" which the tissues must acquire in order to do their best work. It also means the learning and adoption of the line of least muscular force to perform a given task. This is slowly acquired, but when once known, allows of the performance of apparently most onerous tasks with little effort.

Strength is the third, and, beyond a certain moderate amount, least important end of athletic training, although it is often put first. The utmost strength that it is possible for any one to acquire is strictly limited by conditions of age, height, weight, and structure beyond the individual's control; nor is it at all necessary to develop the strength of muscles to their utmost in order to reach their utmost physical perfection. Quite the reverse, indeed, is the case.

To develop these three qualities of tissue wholly different methods of physical culture are required. They do not go hand in hand. The country lout with big muscles that can throw an ox has, as a rule, little endurance and less responsiveness. All army surgeons know how soon these big strong fellows will break down. The circus clown, agile as believe these creatures never possessed. He kicked with his a cat, is often physically weak, and with no more endurance



BULLFROG DISGORGING A MOUSE.

through the open window. All these were successively swallowed by the frog in a most business like manner. A pink fleshy tongue would shoot out and in an instant the insect aimed at would disappear. When he came to the hornet the frog appeared to think his food was rather highly seasoned, for he winked his eyes several times, if that term can be applied to the act of sinking his eyes down in his head and then popping them up again.

Next day he ate fifteen large flies, two big lively katydids, and two full grown fiddler crabs, life-sized drawings of which may be seen upon the border to the accompanying illustration. He had for dessert the same day a dragon fly and an ichneumon fly. I have since tried him with raw meat, but he could not be pursuaded to touch it until a piece cut to represent some insect with long legs was put upon a straw and dangled in front of his nose; this he instantly snapped up.

Insects, crustaceans, mollusks, and small animals, anything with life and not too large to be taken into the capacious mouth of this animal, are greedily devoured, even its own tadpoles and young frogs form a palatable viand for the parent. Once I took a dead mouse and, holding it in the globe, jumped it around to give it the appearance of life. Without hesitation it was seized and speedily swallowed by the frog before he discovered that he had been swindled by a corpse. He then opened his mouth and with his fore feet deliberately pulled out the obnoxious mouse in a manner that set the spectators off in roars of laughter. Since then he has devoured many live mice with apparent relish, are examples. Not only is the nervous message transmit are already under contract.

five of them, and one vicious hornet that had strayed in | the rodent had very few opportunities of biting. Once the mouse's teeth fastened upon the hind foot of the frog, causing him to turn two or three complete somersaults in his efforts to free himself. The mouse was so large that it was no easy task for the Rana pipens to swallow him. Slowly but surely, however, he disappeared, until nothing but the head was visible. There being no water in the globe the frog could not drown him, so he did the next best thingchoked him to death by squeezing his neck until the poor rodent's bead-like eyes stuck out from its head, and life was extinct.

Scientific Gymnastics.

Exercise, to be beneficial in the highest sense, should be for itself alone; it must not be work in any sense; it very favorably. They aver that nearly all cases improve should pursue its own objects, and no other; it should be made a pleasure and not a labor; it should be utterly divorced from ulterior notions of economizing expended powers; and this should never more firmly be insisted on than in the case of those abnormal creatures who say they take no pleasure except in useful work.

The theory of scientific gymnastics is directed to bring about three qualities in the tissues. 1. Responsiveness; 2. Endurance; 3. Strength. The first of these is displayed in brane contracts and becomes thinner and more transparent. suppleness or agility. The muscle is well under the control of the will; it responds at once, with promptness and to the

Moreover, all three of these qualities are to be imparted to all the muscles of the body, in proportion to their uses, so that a symmetrical development may be secured. The blacksmith, with his mighty right arm, but who is "blown" in a foot race of a hundred yards, and the ballet dancer, with her legs like Diana's and her arms like stems, are familiar examples of the absence of symmetry.—Medical and Surgical Reporter.

The Benzoate of Sodiun in Consumption and Diphtheria.

The inhalation of the benzoate of sodium in phthisis continues to attract attention in Germany. Prof. Rokitansky, of Innsprück, was the first to advocate it, and Dr. Winternitz and others who had visited his clinic report upon it upon it, at least at first. This result is categorically denied by many other observers.

Its success as an agent in diphtheria is attested by Dr. Letzerich, of Berlin. The pseudo-membrane is dusted with powdered benzoate, applied through a glass tube or quill, two or three times a day. Older children may use a gargle of one part to twenty. The temperature and pulse together decline under this treatment. The pseudo-mem-

IT is estimated, by those in position to know, that more required extent. The quick blow of the prize fighter, the miles of railroad will be built during 1880 in this country exactly graded and lightning-like motion of the swordsman, than during any year before. About 9,000 miles of new road

THE ACTION OF LIGHT ON PLANTS.

The phenomena which the prolonged action of sunlight produces on vegetation in high latitudes are recorded by M. J. A. Broch in a work recently published.

The farther we go eastward from the Gulf Stream the more severe is the climate, even though the degree of latitude be the same. 'Thus Scandinavia and Finland possess an exceptionally mild climate, considering their high polar altitude. Indeed, barley and oats will ripen in the most northern districts of Norway, Sweden, and Finland, and immense forests are met with; while in Iceland, Greenland, and the polar confines of Russia and America, the earth is barren and sterile, and there are eternal snows. The cause of these advantageous climatic conditions is to be attributed to the enormous mass of warm water and hot air which the Gulf Stream brings down from the equatorial region to the coast of Norway, and which it approaches between 60° and 61° of latitude. This circumstance, together with the difference in the geological formation of the various northern countries of Europe, naturally lead to certain dissimilarities in the respective climates of these countries. The isothermal line passing through the places whose mean temperature is zero-skirting in Norway the chain of mountains and the sea coast from the North Cape, embracing also the central sapphire, and the two surfaces were carefully 'worked' over part of that country between the 60th and 63d parallels-begins in Finland at the 66th degree of latitude and rises rapidly to the north, forming a curve which incloses the elevated lands of the interior between the Gulf of Bothnia and the Arctic Sea, so that not only the countries situated south of that parallel, but also those which slope toward the the Gulf Stream, have a mean temperature above zero. Of all the countries situated in the same latitude as Finland, the Scandinavian peninsula alone enjoys a milder climate. European Russia is much colder, and the climate of Asiatic Russia still severer. With regard to the action of prolonged solar light on the vegetation common to all those countries. Dr. Schübler, of the University of Christiana, has demonstrated that the seed of corn or other plants obtained from the northern regions ripens more quickly than that produced in the more southern countries. In the regions of the extreme north, where grain crops are uncertain in their yield, the seed corn of the north is always used in preference to any other. It is not less true that the various kinds of grain and vegetables cultivated in the northern regions yield better and are much richer in carbo-hydrates than the varieties cultivated more to the south. The color, moreover, is the particles from Glasgow were as obstinate and unacted on deeper—a phenomenon which applies also to all trees and plants. Foreign botanists visiting Norway and the other countries of the extreme north, in summer, are astonished a similar attempt in a hard glasstube in a stream of oxygen, at the fresh dark green of the foliage, and the bright colors and the result was the same. Hence I conclude that the subof those flowers which grow both in northern and southern climes; and as this richness of color increases regularly with mond and is not carbon; and I feel as confident in the results the latitude, trees and plants have at first been considered as thus obtained from a few infinitesimal particles that can new varieties. The leaves of trees grown in the north are larger even when the seed has been brought from more balance of the most refined delicacy, as if the experiments southern countries. M. Schübler has likewise proved that had been performed on crystals of appreciable size. the aroma of all kinds of plants and fruits, both wild and cultivated, increases as the north is approached. Ordinary vegetables and herbs grown in high latitudes have a far more aromatic taste than those grown in southern countries. The caraway is an example of this fact; grown at Christiana, it contains 5.8 per cent of volatile oil, while that cultivated in Germany and Central Russia contains only from 4 to 4.8 per cent. But this large development of aromatic essence is not always considered an advantage; for instance, the tobacco plant grown in Norway or other northern countries contains, it is said, too much nicotine. In proportion, however, as the aroma increases with the latitude the saccharine substance diminishes; the berries and fruits of the north are less sweet than those which are cultivated or grown wild in the more southern parts of those countries. Consequently, while Norway, as well as Sweden, and even Finland, produces the most delicious apples, the pears are not sufficiently sweet. These facts, as well as the rapid growth of vegetation in the northern regions, are attributed to the prolonged action of solar light. Indeed, at Christiana, at the summer solstice, the sun remains below the horizon only 5 hours 17 minutes; at Trondhjem, 3 hours 34 does not descend below the horizon from June 2 to July 11; the center of the sun does not appear above the horizon from November 25 till January 16; and at Hammerfest, from November 20 to January 21. It is not surprising that barley, potatoes, and many other plants and vegetables ripen in the most northern latitudes, seeing that they are exposed to a considerable amount of heat during two or three months of the year. In those regions where the sun hardly descends below the horizon in summer, there is no night, only a short twilight; and the growing plant, therefore, enjoys permanently and without interruption the heat and light which it requires.

Mactear's Artificial Diamonds.

Some weeks ago an item was cabled from London to our daily newspapers stating that real sparkling diamonds had been artificially made by a Glasgow gentlemen which withstood all the tests used in determining the natural stone. The Journal of the Society of Arts brings us the following facts concerning the alleged great discovery.

Professor Nevil Story Maskelyne, F.R.S., of the British dyed, suitable for braces, etc. Shoes have been made at Museum, has examined the presumed "diamonds" manufac- Gloucester, Mass., from the skins of the cusk or torsk tured by Mr. James Mactear, of St. Rollox, Glasgow. The (Brosmus volgaris), the use of which has been patented, and result of his examination is in a letter to the Times, from which the above Journal extracts:

"First, the diamond excels all substances in hardness. Secondly, its crystals belong to the cubic system, and should not, therefore, present the property of doubly refracting light. Frequently, however, from the influence of strain within the crystal, caused by inclosed gas bubbles or other causes, diamonds are not entirely without action on a ray of polarized light sent through them. Finally, the diamond is pure carbon, and as such, burns entirely away when heated to a sufficiently high temperature in the air, and more vividly so burns or glows away when heated in oxygen gas.

"The specimens I had to experiment upon were too light to possess appreciable weight, too small even to see unless by very good eyesight or with a lens, yet were, nevertheless, sufficiently large to answer the three questions suggested by the above properties.

"A few grains of the dust, for such the substance must be termed, were placed between a plate of topaz—a cleavage face, with its fine natural polish-and a polished surface of each other, with a view to the production of lines of abrasion from the particles between them. There was no abrasion. Ultimately the particles became bruised into a pow der, but without scratching even the topaz. They were not diamond.

"Secondly, some particles, more crystalline in appearance Arctic Ocean and are submitted to the salutary influence of than the rest, were mounted on a glass microscope slide, and examined in the microscope with polarized light. They acted each and all powerfully in the manner of a birefrangent crystal. It seemed even in one or two of them that, when they lay on their broadest surface (it scarcely be called a 'crystal face'), a principal section of the crystal was just slightly inclined to a flattish side of it in a manner that suggested its not being a crystal of either of the ortho-symmetrical systems. Be that as it may, it was not a diamond.

"Finally, I took two of these microscopic particles and exposed them to the intense heat of a table blowpipe on a bit of platinum foil. They resisted this attempt to burn them. Then, for comparison, they were placed in contact with two little particles of diamond dust exceeding them in size, and the experiment was repeated. The result was that the diamond particles glowed and disappeared, while the litas before. I had previously treated the specimen I have alluded to as the first on which I experimented by making stance supposed to be artificially formed diamond is not diahardly be measured, and could only be weighed by an assay

"Not content with merely proving what these crystalline particles are not, I made an experiment to determine something about what they are.

"Heated on platinum foil several times with ammonium fluoride they became visibly more minute, and a slight reddish-white incrustation was seen on the foil. At the suggestion of Dr. Flight, assistant in this department, a master in the craft of the chemical analyst, these little particles were left for the night in hydrofluoric acid in a platinum capsule. This morning they have disappeared, having become dissolved in the acid, and on evaporation there is seen a slight white incrustation, on the capsule, of the residuary fluoride. I have, therefore, no hesitation in declaring Mr. Mactear's 'diamonds,' not only not to be diamonds at all, but to consist of some crystallized silicate, possibly one resembling an augite, though it would be very rash to assert silica, possibly of more than one such compound."

Mr. Maskelyne concludes that "the problem of the permutation of carbon, from its ordinary opaque black condition for its sublimation in the form of crystals, or its cooling establish in a laboratory experiment."

THE INDUSTRIAL USES OF FISH SKINS.

easily soluble in water, some are of a firm, strong texture and of a useful character. Up to within a few years, howrather limited, and it is only comparatively recently that atsubstitute for sandpaper; and skins of eels, dressed and additions to fish culture ever undertaken.

an industry is said to be carried on at Colborn, Canada, with the skins of species of siluroids for glove making. In Egypt, fish skins from the Red Sea are used for soles of shoes. The skin of the losh or burbot (Lota maculata) is used by the people in many parts of Russia and Siberia to trim their dresses. It is also utilized by some of the Tartar tribes, as material for their summer dresses, and the bags in which they pack their animal skins. The inhabitants of the eastern coasts of the middle of Asia clothe themselves with the tanned skin of the salmon. The spring and tuberculous skins of many sharks and allied fishes are largely employed, under various trade names, for polishing woods, and for covering boxes, cases, etc. From a certain portion of the skin of the angel shark (Squatina angelus) the Turks make the most beautiful sea-green watch cases. Turners, ebonists, and carpenters in Europe use the rough skin of the blue dogfish (Squalus glaucus) like emery paper, for smoothing their work and preparing it for polishing. This shark skin is also made into shagreen. That most used at present appears to be the skin of the ray (Hypolophus sephen), which is very common on the Malabar coast. The house of Giraudon, Paris, makes excellent use of them for morocco and tabletterie. At the recent Paris Exhibition, this establishment exhibited numerous illustrations of the ornamental application of the prepared skin in large office-table inkstands, candlesticks, boxes and caskets, paper knives, reticules, card cases, photograph frames, bracelets, scent bottles, etc. The fish called chat (Squalus catulus) at Marseilles is smaller than the angel fish, and furnishes a product known as peau de rousette. This skin is reddish, and without spots, and of a uniform grain, flat, and only used to make cases and other articles known as shagreen. Peau de chien de mer is another name given to some species of Squalus. That found on the French coasts is known under the names of chien marin, rousette tigrée, etc. Turners, cabinet makers, and carpenters use the skin for scraping and smoothing their work, and it is also used for like purposes by metal workers. This skin, when worked up with the tubercles with which it is studded, takes the name of "galuchat," and is usually dyed green, to cover cases, sheaths, and boxes. Under the name of chagrin, these skins used to be much employed in Turkey, Syria, Tunis, and Tripoli; that made in Tripoli being considered the best. It was colored black, green, white, and red.

The Quinealt River Salmon.

The Transcript, of Olympia, Washington Territory, describes a new salmon which promises to make a valuable addition to our list of food fishes.

The Quinealt River is situated midway between the mouth of the Columbia River and Cape Flattery, and empties into the Pacific Ocean, thirty-two miles north of Gray's Harbor. Salmon of one of the finest varieties visit this stream, and commence ascending the river about the 1st of March, and continue running up until the 1st of July. These fish are about 20 inches in length, 6 inches deep, and 3 inches thick, and weigh from 6 to 7 pounds each. They have very small fins and tails, and are very uniform in size and weight. Their color is a deep greenish blue on the back, with silver sides and white bellies. The meat is of a bright red color. They are extremely fat, and when put upon sticks before the fire to cook, as is the custom of the Indians, large quantities of fat drip from them. They are particularly noted for their rich and exceedingly fine flavor, and as far surpass the Columbia River Chinook silver-side as the latter does a dog

The Indians are very superstitious about them, and as all the catching grounds are on a reservation they have a monopoly of them. When they first commence to run it is impossible for a white man to get one for love or money, as the anything beyond the fact that they consist of a compound of Indians believe it would stop the run. They are also superstitious about cutting them with a knife, and the first catch is always cut open by the old klootchmen with a sharp shell, and the heart of the salmon thrown into the fire and burned, tion into that in which it occurs in nature as the limpid for fear the salmon will be offended and not come into the crystal of diamond, is still unsolved. That it will be solved river. Later in the season they cut them with knives and minutes. At Bodöe, the chief town in Nordland, the sun no scientific mind can doubt, though the conditions neces-are glad to trade them to the whites. In May and June they sary may prove to be very difficult to fulfill. It is possible run in endless numbers, and are as thick as herring in the at Tromsöe, from May 20 to July 24; at Hammerfest, the chief that carbon, like metallic arsenic, passes directly into the sound, the water in the river at times being seemingly town of Finmark, from May 15 to July 29. On the other condition of vapor from that of a solid, and that the condidative with them. The fish will not take either a fly or hook in any manner, and are only caught by the Indians in at Bodöe from December 14 to December 28; at Tromsöe, into crystal-diamond from the liquid state, is one involving their primitive manner with weirs built across the stream, a combination of high temperature and high pressure pres- and made of poles and hazel brush. These weirs are built ent in the depths of the earth's crust, but very difficult to like all other weirs of the country, and are set at certain places in the river. The fish are taken out with dip nets, often from fifteen to twenty at a time. The weirs are made to stop all the fish ascending when fishing is going on, but Although the skin of fishes is chiefly gelatinous, and are opened at other times to allow the fish to go up and spawn (a fact which white fishermen on other streams might heed to their advantage). It is supposed that they spawn in ever, their employment for practical purposes has been the river and do not ascend to the lake. Those engaged in propagating fish would do well to examine these salmon, as tention has been more generally directed to their utilization we are satisfied they would be a valuable addition to the on an extended scale. At a Maritime Exhibition held at varieties of fish now propagated by the United States Fish the Westminster Aquarium in 1876, a Norway exhibitor Commissioners and various State Commissioners. Coming showed a variety of tanned fish skins, among which were: early in the season, they could be put in the same streams tanned whale skins; upper leather made from the white fish; with latersalmon, and thus continue the fishing season nearly skins of flatfish prepared for gloves; skins of soles tanned the whole year round. Their eggs can easily be obtained, and dressed for purses; skins of thornbacks prepared as a and the trial, if successful, would be one of the greatest

Olives in California.

yield 150 gallons. After a good crop the trees usually very well represent a high official beset by rival office seek hold two ounces less. According to these figures an acre his work, are two courtiers, one expostulating with him nean species mentioned by Panceri, was exceedingly phosably not sell for more than \$400.

After visiting Europe and studying the olive question, Mr. Cooper believes that the California olive is unsurpassed in fitness for producing a fine table oil. The small purple berry is not so nice in appearance as the large green or whitish olive of Spain, but it is like the olives in those French districts which produce the best oils of Europe. Besides, he considers it excellent for pickling, and much prefers the pickled olives of Santa Barbara to those imported from Spain. A few of these Santa Barbara olives are in market; but are said not to be compared with the Kimball olives of San Diego. Olives like the last, if they could be had in abundance, would soon leave the Spanish article without a friend.

Many persons are preparing to set out olive orchards, and there is a great demand for cuttings, which are the only resource at present; but Mr. Cooper believes that the trees grown from the seed, and budded or grafted, though slower in bearing, will be stronger, healthier, and longer lived. He thinks the roots from the cutting never equal those from the seed in symmetry and vigor of nutrition. The Federal De partment of Agriculture is cultivating twenty varieties of the European olive, and will soon be ready to supply applicants with cuttings.

MECHANICAL INVENTIONS.

Mr. James A. Robinson, of Nashville, Tenn., has patented an improvement in cylinder cocks, which consists in combining with a cylinder cock a thimble valve sliding on a stem, a loose pin passing through the stem, and a recessed rod fitted to slide in a cross mortise.

Mr. Harry Oscar Choles, of Upper Clapton, County of Middlesex, England, has patented an improved stock and die for screw threading pipes, etc. This invention has for its object, first, to prepare the pipe for the action of the screw cutting die by removing the burr, and also the hard outer surface of the pipe, this being done in advance of the screw cutting die, but at the same operation with the cutting of the screw thread, instead of at a previous operation, by means of a file, as usual; and, secondly, to feed the die along the pipe as it cuts the screw thread by means of a leading screw separate from the die, but combined with the die stock, instead of relying on the self-feeding action of the die, thereby relieving the die of this part of its work, facilitating the screw cutting operation, and insuring the formation of a perfectly true screw thread.

Mr. William Birch, of Salford, county of Lancaster, Great Britain, has patented an improved machine for guiding and stretching fabrics. The object of this invention is to make an improvement in the governor described in Patent No. 198,787, and to provide means for stretching fabrics in connection therewith. The inventor uses a well balanced frame pivoted in the central line of the passing fabric, and employs in conjunction with them rollers of suitable form.

Manganese Bronze Torpedo Boats.

Mr P. M. Parsons writes to the London Times with reference to the manganese bronze torpedo boat recently arrived at Portsmouth from the Thames. Mr. Parsons says that the thickness of the plates forming the skin of this boat was not 3-16 inch, but varied from No. 9 to No. 18 wire gauge, or from little more than 1/8 inch to about 1-16 inch. As regards the quivering spoken of, this only occurs when the engines are working at a certain number of revolutions, isochronous, and this is also experienced in the steel boats when the speed is such that the two vibrations correspond. When this boat was going at the rate of 16 knots per hour, more than which speed she attained one day when Mr. Parsons was on board of her, no quivering or vibration was felt, but it set in when the speed was reduced to about 10 or 12 knots. He admits, however, that the manganese bronze plates supplied for this vessel are not quite so stiff as steel plates of the same thickness; but this occurred simply because in the contract no stipulation was made as to stiffness. The plates were supplied under the condition that they should stand the Admiralty test for steel plates, namely, a tensile strength of from 26 to 31 tons per square inch, with an elongation of not less than 20 per cent before breaking, and to bend cold to a radius twice the thickness of the plate. This test the plates stood perfectly, those taken haphazard and tested by the Admiralty Inspector giving beradius stipulated.

CHINESE PORCELAIN VASE

Mr. Edward Cooper, of Santa Barbara, California, has! The large porcelain vase shown on this page is of Chinese 6,000 olive trees, some of them seven years old, and these manufacture. The body, neck, and lips of the vase are ming at different depths, produce a very striking illuminaproduce twenty gallons of berries each on an average in covered for the most part with a fine vine and flower scroll a good year, and one gallon of oil is obtained from seven pattern done in polychrome, but the front portion is occuling from great balls of fire floating a short distance beneath of berries. Trees ten years old in a good soil will average | pied by medallions painted with figure subjects. What the | the surface. The most striking phosphorescent phenomena fifty gallons of berries in a good year, but sometimes will subject of the upper design is, is uncertain, though it might take a year's rest, so that its good years alternate. The ers. But the lower picture tells its own story. Here is a oil yield from a mature orchard is estimated by the Alta grand Mogul seated at his ease, surrounded by his courtiers, California at 200 gallons of oil to the acre, and of this 50 gal watching the performance of a couple of clowns. Stand-liant line of light. Among the deep water forms several of lons may be deducted to pay for gathering the berries and ing on the steps, just outside of the Mogul's court, is the the species of Gorgonia and Antipathes (especially Rüsea) making and marketing the oil. Two gallons make a case of master of the clowns, urging the poor fellows on to renewed Mr. Cooper's bottles; though most of the imported bottles exertions, while on either hand, keeping him, the master, to the trawl. One ophiurian also, like one of the Mediterrawill yield \$900 net annually, but, in the present depressed kindly, and the other standing silent, with drawn sword, condition of business, a mature olive orchard would probland a most sinister look on his face—an action more potent



CHINESE PORCELAIN VASE.

This picture is a very good illustration of Chinese pictorial art. It is full of character and action. It is not fine art, considered by our canons of good drawing and perspective, but it shows more artistic perception and ability to portray the salient points of a situation than many European artists possess.

Accident on Board the Greece.

Spontaneous combustion scores another victory over the ignorance of humanity. On Thursday last the steamer Greece arrived from Great Britain. As the cargoes this way are small or not sufficient to load the vessel entirely, the ocean steamers are bringing over sufficient coal to carry which are such as to make the pulsations of the propeller them back, either in whole or in part. In this instance there and the vibrations produced by the spring of the vessel was a quantity of coal in the lower hold, and it was intended to transfer it from there to the bunkers. The coal must have been damp, and being hermetically sealed in the lowest depths of the ship's hold, there was no chance for ventilation, consequently sufficient carbonic oxide was there generated to cause an explosion upon the application of light. This was done when the men descended to the lower hold to unfasten the hatches. Five deaths have already resulted, and seven persons have suffered severe injuries. The Coal Trade Review thinks it is about time that vessel owners and captains became aware of the danger attached to the storage and carriage of this quality of coal (bituminous) in quantity, where it is liable to heating from any cause. Ventilating shafts at least should be made direct from the hold where stored to the outer air.

Phosphorescence in the Caribbean Sea.

Mr. Alexander Agassiz, in his recent "Report on Amerito be found, and consequently the phosphorescence is far advanced upon the disk on the first day of February.

less brilliant than in the Gulf of Mexico. Yet occasionally the masses of Ctenophora (a species of Mnemiopsis) swimtion; sudden flashes of light suddenly appearing as if comwere produced by a small annelid, allied to Syllis, which moved over the surface of the water with great rapidity, performing the most remarkable gyrations and tracing its path, which remained phosphorescent for a short time, by a brilshowed a bright bluish phosphorescence when coming up in phorescent, emitting along the whole length of its arms, at the joints, a brilliant bluish-green light.

Astronomical Notes.

OBSERVATORY OF VASSAR COLLEGE.

The computations in the following notes are by students of Vassar College. Although merely approximate, they will enable the observer to recognize the planets.

POSITIONS OF PLANETS FOR FEBRUARY, 1880.

Mercury.

On February 1 Mercury rises at 6h. 59m. A.M., and sets at 4h. 17m. P.M.

On February 29 Mercury rises at 7h. 11m. A.M., and sets at 6h. 50m. P.M.

In the latter part of February Mercury may be seen after sunset a few degrees north of the point of sunset.

On February 28 Mercury will be seen near Jupiter in the evening twilight.

Venus will be brilliant in the morning throughout the month of February, although rising later and coming more nearly into daylight.

On February 1 Venus rises at 4h. 49m. A.M., on February 29 at 5h. 9m. A.M.

On the morning of February 7 Venus will be seen in conjunction with the thin crescent moon; Venus is about 2° north of the moon in declination.

Mars.

Mars will be the most conspicuous of the evening planets. Its great declination gives it a very high altitude at meridian passage; on February 29 its altitude in this latitude is nearly 72°.

On February 1 Mars rises at 11h. 21m. A.M., and comes to meridian at 6h. 40m. P.M., at an altitude of 69°.

On February 29 Mars rises at 10h. 14m. A.M., and sets at 1h. 16m. of the next morning.

Mars will be seen to be among the bright stars of Taurus; on February 9 it will be 2° south of the star Eta Tauri.

The moon will be seen to approach Mars on the evening of February 17.

Jupiter.

On February 1 Jupiter rises at 8h. 47m. A.M. and sets at 7h. 59m. P.M.

On February 29 Jupiter sets at 6h. 42m. P.M.

Jupiter is two nearly in the direction of the sun for good Saturn.

Saturn as well as Jupiter sets early in February, and it is getting so far off that even large telescopes will not show the smallest satellites.

Saturn sets on February 1 at 10h. 7m. P.M., and on February 29 at Sh. 31m. P.M.

Uranus.

Uranus is in its best position during February.

On February 1 Uranus rises at 7h. 19m., and sets at 8h. 26m. of the next morning.

On February 29 Uranus rises at 5h. 22m. P.M., and sets at 6h. 33m. of the next day. Uranus is moving away from Lambda Leonis toward Rho

Leonis, and on February 29 it has nearly the declination of this star and follows it in right ascension.

A glass of two inches aperture will show the disk of

On February 1 Neptune rises at 10h. 57m. A.M., and sets at 12h. 31m. A.M., of the next day.

On February 29 Neptune rises at 9h. 8m. A.M., and sets at 10h. 43m. P.M.

Nepture is among the small stars of Aries.

Occultations.

The "American Nautical Almanac" gives the Washington time, February 16, 11h. 30m. P.M. for the disappearance of Epsilon Arietis, a multiple star, by occultation, or by the moon's passing across it. As the moon will not have reached the first quarter the stars will seem to touch the dark limb and disappear at once; this is always an interesting phenomenon to observe, and is valuable for a determination of longitude. With an ordinary telescope the stars will appear as

Sun Spots.

The spots on the sun have been very few for several years. At this time (January 15) two large spots are passing out of sight, in consequence of the motion of the sun on its axis, and a group of some 18 or 20 small ones has made more than tween 29 and 30 tons breaking strain, with an elongation of can Dredgings in the Caribbean Sea," states that in the road- half its passage across. These will probably be seen again from 25 to 35 per cent, and bending round cold to half the stead, under the lee of the islands, there is little pelagic life in February. The large ones should be easily seen somewhat

RECENT DECISIONS RELATING TO PATENTS, ASSIGN-MENTS. ETC.

THE RIGHTS OF ASSIGNEES IN PATENTS.

It frequently happens that an inventor, in order to supply himself with the means to apply for a patent or introduce his invention, agrees with another person that, in consideration of the advance of funds, he will grant an assignment of the invention and of the letters patent therefor, in a certain State or States. The making of such assignments | February 6, 1872, No. 123,325, is a lamp chimney with the in advance of the issue of the patent is quite common; and top or upper portion constructed of mica, and a glass base, when the patent is granted the assignee is the owner of the patent without further transfer, for the district originally

There have been cases where the inventor has attempted to deprive his assignee of the benefits of the original assignment by dodges like the following: The inventor applies for the patent, and it is officially rejected. His assignee is glass base in combination with any form of chimney top informed that no patent can be obtained, and the matter is supposed to be closed. But on a subsequent occasion the inventor, having made changes in the invention, files an in its place another, not its equivalent entirely new application. At last a patent is granted, but the inventor declines to admit the original assignee to any benefits therefrom on the ground that the patent is not for the application on which the advances were based.

The question whether the assignee has any right in such patent has been very forcibly decided in favor of the assignee by the U.S. Supreme Court in the well known coal-burner stove case.

An assignment of April 5, 1853, recites the granting to Littlefield of a patent on the 15th of April, 1851, "for a coal burner so constructed as to produce combustion of the inflammable gases of anthracite coal," and the fact that he had applied for a patent "securing to him a certain improvement in the invention so as aforesaid patented by him." and then assigns to Treadwell and Perry all the right, title, and interest which Littlefield "now has, or can or may hereafter have, in or to the aforesaid inventions, improvegranted for said inventions or any improvements thereon, and in any extension or extensions thereof, within and throughout the district and territory embraced within the States of New York and Connecticut, for and during the term for which the aforesaid letters patent were granted, and the terms for which any patent for the aforesaid improvement, and any other improvement or improvements thereof, or extensions for or of either thereof, may be granted." The Supreme Court of the United States, in Littlefield versus Perry (21 Wallace, 205), held that this assignment, "taken by itself, contains, in most unmistakable language, an absolute conveyance by the patentee of his patent and inventions described, and all improvements thereon, within and throughout the States of New York and Connecticut," and that this assignment and a supplemental agreement executed between the same parties at the same time, when construed together, operated to constitute Treadwell and Perry the assignees of Littlefield within the patent laws in respect to the subject matter of the assignment, and to give them and those claiming under them the right to sue in this Court to prevent any infringement upon their

On the 22d of July, 1853, Littlefield withdrew the application before mentioned, which had been filed December 30, 1852, and filed a new application, on which a patent was issued to him January 24, 1854. The Supreme Court held, in the case referred to, that the assignees became in equity the owners of this patent of 1854 under the assignment of April, 1853; that all the patents outstanding and the subject of the controversy in that suit, exclusive of the patent of 1851, were either reissues of the patent of 1854 or improvements upon it: and that the use of the said patents issued after January, 1854, by Littlefield and his co-defendant, Jagger, was an infringement of the rights of said assignees. The patents so referred to were these: A patent issued June 25, 1861: reissues, in two parts, 132 and 133, made November 19, 1861, of the patent of January 24, 1854; reissues, in four parts, 1,332, 1,333, 1,334, and 1,335, made August 26, 1862, of the patent of January 24, 1854, on the surrender of reissues 132 and 133; reissues, in two parts, 1,426 and 1,427, made March 3, 1863, of the patent of January 24, 1854, on the surrender of two of the four reissues August 26, 1862; reissues, in two parts, 1,813 and 1,814, made November 8, 1864, of the patent of January 24, 1854, made November 8, 1864, of the patent of January 24, 1854, on the surrender of one of the two reissues of May 19, 1863; reissue 1,823, made November 22, 1864, of the patent of January 24, 1854, on the surrender of the remaining one of the two reissues of May 19, 1863; a patent issued December 19, 1862; a patent issued August 18, 1863; and reissue 1.594, made December 22, 1863, of the patent of August 18, 1863. The outstanding patents, when the bill of revivor and supplement was filed by John S. Perry, trustee, etc., against Littlefield and Jagger, on the 6th of February, 1865, were (exclusive of the patent of 1851), the patent of June 25, 1861, the patent of December 9, 1862, reissues 1,813, 1,814, 1,815, and 1,823 of the patent of January 24, 1854, and reissue 1,594 of the patent of August 18, 1863.

A new suit, brought by Perry against Littlefield, to re-

Court in the Northern District of New York.

U. S. Circuit Court-Eastern District of New York. Benedict, J.

BLACKMAN et al. versus hibbler et al.—Glass base for COAL OIL LAMPS.

- 1. The invention embraced in patent to E. Blackman, the two being united and designed to be used together as a unit, and the reissue No. 7,417, December 5, 1876, describing and claiming the base separately, is invalid, as being for
- 2. When the original patent described a certain form of mica chimney united to a glass base, a reissue claiming such was regarded as greatly enlarging the scope of the invention by dropping one element from the combination and putting
- 3. A lamp chimney constructed with base and top in one piece being old, no invention was required to conceive the idea that it could be made in two pieces, nor to form a surrounding rim upon the upper part of the base for the purpose of maintaining in position the separate top piece.

Bill dismissed for lack of novelty in the invention.

U.S. Circuit Court.—Eastern District of Pennsylvania. -McKennan, J.

LORILLARD et al. versus RIDGEWAY.—THE MARKING OF PLUG TOBACCO BY PRESSURE NOT A PATENTABLE INVENTION.

- 1. Tobacco having been marked by pressing into its sur face metallic or other hard substances, the imprint of which was left upon the tobacco, it was no invention to provide such plates with prongs or projections, and allow them to remain upon the tobacco.
- 2. Letters and other distinguishing marks having been ment, and patent, or the patent or patents that may be produced upon tobacco, to put such marks upon a metallic tag, if greater prominence was desired, was readily suggested to the common mind, and did not rise to the dignity of an invention.

Before the Commissioner of Patents.-Paine,

VEGETABLE-LIFE DESTROYER.

The motion is submitted in the following words:

Francis B. Rodgers, filed January 2, 1878, the decision of the Examiner denying the patent has been overruled by the patent by the Examiner (unless the utility of the patent is denied) in accordance with the decision of the Examiners.

The application relates to a compound or mixture for the destruction of vegetable life.

One of the grounds upon which the Examiner rejected the application was that the mixture was a mere aggregation the foregoing are always unprofitable, and do them little having no functions differing from those of its several ingredients. The applicant insisted that the compound operated more rapidly and effectually than either of its elements. The Examiners-in-Chief decided, on appeal, that if the mixture described operated more effectually and rapidly, and was more convenient in use, than its elements, the applicant was decision they stated that they were not informed on this to file affidavits, under Rule 31, in case the examiner should traverse his assertion that the mixture operated as above stated. Thereupon the applicant requested the allowance of the patent by the Examiner (unless the utility of the patent was denied), in accordance with the decision of the Exam-

The examiner replied that he did not deny the usefulness or operativeness of the mixture, but denied its patenta-

The applicant appealed to the Commissioner because, as he alleged, the Examiner ignored the decision of the Examiners-in-Chief; and he asked that the Examiner might be instructed to act in accordance with that decision

The Commissioner held that, inasmuch as the Examinersin obedience to the decision of the Commissioner, pass the a third larger than two years ago. case to issue without further delay.

The examiner replied that the Commissioner's decision was that he should pass the case to issue if he did not deny that the mixture operated more effectually and rapidly than effectually than its component parts. And he added that, tional to those named above, has just been decided in favor fulness, but only denied that it would act more effectually measures.

of the assignees by Judge Blatchford, in the U.S. Circuit or rapidly or conveniently than any of its elements, affidavits were expressly prohibited by the last clause of Rule 31, in which it is provided that "affidavits in support of applications will not be received at any stage of the examination unless the office denies that the invention is operative or useful." Upon this action of the Examiner the present motion for the transfer of the case to another division is based.

> This motion cannot be granted. The Primary Examiner has not disregarded the decision of the Commissioner, nor has he disobeyed the decision of the Board of Examiners-in-Chief; and, while he has declined to comply with their suggestion that applicant should be permitted to submit affidavits in the case, he has done so in the belief that this course was forbidden by the rules of the office. I am not prepared to say that this impression was incorrect.

> But I see no good why the applicant should not be permitted, if he can do so, to show that this mixture acts more rapidly and more effectually than the elements of which it is composed, and is more conveniently used. I think that, under Section 483 of the Revised Statutes, I have authority by an order made with the approval of the Secretary to authorize him to introduce such affidavits.

> It is accordingly ordered that the applicant be permitted, within sixty days after the date of this order, to submit affidavits for the purpose of showing that his compound or mixture operates more effectually or rapidly and is more convenient in use than any of the substances of which it is compounded.

The relief demanded by the applicant is denied.

[Approved by the Secretary.]

An undue zeal for the observance of forms and ceremonies is apt to make the ablest officials lose sight of the main object for which they are individually housed in the Patent Office, and for which the patent laws were enacted, to wit: the promotion of the useful arts by the grant of patents to authors and inventors. In times past some of the Commissioners and some examiners seemed to labor under the mistaken notion that the chief purpose of their official life was the opposing of inventors, the placing of obstacles in their way, and preventing the grant of patents.

The foregoing case illustrates our meaning: The Examiner in the first place appears to have wrongfully denied the patent. The applicant was then put to the expense of an appeal to the Board of Examiners, who practically decided that a patent should be granted. But the Examiner then holds back the patent on a technicality; the applicant In the application for patent for vegetable sprout killer by is then put to the further expense of appealing to the Commissioner in person, who supports the little point raised; which now subjects the inventor to further delays and costs Board of Appeals. Applicant requests the allowance of the in getting up expert testimony. All the trouble to all the parties concerned would have been avoided had the Examiner in the first instance simply issued the patent.

> We doubt whether there is any instance where a Patent Office mistake made in favor of the inventor ever hurt the Examiner, the Commissioner, the Secretary of the Interior, or any other official. On the other hand such wrangles as credit.

Yankee Inquisitiveness.

The Price Current, Portland, Me., suggests a legitimate and wise plan to increase the demand for the products and manufactures of any and every country. When a man has entitled to a monopoly of his new compound; but in their a really valuable article to offer to the world, he should devise the best ways and means to let the buyer and consumer point, and suggested that the applicant should be permitted know the source from whence it came, and, if possible, the means and expense by which the recipient may obtain more of the same kind. The result of this justifiable inquisitiveness will be the doubling of the crop of good apples in Maine within a few years. L. J. Stout, of Limington, Me., while barreling apples to be shipped to parts entirely unknown to him, conceived the novel idea of ascertaining their destination by putting a letter, inclosing money to pay the postage on a letter, in one of the barrels, kindly asking the purchaser to write him the date of opening it; his name and residence, the price paid, the condition of the apples when opened, etc. In about three months Mr. Stout received a letter from a merchant in London, England, saying one of his customers found the letter and passed it to him, and by him it was neatly answered, giving all the desired informaof August 26, 1862; reissues, in two parts, 1,478 and 1,479, in-Chief had decided that if the mixture was operative, as tion in regard to the apples, etc. Last winter Mr. Stout remade May 19, 1863, of the patent of January 24, 1854, on claimed, it was patentable in favor of the applicant, although ceived a letter from the same merchant in relation to filling the surrender of the remaining two of the four reissues of they had not decided whether it was or was not so operative, an order for Maine apples, but the quality and scarcity of their decision was obligatory upon the Primary Examiner, the fruit last year prevented his filling the order satisfacand that it was therefore the duty of the Primary Examiner, torily to himself. Last week Mr. Stout received another on the surrender of reissues 1,426 and 1,427; reissue 1,815, if he did not deny that the compound operated as the appli-order by cable for several hundred barrels as samples, from cant claimed, to pass the case to issue. Thereupon the ap the same person. As Mr. Stout will undoubtedly fill the plicant requested that the Primary Examiner, inasmuch as order, the English gentleman will no doubt be surprised at he did not deny the operativeness of the invention, should, the size and quality of the fruit—which is this year probably

The Metric System.

It may not be generally known that we have, in the nickel five cent piece of our coinage, a key to the tables of linear any of its elements; and that, while he did not deny the measures and of weights. The diameter of this coin is 2 operativeness of the mixture, he did deny that it acted more centimeters, and its weight is 5 grammes. Five of them placed in a row will, of course, give the length of the deciwhile the suggestion of the Examiners in-Chief that the ap meter; and two of them will weigh a decagramme. As the plicant should be permitted to submit affidavits would have kiloliter is a cubic meter, the key to the measure of length is been consistent with the rules if the Examiner had denied also the key to measures of capacity. Any person, therethe operativeness or usefulness of the compound, neverthelore, who is fortunate enough to own a five cent nickel may cover ownership and damages in some other patents, addi- less, inasmuch as he did not deny its operativeness or use- carry in his pocket the entire metric system of weights and

Business and Lersonal.

The Charge for Insertion under this head is One Dollar a line for each insertion; about eight words to a line. Advertisements must be received at publication office as early as Thursday morning to appear in next issue. The publishers of this paper guarantee to advertisers a circulation of not less than 50,000 copies every

Horizontal Steam Engines and Boilers of best construction. Atlantic Steam Engine Works, Brooklyn, N.Y. Walrus Leather, Solid Walrus Wheels; Wood Wheels covered with walrus leather for polishing. Greene

Tweed & Co., 18 Park Place, New York. Campbell's Self-acting Window Shade Rollers are the best in the market. Models and terms to the trade. 85 Centre St., New York.

Wanted-A Drill Press, a Bolt Forging and Heading Machine, and a Pulley Lathe, of some new and improved patent. Good second-hand machines might answer. Address Columbus Iron Work's Company, Columbus, Ga.

Engines 1/2 to 5 H. P. Geo. F. Shedd, Waltham, Mass. Linen Hose and Rubber Hose of all sizes, with or

without coupling. Greene, Tweed & Co., New York. For Sale -Two Windmill Patents, and set of patterns for same. None better. F. C. Maxwell, Columbus, O.

Wanted -- A Machinist of experience, competent to superintend a large manufactory. Address, with references, in full, F. Case, Box 387 Cincinnati, O.

For Sale Low.—Horizontal Engines, 16 x 30, 10 x 36, 8 x 20, 7 x 20; Horizontal Tubular Boilers, two 31/2 x 15. one 3 x 13; 35 Horse Locomotive; 3 Horse Upright Engine with 5 Horse Boiler; all in good condition; new (Schenck) 14 inch Planer and Matcher. Beicher & Bag nall, 40 Cortlandt St., New York.

Small High Speed Steam Yachts complete or in parts. Geo. F. Shedd, Waltham, Mass.

Forsaith & Co., Manchester, N. H., & 213 Centre St. N. Y. Bolt Forging Machines, Power Hammers, Comb'd Hand Fire Eng. & Hose Carriages, New & 2d hand Machinery. Send stamp for illus. cat. State just what you want. Wooden Pumps.—Makers please send circulars to Box

125, Moorestown, Bur Co., N J. Electrical Indicators for giving signal notice of extremes of pressure or temperature. Costs only \$20.

tached to any instrument. T.Shaw, 915 Ridge Ave.Phila. The best Truss ever used. Send for descriptive circu-

lar to N. Y. Elastic Truss Co., 683 Broadway, New York. The steam pipes, boilers, etc., in the buildings of the New York Tribune, New York Herald, and Harper & Bro., are protected with H. W. Johns' Asbestos Boiler Cover-H. W. Johns Manufacturing Company, No. 87 Maiden Lane, sole manufacturers of genuine Asbestos Liquid Paints, Roofing, etc.

Partner Wanted .- See advertisement on inside page. Wanted-Two good Machinists; one Plumber, who can do besides common machine work; two good Iron Moulders. Highest wages paid to good men. Address Mountain Foundry, Hazleton, Pa.

Models made to order. H. B. Morris, Ithaca, N. Y. For Pat. Safety Elevators, Hoisting Engines, Friction Clutch Pulleys, Cut-off Coupling, see Frisbie's ad. p. 61.

Wanted.-A Second-hand Turbine Wheel. Give price and dimensions. Address E. L. Pemberton, Fayetteville, N. C.

Instruction in Steam and Mechanical Engineering. A thorough practical education, and a desirable situation s soon as competent, can be obtained at the National Institute of Steam Engineering, Bridgeport, Conn. For particulars, send for pamphlet.

Collection of Ornaments.-A book containing over 1,000 different designs, such as crests, coats of arms, vignettes, scrolls, corners, borders, etc., etc., sent post free on receipt of \$2. Palm & Fechteler, 403 Broadway, New York city.

Best Oak Tanned Leather Belting. Wm. F. Fore paugh, Jr., & Bros., 531 Jefferson St., Philadelphia, Pa. Launches and Engines. S. E. Harthan, Worcester, Mass Special Wood-Working Machinery of every variety Levi Houston, Montgomery, Pa. See ad page 45.

The Baker Blower ventilates silver mines 2,000 feet deep. Wilbraham Bros., 2318 Frankford Ave., Phila., Pa. To stop leaks in boiler tubes, use Quinn's Patent Ferrules. Address S. M. Co., So. Newmarket, N. H.

Nickel Plating.-Sole manufacturers cast nickel an odes, pure nickel salts, importers Vienna lime, crocus etc. Condit, Hanson & Van Winkle, Newark, N. J., and 92 and 94 Liberty St., New York.

Wright's Patent Steam Engine, with automatic cutoff. The best engine made. For prices, address William Wright, Manufacturer, Newburgh, N. Y.

For Solid Wrought Iron Beams, etc., see advertisement. Address Union Iron Mills, Pittsburgh, Pa., for lithograph, etc.

Presses. Dies. and Tools for working Sheet Metal, etc. Fruit & other can tools. Bliss & Williams, B'klyn, N. Y. Lathes and Machinery for Polishing and Buffing Metals.

Bradley's cushioned helve hammers. See illus, ad. p. 77. Split Pulleys at low prices, and of same strength and appearance as Whole Pulleys. Yocom & Son's Shafting

E. Lyon & Co., 470 Grand St., N. Y.

Works, Drinker St., Philadelphia, Pa. Stave, Barrel, Keg, and Hogshead Machinery a specialty, by E. & B. Holmes, Buffalo, N. Y.

Sheet Metal Presses. Ferracute Co., Bridgeton, N. J

Solid Emery Vulcanite Wheels—The Solid Original Emery Wheel -other kinds imitations and inferior. Our name is stamped in full on all our best Standard Belting, Packing, and Hose. Buy that only. The best is the cheapest. New York Belting and Packing Company, 37 and 38 Park Row, N Y.

Mineral Lands Prospected, Artesian Wells Bored, by Pa. Diamond Drill Co Box 423, Pottsville, Pa. See p. 61. For Machine Knives and Parallel Vises, see advertisement, p 61. Taylor, Stiles & Co., Riegelsville, N. J Telephones repaired, parts of same for sale. Send

stamp for circulars. P.O. Box 205, Jersey City, N. J. Inventors' Institute, Cooper Union. A permanent ex-

Saws, Universal Wood-workers, Universal Hand Jointers, Shaping, Sand-papering Machines, etc., manuf'd by Bentel, Margedant & Co., Hamilton, Ohio. "Illustrated History of Progress made in Wood-working Machinery,

The Paragon School Desk and Garretson's Extension Table Slide manufactured by Buffalo Hardware Co. Silent Injector, Blower, and Exhauster. See adv. p. 77.

Fire Brick, Tile, and Clay Retorts, all shapes. Borgner & O'Brien M'f'rs, 23d St., above Race, Phila., Pa.

Diamond Tools. J. Dickinson, 64 Nassau St., N. Y. The Improved Hydraulic Jacks, Punches, and Tube

Expanders. R. Dudgeon, 24 Columbia St., New York. For Superior Steam Heat. Appar., see adv., page 77.

For Pat. Quadruple Screw Power Press, see adv., p. 77. All makes and sizes of Steam Hammers bored out.

L. B. Flanders Machine Works, Philadelphia, Pa.

Millstone Dressing Machine. See adv., page 78. Cut Gears for Models, etc. Models, working machinexperimental work, manufacturing, etc., to order. D. Gilbert & Son, 212 Chester St., Phila., Pa.

Holly System of Water Supply and Fire Protection for Cities and Villages. See advertisement in SCIEN TIFIC AMERICAN of last week.

The E. Horton & Son Co., Windsor Locks, Conn. nanufacture the Sweetland Improved Horton Chuck. Forges, for Hand or Power, for all kinds of work Address Keystone Portable Forge Co., Phila., Pa.

Power Hammers. P.S. Justice, Philadelphia, Pa. p. 77.

For Reliable Emery Wheels and Machines, address The Lehigh Valley Emery Wheel Co., Weissport, Pa. Steam Engines; Eclipse Safety Sectional Boiler. Lam-

bertville Iron Works, Lambertville, N. J. See ad. p. 406. Twin Injectors "Clipper" and "Ajax. "Acme," Governors, etc. Improved; new. Catalogue 1880. J. D. Lynde, Phila,, Pa.

For Shafts, Pulleys, or Hangers, call and see stock kept at 79 Liberty St., N. Y. Wm. Sellers & Co.

Wheels and Pinions, heavy and light, remarkably strong and durable. Especially suited for sugar mills and similar work. Circulars on application. Pittsburg Steel Casting Company, Pittsburg, Pa.

Deoxidized Bronze. Patent for machine and engine journals. Philadelphia Smelting Co., Phila., Pa.

Ore Breaker, Crusher, and Pulverizer. Smaller sizes run by horse power. See p. 77. Totten & Co., Pitts'g.

Wm. Sellers & Co., Phila., have introduced injector, worked by a singlemotion of a lever.



HINTS TO CORRESPONDENTS.

No attention will be paid to communications unless accompanied with the full name and address of the

Names and addresses of correspondents will not be given to inquirers.

We renew our request that correspondents, in referring to former answers or articles, will be kind enough to name the date of the paper and the page, or the number of the question.

Correspondents whose inquiries do not appear after a reasonable time should repeat them. If not then published, they may conclude that, for good reasons, the Editor declines them.

Persons desiring special information which is purely of a personal character, and not of general interest, should remit from \$1 to \$5, according to the subject, as we cannot be expected to spend time and labor to obtain such information without remuneration

Any numbers of the Scientific American Supple-MENT referred to in these columns may be had at this office. Price 10 cents each.

- (1) J. writes: I have a boiler that is good with the exception of about 4 inches at bottom of leg that is eaten badly by salt deposit. I have an idea of raising grate bars and filling with a cement of some kind. Can you inform me how to make it? A. Hydraulic cement, properly mixed, may answer your purpose.
- (2) C. F. L. asks how tracing or vellum cloth is made. A. Wagner's tracing cloth is said to be prepared as follows: Boiled bleached linseed oil, 20 lb.; ead shavings, 1 lb.; zinc oxide, 5 lb.; Venetian turpentine. 16 lb : boil for several hours, then strain, and dissolve in the strained composition 5 lb. white gum copal. Remove from the fire, and when partly cooled add purified oil of turpine sufficient to bring to the proper consistence. Moisten the cloth thoroughly in benzole, and then give it a flowing coat of the varnish.
- (3) G. writes: If a 10 lb. weight is dropped from the center masthead of a steamer running 16 knots Hydraulic Presses and Jacks, new and second hand. per hour, what position would the steamer bear to the steamer to be in advance of the weight's original position at the mast head in the steamer's center, said advance to be computed by the length of steamer and rate of her progress, due allowance being made for force of wind. B claims the weight will fall directly perpendicular, and when touching the water will be in its original position. due allowance being made for the force of wind. A. Neither is exactly right; the weight will strike the deck a very little aft of the perpendicular, as the vessel maintains a constant speed, whereas the weight has the speed of the vessel before dropping, but loses a very small fraction of that speed during the time of falling,
 - (4) C. M. K. asks: What will destroy or drive away fleas? A. Try pennyroyal or essence of pennyroyal.
- (5) D. S. K. asks for directions for silver plating iron and steel. A. Dissolve 12 ounces evanide of potassium and 1 ounce (troy) of chloride of silver in 1 gallon soft water; filter, and suspend in this bath the hibition of inventions. Prospectus on application. 733 ing a surface somewhat larger than that of the work. Connect the work with the negative or zinc pole of a steam pressure also. Am I right? A. You are right. 2. small fragment sent us it is undoubtedly of meteoric

means of a stout copper wire, and join the silver plate in a similar manner with the positive pole of the battery. The work may be prepared for the bath by boiling it in a strong aqueous solution of caustic potassa or soda to remove traces of oil, rinsing in running water and scouring with a brush and pumice powder moistened with strong cyanide of potassium solution; then quickly rinsing again, and, without fingering, placing in the bath, and in circuit. A somewhat weaker (in silver) bath, called the "whitening" bath, and a stronger battery, is generally used to whiten or throw on the first film of silver. The proportions for this are; cyanide of potassium, 1 lb.; chloride of silver, 1/4 ounce (troy). If the silver runs on dark, use a weaker battery, or break the current so as to give alternate in tervals of rest. 30 minutes ordinarily suffices when a battery of 3 or 4 Smee cells, plates 10x4inches, are used. In the whitening process an additional cell or more is employed. Iron takes silver better after having received a light deposit of copper. The metal must be freed from oxide by pickling in dilute acid and scouring with sand. For coppering a slightly acid bath of the sulphate and a strong battery may be used.

- (6) "Reader" asks: Has chromic acid much application in the arts, where manufactured, and what its probable price? A. Yes, several of our large Philadelphia houses now produce the acid. It is quoted at 20 cents per ounce. 2. Can muriatic acid gas be made to combine with turpentine by the aid of heat, or at ordinary temperature without aid of a freezing mixture? A. Turpentine oil forms several compounds with hydrochloric acid. The gaseous acid converts it into the monohydrochloride, C₁₀H₁₆.HCl; when the oil is subjected for several weeks to the action of the strong aqueous acid, crystals of the dihydrochloride C10H16 2HCl are obtained. The latter compound is also formed by the action of hydrochloric acid on lemon oil; hence it is called citrene dihydrochloride.
- (7) H. H. K. asks how to clean and crysdip jars. A. Dissolve in small quantity of hot water, cool slowly, and evaporate by exposure to the air.
- (8) F. W. D. writes: 1. Will you please inform an amateur photographer of the easiest way to recover the silver from waste solutions. 2. If it narms or benefits the silver bath to leave it in the sunlight? A. 1. Precipitate the warm solution by addition to it of common salt; allow it to settle, decant the clear liquid, and throw the precipitate, together with several scraps of zinc, into warm dilute sulphuric acid. When the chloride is all reduced, pick out the remainder of the zinc, decant and press out the liquid from the precipitate, dry, mix it with a little borax, glass, and powdered resin in a small clay crucible, and heat to complete fusion. Cool and break the crucible; the silver will be found as a button in the bottom. With a small crucible, a good fire in an ordinary cooking stove will answer for the fusion. 2. If covered, it is beneficial.
- (9) A. R. F. asks: Can I get any more power from an undershot water wheel fitted with appliances to keep the paddles vertical than I can with a common stayed undershot of the same dimensions? If so, how much? A. You can, if the arrangements are suitable to the course of the current. The amount of gain will depend very much upon such arrangements.
- (10) C. R. B. asks how to tin iron castings. A. Small articles of cast iron may be tinned by wrapping them loosely with zinc wire and immersing in a for 15 minutes. The castings must of course be well cleansed, by pickling them in dilute sulphuric acid and oughly dry it is ready for use. You should make scouring with sand and water or scratch brushing. Use several wheels of different grades. scouring with sand and water or scratch brushing. Use the bath at ordinary temperatures and polish the tinned goods with whiting and the brush. 2. Can you give me any information on soluble glass? A. Consult Feuchtwanger's treatise on Water Glass and its uses.
- (11) W. A. C. asks if there is a cheap proess by which pine poles can be prepared for service as telegraph poles, something that would preserve them in the ground a reasonable length of time? A. Char the ends slightly and coat them thickly with wood tar.
- (12) W. J. R. asks: Please answer the following in your paper. Can I build a cemented wall in water; if so, how? Machinery to pump the water out would be too costly. A. Yes, by using a diving bell.
- (13) F. X. M. asks: 1. How can I preserve cider? A. See p. 81, Vol. 41, SCIENTIFIC AMERICAN, "How to Preserve Cider." 2. A stick of wood weighing 100 lb., when converted into charcoal will be very much lighter, say 60 lb. less, and yet will give a much greater amount of heat. What is the chemical process and what change has taken place? What was the 60 lb. (missing from the original) composed of which would seem lost? A. Your assumption that the combustion of 40 lb. charcoal develop more heat than 100 lb. dry wood is erroneous. In comparing equal weights of the combustibles, the available thermal value of charcoal is greater, as weight on its reaching the water? A claims that the time wood contains more or less water, incombustible nitrooccupied by the falling of the weight will cause the genous compounds, and volatile combustible matters which escape complete combustion in ordinary furnaces. Consult some elementary work on chemistry and heat.
 - (14) F. G. asks for a receipt for making with the japan and turpentine preparation, but desire, if possible, an ink that will flow free from the brush and not become gummy. A. Try nigrosine dissolved in
 - (15) P. E. writes: I wish to protect young pear and apple trees against gnawing by rabbits, by the use of lime whitewash; but it washes off the smooth bark so rapidly by rain that it becomes impracticable. Can you tell me any addition to make to the wash that will make it adhere in wet weather? A. Try mixing a small quantity of water glass solution (20 per cent) with your lime. Wash and moisten the wood with alum water before coating.
 - (16) W. T. S. asks: 1. Is there as much

Planing and Matching Machines, Band and Scroll small Daniell or Smee battery of two or three cells by Can you explain why an injector throws water into a boiler against the pressure? Because the momentum of the water driven by the steam at a high velocity is superior to the pressure on the valve. 3. Is an inch and one fourth steam pipe large enough to supply a seven and a half by ten engine, running from four to five hundred revolutions per minute? A. No; it should be 2 inches diameter, if the engine runs at usual speed.

- (17) M. J. asks: What will remove fruit and wine stains (especially peach and claret) from table linen? A. If uncolored, moisten with dilute sulphuric acid and then rub with a strong aqueous solution of sulphite or hyposulphite of soda; or soak for a short time in a strong aqueous solution of bleaching powder (calcium hypochlorite), press out excess of the liquid, and immerse in dilute sulphuric acid (1 to 10 of water); rinse in cold water, dip in hyposulphite of soda solution, and afterwards wash out thoroughly in hot water. If colored, use plenty of soapsuds and ammonia water. See p. 2511 Scientific American Supplement, No. 158.
- (18) J. E. E. writes: 1. I am intending to build a steam saw mill, 45 horse power. I wish to set the engine 60 feet from the river and 10 feet above the water line. Will I be likely to have any trouble in supplying the engine with water through the pump at that distance? A. Not if your pipes are carefully laid and tight. 2. There is an idea prevalent among engineers here that an engine whose cylinder diameter is 2-3 the stroke is better for saw mills than one whose diameter is 1/2 the stroke, or that a 12x16 is a better proportion than 9x18. Are they correct? A. Ordinarily cylinder 1/2 the stroke is best. The losses from waste spaces and clearances is less.
- (19) J. A. W. asks which is properly the front end of an ordinary stationary engine, the crank end or the cylinder end. A. The cylinder end is usually considered the front, whether it be a beam or horizontal
- (20) J. H. D. writes: I am building a light tallize the blue vitriol which is found in the bottom of draught side wheel boat, 65 feet long, 15 feet beam, making over all 22 feet, to be propelled by 10 foot paddle wheels making 50 revolutions per minute, paddles to be 26 inches long and 10 inches dip. How many paddles would it be advisable to put on each wheel? less than 10 nor more than 12. The latter will work the smoothest.
 - (21) E. B. D. asks: What is the cheapest and strongest battery or electric pile you know of? The Grenet is cheap and strong, but not constant. You do not state how you intend to use it.
 - (22) C. B. C. asks whether an induction coil could be made without commutator or condenser. that would give perceptible shocks, using three or four of the large sized cells of battery described in Supple-MENT 149. A. A condenser is not required for a coil used for giving shocks, but some kind of an interrupter must be used in the primary circuit.
- (23) S. S. D. writes: I am going to try to make an emery wheel for grinding skates, etc. What grade of emery should I get, and what should I mix with it, and how mix? A. You will hardly succeed in making a regular solid emery wheel without expensive moulds and many trials and failures. You may, however. make a serviceable emery wheel in the following way: Turn a wheel of the desired shape from a well seasoned piece of pine board. Heat some emery on an iron plate to 200° Fah., and coat your wheel with good glue of about the consistency used for wood work; roll it in solution of perchloride of tin in 10 parts of soft water the emery and allow it to dry, then give it another coating of glue and emery. When it becomes thor-
 - (24) C. S. asks (1) how the article in No. 161 of the Scientific American Supplement, about a dynamo-electric machine, is to be understood. I mean that portion describing the electro-magnet. It says there: It is not necessary to use permanent magnets. Electro-magnets may be employed, the slight residual magnetism of the soft iron cores serving to excite the armature. Now how can I make this soft iron core to be magnetic, or must the armature be a magnet? A. Temporarily connect the wires that surround it with a battery; or place it in the magnetic meridian, that is, with one pole toward the north and the other toward the south. It is hardly necessary to resort to either of these expedients, as it is almost impossible to find a piece of castiron that is not in some degree magnetic. 2. Also please give me the title of some book on such machines; one giving experiments that may be tried with it. A. An elementary work on physics would meet your wants. Ganot's Physics is a good work for you.
- (25) S. M. E. asks: 1. What effect will ozonized air have on gelatinous animal substances in course of their manufacture? Will it bleach, purify, and deodorize them? A. It would probably bleach and deodorize them to some extent. 2. Is process practicable? A. We have no record of any experiments in this line. Without a better generator of ozones (ozonifier) probably not 3 Are ny at present used utilized in the preparation of isinglass; if not, by what process can they be practically converted into gelatine in quantities? A. No; it remains to be devised. 4. What books give reliable information as to the various black marking ink for boxes, bales, etc. I am familiar manufactures of gelatin, glue, ising lass, and preparation of hair (from cattle) for mattresses, etc.? A. Consult Dawidowsty's Leim und Gelatin Fabrication.
- (26) S. L. H. writes: I was in an assayer's office this morning and saw brought in by a miner something that he thought was very valuable, but it proved to be a mass of iron. Its greatest dimensions over all were: length 13 inches, width 10 inches, thickness 8 inches, weight 130 lb. It seems to be about the quality of best Norway iron, shows regular lamination across the mass, and has the appearance of having been thrown while at a welding heat into a bed of coarse gravel, and is not magnetic. I inclose a fragment chipped from it. It is very tough and would make good horse nails. Is this meteoric iron or what is it. or any more pressure at the top of a steam boiler than and are such things common? It was picked up about 8 chemically clean work and a plate of pure silver, expos- at the bottom? I would suppose that the most would be miles from the Ivanpole gold and silver mines in the at the bottom on account of the weight of water and northern part of this county. [Judging from the

origin. Meteoric iron is perfectly malleable and may readily worked in a forge and put to the same use manufactured iron.]

(27) G. G. G. writes: 1. I am making a induction coil according to directions given in Supplie MENT, No. 160, page 2548. How can I tip the screv which presses against the vibrating spring, with platinum? A. By drilling the end of the screw and dri ing in a short piece of platinum wire. 2. What is vu canite? A. Hard rubber. 3. Could not the cylinder the commutator be made of hard wood? A. Ye 4. How many sheets of tin foil should be used for th condenser? What size should they be? A. About 50 make them a third larger than the dimensions gives Will common lead foil do, or should they be pur tin? A. Tin foil is best; ordinary tin foil will answe It need not be made of absolutely pure tin.

(28) W. M. G. writes: 1. In your Supple MENTS the figures of magneto-electric machines, induc tion coils, etc., are marked "half size." Do you mea exactly half size, or that the dimensions each way ar one half as large as the original? A. The latter. 2. About what would be the weight of the Nos. 16 and 18 wire fo the magneto-electric machine described in Supplement No. 161? A. About 2 lb. No. 16 and 1/2 lb. No. 18. Should the cores for the large magnets be of wrought of cast iron? A. They would be better of wrought iron but cast iron magnets are easier made and will answe very well.

(29) C. A. B. asks: Does the piston in rapidly running reciprocating engine stop at the end of each stroke? A. The piston of all reciprocating en gines stops at the end of each stroke, otherwise th movement could not be reversed.

(30) F. K. asks how to make a waterproo coating for cloth. A. Dissolve gum caoutchouc in ex cess of a bisulphide of carbon containing six per cent of absolute alcohol, concentrated by evaporation, awa from the fire, as the mixture is quite inflammable.

(31) W. T. D. asks what will remove stain from kalsomined ceilings. In this country we put u a great many ceilings made out of brown muslin. The roof not being waterproof will leak on them and stain them, and rekalsomining them will not cover up th stain. A. Muslin may be bleached by soaking it in solu tion of bleaching powder, dipping afterward in sulphur acid diluted with 10 parts of water, and then rinsing i plenty of cold water. 2. What will make muslin water proof? A. See answer to F. K., above.

(32) G. P. P. asks: 1. How can carbon be soldered to brass or copper so as not to hinder the pass age of electricity? A. By the process known as ga vanic soldering, or you may copper your carbon b electro deposition and afterward solder the coppere surface to the brass. 2. How can a resonator be made by the use of which a Bell telephone can be heard i any part of a room 12 feet square? A. We know of nothing better than a plain funnel or trumpet similar t an ear trumpet.

(33) W. H. K. asks: Can you inform me what the preparation to polish ladies' leghorn hats con sists of, as is used by straw hat manufacturers, and ho to prepare and use it? A. An ammoniacal solution of bleached lac, is employed by some makers, we believe

(34) E. H. N. writes: In a school room near by a new oak floor was laid last August. In th fall a few drops of ink were spilled on the floor, and t remove it oxalic acid in solution was applied, removing the stain where it was, but apparently leaving a kind o "halo" of darkness on the edges of the place wher the acid was applied. More acid on this spread th inky matter, until, by successive applications, the colo had spread all over the room. A peculiarity of the ap pearance is the bringing out of black color in place which seemed to have been cleared when water is spille or sprinkled on the floor By what means can th black be removed? A. Use a little strong hydrochlori (muriatic) acid then plenty of water; afterward dry and oil the floor.

(35) F. R. W. writes: An old photogra pher tells me that he at one time used bichromate o potash for a positive bath, exposing the paper throug the negative for just a moment, and then using a de veloper which brought out the picture beautifully. H has since forgotten the name of his developer, and can not do the same thing over. Can you tell me wha would develop the picture in such a case? A. Expos the print to the vapor of aniline (oil). The bichromat should be mixed with a trace of phosphoric acid. Also, if there is anything that will stick India rubber t leather, so that neither weather nor usage will separat them? A. Try a cement composed of equal parts o guttapercha and pitch.

[OFFICIAL.]

INDEX OF INVENTIONS

FOR WHICH

Letters Patent of the United States wer Granted in the Week Ending

January 6, 1880,

AND EACH BEARING THAT DATE

Those marked (r) are reissued patents.

A complete copy of any patent in the annexed list, in cluding both the specifications and drawings, or an patent issued since 1867, will be furnished from this office for one dollar. In ordering please state the number an date of the patent desired, and remit to Munn & Co., Park Row, New York city.

Agricultural forks, machine for manufacturing,	4.5
J. C. Richardson	223,246
Alarm bolt, S. Poole	223,384
Animal trap, W. Driscoll	223,324
Axle lubricator, P. Habel	223,285
Barrel heading press, C. Tyrrell223,302,	223,303
Bed bottom, J. W. Price	223,385
Bed bottom, spring, C. Merrick	
Bed, folding, F. Raymond	
Bed lounge, F. H. Lamb	223,234

	~ \\ \\ \\ \\ \\ \\ \\ \\ \\ \\ \\ \\ \\	W	E
ъе	Bee bucket, G. C. & S. E. Finley		
as	Blow pipe, E. W. Emerton	223,326	3
n	Blower, fan, J. F. Smethells	223,238	3
E- V,	Book case, revolving, J. Danner (r)	9,033	
a- v-	Books with staples, machinery for stitching, J. C. Smyth	223,255	2
1-	Boot and shoe, J. M. Hunter (r)9,034, Boot and shoe counter support, W. H. Van Wor	9,035	•
of s.	mer (r)	9,030	
ne 0;	Bottle stopper, N. Fritzner		
n. re	Fleisher (r)	9,019 223,270	
r.	Bristle bunching apparatus, J. J. C. Smith Buckle, G. H. Palmer	223,399)
G-	Buckle, suspender, F. Kelley	223,359)
c-	Building, fireproof, E. M. Butz	9,025	
n e	Car brake, automatic, Card & Noble	223,317	•
ıt or	Car coupling, J. N. Winn	223,426	;
r, 3.	Car, railway, Lissberger & Samuels	223,291	
or	Car signal, revolving, E. H. Brower	223,313	;
a, er	Cars, ventilating, R. P. Morgan, Jr	223,375	
a	Carriage bow, I. N. Topliff (r)	223,373	;
of	Catapult, E. C. Bruce	223,345	
ı- ie	Chair seat, G. A. Watkins (r)	9,021 9,02 4	
f	Chronographs, minute counting attachment for, P. M. Doret		
r-	Churn, F R. Hawley	223,413	
of y	Churn operating machine, L. G. Sweet	223,425	
٩	Coal and ore breaker, P. H. Sharp	223,299	
s p	Coal hod, Holzner & Vohringer	223,372	ď
e n	Combs from celluloid, etc., making, W. Booth Cooking utensil, steam, J. Ashcroft	223,267	1
e 1-	Corset spring, A. Benjamin	223,214	
ic	Crockery, device for exhibiting, E.J. Ovington, Jr. Cuff fastener, G. C. Bacon	223,268	i
n r-	Cut-off and valve, waste pipe, Millignton & Watson Cut off for cistern leaders, automatic, H.L.Russell		
. e	Damper, J. T. Farrell Door and shutter fastener, A. Sweetland		
S-	Drawer for safe keeping of drawings, G.B. Whiting Dummy, R. H. Weir		
l- y	Egg carrier, C. E. Lozier	223,235	ł
d le	Electroplating with nickel, J. Wharton Elevator, H. W. Sherrill		
n of	Engravers' tools, sharpening and preserving the bevels of, W. S. Brower		
0	Extension table, J. D. Brassington Eyelet, carriage curtain, C. W. Acker (r)	9,029	
e	Faucet, A. Moore	223,298	i
1- W	Felting machine, W. Keenan223,357, Fence, J. F. Maris	223,368	-
of	Fence, iron, Smith & Mounsdon	9,036	
e. n	Fence wire stretcher, G. S. Manning Filter press, C. Furbish		
e	Fire alarm signal box, non-interfering, Crane & Rogers		
g	Firearm, magazine, Sweeney & Wetmore Firearm, magazine, W. Trabue	223.414	
e e	Firearm sight, C. R. Shelton	9,023	
e	Fire extinguisher, J. W. Stanton	223,280	
9-	Furnace, H. M. Pierce		
d e	Galvanic battery, R. C. Anderson	224,237	
ic	Glassmaker's crane, W. Hirt	223,369	
d	Grain binder, D. Strunk	223,233	
- of	Harrow, J. P. Gage Harrow, S. D. Gibson	223,336	1
h	Harvester, corn. W. S. Barnard Harvesting machine. Jones & Owens	223,356	1
e- le	Hatchway, E. E. Furney Hatchway doors, operating, E. N. Dickerson	223,322	1
n- at	Hay fork and balance, combined, G.L. Richardson Hay rake, horse. M. Butler Hay rake, horse, S. Ritty		
e e	Head rest, T. J. Carrick	223,276	
2	Hoist, lumber, J. J. Hennessy	223,424	
te	Houses, apparatus for moving, J. M. Apfeld Hydrant, P. Connolly	223,278	
f	Hydraulic elevator, S. H. Bevins et al Ink, manufacture of printing, J. Kircher Insulating steam conducting pipes, J. Brosius	223,272 223,363	
=	Ironing table. H. L. St. Clair	223,404	
	Knot, door, H. Tucker	222,259	
	Lacing tips, stock for metallic, W. E. Joslin Lamp, S. S. Newton	223,376	;
	Lamp, C. F. Spencer	223,389)
e	Lamp, student, S. C. Catlin	223,263	3
	Lawn sprinkler, C. Chamberlin	223,360)
c.	Level, plumb, M. Harrison Lifting jack, combined screw and lever, F. B.		
	Stevens	223,306	3
n-	Mop wringer, C. B. Pettengill		
ce	Musical attachment for chairs and sofas, M. Schrenkeisen	223,394	1
1d 37	Musical instruments, stringed, T. Cobb Musical instruments, key board attachment for,		
-	C. C. Reynolds	223,410)
46	Nut lock, F. B. Davis Oil can, S. S. Newton		

Oil, transportation can and box for, Everest &

 Ross (r)
 9,017

 Ore crusher, P. C. Du Bois
 223,281

 Pantaloons and other garments, E. Spies (r)
 9,088

 Paper box machine, F. H. Strieby
 223,406

 Paper machine, W. E. Phelps
 223,381

 Paper, manufacture of colored, H. Gmeiner
 223 337

Pen, W.IT. Rightmyer 223,388

Whatley	223,421
Whatley	223,353
Planter, seed, J. Custer	223,320
Planters, check row attachment for corn, W. R. Iles Plow, M. Johnson (r)9,031,	
Plow, P. Kessler	223,361
Plow point, shovel, H. C. Beebe	223,309
Pot hole lids, receptacle for, N. D. White	223.332
Printers bookbinders, etc., pressing machine for,	
J. W. Jones Printing machine, lithographic, H. C. Pfeil	223,355
Printing machine, lithographic, H. C. Pfeil Printing presses, die clamp for plate, L. Dreka	223,243
Pulp, grinding cylinder for reducing wood to,	220,020
S. M. Allen	223,304
Pump, E. S. Mack	223,366
Radiator, W. L. Phillips	223,302
Keirkner	223,231
Railway and tramway track gauge, W.FGoodhue	
Railway, elevated, C. D. Tyler	
Railway joint, C. R. Schellert	223,260
Railway stations, stand pipe for, Van Vorst &	
Pratt	223,416
Rice hulling mill, T. M. Green	
Rivet and screw blanks, machine for heading,	
V. D. Upham (r)	9,027
Rotary engine, W E Sudlow	9,020
Saddle loop, G. Theobald	
Sash fastener, Ingram & Clark	223,351
Sash holder, N. P. Selden	223,250
Sash, window, G. Hartig	
Scraper and fork, combined, G. P. Ruhle	222,390
Screw cutting machine, C. M. Spencer	223,255
Self-waiting table, W. E. Owens	
Sewing machine brake, E. L. Howard	
Sewing machine cording attachment, A. Lobdell.	223,364
Sewing machine piping attachment, A. B. Felt	
Shaft coupling, J Geisinger	
Shoemaker's jack, G. M. Wells	223,264
Shutter, fireproof, W D Smith	223,401
Shutter worker, A. M. & W. H. Johnson	
Sign hanger and support, combined, E. A. Goodes Silk beating and washing machine, A. Urbahn	
Soda water apparatus, J. Matthews (r)	9,028
Spark arrester, J. Kirkland	223,362
Spark arrester, G. Stewart	223,403 223,427
Stakes, apparatus for setting out slope, W.E. Soare	223,253
Stamping machine, cloth, E G. Gibson	223,223
Steam boiler surface feeder, C. N. Petesch	
Steam engine lubricator, J. W. Thompson	
Steering apparatus, P. P. Seoane Stone dressing and paneling machine, N. Jenkins	223,395 223,230
Stone dressing and paneling machine, N. Jenkins Stool, camp, A. S. Drisko	223,230 223,221
Stone dressing and paneling machine, N. Jenkins Stool, camp, A. S. Drisko Stove, cooking, G. Wellhouse	223,230 223,221 223,420
Stone dressing and paneling machine, N. Jenkins Stool, camp, A. S. Drisko Stove, cooking, G. Wellhouse Stove fount, gasoline, G. W. Billings	223,230 223,221 223,420 223,310
Stone dressing and paneling machine, N. Jenkins Stool, camp, A. S. Drisko Stove, cooking, G. Wellhouse Stove fount, gasoline, G. W. Billings Stove, oil, D. Shields. Street sweeper, E. G. Rock.	223,230 223,221 223,420 223,310 223,398 223,297
Stone dressing and paneling machine, N. Jenkins Stool, camp, A. S. Drisko	223,230 223,221 223,420 223,310 223,398 223,297
Stone dressing and paneling machine, N. Jenkins Stool, camp, A. S. Drisko Stove, cooking, G. Wellhouse Stove fount, gasoline, G. W. Billings Stove, oil, D. Shields. Street sweeper, E. G. Rock Sulky, trotting, T. H. Brown. Tap or nipple for water and gas mains, T. B.	223,230 223,221 223,420 223,310 223,398 223,297 223,215
Stone dressing and paneling machine, N. Jenkins Stool, camp, A. S. Drisko	223,230 223,221 223,420 223,310 223,398 223,297 223,215 223,327
Stone dressing and paneling machine, N. Jenkins Stool, camp, A. S. Drisko Stove, cooking, G. Wellhouse Stove fount, gasoline, G. W. Billings Stove, oil, D. Shields. Street sweeper, E. G. Rock. Sulky, trotting, T. H. Brown. Tap or nipple for water and gas mains, T. B. Farrington Telegraph repeater, fire alarm, Rogers & Crane. Telephone transmitter, J. H. Irwin.	223,230 223,221 223,420 223,310 223,398 223,297 223,215 223,327 223,327 223,327
Stone dressing and paneling machine, N. Jenkins Stool, camp, A. S. Drisko Stove, cooking, G. Wellhouse Stove fount, gasoline, G. W. Billings Stove, oil, D. Shields Street sweeper, E. G. Rock Sulky, trotting, T. H. Brown. Tap or nipple for water and gas mains, T. B. Farrington Telegraph repeater, fire alarm, Rogers & Crane. Telephone transmitter, J. H. Irwin. Tobacco drying machine, G. B. F. Cooper.	223,230 223,221 223,420 223,310 223,398 223,297 223,215 223,327 223,248 223,352 223,319
Stone dressing and paneling machine, N. Jenkins Stool, camp, A. S. Drisko Stove, cooking, G. Wellhouse Stove fount, gasoline, G. W. Billings Stove, oil, D. Shields Street sweeper, E. G. Rock Sulky, trotting, T. H. Brown Tap or nipple for water and gas mains, T. B. Farrington Telegraph repeater, fire alarm, Rogers & Crane Telephone transmitter, J. H. Irwin. Tobacco drying machine, G. B. F. Cooper. Toy savings bank, E. L. Morris.	223,230 223,221 223,420 223,310 223,398 223,297 223,215 223,327 223,248 223,352 223,319 223,293
Stone dressing and paneling machine, N. Jenkins Stool, camp, A. S. Drisko Stove, cooking, G. Wellhouse Stove fount, gasoline, G. W. Billings Stove, oil, D. Shields. Street sweeper, E. G. Rock. Sulky, trotting, T. H. Brown. Tap or nipple for water and gas mains, T. B. Farrington Telegraph repeater, fire alarm, Rogers & Crane. Telephone transmitter, J. H. Irwin. Tobacco drying machine, G. B. F. Cooper. Toy savings bank, E. L. Morris. Trace supporter, A. Fellows et al. Track clearer, J. Lyker.	223,230 223,221 223,420 223,310 223,398 223,297 223,215 223,327 223,248 223,352 223,319 223,293 223,293 223,385
Stone dressing and paneling machine, N. Jenkins Stool, camp, A. S. Drisko Stove, cooking, G. Wellhouse Stove, cooking, G. Wellhouse Stove, oil, D. Shields Street sweeper, E. G. Rock Sulky, trotting, T. H. Brown. Tap or nipple for water and gas mains, T. B. Farrington Telegraph repeater, fire alarm, Rogers & Crane. Telephone transmitter, J. H. Irwin. Tobacco drying machine, G. B. F. Cooper. Toy savings bank, E. L. Morris. Trace supporter, A. Fellows et al. Track clearer, J. Lyker Traction engine, J. A. Stout	223,230 223,221 223,420 223,310 223,397 223,215 223,225 223,227 223,248 223,352 223,352 223,393 223,393 223,388 223,388 223,388 223,385 223,405
Stone dressing and paneling machine, N. Jenkins Stool, camp, A. S. Drisko	223,230 223,221 223,420 223,310 2223,398 223,297 223,215 223,327 223,248 223,352 223,352 223,293 223,293 223,293 223,293 223,385 223,385
Stone dressing and paneling machine, N. Jenkins Stool, camp, A. S. Drisko Stove, cooking, G. Wellhouse Stove fount, gasoline, G. W. Billings Stove, oil, D. Shields. Street sweeper, E. G. Rock. Sulky, trotting, T. H. Brown. Tap or nipple for water and gas mains, T. B. Farrington Telegraph repeater, fire alarm, Rogers & Crane. Telephone transmitter, J. H. Irwin. Tobacco drying machine, G. B. F. Cooper. Trace supporter, A. Fellows et al. Track clearer, J. Lyker Traction engine, J. A. Stout Transom lifter, J. M. Axtmann Tubing, armor for flexible, H. Wakeman Tug, hame, G. Hazlewood et al.	223,230 223,221 223,420 223,398 223,398 223,297 223,215 223,327 223,248 223,352 223,393 2223,393 223,388 223,405 223,405 223,305 223,205
Stone dressing and paneling machine, N. Jenkins Stool, camp, A. S. Drisko Stove, cooking, G. Wellhouse Stove fount, gasoline, G. W. Billings Stove, oil, D. Shields Street sweeper, E. G. Rock Sulky, trotting, T. H. Brown Tap or nipple for water and gas mains, T. B. Farrington Telegraph repeater, fire alarm, Rogers & Crane Telephone transmitter, J. H. Irwin Tobacco drying machine, G. B. F. Cooper Troy savings bank, E. L. Morris Trace supporter, A. Fellows et al Track clearer, J. Lyker Traction engine, J. A. Stout Transom lifter, J. M. Axtmann Tubing, armor for flexible, H. Wakeman Tug, hame, G. Hazlewood et al Tugs, spring link for draught, J. F. Miller	223,230 223,221 223,420 223,398 223,297 223,215 223,225 223,248 223,352 223,352 223,393 223,293 223,293 223,293 223,365 223,405 223,405 223,262 223,262 223,270
Stone dressing and paneling machine, N. Jenkins Stool, camp, A. S. Drisko Stove, cooking, G. Wellhouse Stove fount, gasoline, G. W. Billings Stove, oil, D. Shields. Street sweeper, E. G. Rock. Sulky, trotting, T. H. Brown. Tap or nipple for water and gas mains, T. B. Farrington Telegraph repeater, fire alarm, Rogers & Crane. Telephone transmitter, J. H. Irwin. Tobacco drying machine, G. B. F. Cooper. Troy savings bank, E. L. Morris. Trace supporter, A. Fellows et al. Track clearer, J. Lyker. Traction engine, J. A. Stout Transom lifter, J. M. Axtmann Tubing, armor for flexible, H. Wakeman Tug, hame, G. Hazlewood et al. Trugs, spring link for draught, J. F. Miller. Vehicle baggage attachment, E. J. Osborne.	223,230 223,221 223,420 223,310 223,398 223,297 223,215 223,327 223,248 223,352 223,352 223,352 223,352 223,365 223,265 223,262 223,262 223,262 223,278
Stone dressing and paneling machine, N. Jenkins Stool, camp, A. S. Drisko Stove, cooking, G. Wellhouse. Stove fount, gasoline, G. W. Billings Stove, oil, D. Shields Street sweeper, E. G. Rock Sulky, trotting, T. H. Brown Tap or nipple for water and gas mains, T. B. Farrington Telegraph repeater, fire alarm, Rogers & Crane Telephone transmitter, J. H. Irwin Trobacco drying machine, G. B. F. Cooper Trace supporter, A. Fellows et al Track clearer, J. Lyker Track clearer, J. Lyker Traction engine, J. A. Stout Transom lifter, J. M. Axtmann Tubing, armor for flexible, H. Wakeman Tug, hame, G. Hazlewood et al Tugs, spring link for draught, J. F. Miller. Vehicle baggage attachment, E. J. Osborne. Vehicle wheel, O. J. Baldwin.	223,230 223,221 223,320 223,310 223,398 223,297 223,215 223,227 223,248 223,319 223,329 223,329 223,329 223,326 223,365 223,405 223,365 223,405 223,266 223,370 223,378 223,378 223,378 223,378
Stone dressing and paneling machine, N. Jenkins Stool, camp, A. S. Drisko Stove, cooking, G. Wellhouse Stove fount, gasoline, G. W. Billings Stove, oil, D. Shields. Street sweeper, E. G. Rock Sulky, trotting, T. H. Brown Tap or nipple for water and gas mains, T. B. Farrington Telegraph repeater, fire alarm, Rogers & Crane. Telephone transmitter, J. H. Irwin. Tobacco drying machine, G. B. F. Cooper. Troy savings bank, E. L. Morris. Trace supporter, A. Fellows et al. Track clearer, J. Lyker Traction engine, J. A. Stout Transom lifter, J. M. Axtmann Tubing, armor for flexible, H. Wakeman Tugs, spring link for draught, J. F. Miller Vehicle baggage attachment, E. J. Osborne. Vehicle wheel, O. J. Baldwin. Velocipede, N. S. C. Perkins. Vent valve for barrels, C. Shabley.	228,230 223,221 223,310 223,398 223,297 223,215 223,327 223,248 223,352 223,319 223,365
Stone dressing and paneling machine, N. Jenkins Stool, camp, A. S. Drisko Stove, cooking, G. Wellhouse Stove fount, gasoline, G. W. Billings Stove, oil, D. Shields. Street sweeper, E. G. Rock. Sulky, trotting, T. H. Brown. Tap or nipple for water and gas mains, T. B. Farrington Telegraph repeater, fire alarm, Rogers & Crane. Telephone transmitter, J. H. Irwin. Tobacco drying machine, G. B. F. Cooper. Troy savings bank, E. L. Morris. Trace supporter, A. Fellows et al. Track clearer, J. Lyker Traction engine, J. A. Stout Transom lifter, J. M. Axtmann Tubing, armor for flexible, H. Wakeman. Tug, hame, G. Hazlewood et al. Tugs, spring link for draught, J. F. Miller Vehicle baggage attachment, E. J. Osborne. Vehicle wheel, O. J. Baldwin. Velocipede, N. S. C. Perkins. Vermin trap or insulator, E. P. Denton.	223,230 223,221 223,310 223,398 223,297 223,312 223,327 223,215 223,352 223,352 223,365 223,405 223,262 223,362 223,362 223,362 223,378 223,378 223,378 223,378
Stone dressing and paneling machine, N. Jenkins Stool, camp, A. S. Drisko Stove, cooking, G. Wellhouse Stove fount, gasoline, G. W. Billings Stove, oil, D. Shields. Street sweeper, E. G. Rock Sulky, trotting, T. H. Brown Tap or nipple for water and gas mains, T. B. Farrington Telegraph repeater, fire alarm, Rogers & Crane. Telephone transmitter, J. H. Irwin. Tobacco drying machine, G. B. F. Cooper. Troy savings bank, E. L. Morris. Trace supporter, A. Fellows et al. Track clearer, J. Lyker Traction engine, J. A. Stout Transom lifter, J. M. Axtmann Tubing, armor for flexible, H. Wakeman Tugs, spring link for draught, J. F. Miller Vehicle baggage attachment, E. J. Osborne. Vehicle wheel, O. J. Baldwin. Velocipede, N. S. C. Perkins. Vermin trap or insulator, E. P. Denton. Vessels, machine for unloading, F. Imhorst. Wagon brake, W. C. Kohler	228,230 223,221 223,310 223,398 223,275 223,215 223,327 223,248 223,352 223,319 223,365 223,36
Stone dressing and paneling machine, N. Jenkins Stool, camp, A. S. Drisko Stove, cooking, G. Wellhouse Stove fount, gasoline, G. W. Billings Stove, oil, D. Shields. Street sweeper, E. G. Rock. Sulky, trotting, T. H. Brown. Tap or nipple for water and gas mains, T. B. Farrington Telegraph repeater, fire alarm, Rogers & Crane. Telephone transmitter, J. H. Irwin. Tobacco drying machine, G. B. F. Cooper. Troy savings bank, E. L. Morris. Trace supporter, A. Fellows et al. Track clearer, J. Lyker. Traction engine, J. A. Stout Transom lifter, J. M. Axtmann Tubing, armor for flexible, H. Wakeman. Tugs, hame, G. Hazlewood et al. Trugs, spring link for draught, J. F. Miller. Vehicle baggage attachment, E. J. Osborne. Vehicle wheel, O. J. Baldwin. Velocipede, N. S. C. Perkins. Vermin trap or insulator, E. P. Denton. Vessels, machine for unloading, F. Imhorst. Wagon brake, W. C. Kohler Wagon brake, W. C. Kohler	223,230 223,221 223,380 223,398 223,297 223,297 223,327 223,327 223,352 223,352 223,365 223,365 223,307 224,241 223,350 223,307 224,241 223,350 223,302 223,303
Stone dressing and paneling machine, N. Jenkins Stool, camp, A. S. Drisko Stove, cooking, G. Wellhouse Stove fount, gasoline, G. W. Billings Stove, oil, D. Shields. Street sweeper, E. G. Rock. Sulky, trottling, T. H. Brown. Tap or nipple for water and gas mains, T. B. Farrington Telegraph repeater, fire alarm, Rogers & Crane. Telephone transmitter, J. H. Irwin. Tobacco drying machine, G. B. F. Cooper. Toy savings bank, E. L. Morris. Trace supporter, A. Fellows et al. Track clearer, J. Lyker. Traction engine, J. A. Stout Transom lifter, J. M. Axtmann Tubing, armor for flexible, H. Wakeman Tug, hame, G. Hazlewood et al. Tugs, spring link for draught, J. F. Miller. Vehicle baggage attachment, E. J. Osborne. Vehicle wheel, O. J. Baldwin. Velocipede, N. S. C. Perkins. Vermin trap or insulator, E. P. Denton. Vesseis, machine for unloading, F. Imhorst. Wagon brake, W. C. Kohler Wagon seat corner iron, R. A. Morse Wash board, Epeneter & Grahl (r).	223,230 223,221 223,310 223,398 223,297 223,315 223,215 223,215 223,215 223,215 223,215 223,215 223,215 223,216 223,236 223,236 223,262 223,262 223,262 223,370 224,241 223,396 223,396 223,396 223,396 223,396 223,396 223,396 223,396 223,396 223,396 223,396 223,396 223,396 223,396 223,396 223,396 223,396 223,396 223,323 223,396
Stone dressing and paneling machine, N. Jenkins Stool, camp, A. S. Drisko Stove, cooking, G. Wellhouse Stove fount, gasoline, G. W. Billings Stove oil, D. Shields Street sweeper, E. G. Rock Sulky, trotting, T. H. Brown Tap or nipple for water and gas mains, T. B. Farrington Telegraph repeater, fire alarm, Rogers & Crane Telephone transmitter, J. H. Irwin Tobacco drying machine, G. B. F. Cooper Toy savings bank, E. L. Morris Trace supporter, A. Fellows et al Track clearer, J. Lyker Traction engine, J. A. Stout Transom lifter, J. M. Axtmann Tubing, armor for flexible, H. Wakeman Tug, hame, G. Hazlewood et al Tugs, spring link for draught, J. F. Miller Vehicle baggage attachment, E. J. Osborne Vehicle wheel, O. J. Baldwin Velocipede, N. S. C. Perkins Vert valve for barrels. C. Shabley Vermin trap or insulator, E. P. Denton Vessels, machine for unloading, F. Imhorst Wagon brake, W. C. Kohler Wagon seat corner iron, R. A. Morse Wash board, Epeneter & Grahl (r) Wash board, J. M. Gorham	228,230 223,221 223,310 223,398 223,398 223,297 223,215 223,215 223,221 223,319 223,352 223,352 223,365 223,365 223,365 223,365 223,365 223,365 223,365 223,365 223,365 223,378 223
Stone dressing and paneling machine, N. Jenkins Stool, camp, A. S. Drisko	223,230 223,221 223,321 223,398 223,398 223,297 223,215 223,248 223,352 223,323 223,323 223,323 223,323 223,323 223,323 223,326 223,305 223,306 223,306 223,306 223,306 223,306 223,306 223,306 223,306 223,306 223,306 223,306 223,306 223,306 223,306 223,307 224,241 223,306 223,306 223,306 223,306 223,307 224,241 223,306 223,306 223,306 223,306 223,306 223,306 223,306 223,306 223,306 223,306 223,306 223,306 223,306 223,306 223,307 224,241 223,306 223,306 223,307 223,308 223,308 223,308 223,308 223,308 223,308 223,308 223,308 223,208 223,308 223,308 223,208 223
Stone dressing and paneling machine, N. Jenkins Stool, camp, A. S. Drisko Stove, cooking, G. Wellhouse Stove fount, gasoline, G. W. Billings Stove fount, gasoline, G. W. Billings Stove oil, D. Shields Street sweeper, E. G. Rock Sulky, trotting, T. H. Brown Tap or nipple for water and gas mains, T. B. Farrington Telegraph repeater, fire alarm, Rogers & Crane Telephone transmitter, J. H. Irwin Tobacco drying machine, G. B. F. Cooper Toy savings bank, E. L. Morris Trace supporter, A. Fellows et al Track clearer, J. Lyker Tracton engine, J. A. Stout Transom lifter, J. M. Axtmann Tuling, armor for flexible, H. Wakeman Tug, hame, G. Hazlewood et al Tugs, spring link for draught, J. F. Miller Vehicle baggage attachment, E. J. Osborne Vehicle wheel, O. J. Baldwin Velocipede, N. S. C. Perkins Vern valve for barrels. C. Shabley Vermin trap or insulator, E. P. Denton Vessels, machine for unloading, F. Imhorst Wagon brake, W. C. Kohler Wagon seat corner iron, R. A. Morse Wash board, J. M. Gorham Watch and clock movement, E. Ware Watcheand clocks, spring power for, E. Ware Watcheand clocks, spring power for, E. Ware Watcheand clocks, spring power for, E. Ware	228,230 228,221 228,420 228,310 223,398 223,271 223,215 223,215 223,221 223,215 223,221 223,221 223,221 223,222 223,305 223,2365 223,305 223,262 223,305 223,262 223,306 223,232 223,232 223,232 223,232 223,232 223,232 223,232 223,232 223,233 223,233 223,233 223,234 9,022 223,338 223,417 223,231 223,231 223,231 223,231 223,231 223,231 223,231 223,232 223,2338 223,231 223,231 223,231 223,231 223,231 223,
Stone dressing and paneling machine, N. Jenkins Stool, camp, A. S. Drisko	228,230 223,221 223,310 223,398 223,398 223,275 223,215 223,327 223,248 223,352 223,319 223,365 223,370
Stone dressing and paneling machine, N. Jenkins Stool, camp, A. S. Drisko Stove, cooking, G. Wellhouse Stove fount, gasoline, G. W. Billings Stove, oil, D. Shields. Street sweeper, E. G. Rock. Sulky, trotting, T. H. Brown. Tap or nipple for water and gas mains, T. B. Farrington Telegraph repeater, fire alarm, Rogers & Crane. Telephone transmitter, J. H. Irwin. Tobacco drying machine, G. B. F. Cooper. Troy savings bank, E. L. Morris. Trace supporter, A. Fellows et al. Track clearer, J. Lyker Traction engine, J. A. Stout Transom lifter, J. M. Axtmann Tubing, armor for flexible, H. Wakeman Tugs, spring link for draught, J. F. Miller Vehicle baggage attachment, E. J. Osborne. Vehtcle wheel, O. J. Baldwin. Velocipede, N. S. C. Perkins. Vent valve for barrels. C. Shabley. Vermin trap or insulator, E. P. Denton. Vessels, machine for unloading, F. Imhorst. Wagon brake, W. C. Kohler Wagon seat corner iron, R. A. Morse Wash board, Epeneter & Grahl (r) Wash board, J. M. Gorham Watch and clock movement, E. Ware Watchmaker's tool, J. D. Allen. Watches and clocks, spring power for, E, Ware. Watchmelel, turbine, W. Mercer Windmill, J. F. Barker	223,230 223,221 223,310 223,398 223,297 223,248 223,352 223,319 223,352 223,319 223,365 223,365 223,365 223,365 223,365 223,365 223,370 223,378 223,380 223,380 223,380 223,380 223,380 223,380 223,380
Stone dressing and paneling machine, N. Jenkins Stool, camp, A. S. Drisko	228,230 223,221 223,310 223,338 223,237 223,215 223,327 223,248 223,352 223,319 223,365 223,305 223,305 223,307 224,241 223,350 223,378 223,307 224,241 223,350 223,378 223,307 224,241 223,350 223,378 223,307 224,241 223,350 223,378 223,307 224,241 223,366 223,378 223,307 224,241 223,386 223,378 223,387 223,387 223,380 223,378 223,380 223,378 223,380 223,378 223,380 223,378 223,380 223,378 223,380 223,378 223,380 223,378 223,380 223,378
Stone dressing and paneling machine, N. Jenkins Stool, camp, A. S. Drisko	223,230 223,221 223,310 223,398 223,297 223,297 223,248 223,352 223,319 223,365 223,305 223,305 223,305 223,307 224,241 223,352 223,366 223,307 224,241 223,352 223,365 223,367 224,241 223,361 223,367 224,241 223,361 223,362 223,363 223,363 223,363 223,363 223,363 223,363 223,363 223,363
Stone dressing and paneling machine, N. Jenkins Stool, camp, A. S. Drisko Stove, cooking, G. Wellhouse. Stove fount, gasoline, G. W. Billings Stove, oil, D. Shields Street sweeper, E. G. Rock Sulky, trotting, T. H. Brown Tap or nipple for water and gas mains, T. B. Farrington Telegraph repeater, fire alarm, Rogers & Crane Telephone transmitter, J. H. Irwin Tobacco drying machine, G. B. F. Cooper Toy savings bank, E. L. Morris Trace supporter, A. Fellows et al Track clearer, J. Lyker Tracto engine, J. A. Stout Transom lifter, J. M. Axtmann Tubing, armor for flexible, H. Wakeman Tug, hame, G. Hazlewood et al Tugs, spring link for draught, J. F. Miller. Vehicle baggage attachment, E. J. Osborne. Vehicle wheel, O. J. Baldwin Velocipede, N. S. C. Perkins Vent valve for barrels. C. Shabley. Vermin trap or insulator, E. P. Denton Vessels, machine for unloading, F. Imhorst Wagon brake, W. C. Kohler Wagon seat corner iron, R. A. Morse Wash board, J. M. Gorham Watch and clock movement, E. Ware Watchmaker's tool, J. D. Allen Watches and clocks, spring power for, E. Ware Waterwheel, turbine, W. Mercer Windmill, J. F. Barker Windmill, J. F. Barker Windmill, W. H. B. Page Windown Screen, G. Hartig Wood bending machine, S. R. Balley	228,230 223,231 223,310 223,398 223,391 223,398 223,27 223,215 223,248 223,352 223,393 223,323
Stone dressing and paneling machine, N. Jenkins Stool, camp, A. S. Drisko Stove, cooking, G. Wellhouse Stove fount, gasoline, G. W. Billings Stove, oil, D. Shields Street sweeper, E. G. Rock Sulky, trotting, T. H. Brown Tap or nipple for water and gas mains, T. B. Farrington Telegraph repeater, fire alarm, Rogers & Crane. Telephone transmitter, J. H. Irwin Tobacco drying machine, G. B. F. Cooper Toy savings bank, E. L. Morris Trace supporter, A. Fellows et al Track clearer, J. Lyker Traction engine, J. A. Stout Transom lifter, J. M. Axtmann Tubing, armor for flexible, H. Wakeman Tugs, spring link for draught, J. F. Miller. Vehicle baggage attachment, E. J. Osborne Vehicle wheel, O. J. Baldwin Velocipede, N. S. C. Perkins Vermin trap or insulator, E. P. Denton. Vessels, machine for unloading, F. Imhorst Wagon brake, W. C. Kohler Wagon seat corner iron, R. A. Morse Wash board, J. M. Gorham Watch and clock movement, E. Ware Watchmaker's tool, J. D. Allen Watchwheel, turbine, W. Mercer Windmill, J. F. Barker Windmill, W. H. B. Page Windmill, W. H. B. Page Windmill, W. H. B. Page Windmill, E. S. Stahley Wood bending machine, S. R. Bailey Wool washing machine, F. G. Sargent	228,230 223,231 223,310 223,398 223,391 223,398 223,27 223,215 223,248 223,352 223,393 223,323
Stone dressing and paneling machine, N. Jenkins Stool, camp, A. S. Drisko	223,230 223,221 223,310 223,398 223,297 223,215 223,327 223,248 223,352 223,319 223,365 223,305 223,305 223,305 223,307 224,241 223,319 224,321 223,326 223,326 223,326 223,326 223,326 223,321 223,326 223,321 223,326 223,321 223,326 223,321 223,326 223,321 223,326 223,321 223,326 223,321
Stone dressing and paneling machine, N. Jenkins Stool, camp, A. S. Drisko Stove, cooking, G. Wellhouse Stove fount, gasoline, G. W. Billings Stove, oil, D. Shields Street sweeper, E. G. Rock Sulky, trotting, T. H. Brown Tap or nipple for water and gas mains, T. B. Farrington Telegraph repeater, fire alarm, Rogers & Crane Telephone transmitter, J. H. Irwin Trobacco drying machine, G. B. F. Cooper Toy savings bank, E. L. Morris Trace supporter, A. Fellows et al Track clearer, J. Lyker Tracto engine, J. A. Stout Transom lifter, J. M. Axtmann Tubing, armor for flexible, H. Wakeman Tug, hame, G. Hazlewood et al Tugs, spring link for draught, J. F. Miller. Vehicle baggage attachment, E. J. Osborne. Vehicle wheel, O. J. Baldwin Velocipede, N. S. C. Perkins Vent valve for barrels. C. Shabley. Vermin trap or insulator, E. P. Denton Vessels, machine for unloading, F. Imhorst Wagon brake, W. C. Kohler Wagon seat corner iron, R. A. Morse Wash board, Epeneter & Grahl (r). Wash board, J. M. Gorham Watch and clock movement, E. Ware Watchmaker's tool, J. D. Allen Watches and clocks, spring power for, E. Ware Waterwheel, turbine, W. Mercer Windmill, J. F. Barker Windmill, J. F. Barker Windmill, W. H. B. Page Windmill, E. S. Stahley Wood bending machine, S. R. Bailey Wood bending machine, S. R. Bailey Wool washing machine, F. G. Sargent	228,230 223,231 223,382 223,398 223,398 223,297 223,215 223,215 223,223 223,231 223,232 223,393 223,383 223,365 223,305 223,262 223,370 224,241 223,396 223,370 224,241 223,396 223,381 223,282 223,383 223,383 223,385 223,381
Stone dressing and paneling machine, N. Jenkins Stool, camp, A. S. Drisko Stove, cooking, G. Wellhouse Stove fount, gasoline, G. W. Billings Stove, oil, D. Shields Street sweeper, E. G. Rock Sulky, trotting, T. H. Brown Tap or nipple for water and gas mains, T. B. Farrington Telegraph repeater, fire alarm, Rogers & Crane Telephone transmitter, J. H. Irwin Trobacco drying machine, G. B. F. Cooper Toy savings bank, E. L. Morris Trace supporter, A. Fellows et al Track clearer, J. Lyker Tracto engine, J. A. Stout Transom lifter, J. M. Axtmann Tubing, armor for flexible, H. Wakeman Tug, hame, G. Hazlewood et al Tugs, spring link for draught, J. F. Miller. Vehicle baggage attachment, E. J. Osborne. Vehicle wheel, O. J. Baldwin Velocipede, N. S. C. Perkins Vent valve for barrels. C. Shabley. Vermin trap or insulator, E. P. Denton Vessels, machine for unloading, F. Imhorst Wagon brake, W. C. Kohler Wagon seat corner iron, R. A. Morse Wash board, Epeneter & Grahl (r). Wash board, J. M. Gorham Watch and clock movement, E. Ware Watchmaker's tool, J. D. Allen Watches and clocks, spring power for, E. Ware Waterwheel, turbine, W. Mercer Windmill, J. F. Barker Windmill, J. F. Barker Windmill, W. H. B. Page Windmill, E. S. Stahley Wood bending machine, S. R. Bailey Wood bending machine, S. R. Bailey Wool washing machine, F. G. Sargent	228,230 223,231 223,310 223,398 223,391 223,398 223,27 223,215 223,223 223,231 223,323 223,323 223,323 223,323 223,323 223,323 223,323 223,323 223,323 223,323 223,323 223,321 223,321 223,321 223,321 223,321 223,321 223,321 223,321 223,321 223,321 223,321 223,321 223,321 223,321 223,321 223,321 223,321 223,321 223,323 223,323 223,323 223,323 223,323 223,324 223,235 223,325 223,325 223,326 223,327 223,326 223,327 223,326 223,327 223,326 223,327 223,326 223,327 223,326
Stone dressing and paneling machine, N. Jenkins Stool, camp, A. S. Drisko Stove, cooking, G. Wellhouse Stove fount, gasoline, G. W. Billings Stove, oil, D. Shields Street sweeper, E. G. Rock Sulky, trotting, T. H. Brown Tap or nipple for water and gas mains, T. B. Farrington Telegraph repeater, fire alarm, Rogers & Crane Telephone transmitter, J. H. Irwin Tobacco drying machine, G. B. F. Cooper Troy savings bank, E. L. Morris Trace supporter, A. Fellows et al Track clearer, J. Lyker Tracton engine, J. A. Stout Transom lifter, J. M. Axtmann Tubing, armor for flexible, H. Wakeman Tug, hame, G. Hazlewood et al Tugs, spring link for draught, J. F. Miller. Vehicle baggage attachment, E. J. Osborne. Vehicle wheel, O. J. Baldwin Velocipede, N. S. C. Perkins Vermin trap or insulator, E. P. Denton Vessels, machine for unloading, F. Imhorst Wagon brake, W. C. Kohler Wagon seat corner iron, R. A. Morse Wash board, J. M. Gorham Watch and clock movement, E. Ware Watchmaker's tool, J. D. Allen Watchwheel, turbine, W. Mercer Windmill, W. H. B. Page Windmill, E. S. Stahley Wood bending machine, S. R. Balley Wood bending machine, F. G. Sargent DESIGNS. Card baskets or ornaments, L. O. Koones Neck ruching, H. Schild	228,230 223,231 223,310 223,398 223,391 223,398 223,27 223,215 223,223 223,231 223,323 223,323 223,323 223,323 223,323 223,323 223,323 223,323 223,323 223,323 223,323 223,321 223,321 223,321 223,321 223,321 223,321 223,321 223,321 223,321 223,321 223,321 223,321 223,321 223,321 223,321 223,321 223,321 223,321 223,323 223,323 223,323 223,323 223,323 223,324 223,235 223,325 223,325 223,326 223,327 223,326 223,327 223,326 223,327 223,326 223,327 223,326 223,327 223,326
Stone dressing and paneling machine, N. Jenkins Stool, camp, A. S. Drisko	228,230 223,221 223,310 223,398 223,398 223,215 223,321 223,215 223,221 223,221 223,319 223,322 223,305 223,367 223,211 223,212 223,294 9,022 223,294 9,022 223,294 9,022 223,294 9,022 223,294 9,022 223,294 9,022 223,294 9,022 223,294 9,022 223,294 9,022 223,294 9,022 223,294 9,022 223,294 9,022 223,294 9,022 223,368 223,368 223,368 223,368 223,368 223,368 223,368 223,368 223,368 223,368 223,368
Stone dressing and paneling machine, N. Jenkins Stool, camp, A. S. Drisko	228,230 223,221 223,310 223,338 223,237 223,215 223,327 223,248 223,352 223,319 223,328 223,365 223,367 223,367 223,367 223,368 223,368 223,379 223,368 223,379 223,369 223,379 223,369 223,379 223,366 223,379 223,366 223,379 223,366 223,379 223,366 223,379 223,366 223,379 223,366 223,379 223,366 223,379 223,366 223,379 223,366 223,379
Stone dressing and paneling machine, N. Jenkins Stool, camp, A. S. Drisko Stove, cooking, G. Wellhouse Stove fount, gasoline, G. W. Billings Stove, oil, D. Shields Street sweeper, E. G. Rock Sulky, trotting, T. H. Brown Tap or nipple for water and gas mains, T. B. Farrington Telegraph repeater, fire alarm, Rogers & Crane Telephone transmitter, J. H. Irwin Tobacco drying machine, G. B. F. Cooper Troy savings bank, E. L. Morris Trace supporter, A. Fellows et al Track clearer, J. Lyker Tracton engine, J. A. Stout Transom lifter, J. M. Axtmann Tubing, armor for flexible, H. Wakeman Tug, hame, G. Hazlewood et al Tugs, spring link for draught, J. F. Miller. Vehicle baggage attachment, E. J. Osborne. Vehicle wheel, O. J. Baldwin Velocipede, N. S. C. Perkins Vermin trap or insulator, E. P. Denton Vessels, machine for unloading, F. Imhorst Wagon brake, W. C. Kohler Wagon seat corner iron, R. A. Morse Wash board, J. M. Gorham Watch and clock movement, E. Ware Watchmaker's tool, J. D. Allen Watchwheel, turbine, W. Mercer Windmill, W. H. B. Page Windmill, E. S. Stahley Wood bending machine, S. R. Balley Wood bending machine, F. G. Sargent DESIGNS. Card baskets or ornaments, L. O. Koones Neck ruching, H. Schild	228,230 223,231 223,3310 223,398 223,391 223,398 223,27 223,215 223,223 223,231 223,323
Stone dressing and paneling machine, N. Jenkins Stool, camp, A. S. Drisko Stove, cooking, G. Wellhouse Stove fount, gasoline, G. W. Billings Stove, oil, D. Shields Street sweeper, E. G. Rock Sulky, trotting, T. H. Brown Tap or nipple for water and gas mains, T. B. Farrington Telegraph repeater, fire alarm, Rogers & Crane Telephone transmitter, J. H. Irwin Tobacco drying machine, G. B. F. Cooper Toy savings bank, E. L. Morris Trace supporter, A. Fellows et al Track clearer, J. Lyker Tracton engine, J. A. Stout Transom lifter, J. M. Axtmann Tubing, armor for flexible, H. Wakeman Tug, hame, G. Hazlewood et al Tugs, spring link for draught, J. F. Miller. Vehicle baggage attachment, E. J. Osborne. Vehicle wheel, O. J. Baldwin Velocipede, N. S. C. Perkins Vermin trap or insulator, E. P. Denton Vessels, machine for unloading, F. Imhorst Wagon brake, W. C. Kohler Wagon seat corner iron, R. A. Morse Wash board, J. M. Gorham Watch and clock movement, E. Ware Watchmaker's tool, J. D. Allen Watchmaker's tool, J. D. Allen Watchwale, turbine, W. Mercer Windmill, W. H. B. Page Windmill, E. S. Stahley Window screen, G. Hartig Wood bending machine, S. R. Balley Wood bending machine, F. G. Sargent DESIGNS. Card baskets or ornaments, L. O. Koones Neck ruching, H. Schild TRADE MARKS. Beating and mixing machines, C. Lehmann Corsets, Heilner & Strauss Portable engines, Frick & Co	228,230 223,221 223,310 223,398 223,398 223,215 223,321 223,321 223,321 223,321 223,321 223,321 223,321 223,305 223,367 223,211 223,239 9,022 223,393 223,368 223,378
Stone dressing and paneling machine, N. Jenkins Stool, camp, A. S. Drisko Stove, cooking, G. Wellhouse Stove fount, gasoline, G. W. Billings Stove, oil, D. Shields Street sweeper, E. G. Rock Sulky, trotting, T. H. Brown Tap or nipple for water and gas mains, T. B. Farrington Telegraph repeater, fire alarm, Rogers & Crane Telephone transmitter, J. H. Irwin Trobacco drying machine, G. B. F. Cooper Toy savings bank, E. L. Morris Trace supporter, A. Fellows et al Track clearer, J. Lyker Tracto engine, J. A. Stout Transom lifter, J. M. Axtmann Tubing, armor for flexible, H. Wakeman Tug, hame, G. Hazlewood et al Tugs, spring link for draught, J. F. Miller. Vehicle baggage attachment, E. J. Osborne. Vehicle wheel, O. J. Baldwin Velocipede, N. S. C. Perkins Vent valve for barrels. C. Shabley. Vermin trap or insulator, E. P. Denton Vessels, machine for unloading, F. Imhorst Wagon brake, W. C. Kohler Wagon seat corner iron, R. A. Morse Wash board, Epeneter & Grahl (r). Wash board, J. M. Gorham Watch and clock movement, E. Ware Watchmaker's tool, J. D. Allen. Watches and clocks, spring power for, E. Ware Watchwheel, turbine, W. Mercer Windmill, J. F. Barker Windmill, J. F. Barker Windmill, W. H. B. Page Windmill, G. S. Stahley Wood bending machine, S. R. Balley	228,230 223,221 223,310 223,398 223,398 223,215 223,321 223,321 223,321 223,321 223,321 223,321 223,321 223,305 223,367 223,211 223,239 9,022 223,393 223,368 223,378
Stone dressing and paneling machine, N. Jenkins Stool, camp, A. S. Drisko Stove, cooking, G. Wellhouse Stove fount, gasoline, G. W. Billings Stove, oil, D. Shields Street sweeper, E. G. Rock Sulky, trotting, T. H. Brown Tap or nipple for water and gas mains, T. B. Farrington Telegraph repeater, fire alarm, Rogers & Crane Telephone transmitter, J. H. Irwin Tobacco drying machine, G. B. F. Cooper Toy savings bank, E. L. Morris Trace supporter, A. Fellows et al Track clearer, J. Lyker Tracton engine, J. A. Stout Transom lifter, J. M. Axtmann Tubing, armor for flexible, H. Wakeman Tug, hame, G. Hazlewood et al Tugs, spring link for draught, J. F. Miller. Vehicle baggage attachment, E. J. Osborne. Vehicle wheel, O. J. Baldwin Velocipede, N. S. C. Perkins Vermin trap or insulator, E. P. Denton Vessels, machine for unloading, F. Imhorst Wagon brake, W. C. Kohler Wagon seat corner iron, R. A. Morse Wash board, J. M. Gorham Watch and clock movement, E. Ware Watchmaker's tool, J. D. Allen Watchmaker's tool, J. D. Allen Watchwale, turbine, W. Mercer Windmill, W. H. B. Page Windmill, E. S. Stahley Window screen, G. Hartig Wood bending machine, S. R. Balley Wood bending machine, F. G. Sargent DESIGNS. Card baskets or ornaments, L. O. Koones Neck ruching, H. Schild TRADE MARKS. Beating and mixing machines, C. Lehmann Corsets, Heilner & Strauss Portable engines, Frick & Co	228,230 223,221 223,310 223,398 223,398 223,215 223,321 223,321 223,321 223,321 223,321 223,321 223,321 223,305 223,367 223,211 223,239 9,022 223,393 223,368 223,378
Stone dressing and paneling machine, N. Jenkins Stool, camp, A. S. Drisko	228,230 223,221 223,310 223,398 223,231 223,398 223,251 223,215 223,221 223,221 223,352 223,319 223,328 223,365 223,366 223,366 223,368 223,368 223,376 223,368 223,376 223,368 223,379 223,266 223,379 223,266 223,379 223,266 223,379 223,266 223,379 223,266 223,379 223,270 223,27
Stone dressing and paneling machine, N. Jenkins Stool, camp, A. S. Drisko	228,230 223,231 223,3310 223,398 223,391 223,398 223,231 223,321 223,321 223,321 223,323 223,323 223,323 223,323 223,321

Pigeon trap, W. H. Hawes 228,344

TRADE MARKS

Gimp. J. H. Thorp...... 11.566

 Knit fabrics C. E. Bean
 11,552

 Oil cloth, C. T. & V. E. Meyer
 11,554 to 11,556

Woven fabric, E. Maertens. 11,559 to 11,563

,787
784
786
788
789
,785
,

English Patents Issued to Americans.

From December 19 to December 30, 1879, inclusive. Alarm bells, H. Brown, Charleston, S. C. Axles, G. W. Williams, New York city.

Belt fasteners, O. H. Jones, Hartford, Conn. Bicycles, S. Sawyer, Gardner, Mass. Electric light regulators, C. E. Scribner, Chicago, Ill. Fabric splitter, M. H. Chapin et al., New Yor Firearms, H. A. Buck, West Stafford, Conn. Firearms, O. Jones, Philadelphia, Pa. Firearms, W. Trabue, Louisville, Ky. Gas, O. Lugo et al., Flushing, N. Y. Grain weigher, W. H. Allen, New York city. Guns. E. G. Parkhurst, Hartford. Conn. Harvesting machine, S. Johnston, Brockport, N. Y. Hav press, P. K. Dederick, Albany, N. Y. Lubricators, P. Barclay, Boston, Mass. Neckties, F. J. Flagg, New York city. Pencil holder, J. Reckendorfer, New York city. Railway posts, J. S. Williams, Riverton, N. J. Railroad rail machine, J. S. Williams, Riverton, N. J. Railroad switch operator, J. S. Williams, Riverton, N. J. Retorts, A. Q. Ross, Cincinnati, O. Screw drivers, T. A. Weston, Stamford, Conn. Ships, Z. Oram et al., Philadelphia, Pa. Signal buoys, E. E. Mann, Lawrence, Mass. Spring mattresses, S. H. Reeves, Brooklyn, N. Y. Telephones, J. F. Bailey, New York city. Telephone, A. D. Connolly et al., Philadelphia, Pa. Thread waxing machine, S. B. Ellithorp, Rochester, N.Y. Thread ticketing machine, W. R. Landfear *et al.*, New Toasting iron, C. G. Stafford, Eureka, Cal. Tramway, A. S. Halladie, San Francisco, Cal. York city, Valves, F. Winters, New York city.

Advertisements.

Inside Page, each insertion --- 75 cents a line. Back Page, each insertion --- \$1.00 a line. (About eight words to a line.) Engravings may head advertisements at the same rate per line, by measurement, as the letter press. Advertisements must be received at publication office as early as Thurslay morning to appear in next issue.

The publishers of this paper guarantee to advertisers a circulation of not less than 50,000 copies every weekly issue.

MACHINERY FROM AN INSURANCE Point of View. By H. J. Waters. An able paper, pointing out the various factors which combine to cause a rapid depreciation in the value of all kinds of machinery. Depreciation and fire risks through friction, incompetent workmen, the tension of belting, and dust and dirt. Careful estimates of the amount of depreciation in planing mills; on shafting, hangers, pulleys, and belting; on flouring mills, middlings purifiers, smutters and separators, elevators, cups, and belts, stave and heading factories, and on the heavy machinery used by iron workers. General conclusions of the author as a result of the foregoing study. Contained in SCIENTIFIC AMERICAN SUPPLEMENT, NOS 204 and 205. Price 10 cents each. To be had at this office and from all newsdealers. MACHINERY FROM AN INSURANCE

ICE-HOUSE AND REFRIGERATOR.— Directions and Dimensions for construction, with one illustration of cold house for preserving fruit from season to season. The air is kept dry and pure throughout the year at a temperature of 34° to 36°. Contained in SCIENTIFIC AMERICAN SUPPLEMENT, 116. Price 10 cents. To be had at this office and of all newsdealers.



CAVEATS, COPYRIGHTS, LABEL REGISTRATION, ETC.

Messrs. Munn & Co., in connection with the publication of the Scientific American, continue to examine Improvements, and to act as Solicitors of Patents for

In this line of business they have had OVER THIRTY YEARS' EXPERIENCE, and now have unequaled facilities for the Preparation of Patent Drawings, Specifications, and the Prosecution of Applications for Patents in the United States, Canada, and Foreign Countries. Messrs. Munn & Co. also attend to the preparation of Caveats, Registration of Labels, Copyrights for Books, Labels, Reissues, Assignments, and Reports on Infringements of Patents. All business intrusted to them is done with special care and promptness, on very moderate

We send free of charge, on application, a pamphlet containing further information about Patents and how to procure them; directions concerning Labels, Copyrights, Designs, Patents, Appeals, Reissues, Infringe ments, Assignments, Rejected Cases, Hints on the Sale of Patents, etc.

Foreign Patents .- We also send, free of charge, &. Synopsis of Foreign Patent Laws, showing the cost and, method of securing patents in all the principal countries of the world. American inventors should bear in mindthat, as a general rule, any invention that is valuable to the patentee in this country is worth equally as much in England and some other foreign countries. Five paterts-embracing Canadian, English, German, French, and Belgian-will secure to an inventor the exclusive monopoly to his discovery among about one HUNDRED AND FIFTY MILLIONS of the most intelligent people in the world. The facilities of business and steam communication are such that patents can be obtained abroad by our citizens almost as easily as at home. The expense to apply for an English patent is \$75; German, \$100; French, \$100; Belgian, \$100; Canadian, \$50.

Copies of Patents.-Persons desiring any patent issued from 1836 to November 26, 1867, can be supplied with official copies at reasonable cost, the price depending upon the extent of drawings and length of specifications.

Any patent issued since November 27, 1867, at which time the Patent Office commenced printing the drawings and specifications, may be had by remitting to this office \$1.

A copy of the claims of any patent issued since 1836 will be furnished for \$1.

When ordering copies, please to remit for the same as above, and state name of patentee, title of invention, and date of patent.

A pamphlet, containing full directions for obtaining United States patents sent free. A handsomely bound Reference Book, gilt edges, contains 140 pages and many engravings and tables important to every patentee and mechanic, and is a useful hand book of reference for everybody. Price 25 cents, mailed free.

Address MUNN & CO.,

Publishers SCIENTIFIC AMERICAN, 37 Park Row, New York. BRANCH OFFICE—Corner of F and 7th Streets, Washington, D. C.

Scientific and Practical Books

EVERY ONE.

LIST No. 1.

cioth. A Complete Practical Guide for Coach Painters. 21mo. Cloth. Section 12mo. Cloth. Secti

Binn. A Practical Workshop Companion, for Tin, Sheet Iron, and Copperplate Workers. Over 100 illustrations. 12mo. Cloth. The Marble Worker's Manual. 12mo. Cloth. St. 50

ments. 12mo. Cloth, \$100

Fire above or any of our books sent by mail, free of postage, at the publication prices.

Our new and enlarged CATALOGUE of PRACTICAL AND SCIENTIFIC BOOKS, 96 pages, 8vo; a Catalogue of Books on DyEning, CALIGO PRINTING, WEAVING, COTTON and WOOLEN MANUFACTURE, 4to; Catalogue of a choice collection of PRACTICAL, SCIENTIFIC, and ECONOMIC BOOKS, 4to; List of Books on STEAM AND THE STEAM FINGLE, MECHANICS, MACHINERY, and ENGINERING, 4to, List of Important Books on METALLURGY, METALS, STERNGTH OF MATERIALS. CHEMICAL ANALYSIS, ASSAYING, etc. 4to; List of Books on MINING, MINING MACHINERY, COAL, etc., 4to; two Catalogues of Books and Pamphlets on Social Science, Political Economy, Banks, Popul Ation, Pauperism, and kindred subjects; also a Catalogue of recent additions to our stock of PRACTICAL SCIENTIFIC AND TECHNICAL BOOKS, sent free to any one who will forward his address. HENRY CAREY BAIRD & CO.

ddress.

HENRY CAREY BAIRD & CO.,
Industrial Publishers, Booksellers, and Importers,
810 WALNUT STREET, PHILADELPHIA.



ADVERTISERS

Can learn the exact cost of any proposed line of Advertising in American Papers by addressing Geo. P. Rowell & Co's Newspaper Adv'g Bureau, 10 Spruce St., N. Y.



The Field Glass.

kind—one that ably

SWEPS THE WHOLE HORIZON

of its important field. \$1 a year, Sample copies free

Issued monthly by

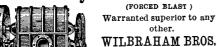
HARTLEY & GRAHAM,

17 and 19 Maiden Lane, New York, N. Y.

GROUND MICA.

The best Lubricator in the world. No more hot boxes. Good for fireproof manufactures of all kinds. Sample package sent to any address on receipt of \$1. Address SALTIEL MICA CO., McLean's Block, St. Louis, Mo.

Baker Rotary Pressure Blower. (FORCED BLAST)



2318 Frankford Ave. PHILADELPHIA

TELEPHONE Works 1 mile. Price \$3.50. Pat'd Circulars free. HOLCOMB & Co., Mallet Creek, Ohio.

Pond's Tools, Engine Lathes, Planers, Drills, &c. DAVID W. POND, Worcester, Mass. Furnace Hoist.

THIS WORK IS VERY RELIABLE. AND IS STRONGLY RECOMMENDED BY THIS PAPER. It is undoubtedly the cheapest work of the kind ever published. The WELL KNOWN REPUTATION OF THE AUTHORIS A SUFFICIENT GUARANTEE OF ITS VALUE.



Allen's Artificers Assistant,

THE KING OF BOOKS! SIZE, 8½ x 6 INCHES; CONTAINS MORE THAN 700 LARGE, CLOSELY PRINTED PAGES; HINDREDS OF ILLUSTRATIONS AND DIAGRAMS; THOUSANDS OF NEW, RARE, AND VALUABLE FORMULAS, RECIPES, TRADE SECRETS, MATHEMATICAL CALCULATIONS, TABLES, BUSINESS FORMS, ETC., REPRESENTING NICARLY EVERY TRADE, PROFESSION, AND OCCUPATION IN CHRISTENDOM, and is a COMPLETE GUIDE IN ALL BRANCHES OF MECHANICAL INDUSTRY.

Fine English Cloth Binding, Handsome Gilt Back...\$2.50 Fine Leather Binding, Library Edition................................. 3.50

WILL BE SENT BY MAIL, POSTAGE PAID, TO ANY PART OF THE WORLD, On receipt of the price. AGENTS WANTED EVERYWHERE. LIBERAL COMMISSIONS PAID. H. B. ALLEN & CO., Publishers, 59 Murray St., New York.

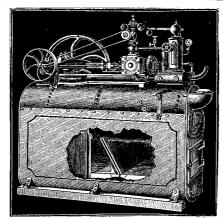
62 All-Chromo and Glass CARDS, 10c. 80 Agents' Samples, 10c. CHROMO CARD CO., Northford, Ct.

\$100 AGAINST \$1.00.

We will deliver free for \$1.00, with full directions, 4 lb. of our cement paint, and will guarantee to the extent of \$100, to cure the most troublesome LEAKS IN ROOPS (if properly applied). This cement paint will make twice as durable, Tan s. Tus, Pails, etc., when lined with it.

B. D. WASHBURN MFG. CO.,

151 & 153 Congress St., Boston, Mass.



PORTABLE AND STATIONARY ENgines and Boilers, 2½ to 15 H. P. Return Flue Boiler, large fire box, no sparks. Do not fail to send for circular to SKINNER & WOOD, Erie, Pa.

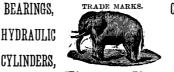
FOR SALE.

Rockville Iron Works. Machine Shop filled with good machinery, Price, \$3,500. Address ISAAC McFADDIN, Rockville, Park Co., Indiana.

PHOSPHOR-BRONZE,

ACKNOWLEDGED to be the BEST METAL for

BEARINGS. HYDRAULIC



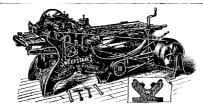
SLIDES, VALVES,

Pump Rods, Phosphor- Peronze. BOLTS, ETC.

Pamphlets and particulars on application to

The Phosphor-Bronze Smelting Co., Limited, 2038 Washington Ave., Phila., Pa.

Sole Manufacturers of Phosphor-Bronze in the U.S.



SWEEPSTAKES, WITH THE SWELFSTAKES, WITH THE EDDIG Patent Journal Box. The best Planer and Matcher ever made. Planing 20 in. wide, 6 in. thick, weight 2,100 lbs. \$300; planing 24 in. wide, 6 in. thick, weight 2500 lbs. \$350. Beading, Arbor, and Head, extra, \$20. Sash, Door, and Blind Machinery a specialty. Send for descriptive catalogue to Rowley & Hermance, Williamsport, Pa.

THE SUTRO TUNNEL. BY ADOLPH Sutro. An interesting address, giving the history of this celebrated mining tunnel, from its inception up to the present time, and the reasons that led to the undertaking; describing the methods that have been used in construction, the difficulties that have been encountered, and the obstacles to progress that have been met with; and prefaced by a valuable account of the discovery of the Comstock lode, and of the geological formations of the gold and silver deposits of California. Contained in SCIENTIFIC AMBRICAN SUPPLEMENT, No. 2005. Price 10 cents. To be had at this office and from all newsdealers.



Bcokwalter Engine.

Compact, Substantial, Economical, and easily managed; guaranteed to work well and give full power claimed. Engine and Boiler complete, including Governor, Pump, etc., at the low price of

RUBBER BACK SQUARE PACKING. BEST IN THE WORLD.

For Packing the Piston Rods and Valve Stems of Steam Engines and Pumps. B represents that part of the packing which, when in use, is in contact with the Piston Rod.

A the elastic back, which keeps the part B against the rod with sufficient pressure to be steam-tight, and yet creates but little friction.

This Packing is made in lengths of about 20 feet, and of all sizes from ½ to 2 inches square.

JOHN H. CHEEVER, Treas. NEW YORK BELTING & PACKING CO., 37 & 38 Park Row, New York.

50 Brilliant, Chromo, and Tortoise Shell Cards, in case. With name, 10c. Outfit, 10c. Hall Bros., Northford, Ct. United States Patent for sale cheap. Well vested. Address C. H. Warrington, Box 486, West Chester, Pa.

PIANOS-ORGANS

CHEAPEST HOUSE IN AMERICA. ist-class instru-ments, all new for cash or installments; warranted 6 years illustrated catalogues free. Agents wanted. T. LEEDS WATERS, Agt., 28 West 14th st., New York.

Roots' Positive Blast Blower.





P. H. & F. M. ROOTS, M'f'rs, Connersville, Ind. S. S. TOWNSEND, Gen. Agt., 6 Cortlandt St. WM. COOKE, Selling Agent, NEW YORK. SEND FOR PRICED CATALOGUE.

Wood-Working Machinery,

Such as Woodworth Planing, Tonguing, and Grooving Machines, Daniel's Planers, Richardson's Patent Improved Tenon Machines, Mortising, Moulding, and Re-Saw Machines, Eastman's Pat. Miter Machines, and Wood-Working Machinery generally. Manufactured by WITHERBY, RUGG & RICHARDSON.

(Shop formerly occupied by R. BALL & CO.)



NEW BOOKS.

Pocket Book for Chemists, Chemical Manufacturers, Metallurgists, Dyers, Distillers, Sugar Refiners, etc. By Thomas Bayley, Concrete: Natural and Artificial. Its varieties and constructive adaptations. By Henry Reid. New edition. with colored plates.

Iron Bridges and Roofs: Elementary theory and calculation of. By August Ritter. Translated from the German by H. R. Sankey.

Electric Light in its Practical Application. By Paget Higgs. 94 illustrations of Lamps, Generators, and Regulators, Ornamental Penman's and Draughtsman's Pocket

or numbers of Lamps, generators, and Reg-gulators.
Ornamental Penman's and Draughtsman's Pocket Book of Alphabets. 32 plates, Industrial Arts and Manufactures. Written by Practical Men and fully Illustrated. Now being issued in parts at 75c. each.
Supplement to Spon's Dictionary of Engineering. Now being issued in parts at 75c. each.

Catalogues and circulars free on application. E. & F. N. SPON, 446 Broome St., New York.



ELEVATORS.

All kinds of Hoisting Machinery a specialty. Steam, Hydraulic, and Belt Power for Passengers and Freight. Iron Furnace Lifts, Portable Hoists. STOKES & PARRISH, 30th and Chestnut St., Phila, Pa.



STEAM PUMPS.

HENRY R. WORTHINGTON,

239 Broadway, N. Y. 83 Water St., Boston. THE WORTHINGTON PUMPING ENGINES FOR WATER WORKS-Compound, Condensing or Non-Condensing. Used in over 100 Water-Works Stations. STEAM PUMPS-Duplex and Single Cylinder.

Prices below those of any other steam pump in the market.

WATER METERS. OIL METERS.

60 Queen Anne and Photo Cards, illuminated and perfumed, in case, 10c. GLOBE PRINT Co., Northford, Ct.



PATENT Steam Hoisting Machines.

Four Sizes-4 to 10 Horse Power. The Four Horse Power will raise 1,200 lb. 150 ft. per minute. Other sizes in proportion.

NOBLE & HALL, ERIE, PA.

JOHN R.WHITLEY & CO European Representatives of American Houses, with First-class Agents in the principal industrial and agricultural centers and cities in Europe. London, 7 Poultry, E.C. Paris, 8 Place Vendôme. Terms on application. J. R. W. & Co. purchase Paris goods on commission at shippers' discounts.

SPARE THE CROTON AND SAVE THE COST. Driven or Tube Wells furnished to large consumers of Croton and Ridgewood Water. WM. D. ANDREWS & BRO., 225 Broadway, N. Y., who control the patent for Green's American Driven Well.



Chase's Pipe Cutting and Threading Machine, for Steam, Gas Fitters, and Machinists for cutting off and threading Pipes, Tubes, Round Iron, Bolts and Nuts, 4 to 2 inches. No pipe splitting. No bevel inside or outside. A boy with this machine can do more work than two men with old system. No other has automatic cutoff or makes nipples. off or makes nipples. and for circular. Chase Mach. Co., 120 Front St., N. Y.

Pin-a-4, Photo, Gilt-Edge, etc., Cards, and 1 Hudson Valley Chromo, 10c. DAVIDS & Co., Northford, Ct.

IMPORTANT TO STEAM USERS.

Great Saving of Fuel. Save repairs and prevent explosion by using the

Peerless Damper Regulator, which regulates the draft automatically, and controls the steam pressure. In ordering mention pressure. Illustrated Catalogue sent on application. Price, \$38.50.

AMERICAN STEAM APPLIANCE CO.

sole manufacturers,

13 and 15 Park Row,

New York.

WATCHES From 82 up; other goods FREE in proportion. Mammoth Illustrated Catalogue FREE E. NASON & CO., 111 Nassau Street, New York.



The Sanitary Engineer

Of JANUARY 15 presents a summary of pa'ents obtained and statements printed in the past by various persons tending to show that Edison has been working in a field already cultivated, indicating that any patents he may obtain on the devices reported must be limited in scope and subject to endless litigation.

Prof. Henry Morton's article on "Water Gas" gives interesting figures of cost of manufacture and results of experiments on comparative illuminating power of water and simple coal gas.

The same issue contains a variety of other matter interesting to Sanitarians, Architects, Engineers, and intelligent readers generally.

Issued on the Istand 15th of each month. Subscription price, \$2 per year; \$1 for six months; single copies, 10 cents. Forsale by all enterprising newsdealers. Published at 140 William Street, New York. P. O. Box 3037.

YOUR NAME and ADDRESS on 50 Gilt, Duplex, etc., Cards, in case, 15c. DAVID BROS., Northford, Ct.

AN ELEGANT IMPORTED OLE BULL VIOLIN.



fully Illust'd 20 page Catalogue of Foreign Musical Instruments. Chas. W. Story, 26 Central St. Boston, Mass.

THE NORWALK IRON WORKS CO., SOUTH NORWALK, CONN.

60 New Styles Chromo and Floral Cards, in case, 10c.80 agts.'s amples, 10c.8 tevens Bros., Northford, t.PARTNER WANTED.—A PRACTICAL Foundryman, Machinist, or Accountant, competent to take charge. Business established in 1869. Good locality. Plenty of Work. Capital required, \$8,000 to \$6,000. Address SPARTA IRON WORKS, Sparta, Wis.

WANTED-DRAPER, DESIGNER, AND UPHOL-sterer. Give particulars and references, and address, H. EGER, care P. O. Box 387, Cincinnati, O.

THE BEST ARE THE CHEAPEST.
THE



FLEETWOOD and DEXTER SCROLL SAWS.

Warranted the most Accurate and Durable. The TRUMP Lathe CHUCK, for small drills—¼ and under. 3 jaws, self-centering, strong, and true. Price \$1.50 to \$2.25. Send for circular.

TRUMP BROS. MACHINE CO., Wilmington, Del.

EUROPE AND HOLY LAND.
THIRD EDUCATIONAL EXCURSION, 1880.
All Travel and Hotels first-class. COMPANY
SELECT. Unsurpassed advantages. Prospectus sent
free. Address E. TOURJEE, Boston, Mass.

FOR SALE.—4 Boilers, 24 feet long, 6 feet diameter, 80 horse power each—A 1 condition and make.

Also 1 Berryman Feed Water Heater 42x96; 2 Evans'
Power Presses, and a lot Woolen Machinery; all for sale cheap. Apply to D. L. EINSTEIN, 167 Church St., New York.

WANTED-MOULD MAKER FOR BRASS AND IRON. Address, with reference, J. HENDLES, care P. O. Box

HEALTH LIFT.—Mans' reactionary, also five large Electro-Magnets, weight 12 lb. each, fiat cores, will sell cheap. L. HOMAN, 58 Fourth Street, Cincinnati, O.

1,000 per cent. profit, manufacturing our patent Anti-cense granted for \$\forall years, covering any county for \$5.00; any township for \$1.00, including sample, carriage baid, Address \$AUDER & CO., Birmingham, Eric Co., Ohio.





2-H. P. Eureka, \$150. 6 " "

B.W.Payne Sons, Corning, N.Y.



Advertisements.

Inside Page, each insertion --- 75 cents a line. Back Page, each insertion --- \$1.00 a line. (About eight words to a line.)

Engravings may head advertisements at the same rate per time, by measurement, as the letter press. Advertisements must be received at publication office as early as Thursday morning to appear in next issue.

The publishers of this paper guarantee to advertisers a circulation of not less than 50,000 copies every weekly issue.



WOOD SOLE SHOES The cheapest, most durable, warm, good looking, and thoroughly waterproof shoe. Particularly adapted to Brewers, Miners, and all classes of laborers. Send for circular to

CHAS. W. COPELAND, 122 Summer St., Boston, Mass.

FRIEDMANN'S PATENT EJECTORS

Are the cheapest and most effective machines in the market for

Elevating Water and Conveying Liquids

from Mines, Quarries, Ponds, Rivers, Wells, Wheel Pits; for use in R. R. Water Stations, Factories, etc. They are splendidly adapted for conveying liquids in Breweries, Distilleries, Sugar Refineries, Paper Mills, Tanneries, Chemical Works, etc. Send for illus. catalogue to

NATHAN & DREYFUS, anufacturers, NEW YORK.



Established 1844.

JOSEPH C. TODD, Successor to TODD & RAFFERTY PATERSON, N. J., Engineer and Machinist.

Flax, Hemp, Jute, Rope, Oakum and Bagging Machinery. Steam En-gines, Boilers, etc. Sole Agent for Mayher's New Patent Acme Steam Engine and Force Pumps combined. Also owner and exclusive manufactu-rer of

THE NEW Baxter Patent Portable Steam Engine.

These engines are admirably adapted to all kinds of light power for driving printing presses, pumping water, sawing wood, grinding coffee, ginning cotton, and all kinds of agricultural and mechanical purposes, and are furnished at the following low prices:

1 Horse Power, \$135 | 1½ Horse Power, \$175 | 2½ Horse Power, \$25 | 2½ Horse Power, 250 | 3 Horse Power, 270 | 4 Horse Power, 325

J. C. TODD,

PATERSON, N. J.

Or No. 10 Barclay St., New York.

COLUMBIA BICYCLE.



A practical road machine. Indorsed by the medical profession as the most healthful of outdoor sports. It aug-ments three-fold the locomotive power of any ordinary man. Send 3c, stamp for 24 page catalogue, with price list and full information.

THE POPE M'F'G CO., 89 Summer Street, Boston, Mass.

COOK'S GRAND EXCURSIONS to

For the Summer of

1880 ANNUAL MAY PARTY,
GRAND ANNUAL EDUCATIONAL VACATION PARTY. ANNUAL MIDSUMMER PARTY.

Pamphlet containing full particulars, with MAP OF EUROPE, sent free on application. Tourist Tickets, for Independent Travelers, by all routes

Cook's Excursionist contains fares for over 1,000 tours; by mail, 10 cents.

Address, THOMAS COOK & SON, 26l Broadway, New York. P. O. Box 4197.



SHEPARD'S CELEBRATED \$\$50 Screw Cutting Foot Lathe. Foot and Power Lathes, Drill Presses, Scrolls, Circular and Band Saws, Saw Attachments, Chucks, Mandrels, Twist Drills, Dogs, Calipers, etc. Send for catalogue of outfits for amateurs or artisans.

H. L. SHEPARD & CO., 331, 333, 335, & 337 West Front Street Cincinnati, Ohio.

The George Place Machinery Agency Machinery of Every Description. 121 Chambers and 103 Reade Streets, New York,

HARDWARE, WOODENWARE,

and NOVELTIES suitable for European markets. Price lists and lowest cash discounts wanted by an Exporting House having branch in Europe. Would be glad to correspond with manufacturers of staple goods or patent articles, with a view of taking sole agency. Have facilities for reaching the best houses in Europe. Address

MANUFACTURER,

December 3. The Control of the P. O. Box 3248, New York City.

80 Samples Photo, Duplex, etc. Cards, 10c. Autograph Album, 13c. CONN. CARD Co., Northford, Ct.



The attention of Architects, Engineers, and Builders is called to the great decline in prices of wrought STRUCTURAL IRON.

It is believed that, were owners fully aware of the small difference in cost which now exists between iron and wood, the former, in many cases, would be adopted, thereby saving insurance and avoiding all risk of interruption to business in consequence of fire. Book of detailed information furnished on application.

WITH THE "AIR SPACE" IMPROVEMENTS. THE CHALMERS-SPENCE CO., Foot E. 9th St., New York. Sole owners of the Air Space Patents

WIRE ROPE

Address JOHN A. ROEBLING'S SONS, Manufacturers, Trenton, N. J., or 117 Liberty Street, New York. Wheels and Rope for conveying power long distances Send for circular.

Gear Molding without Patterns

Scott's Gear Moulding Machines,

AIR COMPRESSORS & ROCK DRILLS. DELAMATER IRON WORKS, Boiler Makers, Engine Builders, and Founders,

FOOT OF W. 13th ST., North River, NEW YORK. ESTABLISHED 1841.

\$777 A YEAR and expenses to agents. Outfit Free. Address P. O. VICKERY, Augusta, Maine.



ICE-HOUSE AND COLD ROOM.—BY R. G. Hatfield. With directions for construction. Four engravings. Contained in SCIENTIFIC AMERICAN SUPPLEMENT, 59. Price 10 cents. To be had at this office and of all newsdealers.

Mill Stones and Corn Mills.

We make Burr Millstones, Portable Mills, Smut Machines, Packers, Mill Picks, Water Wheels, Pulleys, and Gearing specially adapted to Flour Mills. Send for catalogue.

J. T. NOYE & SON, Buffalo, N. Y.

FLIGHT AND ITS IMITATION. -FLIGHT AND ITS IMITATION.—BY
Fred. W. Brearey, Hon. Sec. of the Æronautical Society
of Great Britain. An interesting essay, discussing the
present status of the question as to the possibility of
ærial locomotion being accomplished by man; pointing
out the mechanical conditions of flight which must be
thoroughly understood before they are attainable, and
explaining the various reasons on which those who are
working at the problem found their hopes of ultimate
success. Contained in SCIENTIFIC AMERICAN SUPPLEMENT, NO. 207. Price 10 cents. To be had at this office
and from all newsdealers.



THE Eclipse Engine
Furnishes steam power for all Agricultural purposes, Driving Saw Mills, and for every use where a first-class and economical Engine is required. Eleven first-class premiums awarded, including Centennial, 76. Refer to No. 7, issue of 77, No. 14, issue of 78, of Scitorial illustrations.

FRICK & CO., Waynesboro, Franklin Co., Pa. When you write please name this paper.

PHOTOGRAPH VISITING CARDS, Send 10c. for circular and 80 samples. SEAVY BROS., Northford, Ct.

BOYLE ICE MACHINE CO.,

10 N. Jefferson St., Chicago, Ill.
The best Ice and Refrigerating Machines of all sizes and for all purposes guaranteed. Send for circular.

DROP HAMMERS. STILES & PARKER PRESS CO., Middletown, Conn

Working Models And Experimental Machinery, Metal or Wood, made to order by J. F. WERNER, 62 Centre St., N. Y.



MACHINISTS' TOOLS. New AND IMPROVED PATTERNS. Send for new illustrated catalogue.

Lathes, Planers, Drills, &c.
NEW HAVEN MANUFACTURING CO.,
New Haven, Conn.

PRINCIPLES OF HORSE SHOEING.—
By Geo. Fleming, V.S. A paper describing the proper method of shoeing horses so that the animal's feet may be kept always healthy and sound. How much the walls of the hoof should be reduced, and how the operation should be performed; the kind of shoes that should be selected; how they should be fitted; the number and size of nails that should be used, and how the face of the hoof should be treated. Followed by a description of a modified form of the "Charlier" method as successfully followed by the author for many years. Contained in SCIENTIFIC AMERICAN SUPPLEMENT, No. 205.
Price il cents. To be had at this office and from all newsdealers.

nm iunic, H.M.JUDA ASBESTOS

Liquid Paints, Roofing, Boiler Coverings, Steam Packing, Sheathings, Fire Proof Coatings, Cements, &c. SEND FOR DESCRIPTIVE PRICE LIST.

H.W.JOHNS M'F'C CO. 87 MAIDEN LANE, N.Y.

\$2 WATCHES. Cheapest in the known world. Address COULTER & CO., Chicago.

62 Gold, Crystal. Lace, Perfumed, and Chromo Cards, name in Gold & Jet 10c. Clinton Bros. Clinton ville, Ct.

PERFECT

NEWSPAPER FILE

The Koch Patent File, for preserving newspapers, magazines, and pamphlets, has been recently improved and price reduced. Subscribers to the SCIENTIFIC AMERICAN SUPPLEMENTCAN be supplied for the low price of \$1.50 by mail, or \$1.25 at the office of this paper. Heavy board sides; inscription "SCIENTIFIC AMERICAN," in gilt. Necessary for every one who wishes to preserve the paper.

MUNN & CO.,

Publishers SCIENTIFIC AMERICAN.

HARTFORD

STEAM BOILER

Inspection & Insurance COMPANY.

W.B. FRANKLIN. V. Pres't. J. M. ALLEN, Pres't. J. B. PIERCE, Sec'y.



THE FORSTER-FIR THE FORSTER-FIRAMIN GOLD AND SILVER AMALGAMATING COMP'Y of Norristown, Pa., will grant state rights or licenses on easy terms. This system works up to assay, and recovers the mercury rapidly.

Apply as above.

ORGAN BEATTY PIANO
New Organs 33 Stops, 3 set Golden Tongue Reeds, 5 Oct's, 2
Knee Swells, Walnut Case, warn'd 6 years, Stool & Book \$98.
New Pianos, \$443 to \$255. \$2^5 Newspaperent FreeAddress Daniel F. Beatty, Washington, New Jersey.

Pyrometers. For showing heat of Ovens, Hot Blast Pipes, Boiler Flues, Superheated Steam, Oil Stills, etc.
HENRY W. BULKLEY, Sole Manufacturer, 149 Broadway, N. Y.

SALESMEN 5125 A Month and Expenses SAMPLES FREE CHARS WANTED Samples FREE CHARS SAMPLES FREE CHARS SAMPLES FREE CHARS FREE CHARS SAMPLES FREE CHARS FREE CHARS FREE CO., Cincinnation



THE PICTET
ARTIFICIAL ICE COMPANY, Limited,
Ice Machines to make from 20 pounds per hour to 50 tons
per day, at 36 Cortlandt St., New York. P.O. Box 3083.

NEW AND 2D-HAND ENGINES AND BOILERS CHEAF for cash. O. B. GOODWIN, Oil City, Pa.

For steep or flat roofs. Applied by ordinary workmen at one-third the cost of tin. Circulars and samples free T. NEW, 32 John Street, New York.



Vertical and Horizontal Engines. with Waters' Governor, equal to any in simplicity, du-rability, and efficiency. Other sizes from 10 to 30 H. P. at prices equally low. For illustrated circular, address

HEALD, SISCO & CO., Baldwinsville, N. Y.

DELAWARE RIVER GUNNING SKIFF. DELAWARE RIVER GUNNING SKIFF.

—Detailed description, accompanied by figures drawn to a scale, showing the mode of construction of a "duck boat" or "gunning skiff," which cannot fail to recommend itself to sportsmen. These boats are 12 to 15 feet long, the smaller being best for two persons, while the larger makes an excellent rowboat for hunting, fishing, and pleasure. Owing to their light weight and flat bottom they may be pushed over the mud where there is not enough water to float them, or may be easily dragged over grasses or sedges at portages without injury. Contained in Scientific American Supplement, No. 2007. Price 10 cents. To be had at this office and from all newsdealers.

VALUABLE PATENT CHEAP FOR CASH. Revolving Sulkey Harrow. Parented 1876. All territory with exception of Hansas and Missouri. Single States or all. Fortune for right parties. Send for circulars. G. B. GABLE, Corpus Christi, Texas.

50,000 Agents wanted by 1,000 advertisers in the Agents' Herald, Box 5, Philadelphia, Pa.



An engine that works without Boiler. Always ready to be started and to give at once full power of the CONVENTENCE.

SAFETY, ECONOMIY,

CONVENTENCE.

Burns common Gas and Air. No steam no coal, no ashes, no fires, no danger, no extra insurance.

Almost no attendance.

THE NEW OTTO SILENT GAS ENGINE. Useful for all work of small stationary steam engine. Bullt in sizes of 2, 4, and 7 H. P. by SCHLEICHER, SCHUMM & CO., 3045 Chestnut Street, Phila., Pa H. S. Manning & Co., 1114Liberty St., N. Y., Agents.

Cigar Box Lumber, MANUFACTURED by our NEW PATENT PROCESS. The Best in the World. SPANISH CEDAR, MAHOGANY, POPLAR.

Also thin lumber of all other kinds, ½ to ½ in., at corresponding prices. All qualities. Equal in all respects to any made, and at prices much under any to be obtained outside of our establishment. Send for price list.

GEO. W. READ & CO., 186 to 200 Lewis Street, N. Y.



A New Spinning Band.

ROWBOTTOM'S PATENT DOUBLE LOOPED SPINNING BAND. Suitable for all kinds of Soin-ming and Doubling Frames for Woolen, Worsted, Cotton, Flax.or other fibrous substances. IS FREE FROM KNOTS, neat, speedly adjusted, runs steadily, and avoids the annoyance of Lint. Price, fifty cents per pound, delivered at the mill. Sample orders solicited, State kind of machinery, diameter of Driving Cylinder, and actual length required when in operation.

STODDARD, LOVERING &-CO., Sole Agents, No. 10 Milk Street, Boston, Mass.

THE TANITE CO., STROUDSBURG, PA.

EMERY WHEELS AND CRINDERS.

LONDON-9 St. Andrews St., Holborn Viaduct, E. C.

LIVERPOOL-42 The Temple, Dale St.

ROCK DRILLING MACHINES AIR COMPRESSORS,
MANUFACTURED BY BURLEICHROCK DRILL CO.
COND. FOR PAMPHLET. FITCHBURG MASS.

THE DRIVEN WELL.

Town and County privileges for making Driven Wells and selling Licenses under the established American Driven Well Patent, leased by the year to responsible parties, by

WM. D. ANDREWS & BRO., 235 BROADWAY, NEW YORK.



DYKES'BEARD ELIXIR

Grain Speculation! Write W. T. SOULE & CO., Commission Merchants, 130 La Salle St., Chicago, Ill., for Circulars.

Frints cards labels &c. (Self-inker \$5) 18 larger sizes
For business or pleasure, young or old. Do your own advertising and printing. Catalogue of preses, type, card, &c., for 2 stamps, Kelberg & 60. Meriden, Coun

Lathes, Planers, Shapers Drills, Bolt and Gear Cutters, Milling Machines. Special Machinery. E. GOULD & EBERHARDT, Newark, N. J.

WM. A. HARRIS,
PROVIDENCE, R. I. (PARK STREET),
Six minutes walk West from station.
Original and Only builder of the
HARRIS-CORLISS ENGINE With Harris' Patented Improvements, from 10 to 1,000 H. P.



1880. 1880. 1880.

The Scientific American

FOR 1880.

THIRTY-FIFTH YEAR.

VOLUME XLII. NEW SERIES. The publishers of the SCIENTIFIC AMERICAN beg to announce that on the Third day of January, 1880, a new volume was commenced. It will continue to be the aim of the publishers to render the contents of the new volume as attractive and useful as any of its

Only \$3.20 a Year, including postage. Weekly, 52 Numbers a Year,

This widely circulated and splendidly illustrated paper is published weekly. Every number contains sixteen pages of useful information, and a large number of original engravings of new inventions and discoveries. original engravings of new inventions and discoveries, representing E gineering Works, Steam Machinery, New Inventions, Novelties in Mechanics, Manufactures, Chemistry, Electricity, Telegraphy, Photography, Architecture, Agriculture, Horticulture, Natural History, etc.

All Classes of Readers find in The Scientific AMERICAN a popular resume of the best scientific information of the day; and it is the aim of the publishers to present it in an attractive form, avoiding as much as possible abstruse terms. To every intelligent mind, this journal affords a constant supply of instructive reading. It is promotive of knowledge and progress in every community where it circulates.

Terms of Subscription.—One copy of The Scientific American will be sent for *one year*—52 numbers—postage prepaid, to any subscriber in the United States or Canada, on receipt of three dollars and twenty cents by the publishers; six months, \$1.60; three months, \$1.00.

Clubs.—One extra copy of The Scientific American will be supplied gratis for every club of five subscribers at \$3.20 each; additional copies at same proportionate rate. Postage prepaid.

One copy of The Scientific American and one copy of The Scientific American Supplement will be sent for one year, postage prepaid, to any subscriber in the United States or Canada, on receipt of seven dollars by the publishers.

The safest way to remit is by Postal Order, Draft, or Express. Money carefully placed inside of envelopes, securely sealed, and correctly addressed, seldom goes astray, but is at the sender's risk. Address all letters and make all orders, drafts, etc., payable to

MUNN & CO., 37 Park Row, New York.

To Foreign Subscribers.-Under the facilities of the Postal Union, the SCIENTIFIC AMERICAN is now sent by post direct from New York, with regularity, to subscribers in Great Britain, India, Australia, and all other British colonies; to France, Austria, Belgium, Germany, Russia, and all other European States; Japan, Brazil, Mexico, and all States of Central and South America. Terms, when sent to foreign countries, Canada excepted, both SCIENTIFIC AMERICAN and SUPPLEMENT for 1 year. This includes postage, which we pay. Remit by postal order or draft to order of Munn & Co., 37 Park