

and the increase of pressure. Professor Faraday, however in a series of magnificent experiments, proved that such a distinction had no foundation whatever. He not only liquefied but solidified many gases that had been deemed permanently elastic, and these experiments have been repeated and extended by other investigators, until the belief now obtains that no particular state, whether solid, liquid, or gaseous, is specific to any kind of matter, and that these states depend solely on the relations of the molecules of bodies to heat.

The converse of these experiments, that is, the changing of solids and liquids to a gaseous state, has been performed with nearly every known solid or liquid, and the colors which these gases impart to the blow-pipe flame, and the colors and positions of the peculiar lines or bars, formed by passing the light of such colored flames through a prism, and throwing the beam of refracted light upon a screen, have been found to indicate the nature of different substances with the utmost delicacy. This method of determining the presence of substances by the examination of the effect which the presence of their vapors produces upon the light emitted by burning alcohol, gas, solar light, etc., is called spectrum analysis; and the instrument employed in making such researches is called the spectroscope.

An entirely new department of chemistry has grown out of the extension of the use of the spectroscope to the examination of the light emitted by the heavenly bodies, and such examinations have led to the belief that the elementary substances as we know them by close examination in the chemical laboratory, are distributed throughout the universe.

One of the most prominent physical characteristics of gases, is their great elasticity. It is this property upon which the usefulness of steam as a motive power in a very great measure depends. In fact, gases and non-viscous liquids are the only perfectly elastic bodies.

The theory of the elasticity of gases is comprised in what is known as *Mariotte's Law*, which is "that in an elastic fluid subjected to compression, and kept at a constant temperature, the product of the pressure and the volume is a constant quantity;" or, in other words, the volume is inversely proportional to the pressure. This law does not, however, hold good for all pressures, nor for all gases. In those most difficult to liquefy, as oxygen, nitrogen, or their mixture in atmospheric air, etc., the law holds good, but in such gases as chlorine, steam, and others that can be liquefied under such pressure as can be practically brought to bear upon them, departures from the law are observable, increasing as the gases approach liquefaction. Such variations are, however, of little practical importance, and the law as enunciated is sufficient for all ordinary purposes of computation.

Another prominent characteristic of gaseous bodies is their affinity for water. Water absorbs all gases to a greater or less degree. The colder the water and the greater the pressure the more gas will be absorbed, and *vice versa*; but the volumes of different gases which water and other liquids will absorb, vary greatly. Gases are also absorbable by solids to a large extent, wood charcoal and animal charcoal being some of the most powerful solid absorbents.

But perhaps the most remarkable property of gases is that which gives rise to what is called diffusion. The heaviest gases when placed in contact with the lightest, do not remain separate like oil and water, but mingle and diffuse each through the other in defiance of gravity. This even takes place when the gases are separated by a porous diaphragm. A common experiment, illustrating this truth, is to fill a glass jar with carbonic acid and invert over it a jar filled with hydrogen, which is twenty-two times lighter than carbonic acid. In a very short time equal quantities of both gases will be found in each jar. This has led to the enunciation of the law that every gas comports itself toward every other gas as though it were a vacuum. Thus the presence of dry air in a vessel does not prevent, though it will somewhat retard the entrance of any other gas. As much of the latter will enter with the air present as would be the case if the air were exhausted.

Regnault was the first to prove that although the expansion of each gas is nearly equal for equal increments of heat when rising from different temperatures, all gases do not expand alike for a given increase of heat. We have said the expansion of each gas is nearly equal for equal increments of heat. For practical purposes this expansion may be considered as absolutely equal, as the differences are but slight, and only determinable by accurate experiment. The most important application of this law of expansion, is made in the steam engine, when steam is used expansively.

The distinction between vapors and gases has been, as we have said, virtually abandoned; but the term vapor is still commonly applied to such gases as are most readily reduced to the liquid state. Though it may seem to some an innovation to talk of steam as a gas, yet it is a gas, possessing the physical characteristics of all other gases, and must be considered as such to attain a perfect comprehension of its action as a motive power.

NEW MECHANICAL MOVEMENTS.

Perhaps no department of study is more improving to the inventive faculty than the study of mechanical movements—those minor machines which, combined, produce the various motions to be found in complicated machinery.

The mechanical powers, as they are called—*i. e.*, the lever, the inclined plane, the wedge, the screw, the wheel and axle, and the flexible band or rope—may properly be reduced to three—the lever, the inclined plane, and the band. For the wedge and screw are only modifications of the inclined plane, while the wheel and axle is a modification of the lever.

These three fundamental elements are therefore the basis of all mechanical movements, that is, combinations to produce certain movements of parts of machines. There are already a great number of these in use, and a still larger number which have never been much used, but there is little doubt that there are a great many more which are possible. The search for these gives rise to some of the most beautiful mechanical problems, as well as some of the most difficult. The solution of one of these was given on page 372, Vol. XVIII.

We propose now to enunciate a few such problems upon which our inventors may try their skill, premising that, as in the higher mathematics, the solution of a problem demonstrates its impossibility if it be impossible; so, if it can be satisfactorily shown that the problems here given are any of them impossible, that shall be considered as a proper solution.

PROBLEM 1.—Required to convert the rotary motion of a pulley into a horizontal intermittent rectilinear motion, first in one direction and then in the opposite direction, without the use of a pitman, pulley, toothed wheel, cam, cam groove in a pulley, or a flexible band, the first rotary motion to be constant and uniform. In other words, let it be required to move a piece of metal, wood, or other material, to a certain point where it shall pause, and then again move on a certain distance and again pause, and so on successively as far as desired, when it shall return to the point from which it originally started in the same intermittent manner and under the conditions above specified.

PROBLEM 2.—Required to produce a variable rotary motion in a shaft driven directly by a belt from a pulley having a uniform constant rotary motion, without the use of anything but the one belt and the two pulleys; no cone pulleys or their equivalent to be allowed. All the motions to be continuous and in the same direction.

PROBLEM 3.—From a reciprocating body to communicate reciprocation to another body, so that the second shall make four reciprocating movements for every reciprocation of the first; the motions of these bodies to be in lines parallel to each other, and the pieces to be connected by only three moving parts, which parts shall be neither wheels nor pulleys of any kind, and no inclined planes, cams, belts, or flexible cords, cranks, or bell cranks, to be allowed, and no radial motion from a fixed center in any piece employed.

This will do for the present. Some of these problems are, perhaps, too difficult for a beginning, but they are all capable of solution. It is not at all improbable that the effort to solve them will lead to some useful inventions. The author of them made two useful applications of ideas suggested while attempting their solution.

The solutions offered may be given in simple diagrams accompanied with such description as may be necessary.

PROPOSED PLAN FOR PUBLISHING PATENT OFFICE SPECIFICATIONS AND DRAWINGS.

The speech of Mr. Jenckes, of Rhode Island, in the House of Representatives, on the 9th inst., in support of the House joint resolution providing for the publication of the specifications and drawings of the Patent Office, and the subsequent debate upon the subject, has placed the salient features of the plan in such a light that the public generally may comprehend its advantages.

It is proposed to abandon the publication and distribution of the annual reports as they are now published, and instead to place in the capital of every State, and in every city where a circuit Court of the United States is held, if it be not held in the capital, a complete record of the transactions of the Patent Office; the specifications in full and the drawings in full. Then the inventor has simply to take rail or boat, and visit the capital of his State, and he will have the same means of investigating what are the inventions of the country as if he came to Washington in person.

It is also proposed to furnish an equally perfect record to each public library in any part of the United States, which shall pay for its uniform binding and its transportation to the locality where the library is situated.

It is further intended to make this distribution weekly, so that the latest information relative to patents may be accessible to the entire country.

The disadvantages of the present system are great. It is confessedly expensive, incomplete, inaccurate, and inadequate to meet the needs of inventors.

The advantages of the new system are as obvious as the disadvantages of the old. The distribution being not a matter of favor, as now, the filed drawings and specifications will form a complete as well as an accurate and reliable record. Under the present system the distribution is very imperfect, so much so that complete sets of the reports since their publication in 1844, are rare outside of Government Departments, though not so much so as to justify Mr. Banks' statement in the debate referred to. Mr. Banks said that "Of all the million volumes that have been distributed, I do not believe that there is within the United States in the hands of any private citizen, unless he have some special Government advantages, a complete set of this encyclopedia of inventions. The chairman of the Committee on Printing tells me that there is not in the Patent Office itself, nor in the Library of Congress even, a complete set; and I do not believe that such a set exists in any one of the one hundred and four principal public libraries of the United States, which contain ten thousand volumes and upward. Now what a senseless practice is the distribution of this work, at a cost of \$235,000 a year, when the value of it is greatly impaired by the manner in which it is distributed."

We have a complete set of these reports, and they are of

great service to us. They are constantly sought by large numbers of persons interested, who daily visit our office to consult them. It is true, however, that only complete sets are of much assistance, and that the drawings are often so defective in their lettering as to mislead; and they are altogether too meager to give such information as will form a basis for accurate judgment.

It is claimed that the new system will decrease the expenses of the Patent Office for printing \$100,000 per annum, and it will also reduce the expenses of those who now have to go to Washington to pursue their investigations by requiring them only to journey a short distance to obtain the necessary information.

It is thought this plan would increase the confidence of capitalists and make them more ready to invest in really new and useful inventions, as they would easily be able to verify the value of an invention, so far as novelty is an element of value.

By means of the art of photo-lithography the drawings can be reproduced of half the present regulation size at an estimated cost of one dollar and fifty cents per hundred, and although the bill, in its present form, provides only for the publication of specifications and drawings after the publication of the report of 1868, it is estimated that all the drawings and specifications issued prior to 1870 might be reproduced in 300 volumes at a cost of \$200,000.

Mr. Jenckes performed an act of injustice in his speech toward honest and honorable patent solicitors, in making no distinction between them and such as do not identify themselves with the interests of their clients. No one knows better than Mr. Jenckes that this is unjust, and it is probable that his zeal in the support of his measure, betrayed him into an unguarded expression.

We heartily advocate the passage of this resolution; but we would have the plan extended to the publication of the specifications and drawings of all the patents which have been issued up to the present date; and it ought also to be amended so as to admit of the purchase at cost by such parties as are willing to pay for it in advance of publication. Many copies could thus be sold without increasing the cost to the Government, and a much wider circulation be given to them.

CONGRESS EXTENDING PATENTS.

In the House of Representatives on Friday, March 11, the following measures concerning patents were enacted:

Reports were made from the Committee on Patents by Mr. Jenckes adversely on the following applications:

For extension of patents of J. Carhart, of New York, and of Charles A. Pitcher, for the manufacture of brooms.

Bills were reported from the same committee allowing applications for the extension of patents as follows:

By Mr. Jenckes—Patent of Walter Hunt for the manufacture of paper collars. Passed.

By Mr. Calkin—Patent of Timothy D. Jackson for improved annunciator or bell-telegraph for hotels, etc. Passed.

By Mr. Myers—Patent of Thomas Thompson for improved machine for folding paper. Passed.

Also, patent of William Montstow for improvement in revolving fire-arms. Passed.

Also, patent of John Edgar for self-regulating wind wheels. Passed.

Also, patent of Tobias J. Kindleberger for improvement in cider mills. Passed.

By Mr. Calkin—Patent of John Young for improved washing and wringing machine. Passed.

By Mr. Johnson—Patent of Jonathan Haines, for harvest or header.

After discussion by Messrs. Johnson and Cullom in support of the bill, and by Mr. Tanner in opposition to it, the bill was passed.

By Mr. Jenckes—Patent of Augustus R. Moen for improvement in the construction of basement, cellar, conduit, and other like walls, so as to render them impervious to water. Passed.

Also, patent of Robert Burns Goodyear for improvement in power looms.

Pending its consideration the morning hour expired, and the bill went over to the morning hour next Friday.

If this kind of special legislation by Congress is to continue, the statutes relating to extension of patents might as well be repealed. Of what use is it to absorb the time of the Commissioner, who knows what he is about, in the examination of applications for extension, when a successful appeal from his decision can be made to Congress through the aid of expert lobbyists, thus practically taking the power of granting or refusing extensions out of the Commissioner's hands? We have always opposed this sort of legislation.

TO CLEAN PAINT.—There is a very simple method to clean paint that has become dirty, and, if our housewives should adopt it, it would save them a great deal of trouble. Provide a plate with some of the best whiting to be had, and have ready some clean warm water and a piece of flannel, which dip into the water and squeeze nearly dry; then take as much whiting as will adhere to it, apply it to the painted surface, when a little rubbing will instantly remove any dirt or grease. After which wash the part well with clean water, rubbing it dry with a soft chamois. Paint thus cleaned looks as well as when first laid on, without any injury to the most delicate colors. It is far better than using soap, and does not require more than half the time and labor.

PICTURE frames or frames for looking-glasses may be easily coated with bronze by a thin plate of liquid quartz upon which a fine bronze powder is dusted.

Messrs. Geo. P. Rowell & Co.,
Advertising Agents, No. 40, Park Row, New York, are authorized to receive advertisements for this paper at our lowest rates.

APPLICATIONS FOR EXTENSION OF PATENTS.

CASE FOR SEWING MACHINES.—William O. Grover, of Boston, Mass., has applied for an extension of the above patent. Day of hearing May 11, 1870.
 MAKING MOLDS FOR CASTINGS.—Robert Jobson, of Worsley, England, has applied for an extension of the above patent. Day of hearing May 11, 1870.
 OPERATING STEAM STAMPS.—Adelia E. Ball and Edwin P. Ball, of Chicopee, Mass., administrators of William Ball, deceased, have petitioned for an extension of the above patent. Day of hearing May 11, 1870.
 REAPING MACHINE.—William C. Martin, administrator of Jacob J. Mann, deceased, and Henry F. Mann, of Pittsburgh, Pa., have petitioned for the extension of the above patent. Day of hearing May 18, 1870.
 NAIL MACHINE.—Daniel Dodge, Keeseville, N. Y., has applied for an extension of the above patent. Day of hearing May 18, 1870.
 REGISTERS AND VENTILATORS.—Edward A. Tuttle, of Brooklyn, N. Y., has petitioned for an extension of the above patent. Day of hearing May 25, 1870.

Answers to Correspondents.

CORRESPONDENTS who expect to receive answers to their letters must, in all cases, sign their names. We have a right to know those who seek information from us; besides, as sometimes happens, we may prefer to address correspondents by mail.
 SPECIAL NOTE.—This column is designed for the general interest and instruction of our readers, not for gratuitous replies to questions of a purely business or personal nature. We will publish such inquiries, however, when paid for as advertisements at \$1.00 a line, under the head of "Business and Personal."
 All references to back numbers should be by volume and page.

H. B., of Ky.—You are right in attributing the cracks in your boiler to unequal expansion, and also in the opinion that the boiler is unsafe. You do not say where the feed-water is admitted, but judging from your description we infer that it is at the bottom. If so, it is wrong. It ought to be carried in at a point opposite the middle of the upright flues. The water space between the inside and outside shells of the fire-box is too contracted. Instead of five eighths of an inch space between these shells there should be three inches. You can alter the boiler to correct this error by taking out some of the flues, but of course you will thereby reduce your heating surface.
 F. W. of N. Y.—There would have been no danger of explosion in the boiler of your steam heater if the water had gradually blown out of it under a pressure of 6 lbs. to the square inch; but it would under such circumstances be liable to injury from overheating, and so become weakened, and incapable of withstanding even that low pressure. You should be careful to regulate the draft so as not to get up more pressure than that of the head which supplies the feed water.
 C. B., of Ky.—To find the area of induction pipe to steam engine cylinders, multiply the speed of piston in feet per minute by the square of the diameter of the cylinder in inches. Two one-hundredths of this product multiplied by 170, gives the area of cross section of the induction pipe in square inches. To find the inside diameter, divide the area of cross section by the decimal 0.7854, and extract the square root of the quotient.
 J. G. B., of Miss.—Variations in the temperature of the human body are strong indications of disease, either local or general. In a state of health the human body keeps about the same temperature under all circumstances. Even when a person feels very warm from violent exercise, the thermometer shows little change in the temperature of the blood, unless the functions of the body are disturbed.
 S. C., of N. H.—We have investigated the matter of engines made with cylinders curved in the line of the bore, and find that to properly elucidate the subject it would be necessary to make engravings. The subject is not of sufficient importance to justify this. We understand the cylinders are bored by a tool sliding on curved ways, and driven by means of shafts with universal joints.
 R. S., of Conn.—You will have no difficulty in keeping swans, if you have a small piece of water for them to swim in. Their food is the same as that of geese. They prefer to build their nests on a small secluded island, and such an island if it does not exist naturally is generally provided, and a small house for the young erected thereon.
 W. R. B., of Ind.—There is no gas with which you could safely mingle a mixture of air and the vapor of gasoline to increase the light, unless, perhaps, it might be hydrogen. It has been claimed that hydrogen with gasoline vapor is better than air, but we have some doubts about it.
 R. S., of Tenn.—Gallic acid and tannic acid are extracted from nut galls, barks, etc. They are very nearly alike in composition. Tannic acid is the principle contained in barks which acts upon the gelatin of raw hides to convert them into leather.
 H. & G., of Pa.—We have already expressed our doubts of the safety of high pressure steam heating pipes, in contact with wood, and our belief in the safety of low steam pipes. We refer you to discussions on this subject in our last volume.
 C. Q. E., of Wis.—You are right. There is nearly always a difference in the price of gold and silver coin in favor of the gold. That is, a ten-dollar greenback will buy more nearly ten silver dollars than ten dollars in gold.
 W. J. Lobach, of Ky., and others.—We republished the recipe for recutting files by acids just as we found it recorded. We know nothing about it that we have not already given, and we do not believe in its efficacy.
 T. D., of N. Y.—The drawing of the steam hammer you send us is not clear, and as we are unacquainted with the device, we cannot explain it.
 H. G., of Minn.—The blistering of the silver coating in the process of electro-plating, probably results from too great power of battery.
 D. J. W., Jr., of S. C.—The best thing to prevent guns from rusting is olive oil. It is well to stop the muzzle with a cork, or wooden plug.
 J. G. W., of Ind.—The discovery you have made is not new. We are unable to say who made the same observation first.
 R. T., of Texas.—There are probably twenty processes for preserving meat in use; to which do you refer?
 C. G. F., of Texas.—We shall be glad to hear from you on the subject of "Wooden Railroads."
 W. H. G., of N. J.—The crystals you send are garnets of an inferior kind, and of no value.
 T. F. M., of Pa.—You will find an answer to your query in another column.
 J. K. S., of W. Va.—The subject of small cotton presses has been sufficiently discussed for the present. Your communication contains nothing additional to what we have published.

Business and Personal.

The Charge for Insertion under this head is One Dollar a Line. If the Notices exceed Four Lines, One Dollar and a Half per line will be charged.

To ascertain where there will be a demand for new machinery or manufacturers' supplies read Boston Commercial Bulletin's manufacturing news of the United States. Terms \$4.00 a year.
 1250 lbs. portable platform scales, \$25; hay scales, 4-ton, \$75. Send for free price list, No. 378. Edward F. Jones, Binghamton, N. Y.
 American Boiler Powder.—A safe, sure, and cheap remedy for scale. Send for circular to Am. B. P. Co., P. O. Box 315, Pittsburgh, Pa.
 Physicians of every school wanted to engage in an easy and lucrative office practice. For particulars, address W. C. Coburn, M.D., 568 Main st., Buffalo, N. Y.
 Those desiring excellent copies of old daguerreotypes, tintypes, or card pictures, can have them made to their satisfaction by sending to John A. Whipple, 297 Washington st., cor. Temple Place, Boston, Mass.
 Automatic 10-spindle drill, 5,000 to 20,000 holes a day in castors, etc. Tin Presses & Dies for cans. Ferracute Machine Works, Bridgeton, N. J.
 A No. 2 Smith's molding machine for sale—new and in good order. S. Hartshorn, 82 center st., New York.
 Unparalleled opportunity for agents, canvassers, and all others desiring lucrative employment. For circular, address Chas. H. Nye & Co., Postoffice Box No. 441, Stamford, Conn.
 Wanted—Machinery for a wagon and furniture factory. Address E. D. Jones, Jefferson, Texas.
 A new kind of Waltham Watch, for railroad men, has just been introduced. It is described in Howard & Co.'s Price List. See advertisement on last page.
 A Dickinson Engine Lathe for sale cheap—good as new. Address W. H. C. Dodd, 807 Broad st., Newark, N. J.
 A Master Machinist of thorough and successful experience in designing and constructing work of the best class, will be ready to enter upon an engagement in May or June. Address, till April 1st, Box 298 Worcester, Mass.
 Inventors of non-wasting hydrants send description and terms to John Gibson & Co., Plumbers, 7th and Main sts., Cincinnati, Ohio.
 Wanted.—Brass Spinners address C. Ahrens & Co., 24 and 26 Webster st., Cincinnati, Ohio.
 Pat. watch opener and key, 15c., 2 for 25c. E. M. Kimball, Toledo, Ohio.
 Steam Engine and Boiler for sale cheap, 6-H. P. horizontal, nearly new. Address J. H. Cory, Elizabeth, N. J.
 Second-hand lathes, planers, drills, and all kinds of tools for sale by Charles Place & Co., 60 Vesey st., New York.
 Wanted—Second-hand Engine and Boiler, about 40-H. P. Address Otis W. Booth & Co., 111 Water st., New York.
 Right For Sale.—Action and Reversion Water Wheel (self-governing). Will vent large or small volumes of water. Will retain its power under back water. Address William E. Hill, Erie, Pa.
 Partner or Foreman Wanted.—In a well-established steam wagon factory, at Kansas City, Mo. Address, with references, Oliver Case & Co.
 Spools of all kinds, and spiral shade tassel molds made by H. H. Frary, Jonesville, Vt.
 Millstone Dressing Diamond Machine—Simple, effective, durable. For description of the above see Scientific American, Nov. 27th, 1869. Also, Glazier's Diamonds. John Dickinson, 64 Nassau st., N. Y.
 Peck's patent drop press. For circulars, address the sole manufacturers, Milo Peck & Co., New Haven, Ct.
 The paper that meets the eye of manufacturers throughout the United States—Boston Bulletin, \$4.00 a year. Advertisements 17c. a line.
 Kidder's Pastilles.—A sure relief for Asthma. Price 40 cents by mail. Stowell & Co., Charlestown, Mass.
 Needles for all sewing machines at Bartlett's, 569 Broadway, N. Y.
 For tool making, buy 15-in. engine lathes with taper attachment, made by the Pratt & Whitney Company, Hartford, Conn.
 Pat. paper for buildings, inside & out, C. J. Fay, Camden, N. J.
 For solid wrought-iron beams, etc., see advertisement. Address Union Iron Mills, Pittsburgh, Pa., for lithograph, etc.
 For first-quality new 14, 17, and 20-in. screw lathes, milling machines, and one-spindle drills, at small advance from cost, apply to Geo. S. Lincoln & Co., Hartford, Conn.
 Hackle, Gill Pins, etc., at Bartlett's, 569 Broadway, New York.
 "Winn's Portable Steam Brick Machine," makes more and better brick than any other machine in the world. Address Wright & Winn, Lock Haven, Pa.
 Perforated Zinc and Sheet Iron for separators, smut machines grain dryers, tubular wells, malt kilns, etc. R. Aitchison & Co., Chicago
 T. F. Randolph, Steam Model Works, Cincinnati, Ohio.
 For the Best Upright Drill in the World, address Wm. M. Hawes & Co., Fall River, Mass.
 For mining, wrecking, pumping, drainage, and irrigating machinery, see advertisement of Andrews' Patents in another column.
 To Rent—East River water front, stores and vacant lots suitable for manufacturing or mercantile purposes, together or separate. Daniel W. Richards & Co., 92 Mangin st.
 Portable Pumping or Hoisting Machinery to Hire for Coffer Dams, Wells, Sewers, etc. Wm. D. Andrews & Bro., 414 Water st., N. Y.
 Two 60-Horse Locomotive Boilers, used 5 mos., \$1,300 each. The machinery of two 500-ton iron propellers, in good order, for sale by Wm. D. Andrews & Bro., 414 Water st., New York.
 Cold Rolled—Shafting, piston rods, pump rods, Collins pat. double compression couplings, manufactured by Jones & Laughlins, Pittsburgh, Pa.
 Keuffel & Esser, 71 Nassau st., N. Y., the best place to get 1st-class Drawing Materials, Swiss Instruments, and Rubber Triangles and Curves
 For tinmams' tools, presses, etc., apply to Mays & Bliss, Brooklyn, N. Y.
 Glynn's Anti-Incrustator for Steam Boiler—The only reliable preventative. No foaming, and does not attack metals of boiler. Liberal terms to Agents. C. D. Fredricks, 587 Broadway, New York.

Recent American and Foreign Patents.

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

WATER WHEEL.—Samuel Martin, York, Pa.—This invention consists of certain improvements in turbine water wheels, tending to increase their efficiency.
 EXPANSIBLE CORE FOR CASTING IRON, GLASS, ETC.—Anson Baldwin, Wheeling, W. Va.—This invention has for its object to enable the cores around which hollow articles are cast, to be contracted, after filling the mold, so as to facilitate the removal of the cores from within the casting.
 DITCHER.—James Callihan, Baton Rouge, La.—This invention consists of an apparatus for digging a ditch and throwing up a levee at one and the same time; said apparatus being operated by steam engines, which it carries, and is drawn forward by a steam engine placed upon a separate truck, which carries a steam boiler for supplying all the engines with steam.
 GLAZIER'S POINT DRIVER.—M. D. Converse, London, Ohio.—This invention relates to a semi-annular V-shaped chamber, in which the triangular points, used for setting glass, are placed, said chamber being shaped in conformity with the brass or points, and being combined with a feed spring that keeps the points at the spot where they are required for use, and with a slide and guide by and through which the points are driven, one by one, into the sash.
 STUMP MACHINE.—J. Higgins, Friendship, N. Y.—This invention has for its object to furnish a simple and convenient machine for drawing stumps, and other purposes, where great weight is to be raised short distances.
 COTTON-SEED PLANTER AND FERTILIZER DISTRIBUTOR.—Henry C. Harris, Fort Valley, Ga.—This invention has for its object to furnish a simple, convenient, reliable, and effective machine for planting cotton and other seed and for distributing guano and other fine fertilizers.
 HAND CLOTHES WASHER.—Peter Falarde, Newark, N. J., and George H. Snow, New Haven, Conn.—This invention has for its object to furnish a simple, convenient, and effective hand washing machine, with which the clothes will be washed by squeezing out the water from the clothes, which clothes are at once again wet by water from the machine.
 WINDOW-SHADE HOLDER.—Edward J. Robinson, Syracuse, N. Y.—This invention has for its object to furnish an improved holder for that class of window shades that roll up from the bottom, which shall be simple in construction and convenient and effective in use, holding the shade securely in any position into which it may be adjusted.
 CLOTHES WASHER.—Rev. F. M. English, Evansville, Ind.—This invention has for its object to furnish an improved machine, which shall be so constructed as to wash the clothes and heat the water in which they are washed, which will do its work thoroughly and well, and without injury to even the most delicate fabrics, and which may be used with equal facility for various other purposes.
 SADDLE-GIRTHING ATTACHMENT.—Eugene Speiden, Astoria, Oregon.—This invention relates to improvements in appliances for girthing saddles to horses and other animals. It consists of the combination with the saddle and the girth, of a set of pulley blocks, cord, and cord-holding clamp, under such arrangements that the rider may increase or diminish the tension of the girth, while in the saddle, and accomplish the same more easily than in the common way, by reason of the advantage due to the use of the pulley blocks and cord. The adjustment may also be made while on the ground equally as well.
 FERTILIZER SOWER.—T. J. West, Alfred Center, N. Y.—This invention relates to improvements in machines for sowing plaster, lime, ashes, manure, and all other fertilizing substances, and consists in an arrangement, on an axle, mounted on wheels, and provided with a tongue or other means for hitching horses, of a long V-shaped trough, with a longitudinal opening at the bottom, and having one side arranged on pivots to be oscillated for widening or narrowing the opening, in which trough is placed a recirculating rod, actuated by cams on one of the wheels, and provided with pointed or saw-tooth-shaped agitators, propelling downward through the discharge opening, and provided with flanges, projecting from the sides, by which the lumps and clods of the fertilizing substance will be pulverized and caused to feed uniformly through the discharge opening.
 BLANK BOOK.—George H. Reynolds, New York city.—This invention relates to a new method of binding blank books, and all other books which are to be used for a considerable length of time, and in which great strength and durability are the chief objects. The invention consists more particularly in a novel system of arranging an endless upright string for holding the strapping to the back of the book, and in the manner of disposing such string. The invention also consists in the use of transverse strings, which are applied to the outside of the strapping and interwoven with the afore-mentioned upright strings.
 RATCHET AND PAWL.—John H. Durran, Aurora, Ill.—The object of this invention is to prevent the end of a pawl from working on the edge of a ratchet wheel, and from thereby wearing off the contiguous surfaces, while the pawl slips or works loose on the ratchet. The invention consists in providing the pawl with spring clamps by which it is held away from the edge of the ratchet wheel, so as not to wear the same.
 STOVES AND GRATES.—E. C. Loud, Springfield, Mass.—This invention has for its object to so construct those stoves which have pivoted grates, that the swinging sides of the grates will be opposite to concave surfaces, so that the grate can be considerably agitated to disturb the fuel, without danger of dropping any coal into the ash box, and without danger of wedging coals or cinders between the edge of the grate and the stove frame.
 SCROLL SAWING MACHINE.—G. M. Nickason, Ellenville, N. Y.—This invention relates to a new arrangement of a sliding frame for all kinds of reciprocating saws, so that the stroke allowed to the saw will be regulated by the thickness of the stuff to be sawed, to prevent useless waste of power. The invention also relates to a new application of adjustable spring power, for drawing the saw up, after each stroke.
 COMBINATION TEAKETTLE.—G. Lanarine, Jersey City, N. J.—This invention relates to a new and useful improvement in culinary utensils, and consists in combining with an ordinary teakettle a boiler and a steamer.
 VEGETABLE CUTTER AND PEELER.—George Lutz, John Schultheis, and Michael Florentin, Newark, N. J.—This invention relates to a new vegetable cutter of that kind on which the articles are cut into long, narrow strips, and has for its object to provide an automatic peeling attachment and devices for adjusting the width and thickness of the strips cut.
 HALTER.—Wm. M. Harris, Dixon, Ill.—This invention relates to improvements in halters for horses and other animals, and consists in connecting the tie strap to a ring suspended in a bight of the throat strap, and passing it through another ring in the bight of the lower nose strap, to slide freely in the latter ring, and in passing the bights or loops of both these straps through other rings before attaching the tie strap ring to them, the said rings being connected by a strap extending from the nose strap to the throat strap, under the center of the lower jaw; the said arrangement is designed to apply the restraining force of the tie strap on the nose, the throat, and top of the head, in a way to confine the head in a cramped position, calculated to temporarily disable the animal, when making efforts to escape.
 PRESS FOR HAY, COTTON, AND OTHER SUBSTANCES.—Samuel Miller Mount Union, Pa.—This invention consists in double ratchet vertical hoisting bar applied to a press, which is operated by means of a lever and pawls, upon a rocking block.
 FELTS.—Simon P. Siver, Danbury Ct.—This invention relates to improvements in felts for the manufacture of hats and other articles, and consists of an improved mode of producing felts with plain grounds, spotted with pieces of felt worked into the ground and differing from the same in color, to impart ornamental surfaces of variegated colors, of more permanence than when stamped on.