The answer to the second question involves the inquiry as to the true date of the English patent, within the meaning of our laws. The act says "that no person shall be debarred from receiving any invention or discovery, etc., by reason of the same having been patented in a foreign country more than six months prior to his application; provided, that in all cases, every such patent shall be limited to the term of fourteen years from the date or publication of such foreign letters patent."

The words "date or publication" should the Commissioner hold to be construed conjunctively, the phrase in effect meaning date *and* publication, and if there be a difference between the two, the latter time should be held as the true date. After a review of the practice in the English patent law, the Commissioner says: "As the invention in its perfected, completed form is not published until the enrollment of the final specification, as in fact much of the invention may be made between the time of the filing of the provisional and completed descriptions, it would seem that the date and publication which is to determine the limit of a patent in this country, should be the date of the filing of the complete specification."

The answer to the third question as to the limitation of the term of Cochrane's patent. Under the act of 1836 the inventor who took out a patent in a foreign country more than six months prior to his application in this country forfeited his right to an American patent. But if within six months, it took date from its issue here and ran the full term of fourteen years. The 6th section of the act of 1839 had no reference to those who made application within the six months. If made within the time, it bore the date of issue and ran fourteen years from that date. This view of the case is supported by citations from various decisions. It follows, therefore, that in the present case, Cochrane's application having been filed within less than six months from the time when his invention was "patented" in England, his patent is not affected by the provisions of the act of 1839, and must be corrected so as to run fourteen years from March 31, 1857, the date of issue.

OSBORN'S NEW TREATISE ON THE METALLURGY OF IRON AND STEEL.

A brief notice of this valuable and extensive treatise appeared in our last issue under the head of New Publications. It was our intention at that time to give it a review commensurate with its importance, but we find that to do this adequately would absorb more of our space than can be spared for the purpose. We shall therefore content ourselves with an outline of the character and origin of the work, and some extracts from its pages, one of which will appear in connection with this notice and some others in future issues. The author tells us in his preface that before he began the present work it was thought that a simple re-editing of Overman's Treatise upon Iron, would be sufficient; but that "upon a thorough examination it was found impossible to make that work meet the wants of those who would justly expect a recognition of the many important inventions and discoveries since its last edition was published, and who would not wish to read of anything as a theory which had become a fact, or of procedures which had passed away before the advance of metallurgic science. The author has therefore written a work entirely different in manner and matter."

The work is divided into four parts, the first of which treats of the theoretic metallurgy of iron. Under this head we are presented with a chapter on "the general principles of the chemistry of iron, another on the ores of iron, one on the special properties of iron and its compounds, a chapter on the theory of fluxes, and lastly an exhaustive chapter on fuel, in which the principal kinds of fuel used in the iron manufacture and in steam production are discussed, with remarks on wood, peat, coking of coals, manufacture of charcoal, and analysis of coals."

In Part Second, the practical metallurgy of iron is taken up and exhaustively treated in twelve chapters, in which all the approved processes are fully explained with detailed descriptions of the various furnaces, hot blast ovens, blast machines, etc., now employed in the smelting of iron ores.

Part Third treats of the manufacture of malleable iron, recent improvements in the construction of puddling furnaces, present modes of refining, forging, rolling, reheating furnaces, shearing, piling, etc.; and Part Four is an essay on steel, in which the various kinds of steel and the numerous processes now employed in the steel manufacture are duly discussed, according to their importance.

We find that in this work a common error of authors upon such subjects, has been avoided, and much of the merit of the work consists in the fact that no detail is supposed to be known by the reader, and nothing is jumped, or left to inference. The method adopted is a good one. The author sets out by a sufficiently elaborate discussion of the substances which have to be dealt with in the manufacture of iron and steel, and from the chemical knowledge thus obtained, the reader is led naturally and easily into the practical details of smelting, puddling, and refining iron, and the subsequent operations by which malleable iron is produced.

We have selected the following extract as a fair example of the clear style in which the author writes, and as also giving a good idea of the important part which oxygen plays in the metallurgy of iron.

"OXYGEN.—The air we breathe coutains a large amount of oxygen, which plays an important part in the affairs of iron manufacture. It contains a large portion of nitrogen, with which, as metallurgists, we have but little to do, even supposing that steel contains a small amount—into which supposition we may hereafter inquire. It contains a very small portion of carbonic acid gas, a compound of carbon and oxygen, the former of which two elements, also, plays an influential part, determining by its amount, as carbon in iron, whether that iron be cast iron or steel, and, by its absence from iron, that the metal in question is neither cast iron nor steel, but malleable iron.

"Another fact: the atmosphere always contains more or less vapor of water. This water is composed of a large proportion of oxygen, and also a proportion, equal to twice the volume of this last-mentioned element, of another element and gas, hydrogen. The latter element is soon to become better known to the metallurgical world, but it is the oxygen of the vapor of water to which our attention is now called particularly. Here are *four elements*, important in the following order: oxygen, which is the supporter of all combustion, whether as flame or burning coal, and, like that which it supports, a splendid servant, but a labor-exacting master, ever waiting and watching, in its elementary loneliness, to unite with that for which it has affinity, either to help or perplex. Its union with iron forms that which we call the "rust" of iron, in which we see this affinity accomplished, for it has recalled the metal back to its primal state, namely, that of an ore, from which ore, or rust, it was made to become a metal only by the stronger affinity of the same element oxygen for carbon, whereby the act of rusting the carbon was followed by heat enough to expel oxygen from the iron rust in the ore, and leave the metal pure. That rust of carbon is the carbonic acid gas of the chemist. However rapidly in the one case, or slowly in the other, this affinity of oxygen may be exhibited, it is an affinity always in entire subjection to a stronger law of proportion, which it never violates, whether in the long-continued processes of nature, or the more intense and rapid fires and reduction of the furnace. That stronger law is seen in this: oxygen unites with iron in the proportion of only one atom of oxygen to one of iron; or, where a stronger cause exists, and larger affinity is exhibited, it is (never otherwise than as) one and the half of one atom of oxygen to one atom of iron (Ferric Acid excepted). Now, for the sake of brevity, the one-to-one proportion is called the one-oxide, or protoxide, and the other the one-and-a-half oxide; or, using the convenient Latin term, sesquioxide.

"Thus we have only two rusts, or oxides of iron, the protoxide and the sesquioxide. The latter is the highest affinity oxygen ever exhibits for *iron*, whatever higher affinities it may exhibit for other substances or elements. This oxide, therefore, may also be called the "high oxide," or, again resorting to the convenient Latin syllable "per," the peroxide of iron; so that the sesquioxide of iron, in this particular case of iron, is the peroxide, as there is no greater affinity of oxygen for iron known.

"In the case of carbon, however, we know of an affinity of one atom of oxygen to one of carbon; and again two atoms of oxygen to one of carbon. The former is always known as the oxide of carbon, or *carbonic oxide*, and the latter, inasmuch as the gas partakes of such acid properties that it will readily redden litmus paper (the chemist's test for acids) is called carbonic acid, or carbonic acid gas. Carbon is consumable, and oxygen, as we have said, supports combustion; all the conditions, therefore, of flame or fire, exist in carbonic oxide, and it is not remarkable that it is inflammable, and that the combustion should be attended by great heat. But an anomaly does present itself in the case of the other oxide of carbon, wherein the oxygen exists as the *peroxide*, or two-oxide state. We can and need only state this anomaly, namely, that where two parts of oxygen with one of carbon exist, combustion no longer exhibits itself, nor will the gas of this composition allow any combustion to take place wherever its presence exists to any great degree. When, however, from any stronger attraction or affinity, one atom of oxygen is drawn off from the two which go to form carbonic acid gas, and the resultant gas becomes possessed of only half as much oxygen as it previously possessed, the gas immediately becomes inflammable, and burns with great heat. Singular as it may seem, the addition of two atoms of the flame-supporting element, oxygen, to one of the combustible element, carbon, produces a gas which ceases to burn, nor can any combustion take place where its presence is abundant."

STEAM POWER ON CANALS.

In the annual report of the Hon. Van R. Richmond, State Engineer and Surveyor, noticed in our last, we find the following on the use of steam on our canals:

"Attempts have hitherto been made to substitute steam for horse power upon the canal. These have all thus far failed, probably from the fact, that the machinery used was not properly proportioned to the work which it was designed to perform, and that too high a rate of speed was sought to be obtained. The law connecting the resistances offered to bodies moving in water with the power required to overcome such resistances, may be stated as follows:

"The resistance varies as the *square* of the speed and the power exerted varies as the *cube* of the speed; hence, if two horses were sufficient to tow a boat at a speed of two miles an hour, the number required to tow the same at a speed of four miles per hour would be $(2—\frac{4}{2}\frac{3}{3}=\frac{2\times6\cdot4}{8})$ 16 horses. It appears, therefore, in order to double the speed, the propelling power must be increased eight times. The obvious effect of the double speed would be to reduce the time of transit one half; this, however, would be secured only at an expenditure for propulsion eight times as great as that due to a speed of two miles per hour.

"The foregoing determinations and comparisons are based upon the assumption that two horses will tow a loaded boat at a speed of two miles per hour upon the canal; as shown by M. D'Anbuisson's formula, 44 per cent more power is required to maintain the same speed in an indefinite fluid. For example, as shown in a former calculation from D'Anbuisson's formula, the traction or resistance encountered upon the Erie canal with the large class of boats, carrying 210 tuns, at a speed of two miles an hour, is 428 pounds, requiring about three horses; then the resistance, at a speed of four miles an hour, would be $(\frac{4\cdot3\times4\cdot2\cdot8}{2\cdot3})$=3,424 pounds, requiring over 23 horses.

"If steam power should be provided sufficient to obtain an average speed a little in excess of that realized from present horse power, then it might undoubtedly be successfully and economically employed upon our canals.

"A successful application of the principle of low speeds seems to have been made by Mr. Edward Backus, of Rochester. If the result of the several trials made, are correctly stated by the inventor of this novel mode of steam propulsion, then the cost of transportation may be reduced about 32 per cent, as obtained from the following calculation, based upon the same general method employed for determining the cost of horse power. It is stated in the circular of results, by the inventor, that the extra cost of machinery and placing same in the boats is $2,500, and the consumption of fuel from 1,500 to 1,660 pounds of coal in twenty-four hours. Taking the same average for the boats hitherto used, and allowing 20 per cent for the aggregate detentions for the season (the same as now realized), and the following shows the cost of transportation:

Cost of boat and furniture	$5,000
Cost of machinery	2,500
Interest on same	5,250
Repairs of boat and interest on same	2 061
Expense of crew (same on boat with horse power) $195 per month	16.556
Expense of fuel (1,660 lbs. coal per day for 2,268 days) at $7 per tun	13,174
Total expense for ten years	$44,541
Total expense for one day	$19 64
Forty miles averaged per day for the season, per mile	491 cents
156 tuns average cargoes for the season, per tun per mile	3·14 mills

showing a saving of 32 per cent over horse power.

"The consumption of fuel, as reported, seems greatly in excess of that required, and can, undoubtedly, be reduced one half when the system shall have been perfected. Should this saving be realized, the cost per tun per mile will then be $2\frac{3\,6}{1\,0\,0}$ mills, a saving of about 50 per cent.

"The following extract from a letter written by Gen. Quimby, U. S. A., who witnessed two trials of this boat, will convey an idea of the character of this new mode of propulsion:

"In this boat the motive power, steam, causes a wheel located near the center of the boat to roll on the bottom of the canal, and thus drive the boat in the same manner that the locomotive is propelled by its driving wheels. The wheel, placed at one end of a lever frame, readily adjusts itself to the varying depths of the water, and its weight, together with the cog-like projections distributed over its circumference, prevents slipping and consequent loss of traction. It has been found that in the whole extent of the Erie canal there are not to exceed twenty miles in which the depth of the water is too great for the wheel to work well. For very deep water, a screw propeller wheel is used and the motive power is changed from the ground wheel to it with the utmost ease and expedition."

Dredging in the Gulf Stream.

Our readers are, perhaps, aware that a scientific examination of the ocean bottom in the Gulf Stream has been in progress under the direction of Professor Agassiz, assisted by M. de Pourtalès. The *Atlantic Monthly* for October has an interesting article upon this subject, from which we collate some particulars of the method employed and the object of this examination.

"Dredging in great depths is a slow and rather tedious process, requiring not only patience but very accurate observation. M. F. de Pourtalès, of the Coast Survey, has been engaged on board the *Bibb* for the last three years in making dredgings in the Gulf of Mexico. These dredgings have included every variety of depth, from the shore outward to soundings of six, seven, and eight hundred fathoms, eight hundred and sixty fathoms being the deepest. They have brought to light the most astonishing variety of tiny beings—especially crowded on rocky bottoms, but not altogether wanting in the deepest mud deposits. A report of the results obtained in his first two years' dredgings has been partially published by M. de Pourtalès in the Bulletin of the Museum of Comparative Zoölogy at Cambridge. They form a most valuable contribution to our knowledge of the animals existing in the deep sea.

"The dredge is a strong net about a yard and a half in length, surrounded by an outer bag of sail-cloth. Both are open at the bottom, but laced above around an oblong frame of iron. This frame has two arms, with a ring at the end of each. One of these arms is securely fastened to the line by which the dredge is let down; but the other, instead of being attached to the line, is simply tied by a weaker cord to the first. This is in order that, in case the dredge should be caught on the bottom, as often happens, one of the arms may give way, allowing it thus to change its position slightly and be more easily freed. It is an important precaution; for sometimes the dredge is caught so fast that it requires not only the force of the small engine to which the reel, holding seventeen hundred fathoms of line, is attached, but the additional strength of all hands on board, to disengage it. When the dredge is lowered—being of course weighted, so as to sink rapidly—a cord is tied around the bottom of the net, while the sail-cloth is left open; thus allowing the free escape of water from the former, while the sail-cloth protects it from injury. When the dredge is landed on deck, a tub or bucket is placed under it, into which all its contents fall the moment the cord around the bottom of the net is untied. Some-

times a large tub is filled at one dredging with all sorts of living specimens—shells, corals, shrimps, barnacles, sea-urchins, star-fishes, sponges, polyps, and sea-weeds, with all their natural brilliancy of tints."

A water glass is also used which "is nothing more than a square wooden tube, with a glass plate in the lower end. Sinking this under the water and looking through it, all the undulations of the surface, which distort objects below, are lost, and nothing obstructs the vision.

"Seen through this simple apparatus, the sea-bottom, or rather the summit of the reef above which we were floating, was like the most exquisite aquarium, the contents of which were ever shifting."

LONDON Bridge having become too narrow to accommodate the traffic over it, it is now proposed to widen it by throwing the foot-walks into the carriage-road, forming new footways upon cantilevers and brackets on either side of the road. This will increase the width of the carriage-way from thirty-five to fifty-three feet.

Inventions Patented in England by Americans.

[Compiled from the "Journal of the Commissioners of Patents."]

PROVISIONAL PROTECTION FOR SIX MONTHS.

2,465.—MANUFACTURE OF BOOTS AND SHOES, AND IN MACHINERY OR APPARATUS EMPLOYED THEREIN.—N. A. Baldwin, Milford, Conn. August 25, 1869.

2,640.—SPINNING MULES.—Samuel Oddy, Manchester, England, Robert Nuttall, Bury, England, and John B. Smith, Wappinger Falls, N. Y. Sept. 8, 1869.

2,664.—FIRE EXTINGUISHER.—G. F. Pinkham, Cambridge, Mass. Sept 11, 1869.

2,745.—SPINDLES AND FLYERS OF SPINNING FRAMES.—J. Goulding, Worcester, Mass. September 21, 1869.

NEW PUBLICA IONS.

AN ESSAY UPON FORCE IN NATURE AND ITS EFFECTS UPON MATTER. Cincinnati: Robert Clarke & Co., Publishers.

The theory of Newton that every particle of matter attracts all other particles of matter in right lines joining their centers, and in an inverse ratio to the squares of their distances by virtue of an inherent force called gravity, accounted for the motions of the planets so satisfactorily that it has been almost universally adopted by subsequent physicists as a natural law. Nevertheless there have not been wanting those who have doubted the correctness of this theory. Among these Faraday has been perhaps the most conspicuous. Without doubting the fact that what we call gravity varies as the squares of the distances, he claimed that the supposition that *a single force* could so vary was in conflict with the highest law in physical science capable of comprehension by the human mind, namely, the conservation of force.

The pamphlet before us is a very modest and calm statement of a doubt in regard to the truth of this celebrated and generally accepted theory, and though metaphysical, as all discussion upon an abstract notion of force must be, calls in mathematics to aid in the elucidation of a new theory which is, that "that all planetary movements are caused by the effect of force on matter—not inherent in matter; and further, that the one primal force on which planetary movement depends, modified by special effects upon substances differing in kind, in arrangement, and in position, is that which, under the modified conditions, is called by the various names of force, as of attraction and repulsion, cold and heat, electricity, magnetism, weight," etc. The latter portions of the essay, in which it is attempted to sustain the theory, are, as the author claims, merely suggestive; the first part being devoted to the attempt to demonstrate mathematically that the theory of Newton is untenable.

We are disposed to be lenient with the errors of an author who expresses his views so temperately and candidly as this, and though it would not be difficult to show some defects that, in our opinion, vitiate the whole argument, we do not think the topic of sufficient value to enter upon its discussion. Indeed the author himself asserts that he claims no scientific value for the discussion or the idea which led to it. We must therefore place this book among those works of which the world has seen too many; works seemingly written to no purpose but to indulge the love for speculation which has been a characteristic of certain minds in all ages.

THE GOLD FIELDS AND MINERAL DISTRICTS OF VICTORIA With Notes on the Modes of Occurrence of Gold and other Metals and Minerals. By R. Brough Smyth, F.G.S., Secretary for Mines for the Colony of Victoria. Melbourne: Printed and published by John Ferres, Government Printer. H. T. Dwight, 232 Bourke street, East. London: Trubner & Co., Paternoster Row.

This is a compilation in large quarto form, of an immense mass of information, historical, statistical, and technical, relating to the mineral resources of the Colony of Victoria in Australia. The perusal of the volume will, without doubt, excite surprise even in the minds of many Englishmen accustomed to regard Australia as a sort of *El Dorado*, yet having only a vague and very imperfect idea of the immense resources of that continent. Even many Anglo-Australians have only a partial knowledge of the country they inhabit, a country destined, perhaps, at some future period, to play as prominent a part in the history of the world as Great Britain itself. It would be futile to attempt a review of this work in any space we can at present allot to it. Suffice it to say, that we deem it one of the most important works of its class ever published. As a work of reference it will prove of great value, as it is thoroughly indexed, and also contains a glossary of mining terms, with plates illustrating scenery, also apparatus, implements, etc., used in the Australian mines. The entire work is, moreover, illustrated in a very artistic manner. The reader will find in another column an extract from this work, with an illustration of the "Welcome Stranger Nugget," found near Donolly in Australia, the largest mass of pure gold ever found native in the history of gold mining.

THE PROGRESS AND CONDITION OF SEVERAL DEPARTMENTS OF INDUSTRIAL CHEMISTRY. By J. Lawrence Smith, U. S. Commissioner to the Paris Universal Exposition, 1867.

This is one of the series of able and instructive reports which have been prepared and published on the great French Exposition. We have met with no similar document of greater interest and value than this, and we find in its perusal that we shall be able to select many extracts of interest which we shall in due time lay before our readers, premising that some of the deductions of the author in regard to the effect of legislation upon similar industries in the United States do not receive our sanction. An extract from this report, entitled "Applications and Progress of the Manufacture of Sulphuric Acid," will be found in another column, and is the first of several extracts we shall make upon this, and other important branches of manufacture.

USEFUL INFORMATION FOR RAILROAD MEN. Compiled for the Ramapo Wheel and Foundery Company by W. G. Hamilton, Engineer. Second Edition. Revised and Enlarged. New York: D. Van Nostrand, Publisher, 23 Murray street, and 27 Warren street.

This is a hand, or rather a pocket book of information in a condensed form, mainly compiled from the standard works of Clark, Colburn, Bourne, Haswell, Hurst, Molesworth, Nystrom, Percy, Scribner, Templeton, Ure, Price, and Williams, and is filled with useful and practical formulæ, rules, statistics, recipes, tables, etc., etc., thoroughly indexed, and provided with a rubber clasp. One of those books of reference most useful to practical men, and published in admirable style.

RAILWAY ECONOMY. Use of Counter-Pressure Steam in the Locomotive Engine as a Brake. By M. Le Chatelier, *Ingenieur en Chief Des Mines*. Translated from the Authors' Manuscript. By Lewis D. B. Gordon, F.R.S.E., Honorary Member of the Institution of Engineers in Scotland. Philadelphia: J. B. Lippincott & Co.

There is nothing new in the general idea of steam counter-pressure brakes. As practiced previous to the investigations and inventions of M. Le Chatelier, there were, however, insuperable objections to the employment of the system. These objections are fully set forth in the little Work before us, as well as the progress of the experiments by which such an important modification of the system has been made, that, at the present date, upward of two thousand engines are running in France and Spain with this improvement attached, and it is also being introduced on the German railways. We have now in process of preparation an engraving of this improvement, and will give, in a future number, all necessary explanatory details in regard to it.

WE are in receipt of the first number of a neatly-printed quarto sheet called THE POLYTECHNIC, a semi-monthly of twelve pages, Montague L. Marks, editor and proprietor, 208 and 210 River street, Troy, N. Y. The prospectus informs us that the design is to establish this paper permanently as a high-class college scientific publication, to be increased both as to quantity and quality of its contents according to the amount of patronage it may receive. The connection of this paper with the Rensselaer Polytechnic Institute gives it command of many resources, both from the talent always to be found in that excellent school and from the alumini, among whom are many of our best engineers and scientific men. The first number is spirited and its contents are interesting. We wish our new co-temporary the success it merits. Subscription price $1 per annum.

MANUFACTURING, MINING, AND RAILROAD ITEMS.

A valuable discovery of bismuth ore has been made near Balhannah, South Australia.

An alloy for jewelers' use, said to be very ductile and malleable and to possess a fine color, is composed of 750 parts of gold, 166 parts of silver, and 84 parts of copper.

During last year the quantity of silkworms' eggs exported from Japan amounted to 2,195,651 cards. Of this number 800,000 have been sent to France, Spain, Turkey, Persia, and other countries, and the remainder to Italy.

Dr. Poselger has determined by positive experiments that the death of trees growing along streets and promenades is not due, as has been often asserted, to the effects of the leakage in gas mains; but that it is owing chiefly to the neglect of so keeping the soil that air may freely permeate to the roots.

Abundant seams of coal of good quality have been discovered on the eastern shores of the Caspian Sea. Humboldt was of opinion that coal would be found there at no great depth, since the entire district abounds in naphtha. The steamships of that sea have hiterto employed wood as fuel, which had to be conveyed, at great cost, from the Ural mountains.

A number of submarine sweet water springs are known to exist in the Adriatic, along the coast of Istria and Dalmatia. As the maritime districts of these provinces suffer from want of a sufficient supply of water, and as it is possible by means of the Norton pump to save much that is now lost; the Austrian Minister of Agriculture has published a book on the means of finding and utilizing submarine fresh water springs on the Austrian coasts.

The Pacific railroads are now carrying emigrants to California for $70 from Philadelphia or $42 from Omaha. The number of emigrants since the 1st of September has averaged 100 per day. They are carried on the express freight train, and make the trip in less than ten days. A large increase of business is expected on this train next year.

Sir David Brewster found, says the *Engineer*, that the fundamental principle of the stereoscope was known to Euclid, who compiled the well known *Elements* about B. C. 280; that it was distinctly described by Galen, 1,500 years ago; and that Baptista Porta, in 1599, gave such a complete separate picture seen by each eye, and of the combined picture placed between them, in which we recognize not only the principle but the construction of the stereoscope.

M. Armand contributes a paper to the *Comptes Rendus* wherein he states that the deleterious effects of tobacco might be counteracted, if not entirely annihilated, by moistening the tobacco, while undergoing the various preparations and fermentations previous to its delivery to the consumer, with a strong infusion or other preparation of water-cresses. He has discovered that this vegetable contains principles which, while the peculiar aroma of tobacco will remain unaffected, will destroy the bad effects of nicotine.

The most remarkable railroad in Germany and Europe is the new Black Forest road, which will be completed within four years. Between Hornberg and St. George, situated 2,870 feet above the level of the sea, and but four miles distant from Hornberg, the railroad ascends nearly 2,000 feet, and passes through 27,000 feet of tunnels. Eleven thousand feet of the latter have been completed during the last two years. The truly Cyclopean work on the road is progressing rapidly, and attracting thousands of visitors, who flock together from all parts of Southern Germany and Switzerland.

Recent American and Foreign Patents.

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

HARROW.—P. S. Graves and P. B. Parcell, Ashmore, Ill.—This invention relates to a new and useful improvement in harrows, and consists in arranging the teeth in the harrow frame so that they may be simultaneously thrown backward or forward on either side.

APPARATUS FOR RAISING WATER.—Jas. W. Prendergast, New York city.—This invention relates to a new and useful method of raising water by atmospheric pressure.

SOLDERING MACHINE.—John G. Borden, Brewster Station, N. Y.—This invention relates to new and useful improvements in a machine for soldering tin cans and other articles of tin ware.

STEERING APPARATUS.—George H. Davis, Stony Brook, N. Y.—This invention relates to a new and useful improvement in apparatus for steering vessels on the water, and consists in constructing and arranging a chain pulley in such a manner that a chain may be effectively used in combination with a traversing wheel.

CAR COUPLING.—William Cottrell, Bordentown, N. J.—This invention relates to new and useful improvements in couplings for uniting railroad cars together; and it consists in a device for holding the coupling link in a horizontal position when the cars are being coupled, and in the method of inserting the coupling pin.

RAILROAD SUPPLY APPARATUS.—David Harrison, Fayette, Miss.—This invention has for its object to furnish a simple, convenient, and effective means for supplying a moving railroad train with water, fuel, etc., while under full headway.

FENCE.—Smith Riley, Kenton, Ohio.—This invention consists of sections made of longitudinal bars with beveled ends and vertical pickets, the said beveled ends of the sections being joined so as to assume a zig-zag form, and held together by connecting links extending from the picket with the end of one section to the corresponding picket of the next section.

TILE MACHINE.—George Jackson, Albany, N. Y.—This invention relates to certain improvements in tile machines, of that class in which the clay is by a sliding piston forced through apertures in the end of a box, so that it comes out in a continuous stream of the requisite cross section, to be cut into pieces of the desired length by a series of wires attached to a swinging frame.

SICKLE-BAR COUPLING FOR MOWERS AND REAPERS.—Rufus C. Wood, Le Roy, Kansas.—This invention has for its object to furnish an improved coupling for connecting the pitman and sickle bar of a reaper or mower to diminish the wear of the coupling pin and eye, and prevent the "end shake" of the sickle bar, and which shall at the same time be simple in construction and easily attached.

CLOTH-THINNING MACHINE.—J. W. Burch, Fayette, Miss.—This invention comprises an arrangement of devices for operating either a rotary cutter of three or any other preferred number of curved blades projecting from a disk, revolving transversely of the row, or a vibratory cutter working back and forth above the row, the whole mounted on a suitable frame and wheels, and deriving motion from the axle of the said wheels by suitabe gearing.

PRESS.—John Berkley, Washington, Texas.—This invention relates t improvements in presses for cotton, hay, and similar substances designed to provide a portable press of simple and cheap construction, mounted on wheels, for moving it from place to place, and arranged for adjusting the case in a vertical position for filling, and in a horizontal position for pressing, the follower being also arranged to work in a horizontal position.

CHURN DASHER.—Gustav Radbruch, Hoboken, N. J.—This invention relates to a new churn, of that class known as atmospheric churns, and consists of a new dasher, so constructed that it will at once agitate the cream and supply the necessary air by simple means.

RUFFLING ATTACHMENT TO SEWING MACHINES.—Louis H. Gunnerman Pittsburgh, Pa.—This invention relates to a new apparatus for ruffling or wrinkling fabric, and for attaching the same to straight fabric; and the invention consists in the arrangement and combination of two plates, by which the two fabrics will be properly gaged and separated before they are sewed together.

CHAIR.—Allen Lapham, Paterson, N. J.—This invention has for its object to improve the construction of chairs, so as to make them stronger, more durable, and less liable to become loose and shaky than when constructed in the ordinary manner.

GANG PLOWS.—H. N. Dalton, Pacheco, Cal.—This invention has for its object to improve the construction of gang plows, in such a way that the gang plow may be raised while running to cut a light furrow, or to lift it entirely from the ground at the will of the operator, and which shall be simple in construction and readily applied and operated.

KEROSENE LAMP BURNERS.—Edward L. Gilman, Somerville, Mass.—This invention has for its object to improve the construction of kerosene lamp burners, so that the gas arising from the oil or fluid mingled with air may be conducted to the flame to increase the light.

PORTABLE FIRE ESCAPE.—Hugh C. Carrigan, New York city.—This invention has for its object to furnish an improved portable fire escape, designed to be kept by those occupying upper apartments, in their rooms; and which shall be so constructed and arranged, that it will enable the occupants of the rooms to lower their property and themselves with speed and convenience to the ground, and which, when not in use, will present the appearance of being nothing but an ordinary chair and may be used as such.

WATER REGULATOR, ALARM, AND INDICATOR FOR STEAM BOILERS.—Leopold Steigert, Cincinnati, Ohio.—This invention consists of the arrangement of a float in a vessel, attached to the side of the boiler in a manner to oscillate a shaft carrying indicators and actuating a whistle valve, and a plug in the supply pipe whereby the whistle may be caused to blow at the proper time, and the water is allowed to flow to the pump where required, or shut off when not needed.

HAY LOADER.—J. C. Leonard, S. B. Holcomb, and W. B. Wight, Clinton, Mo.—This invention consists in a rake and elevating apparatus, mounted on two wheel to be hitched to the rear end of the wagon and arranged to gather the hay in front of the fixed curved teeth of the rake, from which it is taken by the elevator and delivered to the wagon in a peculiar manner.

WATER REGULATOR AND ALARM.—James William Ebert and Eli C. McCloy, Zanesville, Ohio.—This invention comprises an arrangement of valves in the feed water supply pipe for the pump, connected with a float and bung inside the boiler, so as to open and close the passage, as required; also, in connection with the said valves, another set of valves in the steam pipe leading to the whistle, which, when the water supply fails will give the alarm.

VELOCIPEDE.—Theodore Searing, New York city.—This invention consists, first, in a peculiar arrangement of runner and brake attachment for the wheels, and second, in an attachment to the propelling cranks of a pair of vibrators, to which are attached spiked segmental bars by pivot joints, under an arrangement whereby the spikes will be caused to engage with the ground when moved in the direction for propelling, but will slip over it without engaging when moving in the opposite direction.

FLYING MACHINE.—W. F. Quinby, Wilmington, Del.—This invention relates to improvements in flying apparatus intended to provide an arrangement of temporary sails, resembling in some respects the wings of birds in their construction and operation, which may be readily connected to the body of a person by means of a cuirass fitted to the body and made of metallic strips, formed and adapted to assist the operator to support the wings and at the same time to shield him from the shocks and jars due to the operation of the wings.

GOVERNOR FOR STEAM AND OTHER ENGINES.—W. J. Kesselmeyer, C. A. Kesselmeyer, Manchester, England, and E. H. Nacke, Als-Shoenfeld, Saxony.—This invention has for its object to render centrifugal governors more perfect in regulating the speed of the engine, so that the speed will be immediately corrected, as soon as it shall vary. The invention consists in the application to the movable valve rod of a vessel containing liquid matter, and in connecting the same with a stationary vessel in such a manner that, when by the contraction of the governor balls, the movable vessel is lowered, the liquid will flow into it from the reservoir, causing it to sink and to open the valve without loss of time.

WATER VELOCIPEDE.—F. A. Spofford and M. G. Raffington, Columbus, Ohio.—This invention relates to a new mechanism for propelling water craft by muscular power and by the aid of levers, ratchet wheels, etc., applied to paddle wheels.

CHOCOLATE PASTE.—L. F. Leger, New York city.—The object of this invention is to so prepare chocolate that it can be preserved in a semi-liquid state, to be readily dissolved when required.

IRON DOUBLE SHOVEL PLOW.—C. I. Voigt, West Salem, Ill.—This invention has for its object to furnish an improved double shovel iron plow or cultivator, which shall be simple in construction, easily adjusted, effective in operation, and easily operated.

MANUFACTURING AND REFINING SUGAR.—Louis J. F. Margueritte, Paris, France.—This invention consists in manufacturing and refining sugar by the following mode of operation: The sugar mixed with molasses is first brought in contact with a certain quantity of wood spirit in a mixer, where the whole is stirred for a very short time. The mixture consisting of sugar and liquid is then passed to a filter similar to those containing animal charcoal, when the black liquor of the molasses is run off, which is afterward replaced by pure wood spirit. A washing effected in this manner by displacement furnishes a perfectly white sugar.

HAY RAKER AND LOADER.—N. Farlow and J. A. Ham, Sullivan, Ill.—This invention relates to improvements in apparatus for raking hay and elevating it to a pitching platform, all suspended from a pair of wheels to be hitched to and drawn by the wagon to be loaded, or, when used for gathering grain for binding, to be drawn by a horse; the invention consisting in certain arrangements of the parts.

HAY DERRICK.—Winfield Denton, Iowa City, Iowa.—This invention reates to a new and useful improvement in derricks for loading hay.

CAR COUPLING.—Michael Connelly, Baltimore, Md.—The object of this invention is to provide for public use a simple and effective automatic coup ing for railroad cars.