Heat, Light, and Actinism.

We may apparently have heat without light, and light without heat, says Dr. Draper in *Harper's Magazine*. In the darkest room we cannot perceive vessels filled with boiling water, yet the warmth we experience on approaching them assures us that they are emitting radiations. Is not this heat without light? If we stand in the rays of the full moon, we cannot detect any decrease of temperature. Is this not light without heat? It is true that in this latter instance we are mistaken as to the fact; but overlooking that—for the heat to be detected in the moonbeams requires the most sensitive apparatus—do not such observations assure us that heat and light are independent of each other, physical principles having an existence separate from each other?

Such were some of the arguments on which were sustained the hypothesis of the intrinsic difference of light and heat. In this no account was taken of the optical functions of the eye. Qualities were incorrectly attributed to radiations which, in truth, were due to peculiarities in the organ of vision.

The great service which the diffraction spectrum has rendered to science is the abolishment of all these imaginary independent existences—heat, light, actinism, etc.—and the substitution for them of the simpler conception of vibratory motions in the ether. The only difference existing among the radiations that issue from a grating, in the manner we have been describing, is in their wave lengths, or, what comes to the same thing, in their times of vibration. The diversity of effects produced depends on the quality of the surface on which they fall. If on a dark surface, and the more so in proportion to its blackness, they engender heat; if on the retina, they are interpreted by the mind as light; if on photographic preparations, they produce decomposition, designated actinic effects.

Heat, light, actinism, are, then, not natural principles existing independently of each other, but effects arising in bodies from the reception of motions in the ether, motions which differ from each other in their rapidity. Of those that the eye can take cognizance of, the most rapid impart to the mind the sensation of violet light; the slowest, the sensation of red; and intermediate ones, the intermediate optical tints. Colors, like light itself, are nothing existing exteriorly. They are merely mental interpretations of modes of motion in the ether, and in this they represent musical sounds, which exist only as interpretations by the mind of waves in the air.

THE WHITE BRUGMANSIA.

All who aim at making the greenhouse or conservatory beautiful and picturesque with the smallest amount of trouble have a valuable aid in this well-known plant. Planted out in a bed or border of any kind, and without any special culture beyond allowing it plenty of root room and water, it quickly becomes a handsome bush. It is also generally so healthy and vigorous that year after year it is a source of pleasure. The long and fine white fragrant trumpets are produced plentifully, and are seen to advantage among the soft and ample fresh green leaves. They last a long time in flower, often appearing till nearly the end of the year. It is fitted for walls in certain positions as well as for beds and wide borders, and it is particularly valuable in large cool houses where more natural verdant effects are sought than are obtainable by means of plants in pots.

Improved Method of Plastering.

Mr. Hitchings, of Stoke Newington, England, has introduced a new method of forming ceilings and other plaster work which, for durability, saving of time, and cleanliness, is unrivaled. By means of this system the plaster is prepared beforehand in slabs, which are fixed expeditiously to the joists, forming the ceiling at once as it would be when lathed and plastered with the two coats of lime and hair in the old process. The slabs or sheets are made in the following manner: A layer of plaster of Paris in a moist or plastic state is spread evenly on a flat surface surrounded by raised edges of the form to produce the desired bevel of the edges of the slab or sheet, and upon this first layer of plaster is laid a sheet of canvas or other woven fabric of proper size, or a thin layer of loose fibers, which is made to embed itself into and adhere to the plaster. Two laths are then laid along two opposite edges of the canvas, upon which another layer of plaster is spread evenly, and before it sets a rough broom is passed over the surface of this second layer of plaster to form a key for the finishing coat. When the plaster is set the slabs are nailed to the joists, as before mentioned, and the joints are made good with plaster of Paris. The third or finishing layer of lime and plaster is then applied to the ceiling in the ordinary way. Besides the advantages derived from rapid fixing, with the minimum of dirt and inconvenience, the new ceiling is practically unflammable, and very economical to put up. Moreover, unlike the old plaster ceilings, it can never become detached from the joists; in fact, besides being self-supporting, it braces and strengthens all partitions and slight timbers.

ALUM and plaster of Paris, mixed with water and used in the liquid state, form a hard composition and a useful cement.

Progress of the Patent Purifier.

The war instituted by the Cochrane patent owners, known as the purifier ring, against the millers has now become general throughout the whole country, so says the *Mill Stone*. Emboldened by their temporary success in the case of J. A. Christian & Co., at Minneapolis, the American Middlings Purifier Company have, during the last two months, commenced a large number of similar actions for preliminary injunctions against the leading millers in every part of the country. By bringing a number of such suits simultaneously in various parts of the country, and creating the impression that they can compel all the principal millers, as well as the smaller ones, to either shut down their mills or furnish bonds ranging in amount from \$50,000 to 100,000, the purifier ring seems to aim at securing as many settlements as possible, and gather all the prestige and "sinews of war" they can from such source before a trial of their case on its real merits can be forced upon them. We say this seems to be their policy, and it is so regarded by the leading millers and their associations, all of which are gaining strength daily and becoming more and more determined to contest the matter, directly through the courts, even up to the court of last resort, notwithstanding any and all of the numerous and industriously circulated reports of the ring and its agents to the contrary.

In Missouri and Indiana the war is already fairly inaugurated; and instead of having the effect of weakening the defensive associations, as anticipated by the ring, it has had exactly the contrary effect, the millers throughout those States having at length become fully awake to the importance of sustaining each other and making common cause against the demands of the ring, which they consider not only extortionate, but based upon fraud of the worst character, and which they regard it a matter of principle as well as vital interest to defeat.

In their application for an injunction against the Haxall-Crenshaw Company, Cochrane *et al.* give the history of the Cochrane patents, which the *N. W. Miller* condenses as follows:

In 1863 Cochrane, assignor unto himself and Warder & Child, was granted three patents, one of which was for an improved method of bolting flour; the second and third for improvements in bolting chests.

In 1873 Cochrane assigned one half of his remaining undivided interest to Rodney Mason.

In 1874 Child assigned his interest to Warder.

In 1874 Cochrane, Warder & Mason surrendered these patents and obtained reissues (for altogether different claims).

In 1874, April 27th and August 26th, Benj. H. Warder assigned all his interest to Wm. Warder.

THE WHITE BRUGMANSIA.

August 18, 1875, Cochrane, Warder & Mason assigned an undivided one third interest in the original and reissued patents to Chas. F. Peck, J. M. Van Buskirk, J. A. Evans, W. S. Cox, and W. H. Phillips.

March 22, 1877, the alleged Cochrane, Warder, Mason, Peck, *et al.* formed themselves into the American Middlings Purifier Company.

In this connection it may be said that Cochrane and Warder had failed utterly to make the machine for which the original patents were granted of any use; and that its use has been discontinued in the only mill where it was ever tried; and that the so-called American Middlings Purifier Company has never, to our knowledge, says the *N. W. Miller*, built, put in operation, or sold a middlings purifier, nor instructed a single miller in their "process" of making flour.

CEMENT FOR COATING ACID TROUGHS.—Melt together one part pitch, one part resin, and one part plaster of Paris. The ingredients must be perfectly dry.

THE MODERN HYPOSULPHITE OF SODA.

BY RUDOLF WAGNER.

The confusion which for some time past has begun to slip into the technical periodicals, in regard to the designation of two oxysulph compounds of sodium, induces me to make the following notice.

Until very recently we understood, by the term hyposulphite of soda, the sodium salt of the acid $\text{H}_2\text{S}_2\text{O}_3$; this compound was also called sodium dithionite, sodium hyposulphite, and the author designated it, in the *Pharmacopœia Germanica*, published 1872, as *natrum subsulphurosum*. (The same term appears in the German *Pharmacopœia* translated by C. L. Lochman, published by Edler & Co., Philadelphia, 1873, page 188). On account of its use in bleacheries and paper mills to remove the excess of chlorine, the (old) hyposulphite of soda is called antichlor, although, since the Vienna exposition of 1873, several German manufacturers have sent their sodium bisulphite into the world under this name.

The name of hyposulphurous acid for the compound $\text{H}_2\text{S}_2\text{O}_3$ has become impossible since the discovery of the acid H_2SO_3 or $\text{SO}_2\text{H}_2\text{O}$, by P. Schuetzenberger (*Comptes Rendus*, 1869, LXIX, 169). To this is added the important circumstance that the acid $\text{H}_2\text{S}_2\text{O}_3$ is no longer regarded as S_2O_3 , H_2O , that is, as a lower degree of oxidation of sulphur, standing below the sulphurous acid in the series, but as sulphuric acid in which 1 atom of oxygen is replaced by 1 atom of sulphur, hence its formula is: $\text{SO}_2 \begin{Bmatrix} \text{OH} \\ \text{SH} \end{Bmatrix}$, and all the decompositions of the acid and its salts harmonize with this supposition. Hence it is no longer possible for it to retain the name of hyposulphurous acid, but must be called, as is already done here and there, thiosulphuric acid. The (old) hyposulphite of soda, therefore, must retain in future the name of sodium thiosulphate, or thiosulphate of soda. I would like to suggest that in manufacturing industries and among chemical dealers the soda salt be called simply "thiosulphate," just as sodium sulphate is called "sulphate" for short, and, to avoid any confusion in ordering or using it, to restrict the name of antichlor to sodium sulphite. The name of sodium hyposulphite, the (old) hyposulphite of soda, naturally disappears, while the designation dithionite is permissible, or, at least, not incorrect.

The acid of the modern hyposulphite of soda belongs to the same series as the other technically important acids of sulphur, and fills a previously existing gap, as will be evident from the following arrangement:

SO_2 , sulphur monoxide, or SO , $\text{H}_2\text{O}=\text{H}_2\text{SO}_3$.
 SO_2 , sulphur dioxide, or $\text{SO}_2\text{H}_2\text{O}=\text{H}_2\text{SO}_4$.
 SO_3 , sulphur trioxide, or $\text{SO}_3\text{H}_2\text{O}=\text{H}_2\text{SO}_4$.

The first of this series is the hyposulphurous acid of Schuetzenberger, which the discoverer named hydrosulphurous acid (*acide hydrosulfureux*) and thereby gave impetus to error and confusion. K. Kraut gave to this acid the name of water-sulphurous acid (*Wasserschweflige Säure*). There is no doubt that this acid is hyposulphurous acid. Berthelot recognized this fact in a paper published within a few months upon the thermal properties of the new acid, in which he said "in a rigorous nomenclature we are compelled to reserve for this acid the name of hyposulphurous acid." In the new textbook of chemistry published by H. E. Roscoe and C. Schorlemmer, Professors in Owen's College, Manchester, England, the name of hyposulphurous has already been introduced for the acid discovered by Schuetzenberger. In Fowne's "Chemistry" the names are also employed in this manner.

It is surprising that the hyposulphurous acid was overlooked for so long a time, although many reactions from distant and recent times indicate that the experimenters had the new acid in their hands, especially where sulphurous acid came in contact with active reducing agents. As early as 1789, Berthollet made the observation that metallic iron dissolved in an aqueous solution of sulphurous acid, without any gas being evolved; and nine years later Fourcroy and Vauquelin noticed that zinc and tin likewise dissolved in sulphurous acid without gas being liberated. In 1850 Schoenbein brought an aqueous solution of sulphurous acid into contact with phosphorous acid; he obtained a liquid which reduced indigo blue, probably because the phosphorous acid had reduced the sulphurous acid to sulphur monoxide. By warming the phosphorous acid with sulphurous acid, no hyposulphurous acid was formed, but beside phosphoric acid also sulphuric acid.

As already stated, P. Schuetzenberger in 1873 was the first who discovered the (new) hyposulphurous acid, and sought to make use of its powerful reducing properties in the arts. It is prepared by digesting granulated zinc, or zinc dust, in a closed vessel, with a cold saturated solution of sulphurous acid in water. The zinc dissolves without any evolution of gas, and in the solution will be found hyposulphite of zinc:

Zinc sulphite. Zinc hyposulphite.

In preparing the sodium salt of the formula NaHSO_3 (the second atom of hydrogen is not replaceable by a metal), the zinc is digested with a cooled concentrated acid solution of sodium sulphite, and the solution allowed to stand over night in an ice chest, when a double salt ($\text{ZnSO}_3 + \text{Na}_2\text{SO}_3$) crys-

talizes out. The liquid remaining over the crystals will, if cooled more and left standing a long time, yield a crystalline mass consisting of colorless needles, which must be pressed out and dried in a vacuum. Aluminum likewise produces a hyposulphite by digestion with aqueous sulphurous acid. The reaction of hyposulphurous acid to magnesium is very peculiar, for this metal dissolves with an abundant evolution of gas (hydrogen but no sulphuric acid). The process, about which I reserve further communication, seems to be a complicated one.

The aqueous solutions of hyposulphurous acid and its salts greedily absorb oxygen from the air and then pass into acid sulphites: $\text{NaHSO}_2 + \text{O} = \text{NaHSO}_3$. A hyposulphite solution when kept a long time goes over partially into thiosulphate: $2 \text{NaHSO}_2 = \text{Na}_2\text{S}_2\text{O}_3 + \text{H}_2\text{O}$. An aqueous solution of hyposulphurous acid likewise decomposes in a few days, forming milk of sulphur; at first this sulphuric acid is formed, but this at once splits up into sulphurous acid and milk of sulphur:

DeLande and P. Schuetzenberger first made use of its important reducing properties in the preparation of hyposulphite vat, by mixing a solution of hyposulphite of soda with mixture of finely ground indigo and sodium hydrate:

Indigo blue. Sodium hyposulphite.
Indigo white soda (hyposulphite bath). sodium bisulphite.

The hyposulphite vat is used in the place of the vitriol vat in dyeing as well as printing with indigo.

Hyposulphurous acid precipitates the metals from solutions of silver and mercury salts, for example, from silver nitrate:

Chloride of silver, when freshly precipitated, is reduced to silver by long digestion with sodium hyposulphite, a reaction by which the hyposulphite is distinguished from the thiosulphate. I cannot confirm the statement that copper is separated as regulus from copper salt solutions by hyposulphite; the black precipitate which forms after some time consists of sulphide of copper.

A solution of permanganate of potash is immediately decolorized by hyposulphite.

It is evident that the hyposulphurous acid and its alkaline salts will still find many valuable uses in the province of chemical technology and chemical technical analysis.—*Dingler's Journal*.

NEW BOOKS AND PUBLICATIONS.

INDUSTRIAL DRAWING. By D. H. Mahan, LL.D. Revised and enlarged by Dwinel F. Thompson, B. S. John Wiley & Sons, 15 Astor Place, New York. Price \$3.50.

Dr. Mahan's work has been a standard text book for so long that it is hardly necessary here to refer to its particular merits. The present reviser has, however, made many important improvements, notably in rewriting the chapters on drawing instruments and their uses, and adding others on tinting, shadows, shading, isometrical drawing, oblique projection and perspective. The value of the book is thus materially enhanced.

THE THEORY AND ACTION OF THE STEAM ENGINE. By W. H. Northcott, C.E. Cassell, Petter & Galpin, Publishers: London and New York. Price \$3.50.

To students, to the general reader who wishes to avoid technical dissertations, and to the professional engineer who desires a handy book of the A B C of his calling wherewith to refresh his memory, we can cordially commend this work. It is one of the clearest, best written treatises that have ever come under our notice. The author not only fully comprehends his subject, but he possesses the rare faculty of not letting his own knowledge blind him to the needs of others not so well versed or wholly unversed therein. Beginning with a chapter on the theory of combustion, he proceeds to its practical consideration, taking up one by one, and capably elucidating them, the various considerations affecting the steam boiler. Having discussed the generation and properties of steam, he proceeds to motive power derived therefrom and concludes with chapters on varieties of engines, their relative efficiencies and how to test them. The arrangement is logical, the explanations must be clear to any one of average intelligence, and taken altogether we know of no similar work which we should prefer to place before the young student as a text book and guide. There are plenty of illustrations and numerous useful tables.

PRACTICAL HINTS FOR THE SELECTION AND USE OF THE MICROSCOPE. By John Phin. Second Edition. Industrial Publication Co. New York city. Price 75 cents.

"The object in view of the preparation of this book," says the author in his preface, "was the furnishing of a cheap manual for those who cannot afford the more expensive books of Carpenter, Beale, Frey, and others." It is a work of nearly 200 pages, well illustrated and containing the practical information which beginners in the use of the microscope especially need. Dr. Phin is a microscopist of deserved reputation, and the first edition of his book was generally commended. The present edition has been materially enlarged and improved.

A SYSTEM OF VOLUMETRIC ANALYSIS. By Dr. Emil Fleischer. Translated by M. M. Pattison Muir, F.R.S.E. Illustrated by Macmillan & Co, 22 Bond street, New York. Price \$2.50.

This work divides volumetric analysis into a few great groups, points out the principles underlying each, illustrates such principles by practical examples, and in general inculcates the necessity of studying this method of analysis as a branch of the science of applied chemistry. A distinctive feature is the plan for the estimation of bases without previous separations. The translator has judiciously condensed the original, added some new processes and tables and the new chemical formulae, and otherwise better adapted the book for practical use, rendering it in English, as it already is in German a standard work upon its special subject.

Inventions Patented in England by Americans.

From September 11 to September 17, inclusive.

BAYONETS.—E. Rice, Cambridge, Mass.
BINDING BOOKS.—A. Boehmer (of Philadelphia, Pa.), London, Eng.
IRONING MACHINE.—H. Monk, Troy, N. Y.
PINCERS.—A. F. Stow et al., Worcester, Mass.
PROJECTILES.—J. G. Butler, West Troy, N. Y.
SEWING MACHINE ATTACHMENT.—W. Gay, Troy, N. Y.
SPINNING MACHINERY.—J. M. Pursey et al., Wilmington, Del.
TESTING CHECKS.—F. Grafelman, Middle Village, N. Y.
TOY MATCHES.—J. G. Powell, Philadelphia, Pa.
WINDOW BLINDS.—A. E. Wemple (of New York city), London, Eng.

Recent American and Foreign Patents.

Notice to Patentees.

Inventors who are desirous of disposing of their patents would find it greatly to their advantage to have them illustrated in the *SCIENTIFIC AMERICAN*. We are prepared to get up first-class WOOD ENGRAVINGS of inventions of merit, and publish them in the *SCIENTIFIC AMERICAN* on very reasonable terms.

We shall be pleased to make estimates as to cost of engravings on receipt of photographs, sketches, or copies of patents. After publication, the cuts become the property of the person ordering them, and will be found of value for circulars and for publication in other papers.

NEW WOODWORKING AND HOUSE AND CARRIAGE BUILDING INVENTIONS.

IMPROVED VEHICLE RUNNING GEAR.

George R. Duval, Oregon City, Oregon.—This invention relates to an improved construction of gear for vehicles of all kinds, which admits the employment of iron or other metal for all the parts, and produces a strong and substantial supporting and connecting gear thereby. The axle may be formed of hollow pipes, with interior truss rods, when extra strength is required, the seats carrying in outside grooves the thimbles, which are securely attached by outer screws. To the arch of the front axle is attached the fifth wheel, that is bolted thereto to support the front of reach, through the end of which the king bolt passes in the customary manner. The front bolster is constructed of arched parallel plates or bars supported in end seats or lugs, and braced by a curved stiffening rod and screw nuts at the ends, and acts in the manner of a truss, and is supported in the center by the head of the king bolt. The wagon body rests on front and rear bars, and between the uprights or standards, which are bent of flat iron, braced by cross studs, and secured rigidly to the ends of the bars by fastening bolts and nuts. The reach is made of iron tube or gas pipe of suitable strength, and clamped in suitable manner to a coupling sleeve or thimble by collars and set screws, being capable of adjustment to different length by means of the adjustable collars and screws. In this manner a strong, substantial, and firmly braced iron running gear for farm, lumber, and other wagons requiring a certain strength is obtained, which may, by slight modifications, be also used for vehicles of all description, imparting to them a light and pleasant appearance in place of the clumsy and heavy wooden wagons at present in use.

IMPROVED FASTENER FOR THE MEETING RAILS OF SASHES.

Henry L. Clark and Augustus B. Smith, Chester, N. Y.—The object of this invention is to provide a simple and inexpensive sash fastener to be applied to the meeting rails of window sashes, which cannot be unfastened from the outside, and will prevent the window from rattling. When the window is closed it is fastened by turning a lever down into a horizontal position over a plate and swinging the latch over it, the curvature of the lever being such as to permit the notched part of the latch to slip over it. It is impossible to move either the latch or lever from the outside of the window, therefore the window cannot be opened from the outside.

IMPROVED FRAME BUILDING.

William R. Morris and Joseph Slanser, La Rue, O.—This invention relates to improvements in the method of constructing frame buildings by the use of planks of suitable length and thickness, so that the entire building may be finished in its several parts, and finally put up in strong and reliable manner and without skilled help. The planks are placed at some distance from each other and bolted firmly to the beams, which are made of several planks interposed between the upright planks of the posts, so as to form therewith a compound plank construction that gives strength and rigidity to the building. The lateral post connecting girders are passed through mortises of the plank posts and secured rigidly at the meeting ends or joint of two girders by a recessed key, that is first passed through the mortises of the post and then placed in position, the girder ends being then inserted and connected by a second recessed post key, of less width, which keys are both spiked to the girder ends, to unite the same. The keys and girder joint are finally rigidly locked to the mortises of the plank post by two wedge keys running in opposite directions to each other. In this manner the construction of the compound plank frame buildings is perfected and rendered stronger and more durable.

NEW TEXTILE INVENTIONS.

IMPROVED FABRIC FOR CARPET LINING, ETC.

Daniel G. Rollin, New York city.—This invention has for its object the production of an improved elastic fabric, which is useful for a great many purposes where a fabric possessing strength and elasticity is required, as, for instance, carpet lining, insoles for boots and shoes, etc., and is composed of vegetable or animal fibers, or of vegetable and animal fibers combined. The following is the process usually employed in the manufacture of the new fabric: The inventor gives in manufacture this formula: For making, say, one square yard of the fabric, take about one and a half ounce of cotton waste, about one fourth of an ounce of glue made into a sizing, and a sufficient quantity of water to perfectly saturate the fibrous mass. To this add particles of sponge, cork, raw cotton, or other suitable elastic substance; also about one sixteenth of an ounce of alum, acid, or any other astringent. The cotton waste should be finally reduced by pickers suitably adapted to the purpose. The wet mass is passed between wire cloth aprons and dried, when it is ready for use.

NEW AGRICULTURAL INVENTIONS.

IMPROVED GUANO DISTRIBUTOR.

Joseph P. Baker, Madison, Ga.—This is an improved device for distributing guano and other similar fertilizers. In construction it consists of a spout having a flared upper end containing a removable hopper, and having two free rollers geared together and operated by a crank. One of the rollers is grooved or fluted and co-operates both with the hopper to shake it and with the other roller to pulverize and feed the fertilizer, the whole forming a light and convenient portable hand-distributor.

IMPROVED STOCK FEEDER.

Osman M. Hayden and George A. Knowles, La Porte City, Iowa.—This invention is intended for the purpose of feeding ground or other feed to hogs, cattle, sheep, or colts in an economical manner, without deteriorating the feed by impurities or the breath and saliva of the animals, so that other animals are kept from it; and the invention consists of a trough with feed hopper having adjustable slide piece and stirring lever or levers. The feeder may be arranged for different animals by being made of different width and height, forming, however, in all cases an economical feeding trough, as there is no waste of feed nor soiling of the same by the animals, the feeding being readily interrupted, when one set of animals is fed, by dropping the slide piece, the next set taking readily the feed as it is delivered in fresh state to them by opening the slide.

IMPROVED COTTON HARVESTER.

John E. Watkins and Morris Sale, Smithfield, Ky.—This invention has relation to machines for picking cotton in the field, and the nature of the invention consists, first, in a novel combination of devices with an exhausting fan and a picker, whereby one of the transporting wheels, when rotated, operates continually to wind up a spring, which, in turn, gives rapid motion to a fan and picker; second, in applying the exhausting fan and

picking devices on the end of a frame which is vertically adjustable on the main frame; third, in combining picking nippers with a nozzle which communicates with the fan case, which nippers will pick the cotton from the pods, deliver it into the nozzle, and keep the same clear. In practice a governor to regulate is used to regulate the speed of the fan. Steam may also be used to run the machine. The convolute spring that drives the fan is employed to get a reserved force for use while stopping to gather the cotton where the pods are thickest.

IMPROVED HARROW.

George D. Miles, Cairo, Pa.—The handles of the harrow are attached by screw bolts to the side sections in such a manner as to be detached for being both placed on one side section, when the same is used as a cultivator. The handles serve to raise the side sections in passing a stump, rock, or other obstruction, which is a great advantage in harrowing new ground or an orchard, while the coupled side sections without the middle section may be readily used for harrowing corn. The side sections or wings may also be provided with wheels turning on center pins attached by straps, the front wheel being made like a caster, so as to turn below the wings and admit the easy transportation of the harrow to and from the field. The middle section is first lifted up and the wings drawn by slight side draft under it, to be conveyed as sled or vehicle. The harrow is in this manner adapted in superior manner for the purposes of the farmer, as it may be more conveniently handled and applied for different work.

IMPROVED FRUIT DRYER.

William W. Ferguson, Healdsburg, Cal.—The object of this invention is to furnish an improved machine for drying fruit, which shall be simple in construction, convenient in use, and effective in operation, drying the fruit evenly and rapidly, and which may be constructed at comparatively small cost. The case of the machine, which is designed to be placed over or connected with a furnace, has a pipe inserted in a hole in its top to allow the moisture from the fruit to escape. In the front and rear sides of the case are formed large doors for convenience in putting in and taking out the fruit pans, and to enable the machine to be cooled off quickly when the fruit is to be taken out. To the upper and lower parts of the sides of the case are pivoted two shafts, to each of which are attached two chain wheels, around which are passed two endless chains, to which are attached fruit pans for receiving the fruit to be dried. The machine may be driven by steam power or horse power, as may be desired or convenient.

NEW MECHANICAL AND ENGINEERING INVENTIONS.

IMPROVED CAR MOVER.

George W. Leek, Terre Haute, Ind.—This invention is intended to provide an easily operated yet powerful device for moving cars on the track, and it consists of a wheel with lateral concave knives, driven into the grooved circumference and biting into the railroad, said wheel turning, by a center pivot, in a forked lever arm, that is secured to the platform of the car. The knife wheel is turned and car moved by a pivoted spring pawl of a hand lever engaging a fixed side ratchet wheel of the knife wheel. The forward motion of the hand lever gives a purchase on the ratchet, which thereby turns the knife wheel, that bites, by the lateral knives, into the head of the rail, and transmits thereby motion to the car. The return motion of the hand lever passes the pawl back over the ratchet, so as to engage the same again by the forward motion of the hand lever. The car or cars are thus moved with ease by this simple and effective device to any point on the track or to the side track, as required.

IMPROVED RAILWAY GATE.

William I. French, Cainsville, Mo., assignor to himself and Peter Jacobs, of same place.—This invention is an improvement in the class of railroad gates which are suspended by rods and arranged to swing across the track, being operated by levers which are connected with movable track rails so as to be operated by a train approaching from either direction. The operation of gates thus connected with movable rails is liable to be hindered or prevented by ice, snow, stones, or other substances beneath the rails. This invention consists in suspending the gates by two parallel rods, and in operating the same by pivoted arms or levers, which are depressed by contact with the wheels of the locomotive. The operation is as follows: The wheels of the approaching train run upon and depress the levers, which draw down the short arm of these levers, and swing the gates so as to leave the track clear. The levers are of such length that they are constantly pressed downward by the wheels of the passing train.

IMPROVED LEATHER-ROLLING MACHINE.

Henry Hudson, Saltillo, Pa.—The object of this invention is to furnish an improved leather-rolling apparatus which shall be so constructed as to enable the pressure to be applied by steam power, and which shall be simple in construction and easily controlled. When the free end of the lever is pressed down, steam is admitted to the cylinder, which forces down the piston and applies pressure to the roller. When the foot is removed from the lever it is raised by the spring, which closes the inlet and opens the exhaust, and the piston and the roller will be raised by the spring. The bar is vibrated to roll the leather in the usual way.

NEW MISCELLANEOUS INVENTIONS.

IMPROVED PASSE-PARTOUT MAT.

Samuel Philips, Paterson, N. J.—The object of this invention is to furnish passe-partout mats which shall be strong and durable. The body or foundation of the moulding is wood, and is made in long pieces or strips in the same way as other wood mouldings. To the face of the long pieces of moulding is glued torchon or other paper. The long pieces are then mitered into pieces of the proper length to form a mat of the required size, and the mitered ends of said pieces are firmly glued and nailed to each other. By this construction the paper in the angle of the mat will be even and smooth, and without any pull or tear, which cannot be the case when the paper is applied to the moulding after the frame is formed. The inside mat is placed in the rabbet formed in the inner edge of the back of the moulding to receive it and the picture. The outside mat is attached to the outward extension of the moulding. When the mat is small the extension may be a solid part of the moulding; but when the mat is large the extension may be a separate piece, securely nailed to the moulding. After the moulding has been put together to form the mat the paper upon the moulding and the inside mat are coated with French zinc, mixed with water and enough gelatine to cause it to adhere firmly to the paper, a little ultramarine blue being added to make the color a pearly white. This preparation gives a pure white color to the moulding and mat, and greatly increases the beauty of the mat.

IMPROVED MUCILAGE HOLDER.

George B. Wight, New York city.—This invention relates to such improvements in those mucilage bottles in which the mucilage is applied by means of a sponge attached to the cap of the bottle that the required quantity of mucilage is supplied directly to the sponge on turning the bottle, and the sponge kept moist for use by a small storage receptacle formed in the cap at the base of the sponge. The invention consists of the flanged cap of a mucilage bottle, having a central perforation and outer rim, that forms, with a circumferential flange of the cap, a space for fastening the base of the conical sponge, which is attached by a toothed ring, over which the flange is drawn. The interior of the sponge is conically hollowed out to admit the easy passage of the mucilage, and the shedding of the same into the space or reservoir between rim, flange, and ring when the bottle is placed in upright position after use.