

order to lessen the blackening action of the osmic acid, as much pure water as the test tube will hold is added. In certain waters rich in organisms the microscopical examination may be made in a few hours. If the water is comparatively pure, twenty-four or forty-eight hours must be allowed to pass. The liquid, with the exception of the last one or two centimeters, may then be decanted. The detection of the organisms in the residue is facilitated by the employment of coloring agents, such as Ranvier's picrocarminate, methyl violet, logwood, etc. It is always well to introduce the coloring agent mixed with glycerine; the organisms are thus better tinted, and can, if desired, be better preserved.

#### The Conversion of Starch into Sugar.

In the new era which is before the brewing trade of this country there will be many problems to solve, and many opportunities to practically apply the teachings of science. The principal change which takes place in the brewer's mash tun is the conversion of an insoluble substance, starch, into soluble substances, dextrine, maltose, and dextrose; the exact nature and proportion of these resulting saccharine bodies are not yet absolutely determined, and they vary considerably with changes of temperature, time, and quantities. The brewer's art consists largely in the production of a wort of suitable composition, by which we mean, one containing all the essential constituents for a healthy fermentation, and also a due proportion of such substances as will resist the disintegrating properties of yeast, and remain to fulfill their proper functions in the finished beer.

Hitherto the only converting agent at the disposal of the brewer has been the diastase of the malt, and in the future, in all probability, this will also be the principal converting agent, even if raw grain be used in conjunction with malt. But with a free mash tun, we shall be at liberty to avail ourselves of other methods of conversion if there be such, and if they can be practically applied. It is now well known that dilute sulphuric acid exerts a solvent action on starch very similar to diastase: but while malt extract converts starch into dextrine, maltose, and dextrose in varying proportions, with probably other intermediate products, boiling dilute sulphuric acid converts starch almost immediately into the ultimate product—dextrose, accompanied by only small quantities of dextrine.

This property of sulphuric acid is largely made use of by the glucose manufacturers, and in this way the enormous quantities of this substance, both home made and imported, are prepared; the process consists in boiling maize or other grain containing a large proportion of starch, with dilute sulphuric acid, sometimes under pressure, although this is not absolutely necessary, except for hastening the change, and after neutralizing the acid with carbonate of lime the saccharine liquid is concentrated to a sirup, which solidifies on cooling. A large amount of fuel is employed in evaporating the sirup, and as the solid glucose has to be dissolved again by the brewer, this represents a considerable loss. With perfect freedom in the choice and manipulation of his materials, it is more than probable that the brewer will learn to use sulphuric acid as a converting agent; but besides the conversion of starch into dextrose, sulphuric acid will be useful in inverting cane sugar.

The plant required for carrying on this conversion of starch into sugar by means of sulphuric acid is very simple, for pressure is only required when a complete conversion into dextrose or glucose is desired; but the brewer prefers to have a mixture of dextrine and intermediate products with his dextrose, and he would, therefore, probably obtain the most satisfactory result by conducting the operation at the ordinary pressure.

Distillers who now use large quantities of raw grain in their mashing process have already in some instances availed themselves of this property of sulphuric acid, and lead-lined mash tuns for the purpose are not unknown; brewers may in the future find it worth their while to do the same, and in answer to the objection by so doing they will be converting their breweries into chemical manufactories, we say the process of mashing is essentially a chemical operation, and that as the products obtained by the judicious use of sulphuric acid and malt extract are really identical, there can be no valid reason for not using the first-named agent, if it possesses any advantages over the latter. —*Brewer's Guardian.*

#### Learning Versus Common Sense.

Democritus long ago drew an emphatic distinction between learning and wisdom. Learning consists of knowledge acquired mainly from books, and often its possessor is developed by its acquisition only in his perceptive and retentive faculties. Though his memory may be a vast storehouse of useful facts and brilliant second-hand ideas, yet, owing to a judgment originally weak and only partially trained to discriminate, he may be the most inconsequent and uncertain of reasoners. Wisdom, on the contrary, is the outgrowth of native sagacity, sound judgment, wary discretion—in a word of good common sense, and yet of common sense acting under the enlightenment of more or less knowledge. Thus wisdom makes a man a true seer. He not only sees and grasps the best means to accomplish an

end, but he instantly sees and selects the highest and best ends as the objects of his aim and life. Regarding learning and knowledge as the same thing, we may conclude with Cowper that

Knowledge and wisdom, far from being one,  
Have oftentimes no connection.

The paradox is, therefore, not unfrequently met of learned physicians who are destitute of skill as practitioners, of learned orators who are wretched statesmen, of learned linguists who are little better than fools, and finally of learned theologians who are the worst possible interpreters of the oracles of God.—*Christian at Work.*

#### THE WILLIAMSPORT PANEL PLANER.

The panel planer shown in the annexed engraving is manufactured by Messrs. Rowley & Hermance, of Williamsport, Pa., and possesses several features which render it very efficient. It is designed for planing door panel and cigar box stuff, and is especially adapted for general use in manufacturing furniture, doors, and boxes, and may be used to advantage in any wood-working shop.

The frame is cast in a single piece, giving it great rigidity, and its form being pyramidal gives it a very wide base, which insures stability. The machine is provided with two pressure bars, one on each side of the head; the front one being

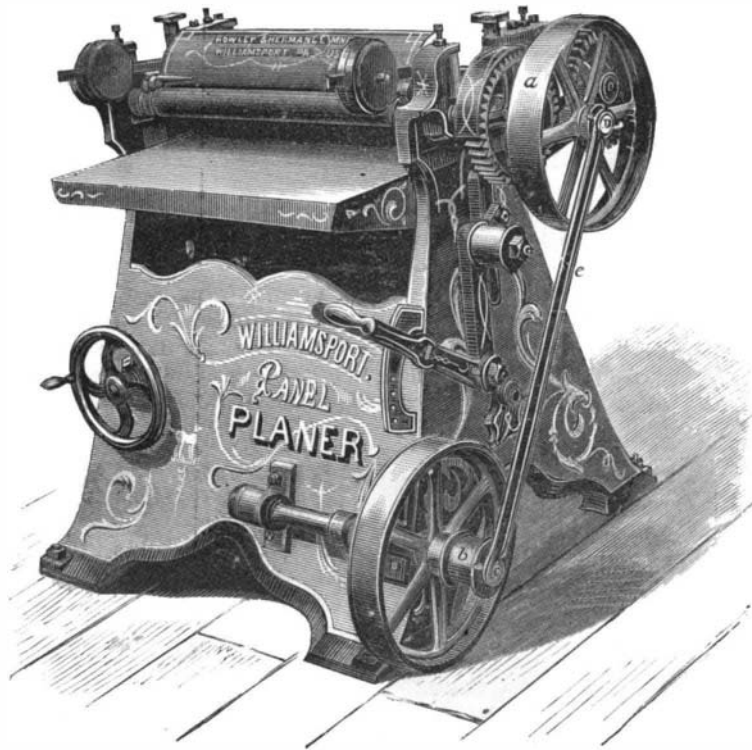


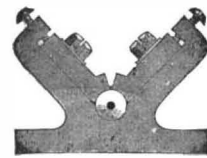
Fig. 1.—THE WILLIAMSPORT PANEL PLANER.

hinged and weighted adjusts itself automatically to different thicknesses of stuff. Both of these bars are placed very near the head to prevent the work from clipping or tearing out.

The cutter head is of forged steel, and being of small diameter may be run at a high rate of speed with perfect safety. This is very important, especially in working brash and cross-grained lumber. This machine is provided with two devices for preventing the marring of the surface of the lumber as it is delivered from the machine, one being a steel scraper attached to the delivering roll for preventing it from gumming and marking the lumber; the other is a shaving guard, which is so arranged as to prevent the shavings from getting under the smooth rolls and imprinting the work. This is a very essential feature in a smoothing planer. The feed is very powerful, the machine having two geared feed rolls. The planer is capable of planing long or short stuff with equal facility. Stuff as short as four inches, and from one-sixteenth to six inches thick, may be planed without clipping the ends. The machine is made in two sizes, adapted to lumber eighteen or twenty-four inches in width. The smaller machine weighs about 1,200 pounds, the larger one 1,400 pounds, and the speed of the head is from 4,000 to 5,000 revolutions per minute. It will be noticed that the planer is very heavy; it is strong, well built, and calculated to withstand constant use.

The journals of the head are provided with Ellis' journal box, the patents for which have been acquired by this firm at considerable expense and trouble. This box, which is shown in detail in Fig. 2, is entirely different from the ordinary cap box, and will keep the shaft central and tight until the box is worn out, and heating and trembling of the shaft, and the trouble of taking out liners, scraping, and readjusting, are avoided.

The construction of the box will be readily understood by referring to the engraving. It is made in three parts, the caps being held in place by bolts and adjusting screws, and they are tightened by loosening the bolts and setting down the adjusting screws at the ends of the caps, an operation requiring less than a quarter of the time required to adjust a box of the old style.



(Patented May 9, 1871, and September 23, 1879.)  
Fig. 2.—Ellis's Adjustable Journal Box.

The advantages of a box of this description will be apparent to practical men, and there can be no question but that, other things being equal, a machine having journal boxes of this kind is to be preferred to one having the ordinary boxes.

#### MISCELLANEOUS INVENTIONS.

Mr. Aden K. Munson, of Marysville, Kan., has patented a yoke to be used with a pair of horses in driving a plow, whereby the horse in the furrow may at all times control the tongue and guide the plow, while the horse on the land can pass around any obstruction and come in place again without changing the direction of the plow.

A machine for forming flanges on counter-stiffeners for boots and shoes has been patented by Mr. Hiram G. Farr, of Brandon, Vt. The invention consists in a novel arrangement of a concave mould and convex mould for pressing the material into the required shape.

An improved baling press has been patented by Mr. John H. Simonson, of East Norwich, N. Y. It consists in the combination with the followers, of a series of levers, bars, and ropes, so arranged that the followers may be drawn toward each other with constantly increasing power.

An improved limekiln has been patented by Mr. William Hughes, of Avondale, and Joseph L. Foulk, of Strasburg, Pa. This invention relates to that class of kilns known as "continuous" kilns, or those in which the limestone is supplied to the top of the stack, and as it settles during the calcining process the lime is drawn off at the bottom of the heating chamber, and a fresh supply of limestone is added to the top of the unconsumed mass in the heating chamber or stack; and it consists, first, in an improved construction of combustion chamber, in combination with a peculiar arrangement of furnaces to direct the flame equally across the entire area of the combustion chamber to prevent the formation of cores or unburned masses of limestone, in connection with a relative arrangement of draw chute or delivery channel which will secure an economy of space together with the greatest effective volume of flame or caloric from the furnaces.

Mr. Christopher G. Calo, of Albany, N. Y., has patented a simple device for instantaneously fastening and unfastening hames. It consists in a combination of devices which cannot be clearly described without an engraving.

Mr. Josephus H. Rosson, of Columbus, Ky., has patented an improved holder for hair, bristles, broom straw, and like material, for making brushes or brooms in a simple and convenient manner.

Mr. John D. Baxter, of Mechanicsville, N. Y., has patented a double-edged chisel provided on each side with a groove, which extends from between the points upward to the shank of the chisel, said grooves widening as they extend upward, the object being to render the chisel self-clearing.

An improved wagon spring, patented by Mr. William G. Hughes, of Churubusco, Ind., consists of a spiral spring set on the end of a wagon bolster and held in a vertical position in a framework of arched rods, while resting centrally on the top of the spring is a slotted yoke, from the ends of which depend two eyebolts or clips and links, that pass down to or through cross bars which extend laterally from beneath the wagon bed, and thereby support the wagon body.

An improved gate, so arranged that it can be conveniently opened and closed from a vehicle or by a pedestrian, has been patented by Mr. Edward Lanning, of Iowa City, Iowa. It consists in a balanced gate, pivoted near its center, and provided with two pulleys, to which ropes or wires pass, by means of which the latch and the gate are opened and closed. The gate has an improved head containing a weighted lever and pulleys for the purpose of keeping the latch in its proper place or for drawing it.

Mr. Charles L. Wolff, of Edgewater, N. Y., has patented an apparatus for supporting the middle part or center of the top or arch of cisterns and other structures while being built, so constructed that it can be readily taken out through the man-hole when the work has set, and which will allow the floor and sides of the cistern to be cemented before the middle part of the top is built.

Mr. Frederik Alsing, of Copenhagen, Denmark, has patented a compass provided with mechanism so constructed as to record all changes of direction in the ship's course and divide the diagram of the course into hour spaces.

An improved compensating pendulum, patented by Mr. Charles T. Mason, of Sumter, S. C., consists in a compound bar of metal bent in curved form, hung on the pendulum rod, and connected by links with the sliding bob in such manner that the expansion and contraction of the compound bar shifts the bob in the direction of the length of the pendulum. The bob is sustained by the compound bar, and the latter hung on the pendulum rods by a screw rod, which permits adjustment for regulating the clock.

An improved grain troller has been patented by Mr. William J. Wilson, of Stephenville, Texas. This invention consists in a novel construction of a revolving cylinder provided with cavities representing certain measures, and of a casing in which the cylinder works, whereby provision is

made for measuring the grain by the revolution of the cylinder, and at the same time separating a certain proportion thereof to be retained as toll, and whereby, also, provision is made for varying the size of the toll measure, so as to enable it to separate different proportions from the main body of the grain, according to the amount of toll to be taken.

Mr. Charles S. Woodruff, of Troy, N. Y., has patented a toe weight for horses. The object of this invention is to provide, in addition to the ordinary strap by which toe weights are usually secured to the feet of trotting and road horses, a fastening device by which the weight is firmly secured in position.

An improved steam radiator has been patented by Messrs. Lewis G. Goldsmith and Nicholas Reed, of Jersey City, N. J. The object of this invention is to furnish steam radiators, constructed so as to have a much larger radiating surface than those constructed in the ordinary manner, and at the same time to induce a free circulation of air between and around their parts.

A clearing device for millstones, patented by William H. Hall, of DeWitt, Iowa, is designed to prevent the collection of the chop between the stones and the curb, and thus prevent the consequent glazing of the stones, rendering it unnecessary to dress the stones so frequently, and causing the stones to run with less resistance, consequently requiring less power to drive them.

Mr. August Hilpert, of Hoboken, N. J., has patented an improved method of inlaying sheets of card or leather board or like material, so as to produce novel and effective ornamental sheets, which may be used for various purposes. The invention consists in punching the desired design out of a sheet of card or leather board, thick paper, or like fibrous material, and filling in the apertures thus produced with corresponding pieces of the same or some other suitable material pressed into the apertures.

Mr. Jerome W. Dewey, of Chicago, Ill., has patented an ironing board formed of two parts, held together by dowel-pins, and is provided with a beveled rabbet along the edges, into which a metal frame for holding the goods to be ironed fits. This frame is drawn up tight by means of a cam lever, a spring, and screw.

Messrs. Jules A. Arrault, of New York city, and Jules Schmerber and Charles Schmerber, of Paterson, N. J., have patented a process for manufacturing nitro-derivatives from cellulose, etc., by using nitric acid in a gaseous state. By this process but little more acid is used than the theoretical quantity required to transform the substances into their nitro-derivatives.

Mr. John F. McLaughlin, of Aiken, S. C., has patented an improved bale tie, which is simple, strong, and reliable, and which is so constructed that the bands may be taken off without cutting or breaking them.

An improvement in pantaloons braces has been patented by Mr. Charles Laffite, of Paris, France. The invention consists in providing the suspender ends with short transverse straps or chains.

Mr. Henry G. Bardwell, of Winton, Texas, has patented a buckle of novel design, especially adapted to bridles, check-lines, and hip straps for horses, and for trunk straps, gun straps, etc.

Mr. Louis J. Ryerson, of Paterson, N. J., has patented an improved starching machine, which consists in a pair of corrugated rubbers having a parallel reciprocating motion imparted thereto by eccentrics or a double crank, one of which rubbers is arranged to slide in a direction at right angles to the direction of the reciprocating movement of the rubbers, and is attached to one end of a bell crank lever pivoted to the frame of the machine and provided with an adjustable weight for the purpose of pressing the two rubbers together. A fixed and a hinged arm, provided with a suitable lock, are arranged above the rubbers for the purpose of holding the goods or articles to be starched.

Mr. Herman E. Briggs, of Center Star, Ala., has patented a simple device by which stock may be tethered and have free movement for grazing without becoming entangled in the rope.

An improved furrow-staff for millstones has been patented by Mr. Ura H. Palmer, of Green Spring, O. The object of this invention is to furnish a furrow-staff so constructed that by its use the furrows of a millstone-dress may be brought to a perfect gauge.

Mr. John Y. Lanfair, of Hill View, N. Y., has patented an improvement in that class of churns in which a suspended dasher is made to swing back and forth in the body of the churn; and it consists of a dasher composed of a number of downward projecting rigid fingers that are made to swing back and forth between a number of corresponding fingers that are fixed so as to project upward from the bottom of the churn.

Mr. John S. Butcher, of Yorktown, N. J., has patented an improved protector for lamp chimneys, which prevents breaking by the heat of the burner. It consists in a protector for lamp chimneys formed of two tapering metal tubes, one of which has a greater taper, and is suspended from the lower edge of the other, which in turn is suspended from a looped wire resting on the upper edge of the lamp chimney.

An improvement in tongs has been patented by Mr. Irving R. Le R. Boardman, of Snedekerville, Pa. The invention consists in a novel construction of the head of the tongs and arrangement of the legs therein, whereby provision is made for insuring the proper motion of the movable leg and preventing its lateral displacement.

Mr. John B. Stewart, of St. Johns, Mich., has patented an effective, cheap, and simple device for fastening buttons on clothes, and it may be used as a belt fastener, and for kindred purposes.

Mr. William H. Miller, of Philadelphia, Pa., has patented an improved mosquito netting device, by means of which mosquito netting can be put up or taken down easily.

A pigeon hole bottom for post office boxes, secretaries, and desks, consisting of a perforated plate bent down at the ends and having the edges lapped to form receptacles, has been patented by Mr. James E. McNair, of Webb City, Mo.

An improved gate has been patented by Mr. James H. Greenhow, of Eckmansville, Ohio. This invention consists in novel details of construction of the gate and means for opening and closing it.

**The Cause of Perpetual Snow.**

Dr. James Croll, in the current number of the *American Journal of Science and Arts*, says the reason why snow at great elevations does not melt, but remains permanent, is owing to the fact that the heat received from the sun is thrown off into stellar space so rapidly by radiation and reflection that the sun fails to raise the temperature of the snow to the melting point; the snow evaporates, but it does not melt. The summits of the Himalayas, for example, must receive more than ten times the amount of heat necessary to melt all the snow that falls on them, yet in spite of this the snow is not melted. Notwithstanding the strength of the sun and the dryness of the air at these altitudes, evaporation is insufficient to melt the snow. At low elevations, where the snowfall is probably greater, and the amount of heat received even less, the snow melts and disappears. This, Dr. Croll believes, must be attributed to the influence of aqueous vapor. At high elevations the air is dry and allows the heat radiated from the snow to pass into space, but at low elevations a very considerable amount of the heat radiated from the snow is absorbed by the aqueous vapor in the atmosphere. A considerable portion of the heat thus absorbed is radiated back on the snow, and being of the same quality as that which the snow itself radiates, is for that reason absorbed by the latter. The consequence is that the heat thus absorbed accumulates in the snow till this is melted. Were the amount of aqueous vapor possessed by the atmosphere sufficiently diminished, perpetual snow would cover our globe down to the sea shore. In a like manner the dryness of the air will, in a great measure, account for the present accumulation of snow and ice on Greenland and on the Antarctic Continent. These regions are completely covered with snow and ice, not because the quantity of snow falling on them is great, but because the quantity melted is small. And the reason why the snow does not melt is not because the amount of heat received during the year is not equal to the work of melting the ice, but mainly because of the dryness of the air, the snow is prevented from rising to the melting point. In places like Fuego and South Georgia, where the snowfall is considerable, perennial snow and ice are produced by diametrically opposite means, namely, by the sun's heat being cut off by clouds and dense fogs. In the first place, the upper surfaces of the clouds act as reflectors, throwing back the sun's rays into stellar space, and in the second place, of the heat which the clouds and fogs absorb, more than one-half is not radiated downward on the snow, but upward into space. And the comparatively small portion of heat which manages to reach the ground and be available in melting the snow is insufficient to clear off the winter's accumulation.

**Ballooning.**

At a recent meeting of the Balloon Society of Great Britain, held in London, Mr. Simmonds reported some incidents of an ascent he had made at Bath a short time previous, under the auspices of the society. On this occasion the balloon entered altitudes varying from 4,000 feet to 12,000 feet, and traversed a distance in one direction of 16 miles in the same number of minutes. Allowing for the fact that the ascent and descent were both accomplished in a perfect calm, it follows that the balloon in certain stages of its career must have been impelled at a speed of not less than 120 miles an hour—a very remarkable result. A somewhat animated discussion which followed, as to the best system of ballooning in the Arctic regions, was adjourned to the next meeting. The president stated that the present system of inflating balloons was very defective. Instead of employing coal gas different kinds should be used together, namely, coal gas, oil gas, and hydrogen, the former for partial inflating, the second for making the balloon gas tight, and the third for reducing the weight of the two former. He considered that the only means of determining the law of currents at high altitudes, as shown by the before mentioned trip of Mr. Simmonds, at Bath, was by means of balloons.

**The Bagdad Date Mark.**

Bagdad, says one of our medical exchanges, is noted for a curious and mysterious malady, which affects everybody in the city, whether he be citizen or stranger. It is a sore called a "date mark," because after it has healed it leaves an indelible mark about the size and shape of a date. It generally makes its appearance upon the face, lasts a year, and then disappears. The cheek of nearly every man and woman in Bagdad shows the inevitable mark. Sometimes it settles upon the nose, and then the disfigurement is great; sometimes on the eyelid, when blindness is the result.

Strangers are attacked even after a brief residence; but fortunately, if they are adults, the sore is more apt to come on the arm. In every case the attack runs its course for one year. No treatment, no ointment, nor medicine, it is said, has the slightest effect upon it. Once the sore appearing, the sufferer knows what to expect, and may as well resign himself to his fate. The Arabs say that every one who goes to Bagdad must get the "date mark"; or, if he does not get it while in the city, he will be followed by it—have it sooner or later he must. Dr. Thom, of the American Mission, states that he has examined the ulcer microscopically and found it to be composed of a fungoid growth; but nothing that he had ever tried had proved remedial.

**AGRICULTURAL INVENTIONS.**

Some improvements in corn planters have been patented by Mr. Charles G. Everet, of Bellefontaine, O. These improvements pertain to the construction and arrangement of devices forming the seed discharging mechanism proper and the devices for imparting regular or uniform motion to such mechanism; also to the devices for indicating the intermittent operation of the seed dropping slides.

An improved fertilizer attachment for seed drills has been patented by Mr. Adam C. Hendricks, of Duffield Station, W. Va. This improvement relates to the construction of a hand lever and the attachment of it and the gates for controlling the discharge of seed to a shaft which is arranged parallel to the side of the hopper.

Mr. William E. Hart, of Cedar City, Mo., has patented an improved harvester, which gathers the cut grain as it is deposited upon the binding platform into gavels and drop the gavels to the ground at the rear of the machine automatically.

An improved reaping and mowing machine has been patented by Mr. David Forrest, of Eastport, Me. The object of this invention is to obtain a smooth and continuous cutting action by revolving knives, and to construct a machine requiring comparatively small power for its operation.

Mr. William A. Reddick, of Niles, Mich., has patented a shovel. This invention relates to an improvement in shovels of that class which are formed of parallel open tines, for use in culling potatoes from the loose earth, screening coal, sifting ashes, and for other analogous purposes.

An improved sulky plow has been patented by Mr. Louis W. Powell, of Mexia, Texas. This invention consists in a novel construction and arrangement of hangers, braces, and levers, whereby provision is made for the attachment of plow beams of different sizes, and for adjusting the parts.

An improved grain binder has been patented by Messrs. Ransom K. Laraway and Jerome Laraway, of Battle Creek, Mich. This invention relates particularly to that class of grain binders which bind the gavel with a string or twine by tying a knot in it, although it is capable of doing the same work with fine wire.

**The Light of Jupiter.**

There has been for some years a discussion as to whether the planet Jupiter shines to any perceptible extent by his own intrinsic light, or whether the illumination is altogether derived from the sun. Some facts ascertained from spectroscopic observation by Prof. Henry Draper, and communicated by him to the current number of the *American Journal of Science and Arts*, seem to point to the conclusion that it is not improbable that Jupiter is still hot enough to give out light, though perhaps only in a periodic or eruptive manner. Most of the photographs hitherto made of the spectrum of Jupiter by Prof. Draper, bear so close a resemblance to those of the sun as to indicate that under the ordinary circumstances of observation, almost all the light coming to the earth from Jupiter must be merely reflected light originating in the sun. But on one occasion—September 27, 1879—a spectrum of Jupiter with a comparison spectrum of the moon was obtained by him which showed a different state of things. The photograph which was taken of this shows, not a change in the number or arrangement of the Fraunhofer lines, but a variation in the strength of the background. These modifications in the intensity of the background seem to Prof. Draper to point out two things that are occurring: (1.) An absorption of solar light in the equatorial regions of the planet. (2.) A production of intrinsic light at the same place. These two apparently opposing statements can be reconciled on the hypothesis that the temperature of the incandescent substances producing light at the equatorial regions of Jupiter did not suffice for the emission of the more refrangible rays, and that there were present materials which absorbed those rays from the sunlight falling on the planet. The strengthening of the spectrum in the portions answering to the vicinity of the equatorial regions of Jupiter, says Prof. Draper, bears so directly on the problem of the physical condition of the planet as to incandescence that its importance cannot be overrated.

**A Village Founded on Gold Rock.**

The village of Las Placitas, about thirty miles from Santa Fé, New Mexico, is reported to be founded on a ledge of rock carrying from \$3,000 to \$6,000 worth of gold per ton. The value of the rock was detected by prospector Jesse Martin, who has "located" the streets of the town. Governor Lew Wallace describes the lead as eighty-four paces in width, and nine thousand feet have been located along the vein. The whole village is built on the ledge, and rock worth \$3 a pound has been thrown about as worthless.